

Kathmandu Tourist Places(GABELS-2024)



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GABELS- 2024

7th International Conference

(Kathmandu Chapter 2.0)

Global Approaches In Agricultural, Biological, Environment
& Life Science For Sustainable Future

Souvenir / Abstract Book



Venue:

Buddha Hall

D.A.V. College (Tribhuvan University) Lalitpur, Kathmandu, Nepal

: EDITORS :

Dr. Joginder Singh
Dr. A. P. Garg
Dr. S. P. Vista

Dr. Anant Kumar
Mr. Shashi Bhushan Chaturvedi
Dr. Rashmi Nigam

SOUVENIR / ABSTRACT BOOK

7th International Conference

(Kathmandu Chapter 2.0)

Global Approaches in Agricultural, Biological, Environment & Life
Science For Sustainable Future

Editor: Dr. Joginder Singh, Dr. A. P. Garg, Dr. S. P. Vista, Dr. Anant Kumar, Mr. Shashi Bhushan Chaturvedi

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WELCOME

Welcome

To

All Dignitaries, Delegates & Participants

3 - Days

7th International Conference

**Global Approaches in Agricultural, Biological,
Environment and Life Sciences for Sustainable
Future (GABELS - 2024)**

Date: June 8 – 10, 2024

**Venue: Buddha Hall, D. A. V. College
(Affiliated to Tribhuvan University)**

Lalitpur, Kathmandu, Nepal

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EDITORIAL DESK

As we stand on the threshold of a new era, the challenges and opportunities presented by the intersections of agriculture, biological sciences, environmental stewardship, and life sciences have never been more critical. The need for sustainable practices and innovative solutions to ensure a resilient future for our planet is paramount. This conference, aptly titled “Global Approaches in Agriculture, Biological, Environmental, and Life Sciences for a Sustainable Future,” brings together some of the brightest minds from across the globe to share insights, research, and strategies that will shape the trajectory of our collective efforts. One of the core strengths of this conference is its interdisciplinary approach. The complexity of today’s global challenges requires holistic solutions that transcend traditional disciplinary boundaries. Agriculture, biology, environmental science, and life sciences are deeply interconnected, and only by addressing them together can we hope to create sustainable systems. This synergy fosters innovation, allowing us to tackle issues such as climate change, food security, biodiversity loss, and public health in a comprehensive manner. Innovation lies at the heart of our quest for sustainability. The presentations and discussions at this conference showcase cutting-edge research and technological advancements that promise to revolutionize our approach to these fields. From precision agriculture and genetically modified crops that enhance food security to biotechnological breakthroughs that promise new treatments for diseases, the innovations discussed here hold the potential to create a more sustainable and equitable world.

Environmental sustainability is a cornerstone of this conference. Our natural environment is under unprecedented pressure from human activities, and the need for robust conservation strategies has never been more urgent. The environmental sessions focus on innovative approaches to conservation, sustainable land use, and ecosystem management. By promoting practices that protect and restore our natural habitats, we can ensure that biodiversity thrives and that our ecosystems continue to provide essential services. Ensuring that everyone has access to sufficient, safe, and nutritious food is a fundamental challenge that this conference addresses head-on. The agricultural sessions highlight strategies to enhance food production while minimizing environmental impacts. From sustainable farming practices to the integration of agroecological principles, the discussions aim to create a roadmap for a food-secure future that respects the limits of our planet. The life sciences sessions focus on the intricate connections between human health and the environment. As we face global health challenges, from pandemics to chronic diseases, the importance of a holistic understanding of health is clear. This conference explores how advances in life sciences can lead to improved public health outcomes, with an emphasis on preventative measures, sustainable healthcare systems, and the importance of a healthy environment for overall well-being.

This conference is not just a platform for sharing knowledge; it is a call to action. The insights and strategies discussed here must be translated into real-world applications that drive change. We must forge partnerships across disciplines, sectors, and borders to implement the sustainable solutions that our planet urgently needs.

As we conclude this editorial, it is our hope that the discussions and collaborations forged during this conference will ignite a renewed commitment to sustainability in all its forms. The path to a sustainable future is fraught with challenges, but it is also ripe with opportunities for those willing to innovate, collaborate, and act. Together, we can build a future where agriculture, biological sciences, environmental stewardship, and life sciences coexist in harmony, ensuring a thriving planet for generations to come.

We extend our deepest gratitude to all the participants, speakers, and organizers who have made this conference a beacon of hope and a catalyst for change. Let us move forward with a shared vision and unwavering determination to achieve a sustainable future for all.

Editors

MESSAGES



भारतीय कृषि अनुसंधान परिषद
भा.कृ.अनु.प.- केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई
(वि.अ.आ. अधिनियम धारा-३ के अंतर्गत विश्वविद्यालय)
ICAR - CENTRAL INSTITUTE OF FISHERIES EDUCATION
(University under Sec.3 of UGC Act)

कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार, Ministry of Agriculture and Farmers Welfare, Govt. of India



डा. रविशंकर सी.एन.

निदेशक/कुलपती

Dr. Ravishankar C.N.

Director/Vice Chancellor



MESSAGE

I am delighted to note that the **7th International Conference on “Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS-2024)”** is being held at **Buddha Hall, D. A. V. College, Lalitpur, Kathmandu, Nepal during June, 08-10, 2024**. A large number of scientists, faculty members, teachers, professionals, research scholars, NGO's, social workers, students, farmers and others who are involved in practices and research areas related to agriculture, life science and all applied sciences are expected to attend and deliberate on various scientific tracks covering major areas of research on agriculture, biological and applied sciences.

I congratulate the organizers for organizing such an important conference which is a need of the hour and hope that this conference will be a platform for knowledge sharing, collaboration, and exploration of new possibilities.

I wish the conference a great success.

June 4, 2024
Mumbai

(Ravishankar C.N.)

डॉ. धृति बैनर्जी
निदेशक
Dr. Dhriti Banerjee
Director



भारत सरकार
भारतीय प्राणि सर्वेक्षण
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Government of India
Zoological Survey of India
Ministry of Environment, Forest and Climate Change



Message

It is with great pleasure that I extend my warmest greetings to all participants of the 7th International Conference on “Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS - 2024). The conference is a testament to our collective commitment to addressing some of the most pressing challenges of our time. As we navigate the complexities of the 21st century, it is imperative that we embrace innovative solutions and collaborative efforts to ensure a sustainable and thriving future for all.

The themes of this conference – “Global Trends in Agricultural Sciences & Artificial Intelligence or Digitalization Ag.”; “Sustainable Environment, Biodiversity, Life Sciences and Climate Change” and “Recent Advances in Life Sciences: Fisheries Sciences, Veterinary and Animal Sciences” highlight the multifaceted approaches required to achieve sustainability.

I believe that the integration of artificial intelligence and digitalization in agriculture presents an unprecedented opportunity to enhance productivity, optimize resource usage and mitigate the impacts of climate change. By leveraging cutting-edge technologies, we can transform traditional agricultural practices into more efficient, sustainable and resilient systems. This may not just be an option but, a necessity to meet the growing demands of a burgeoning global population while safeguarding our natural resources. Moreover, the focus on sustainable environments, biodiversity, and recent advances in life sciences highlights the crucial connection between human activities and the overall health and resilience of our planet. The rapid industrialization and population growth of the last century have exerted immense pressure on our ecosystems, leading to biodiversity loss and ecological imbalance. It is crucial that we prioritize the conservation of our natural resources and promote biodiversity to maintain the delicate balance of life on Earth. Recent advancements in fisheries, veterinary, and animal sciences play a pivotal role in this endeavour, offering new insights and methodologies to enhance the health and sustainability of our agricultural and ecological systems.

I commend all the scientists, researchers, and participants for their dedication to this vital cause. I believe that this is essential in forging a path toward a sustainable future where economic development and environmental stewardship go hand in hand. May this conference serve as a dynamic forum for knowledge exchange, innovation, and the formation of partnerships, propelling us towards a future that fulfills present needs while safeguarding the capabilities of the future generations. Together, let us create a sustainable world for all.

I would like to convey my best wishes to the organizers.

Jai Hind!

Place: Kolkata
Date: 03.06. 2024

(Dr. Dhriti Banerjee)



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NATIONAL CHAMBAL SANCTUARY PROJECT, AGRA

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राष्ट्रीय चम्बल सैक्चुरी प्रोजेक्ट,
उ०प्र०, आगरा।

Message

It is with great pleasure that I extend my warmest greetings to all the participants of the 7th International Conference on 'Global Approaches in Agriculture , Biological , Environment and Life Sciences for Sustainable Future (GABELS – 2024)'. This initiative to bring together at one platform the various stakeholders for finding the collective solutions to the challenges of our times is commendable to ensure our contribution in ensuring a sustainable future for all.

The theme of the 7th meet which is focused upon – “ Sustainable Environment , Biodiversity , Life Sciences and Climate Change “ encourages us all to appreciate the role of environment in ensuring good health for all , ecosystem services , food security , economic security and sustainable world for all by bringing together the various approaches required to achieve sustainability .

The growing environmental concerns require solutions with help of integration of present and future based technologies like Biotechnology , Green Energy and Bioinformatics to enhance productivity , optimization of resource usage and approaching less polluting, less wasteful and greener methodologies of meeting our needs while ensuring equitable sharing of benefits along with development of an environmental consciousness . The biodiversity loss and ecological imbalance demand our efforts towards conservation of our natural resources by ensuring use of evidence based researches for framing our policies and cooperation of all stakeholders in the right direction.

I congratulate all the scientists , researchers and participants for their dedication to this vital cause . It is fundamental to ensure development in harmony with environment to undo the errors of past actions as we all understand that there is no planet B. May this conference serve as a dynamic forum for knowledge exchange, innovation and the formation of partnerships that will launch new energy towards the sustainability achievement for all.

I would like to convey my best wishes to the organizers .

Place : Agra, Up
Date: 05 .06. 2024


(Mrs. Arushi Mishra)

राष्ट्रीय चम्बल सैक्चुरी प्रोजेक्ट, निकट कन्द्रीय हिन्दी संस्थान, आगरा– 282005



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D.A.V. COLLEGE

(Affiliated to Tribhuvan University)

MESSAGE FROM CONFERENCE EXECUTIVE CHIEF PATRON/CHAIRMAN



To My Honored Coworkers, Scholars, and Participants,

As the host of the 7th International Conference on "Global Approaches in Agricultural, Biological, Environment, and Life Sciences for Sustainable Future (GABELS-2024)" at D.A.V. College, Lalitpur, Kathmandu, I have the great honor of extending my warmest wishes to each and every one of you.

As the Chairman of D.A.V. College, which offers programs in microbiology for BSc, BCA, BBA, BBM, BBS, and MBS, I must emphasize the importance of microbiology research in expanding our knowledge and skills in the biotechnology industry throughout Asia. Particularly in Nepal and India, agriculture continues to be both a vital component of our Gross Domestic Product (GDP) and a fundamental aspect of our culture. It supports innumerable livelihoods in addition to our economies.

In these transformative times where technology evolves rapidly before our eyes, integrating current technological advancements and Artificial Intelligence (AI) into agricultural practices is no longer optional—it's imperative for sustainable growth.

Let us use this platform provided by the Agricultural Technology Development Society (ATDS) Ghaziabad to forge new partnerships that will catalyze innovation in biotechnology fields—ushering in an era where sustainability isn't just an ideal but a tangible reality.

Together we can cultivate resilience within our agricultural systems through scientific exploration—ensuring food security for future generations while respecting Mother Earth's delicate balance.

Warm regards,

Anil Kumar Kedia

Conference Chief Patron & Chairman

D.A.V. College,

Kathmandu, Nepal

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Amar P. Garg

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Sect. President-Env. Sci. (2020-23) Indian Science Congress
Former Vice-Chancellor, Shobhit Deemed University
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MESSAGE

It is my pleasure to know that 1000+ papers have been received from a galaxy of scientists across the world to present their research contributions/experiences in 3-day “**7th International Conference on Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS - 2024)**” during **June 8-10, 2024** at **D. A.V. College, Kathmandu, Nepal** being jointly organized by Agricultural Technology Development Society (ATDS) Ghaziabad, Swami Vivekanand Subharti University, Meerut, J. V. College, Baraut (Baghpat), Uttar Pradesh with several other national and international co-organizers.

Global climate changes and continued degraded environment have resulted in global food insecurity, nutritional deficiencies, affordability, availability that have compelled the scientists and farmers to design and develop various strategies to meet the needs of growing population and increasing gap between high and low-income countries. To feed 10 billion population by 2050, we need to increase 56% more food production and 593 million hectare more cultivable agricultural land area with mitigation of 11 Gigatons of green house gases (GHG) and below 2°C of global warming including increased fertile soil, unpolluted clean water for irrigation and with reduced air pollutants to create sustainable life and environment with industrial development. The topic of International Conference has been very rightly selected by the organizers and the enthusiastic participation of young researchers from all over India, Nepal and abroad show that it will provide an excellent opportunity to the participants to learn different approaches and strategies to achieve the target of UN to eliminate poverty and hunger by 2030 with sustainable environment. The presence of galaxy of scientists working in various fields of agriculture and allied sciences will facilitate the participants to interact with each other in a beautiful city of Kathmandu, known for its beauty, healthy climate and rich cultural heritage.

As chairman of the conference, I welcome all participants.

Amar P. Garg



Mr. Bhanu Bhakta Pokharel, PhD
Principal Scientist and Chief, National Agronomy Research Centre, NARC
President, Society of Agricultural Scientist Nepal (SAS-Nepal)
Email: bhanu.pokharel@gmail.com



This is a great privilege for me to write this message about the **7th International Conference on ‘Global Approaches in Agricultural, Biological, Environment, and Life Sciences for Sustainable Future (GABELS-2024)’** which is scheduled to be held from April 8-10, 2024 in Kathmandu, Nepal. I extend a warm welcome to all the delegates, scientists, professionals, and participants from different countries. As the backbone of food security, health, and economic expansion, the agriculture sector is essential to human development. Nevertheless, we are facing numerous challenges in agriculture, despite the worldwide efforts being made to counteract climate change, biodiversity loss, and resource scarcity. I expect that these issues will be covered at the conference, along with potential solutions for creating sustainable food systems that improve both environmental and human health. Experts in agriculture, including those in the biological, environmental, and life sciences, as well as those dealing with policy concerns, will be sharing their experiences and best practices in vibrant conversations and cutting-edge research presentations.

I wish each participant will leave with a few solutions to share with others, broaden their knowledge, and help develop new tools and technologies to address the pressing issues in agriculture using both traditional and cutting-edge technologies, such as artificial intelligence, biological, and molecular technologies, to create resilient, equitable, and sustainable food systems.

Myself and on behalf of Society of Agricultural Scientists (SAS-Nepal), await meeting you at the conference in Kathmandu and wish you a healthy and happy journey.



Dr. Binay Kumar Chakraborty
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Date: 06.04.2024

MESSAGE

I am incredibly happy and grateful that the 7th International Conference on “Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS-2024)” will be held in Katmundu, Nepal from June 8-9, 2024. This conference is being organized by the Agricultural Technology Development Society (ATDS), India; D.A.V. College (Tribhuvan Univ.) Lalitpur, Kathmandu, Nepal and other related organizations.

To ensure that everyone has a good life on a healthy world by 2030, the United Nations has established seventeen Sustainable Development Goals, or SDGs. Goals No. 1. No Poverty, 2, Zero Hunger, 3. Health and Well-Being, 5. Gender Equality, 6. Clean Water and Sanitation, 8. Decent Work and Economic Growth, 13. Climate Action, and 14. Life Below Water have all benefited directly from the aquatic resource. However, the World Bank estimates that by 2050, there will be nine billion people on the planet (FAO, 2010). Meeting the demands for food, fuel, fiber, fisheries, and livestock shouldn't be simple. In the near future, there will be severe obstacles to deal with, including famine, malnutrition, poor health, and biodiversity loss. These difficulties also serve as roadblocks in the process of human development. The conference's themes are crucial for reducing the population's dietary need for protein and minerals.

This conference will give researchers in related subjects a forum to reflect on and present their research papers, as well as the chance to network with other academics and academicians in their field. I have no doubt that the speakers and delegates will have a platform to discuss and reach a consensus on future planning for the development of aquaculture and fisheries as well as the preservation of aquatic natural resources.

I congratulate Dr. Joginder Singh, organizer; Prof. A. P. Garg, India; Dr. S. P. Vista (Nepal) and the entire team for taking up this difficult yet significant project. As a result, I am optimistic that the two days of the conference will feature lively intellectual debate and discussion, which will lead to the development of some rough answers for the problems under testing.

With the warm welcome of distinguished scientists and delegates, I wish the conference a grand success in its objective and mission.

(DR. B.K. CHAKRABORTY)

Prof. (Dr) H. Shivananda Murthy
Dean & Chair Professor
Division of Fisheries Science &
Former Registrar, Dean & Director
KVAFS University, Karnataka



Message

I am extremely happy to know that the 7th International Conference “Global approaches in Agricultural, biological, environmental, and life sciences for sustainable Future” (GABELS2024) will be organized by ATDS, Gaziabad, UP, in association with ICAR Institutions, The Neotia University, West Bengal, several other Universities and organizations in India and Nepal at DAV College, Kathmandu, Nepal, during June 8-10, 2024.

In this conference, in addition to covering Agricultural Sciences, Fisheries and Animal Science, Life Sciences, and other areas are covered. Apart from keynote addresses from eminent speakers, a large number of lead papers will be presented. Further, full papers of abstracts submitted by delegates will be presented. There will be best paper and poster presentation awards. Young scientists and other awards will be presented. Several edited books and other publications will also be brought out during the occasion. I understand there will be online presentations also so that this conference is organized in Hybrid mode. I believe more than 300 delegates and participants will attend the conference. I am sure the latest developments and recent advances in the identified areas will be discussed and deliberated in the three day conference

I am happy that we are associated in the organization of this important international conference.

I wish all the best and success for the conference.

With regards

Prof (Dr) H Shivananda Murthy



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Ref.No: _____

Date: 31/05/2024

MESSAGE



I am extremely delighted to know that an International Conference on “Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS- 2024))” is being organized by Agriculture Technology Development Society (ATDS) Ghaziabad, (U.P.), in collaboration with D.A.V. College, Lalitpur, Kathmandu, Nepal, Kathmandu University, Nepal, R&D Cell, Subharti University, Meerut, UP, SWERI, Giza, Egypt, The Neotia University, WB, Zoological Survey of India, Govt. of India, NCSP Agra-UP, Forest Department, India, CCSU, Meerut, UP, CUHP, HP, SNRM, SPGSAS, CAU, UMIUM, Meghalaya, NGT, Jammu, J&K BSA College, Mathura, UP, BRDS, Agra, UP, India. The theme chosen for this conference is of utmost importance in today’s context as concerned for sustainable Future and Food Security. Our collective focus on sustainability in agriculture, biology, environment, and life sciences is paramount in addressing the challenges of our time. Through collaboration, innovation, and shared knowledge, we strive to pave the way for a more resilient and prosperous future for generations to come.

This conference serves as a platform for robust discussions, exchange of ideas, and forging partnerships that will shape the trajectory of research and practices in these critical fields. Together, we will explore novel approaches, cutting-edge technologies, and interdisciplinary solutions to tackle pressing global issues such as climate change, food security, biodiversity loss, and public health.

I am confident that the insights gained and collaborations formed during this conference will not only advance the frontiers of science but also contribute significantly to the development of policies and strategies for building a sustainable and equitable world.

I extend my heartfelt gratitude to all participants, sponsors, and organizers for their invaluable contributions to this endeavor. May the deliberations be fruitful, and may our collective efforts lead us towards a more sustainable and resilient future.

Exploring Gladiolus for colour Revolution in India

Prof (Dr) Monaj Nazir
CHAIRMAN, NATIONAL
GLADIOLUS TRUST



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Date :- 23-05-2024



Message

It gives me an immense pleasure to know that ATDS is organizing 7th international conference (Kathmandu Chapter-2) GABELS-2024 From June 8-10, 2024 at Buddha Hall, D.A.V College, Kathmandu, Nepal. This society had been showing much concern for environmental protection since 2017. Human well being is closely linked to the health of the environment. Around the world about 24 percent of deaths can be traced back to avoidable environmental factors, according to world health organization. People need clean air to breathe, fresh water to drink and places to live that are free of toxic substances and hazards.

As we being to experience the long term consequences of exponential industrial growth and energy use, we must act to reverse these effects and prevent further damage, ensuring we have healthy places to live for generations to come.

This three days conference will prove beneficial for scientific community, students and scholars to protect environment which is correlated with mental health.

I congratulate Dr. Jogindar singh and his organizing team for this meaningful conference.

I wish this conference all success.

Dr Manoj Nazir



**Dr. Sanjay-Swami, Professor (SSAC),
& Organizing Convener: GABLES-2024**
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MESSAGE

It is indeed a matter of great pride for me in organizing the 7th International Conference on “Global Approaches in Agricultural, Biological, Environmental and Life Sciences for Sustainable Future (GABLES-2024) during 8 to 10 June, 2024 in hybrid mode at D.A.V. College, Kathmandu, Nepal under the patronage of Agricultural Technology Development Society (ATDS), Ghaziabad, UP, India.

Sustainable future mainly depends on economic growth, environmental stewardship, and social inclusion. The modern world is recognizing the importance of conserving natural resources. The farmers are practicing climate-smart agriculture and industries are realizing as to how much they can save through energy efficiency. To create a sustainable future, addressing global challenges like poverty, inequality, tackling climate change and reversing nature loss is not something any one organization can achieve alone. It requires good decision-making and engagement with complex social, economic and environmental challenges. The SDGs have inspired new thinking about how business, government and civil society including organizations can collaborate globally.

I am confident that this International Conference will provide a right platform to scientific community to deliberate on how to bring the social, environmental and economic dimensions of sustainable future together in a single agenda for securing sustainable world. I hope some concrete recommendations will come-up to face the challenges ahead. It is now up to all of us to work together to create a better future.

I wish the International Conference a grand success.

Dated: 08-06-2024

(Sanjay Swami)

Agricultural Technology Development Society (ATDS)

(Registration No. 1024/61550-M/2015/16, under the societies registration Act No. 21, 1860)

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MESSAGE

I am glad to know that Agriculture Technology Development Society (ATDS) Ghaziabad, (U.P) India, D.A.V.College, Lalitpur, Kathmandu, Nepal, Kathmandu University, Nepal, R&D Cell, Subharti University, Meerut, UP, SWERI, Giza, Egypt, The Neotia University, WB, Zoological Survey of India, Govt. of India, NCSP Agra-UP, Forest Department, India, CCSU, Meerut, UP, CUHP, HP, SNRM, SPGSAS, CAU, UMIUM, Meghalaya, NGT, Jammu, J&K BSA College, Mathura, UP, BRDS, Agra, UP, India. is organizing three days 7th International Conference on “Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS- 2024)” from June, 08-10, 2024 at Buddha Hall, D. A. V. College, Lalitpur, Kathmandu, Nepal. The Conference is playing host to number of leading national and international scientists and academicians covering the entire field of agriculture and science benefitting the theme of the conference.

World’s population is projected to reach 9.7 billion in 2050 and 11.2 billion in 2100. To meet the food demands of the exponentially increasing population, a massive food production is necessary. Agricultural production on land and aquatic systems pose negative impacts on the earth’s ecosystems. Combined effects of climate change, land degradation, cropland losses, water scarcity and species infestations are major causes for loss of agricultural yields up to 25%. Therefore, the world needs a paradigm shift in agriculture development for sustainable food production and security through green revolution and eco-friendly approaches. Considering all these points, this conference will surely address and insights to generate awareness of food security and focuses on perspectives of sustainable food production and security towards human society. The conference will be providing a platform to enrich and share the knowledge and expertise in the concern area.

The conference has been designed to focus on various scientific tracks covering major areas on agriculture, allied, life and environmental sciences and the presences of eminent scientist, research scholars, policy maker, professional entrepreneur through their exchange of ideas, deliberation will surely help to address the issues of food security and environment sustainability. The useful recommendation during the symposium will be of immense significance in ensuring food security

I hope that the conference will be of professional and personal benefit to all of us as we proceed with our work toward a future food and agriculture situation that is sustainable and capable of providing food security and good nutrition for all. I convey my blessing and good wishes for the success of this International Conference and compliment to the organizers.

Anant Kumar (President, ATDS, Ghaziabad)
Scientist / SMS/ Asstt. Prof. (Hort.) KVK, Bulandshahr (SVPUAT, Meerut, UP)



NEPAL AGRICULTURAL RESEARCH COUNCIL



Dr. Shree Prasad Vista

Managing Chairman and Convenor, GABELS-2024

Senior Scientist and Chief, National Soil Science Research Centre, NARC

General Secretary, Nepalese Society of Soil Science

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Message

I am very happy to announce that we are organizing 7th International Conference on “**Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS-2024)**” during April 8-10, 2024 at DAV College, Jawlakhel, Kathmandu in collaboration with many other national and international organizations. I would be happy to welcome all the delegates, scientists, professionals, etc. from different countries to this holy land of Pashupatinath. Agriculture, biology, environment and life sciences are critical components of human development, providing the foundation for food security, health, and economic growth. However, they also face a range of challenges, including climate change, biodiversity loss, resource scarcity, and social and economic inequalities. The aim of this conference is to address these challenges and explore strategies for achieving sustainable food systems that promote human well-being and environmental health. I hope this conference will have the opportunity to engage in lively discussions, learn from cutting-edge research, and share our experiences and best practices from experts in a wide range of fields, including agriculture, biological science, environmental and life sciences, and policy will offer insights into the latest trends and innovations in these areas.

I encourage you all to take advantage of this unique opportunity to connect with peers, expand knowledge, and contribute to the development of more sustainable, equitable, and resilient food systems. Let us work together to create a brighter future for ourselves and for generations to come.

I look forward to meet you in the conference in Kathmandu and wish for your good health.



D.A.V. COLLEGE

(Affiliated to Tribhuvan University)

Message from Organizing Convener



To all the delegates:

Here in the stunning city of Lalitpur, I have the great pleasure and honor of extending a warm greeting to you for the International Conference on Global Approaches in Agriculture, Biological, Environment, and Life Science for a Sustainable Future. This conference brings together academics, researchers, practitioners, and policymakers from all around the world with the singular objective of investigating and advancing sustainable solutions for the future of our planet.

This year's conference subject centers on the vital junction of biological environment, agriculture, and life sciences. These disciplines are leading the way in tackling some of the most important issues of the day, such as public health, environmental sustainability and food security. Our goal is to stimulate innovation and motivate practical approaches that will lead to a more resilient and sustainable world through promoting interdisciplinary collaboration and knowledge sharing.

We have an exciting program lined up, featuring keynote addresses from renowned scientists, interactive workshops, and a variety of technical sessions that cover a wide range of topics.

My sincere gratitude goes out to all of the presenters, sponsors, and volunteers who have put in many hours of labor to make this conference possible. Your contributions are priceless, and it is really encouraging to see how committed you are to expanding practice and knowledge in these important fields.

Thank you for your participation, and I wish you all a productive and enjoyable conference.

Shashi Bhushan Chaturvedi
Organizing Convener
D.A.V., Kathmandu, Nepal

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From The Desk of Organizing Secretary



It is a matter of great privilege for me to organize an 7th International Conference on “**Global Approaches in Agricultural, Biological, Environment and Life Sciences for Sustainable Future (GABELS - 2024)**” is being organized by Agriculture Technology Development Society (ATDS) Ghaziabad, (U.P.), India in collaboration with D. A. V. College, Lalitpur, Kathmandu, Nepal, Kathmandu University, Nepal, R & D Cell, Subharti University, Meerut, UP, SWERI, Giza, Egypt, The Neotia University, WB, Zoological Survey of India, Govt. of India, NCSP Agra-UP, Forest Department, India, CCSU, Meerut, UP, CUHP, HP, SNRM, SPGSAS, CAU, UMIUM, Meghalaya, NGT, Jammu, J&K B. S. A College, Mathura, UP, BRDS, Agra, UP, India. I warmly welcome all the guests, participants, delegates, researchers and scientists in the conference. The main motive of the conference is to bring together interdisciplinary ideas in the areas of next generation of agriculture, green earth, good nutrition and health, biotechnology and sustainable environment and global warming.

The conference has been designed to focus on various scientific tracks covering major areas on agriculture, allied, marine, life and environment science. The presence of eminent scientists, researchers, scholars and policies makers your professional entrepreneur through their actions of ideas, deliberation will surely help to address the issues of healthy and green environment, food and nutritional security. The conference will provide a common platform to the researchers, academicians, intellectuals and scholars to discuss the important themes of the conference on “Global approach in agricultural, biological, environment and life science for sustainable future (GABLES, 2024) and will have fruitful deliberations. The useful recommendation during the symposium will be of immense significance in AI agriculture, food security and global warming.

I hope that the conference will be professional and personal benefits to all of us as we proceed with our work toward a future. I am grateful to the respected teachers, parents and friends and for their constant encouragement and valuable suggestions for organizing of this conference. I am also grateful to the members of various committees, my families, colleagues and supporting staff who work day and night for the successful organization of the conference.

I am again delighted to welcome you all to this occasion and pray almighty to bless us for making this International conference a grand success

(Joginder Singh)

Organizing Secretary (GABELS - 2024)

Secretary (ATDS, Ghaziabad, UP)

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LEAD PAPER ABSTRACT

(All lead papers will be published in Proceeding Book with Reputed Publisher)

SUSTAINABLE AGRICULTURE FOR GLOBAL FOOD SECURITY

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The global Agriculture is facing huge risks from climate changes that include environmental degradation, desertification, and various other contributing factors including tropical rainforest, erosion of coastal ecosystems, depletion of soil resources, overfishing, extinction of species and loss of biodiversity including microbial diversity, reducing ground water levels, increasing non-biodegradable waste including e-waste and plastic, loss of irrigation water and danger to marine flora and fauna, increasing toxic substances in soil, water and air, global warming, carbon emissions, melting glaciers, reducing crop productivity and quality of nutrients, increasing life threats and many more complications. Cumulative impact on the environment changes has significantly altered the Earth's surface and the expected 10 billion population by 2050 on this earth will require 56% more food, 593 million hectare greater agriculturally cultivable area with mitigation of 11 Gigatons of green house gases (GHG) and below 2°C of global warming + twice fertile soil, unpolluted clean water for irrigation and with reduced air pollutants that need to be addressed urgently by global policy makers, business leaders, scientists and the common man in a collective manner for quality life. More research in sustainable agriculture are required for world food security and the recent studies by National Institute of Agriculture Economics and Policy research (NIAP) revealed that an investment of 1 Rupee in agriculture research yields Rs.13.85, the highest amongst all. The word “sustainable” has a very broad meaning and has been wrongly defined at various forums by various scientists/countries that suits to their business and political interests. To my mind, the sustainable means “*a process, technology or stage that does not adversely affect the life, environment, earth and the globe and ensures long term co-existence of all life forms without compromising with their quality of life in future generations*”. In simple words, we may say that the in-put and out-put from the earth and environment should be the same. We have pumped out more amount of water from the earth than pumped-in while the nature provided equal amount of water in the form of rains, precipitation, snowfall etc., we did not manage this natural water and allowed it to run away into the sea that resulted in rising sea level causing multiple problems. Similarly, we extracted more amounts of minerals and carbon from the earth than we returned back to soil which led to reduced soil fertility. For sustainable agriculture, we need the minimal use of systemic antimicrobial to preserve and protect the microbial diversity and its populations to save soil fertility. The use of diversified agriculture, climate resilient, drought resistant, genetically modified, early maturing crops are the key solutions for global food security. Natural, zero budget and organic farming are overlapping and need greater experimentation and discussions in view of the recent food crisis of Sri Lanka after adopting organic farming. Mandatory system of rain water harvesting to increase ground water level is the necessity of current clean water for which a global policy is required. Net-zero carbon is not only the requirement of sustainable agriculture but essential for preservation of the environment and global food security. India is an agro-politically dominant country having 15 different agro-climatic zones with diversified population, providing livelihood to 58% of its population (Indian Agriculture and Allied Industries Report, September 2019). Agriculture account for 17-18% of Indian's Gross Domestic Product (GDP) and remained largely unaffected even during Covid-19 pandemic. To achieve the target of 5 trillion economy by 2025 and to feed increasing world population, the Government of India needs to focus on smart agriculture, rural infrastructure better irrigation facilities, healthy soil, farmer's and animal's health, post-harvest management, better warehousing and cold storage facilities, and professionalism in agri-business besides the diversification of traditional agriculture for cultivation of pulses, oil crops and medicinal (herbal drugs) plants including floriculture, milking animals, fisheries, piggeries, poultry, goatees etc. The use of chemical fertilizers and pesticides in global agriculture needs to be addressed seriously in view of the growing demands for eco-friendly organic foods throughout the world in post Covid-19 era but at the same time, the Scientists have to keep in mind the issue of world food security. Based on affordability, availability, quality & safety, sustainability & adaptation, the Global food security index-2022 revealed that India stands at 68th rank among 113 countries by gaining 58.9 points while Finland at the top with 83.7 score. Global Report on Food Crisis revealed that 282 million people in 59 countries and territories experienced high levels of acute hunger in 2023 with a global increase of 24 million from the previous year, that was mainly because of Gaza Strip and the Sudan, an effect of war between Israel-Hamas and internal conflict + climate change. The change in food habits, diversified agriculture, stoppage of wastage of food and increased crop productivity, free and easy transport of excess food across the borders, agriculture friendly global economy are the key solutions for global food security.

Keywords: Sustainable Agriculture, Global Food Security, Organic and Natural Farming, Diversified Agriculture

IMPROVING WHEAT (*TRITICUM AESTIVUM* L.) PRODUCTIVITY THROUGH SEED TREATMENT AND FOLIAR APPLICATION OF SEAWEED EXTRACT**KUMAR D LAMANT¹, NAGESH RATHOD^{2*}, UDAY G REDDY³ AND SUMA S BIRADAR⁴**¹**Principal Scientist (Agronomy), AICRP on Wheat and Barley, Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad, India**²**Ph.D. Scholar, Department of Agronomy, University of Agricultural Sciences, Dharwad, India**³**Junior Geneticist (GPB), AICRP on Wheat and Barley, Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad, India**⁴**Principal Scientist (Genetics & Plant Breeding), AICRP on Wheat and Barley, Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad, India**

A field experiment was conducted to study the “Improving wheat (*Triticum aestivum* L.) productivity through seed treatment and foliar application of seaweed extract” at AICW & BIP, MARS, UAS, Dharwad (Karnataka) during *rabiseason* of 2019-20 and 2020-21 in split plot design with seed treatment levels as a main plot and six foliar spraying levels as a sub plot and single control, replicated three times. Seed treatment with seaweed extract at 3ml /kg seeds recorded significantly higher growth parameters, yield attributes and economics returns over without seed treatment with seaweed extract. Foliar application of seaweed extract at 4ml l⁻¹ water at tillering and heading stage recorded significantly higher grain yield (9.16 %), straw yield (12.83 %), number of effective tillers (14.30 %), grain weight (37.50 %), gross returns (Rs 1,38,292 /ha) and net returns (Rs 1,00,203 /ha) compared to other treatment. Combination of seed treatment with seaweed extract at 3ml /kg seeds with foliar application of seaweed extract at 4ml l⁻¹ water at tillering and heading stage recorded significantly higher grain yield (19.10 %), straw yield (27.80 %), number of effective tillers (41.75 %), grain weight per spike (61.02 %), plant height (38.51, 49.18 and 30.13 %), gross returns (Rs 1,41,694 /ha) and net returns (Rs 1,03,595 /ha) over the other treatments.

Keywords: Foliar application, Seaweed extract, Seed treatment, Wheat**AGRICULTURE, FISHERIES AND LIVESTOCK: CHALLENGES AND CONSTRAINTS OF THESE THREE SECTORS
BINAY KUMAR CHAKRABORTY****Executive Director, Mud eel, Mud crab, Aquaculture and management Centre & Supervisor, Bangladesh Agricultural University
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Despite the impact of decreasing arable land, rising population needs for food and nutrition, climate change, the Russia-Ukraine crisis, and the Corona epidemic, agricultural, aquaculture and livestock production of Bangladesh has been able to continue, and food and nutrition security is ensured by the friendly policies and strategies of the government's. To guarantee food security, the government is putting forth great effort to develop profitable, safe, and sustainable agricultural, aquaculture and livestock systems. In light of Vision 2041, the 8th Five-Year Plan, the National Agricultural Policy 2018, the Sustainable Development Goals, Deltaplan-2100, and other planning documents, the government has been working tirelessly to promote the general growth of the agriculture sector. To address the needs of the expanding population, the government has currently adopted short, medium, and long-term action plans. These plans are based on the agricultural sector's successes in responding to numerous calamities, notably the COVID-19 pandemic. Food grains were produced in a total of 484,988 metric tons (MT) in FY 2022–2023, up from 465,83 lakh MT in FY 2021–2022. In an attempt to increase output in response to Corona's impacts, agribusiness input subsidies were extended to include seed production, fertilizer subsidies, and other agricultural activities. Additionally, agricultural inputs were made available, and the availability of agricultural loans was increased. Fish production from marine and inland water sources was 47.69 lakh MT in FY 2022–23. For the fiscal year 2021–2022, 32.04 core dosage vaccinations against 17 diseases of cattle and poultry were produced and administered in an effort to prevent various illnesses and lower the financial risk associated with illnesses. The sustainability of conventional agriculture, aquaculture and livestock in Bangladesh is under threat from the continuous degradation of land and water resources and from declining yields due to the indiscriminate use of agro-chemicals. Agricultural sustainability depends on productivity, environmental stability, economic profitability, and social and economic equity. Significant differences were found between the two systems (conventional and sustainable agriculture) in crop diversification, soil fertility management, pest and disease management, use of agrochemicals, and environmental issues. However, no significant variations were found in the indicators of land-use pattern, crop yield and stability, risk and uncertainties, and food security. So, sustainable agriculture, aquaculture and livestock has a tendency towards becoming environmentally, economically, and socially more sound than conventional agriculture, as it requires considerably less agro-chemicals, adds more organic matter to the soil, provides balanced food, and requires higher local inputs without markedly compromising output and financial benefits.

Keywords: Agriculture, Aquaculture, Livestock, Production, Sustainability, Population, Nutrition, Diversification.

SUSTAINABLE AQUACULTURE FOR FOOD SECURITY AND NUTRITION: AN INSIGHT IN TO RECENT ADVANCES**H SHIVANANDA MURTHY****DEAN & CHAIR PROFESSOR, THE NEOTIA UNIVERSITY AND FORMER DEAN, REGISTRAR, DIRECTOR & COLLEGE OF FISHERIES, MANGALORE & KVAFS UNIVERSITY, KARNATAKA**

The 2030 Agenda sets aims for the contribution and conduct of fisheries and aquaculture towards food security and nutrition, and the sector's use of natural resources, in a way that ensures sustainable development in economic, social and environmental terms, within the context of the FAO Code of Conduct for Responsible Fisheries. Present world fish production is 214 mmt (2020-21). Out of which 80% goes for direct human consumption. About 90.3 mmt comes from capture fisheries. Per capita availability is 21.4 kg per person/year. 122.6 mmt comes from Aquaculture including aquatic plants. The average annual increase in global food fish consumption (3.2 %) surpassed population growth (1.6 %) and exceeded that of meat from all terrestrial animals combined (2.8 %). In per capita terms, food fish consumption grew from 9.0 kg in 1961 to 20.5 kg in 2017 and 22 kg in 2022. Asia including India and Bangladesh produced almost two-thirds of total inland fisheries, followed by Africa – inland catches are important for food security in both these regions. 59.6 million people were engaged (full-time, part-time or occasional basis) in the primary sector of capture fisheries and aquaculture. 19.3 million in aquaculture and 40.3 million in capture fisheries. Nearly 14 % of these workers were women. Global production has been recorded for a total of 598 species ever farmed in the world. Species recorded so far include 369 finfishes (including 5 hybrids), 109 molluscs, 64 crustaceans, 7 amphibians and reptiles, 9 aquatic invertebrates and 40 aquatic algae. Area of the country 3.29 million sq. km. Length of Coastline 8118 kms, Exclusive Economic Zone is 2.02 million sq. km. Continental shelf area (approx.) 0.53 million sq. km. Indian Fish Production in 2020-21 (mmt): 17.4 mmt. Export of fisheries products, 2022: INR 77000 crores. Contribution of fisheries to GDP (GVA). Total GVA 1.1 %, to Agriculture sector it is 6 %.

THE POTENTIAL OF CRISPR-CAS9 GENE EDITING AS A TREATMENT STRATEGY FOR CANCER AND OTHER GENETIC DISEASES**MUHAMMAD NOUMAN AZAM¹, MAQSOOD AHMAD², SYED BILAL TAHIR³, BILAL AHMED KHAN², SUHAIL AHMED MANGI^{4*}, MUJEEB UR REHMAN⁵, PERVAIZ ALI⁶, NIZAM UD DIN², HAMEER KHAN KHASKHELI⁷, UMBER RAUF³**¹University of Veterinary and Animal Sciences, CVAS Jhang, Pakistan²University of Agriculture, Faisalabad, Pakistan, ³Veterinary Research Institute (VRI), Lahore, Pakistan⁴Sindh Agriculture University, Tandojam, Pakistan, ⁵The University of Agriculture, Peshawar, Pakistan⁶Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand, Pakistan, ⁷University of Padova, Italy

The emergence of CRISPR-Cas9 gene editing technology has fundamentally transformed the domain of molecular biology by providing unparalleled accuracy and effectiveness in modifying the genome. This significant advancement offers great potential for therapeutic interventions in cancer and different genetic illnesses. This abstract examines the possibility of CRISPR-Cas9 as a therapy approach for addressing these disorders. Cancer continues to pose a demanding obstacle in contemporary healthcare. Conventional therapies like chemotherapy and radiation therapy frequently lead to substantial negative consequences and may not completely eliminate the illness. The CRISPR-Cas9 system offers a new method for making specific changes to genes associated with cancer. This can disrupt the processes that contribute to the development of tumors and help them to shrink. Moreover, the capacity to accurately modify immune cells provides novel opportunities for augmenting immunotherapy responses against cancer. In addition to cancer, CRISPR-Cas9 has potential for treating a wide range of hereditary disorders, such as cystic fibrosis, sickle cell anemia, and muscular dystrophy. CRISPR-Cas9 has the potential to provide revolutionary therapeutics by rectifying disease-causing mutations directly at the DNA level, thereby targeting the underlying cause of many illnesses. The efficacy and safety of CRISPR-mediated genome editing have been enhanced by recent developments in delivery techniques, including nanoparticle-based delivery and viral vectors. These breakthroughs have brought us closer to fully harnessing the therapeutic capabilities of this technology. This abstract emphasizes the revolutionary capacity of CRISPR-Cas9 gene editing as a flexible and accurate approach for treating cancer and genetic illnesses. It suggests that this technology has the potential to make targeted genomic treatments a routine part of clinical practice in the future.

Keywords: CRISPR-Cas9, Cancer, Cystic Fibrosis, Sickle Cell Anemia, Muscular Dystrophy**WASTEWATER MANAGEMENT****ATTIA EL GAYAR****Soil-Water Management Professor, Soil, Water & Environment Research Institute, SWERI, Giza, Egypt**

Wastewater is water that contains major and minor elements, impurities, microorganisms and organic matter that are considered a threat to human, animal and plant health. Wastewater is subjected to four stages of treatment so that it can be safely used in agriculture (primary - primary - secondary - tertiary). Wastewater treatment will generally lead to: 1- Providing additional sources of water, nutrients, and organic matter to improve the soil, 2- Improving the environment by preventing or reducing discharge to surface waters, 3- Preserving fresh water sources, 4- Improving the economic efficiency of investments in the field of waste water disposal and irrigation. The strategic approach to water recycling and management includes: The first step: pollution prevention or waste minimization, The second step: processing for reuse, Step Three: Eliminate the product and stimulate natural purification.

COMBINED EFFECT OF PLANT ESSENTIAL OILS AGAINST SUCKING INSECT PESTS**D. N. KAMBREKAR^{1*}, S. A. JAHAGIRDAR², P. U. KRISHNARAJ³, SHIVALEELA ULLAGADDI⁴, KARTIK NIDAGUNDI⁴, SAHANA M⁴ AND NAVEEN V⁴**¹Senior Scientist and Head, ICAR-KVK, University of Agricultural Sciences, Dharwad 580005, Karnataka, India²Professor, Department of plant pathology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India³Professor and Head, Norman Borlaug International Centre for Agricultural Development, University of Agricultural Sciences, Dharwad 580005, Karnataka, India⁴Department of Entomology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India

Aim The goal of the present investigation was to evaluate toxicity of mixed formulations of plant essential oils against six major sucking insect pests. **Methodology** The study was conducted under laboratory conditions during 2019 and 2020 at the Department of Entomology, University of Agricultural Sciences, Dharwad-Karnataka-India. Tender leaves were selected from cowpea, cabbage, safflower, cotton, guava and okra seedlings, and were immersed in the essential oil solution (1, 2, 3, 5 and 7 ml/l) for 10 sec and then air-dried naturally. Twenty nymphs or adults of aphid (*Brevicoryne brassicae*, *Aphis craccivora*, *Uroleucon carthami*), spiralling whitefly (*Aleurodicus dispersus*), whitefly (*Bemisia tabaci*) and mite (*Tetranychus urticae*) were released onto their respective essential oil treated leaves. Each treatment was replicated three times. The mortality of insects in each treatment group was observed and LC₅₀ was computed. **Results:** The findings revealed that mean LC₅₀ values of 24 and 48 hrs after treatment was minimum in treatment with mint oil + thyme oil + mustard oil against *A. craccivora* (2.389 ml/l) and mint oil + lemongrass oil + mustard oil against *B. brassicae* (1.970 ml/l), *U. carthami* (2.184 ml/l), *A. disperses* (0.581 ml/l), *B. tabaci* (0.665 ml/l) and *T. urticae* (1.152 ml/l). **Interpretation:** Since each plant essential oil is having different components responsible for toxicity, mixed formulations of these plant essential oils with different mode of action can well fit into integrated pest management.

Keywords Clove oil, Lemon grass oil, Mint oil, Mustard oil, Thyme oil**EFFECT OF DECOMPOSER ENRICHED CITY WASTE COMPOST APPLICATION ON GROWTH AND YIELD OF BROCCOLI****SABINA DEVKOTA¹, DILRAZ YADAV¹ AND PARBATI ADHIKARI¹**¹Nepal Agricultural Research Council, (NARC), Khumaltar, Lalitpur

Waste is a major problem in main city of the Nepal which tends to increase with rapid urbanization, improved living standards and changing consumption patterns. Management of increasing amounts of solid waste has become a major challenge in many cities in developing countries. City compost produced at mechanical composting plants in Asian countries including Nepal are generally low in plant nutrients. Hence enrichment is necessary for improving nutrient status and quality of compost. Considering the nutritional significance, fast decomposition rate and quality of the compost the study was conducted to enrich the city waste compost with waste decomposers. The present study was undertaken to evaluate the decomposer enriched city waste compost on broccoli growth and yield. The study was done in Jitpur, Bara during 2022 and 2023. The study used a Randomized complete block design (RCBD) with eight treatments and 3 replications. Five types of decomposers namely prarambha dhulo, prarambha jhol, jeevatu, Sathi, and Sanjivani were used to decompose the city waste. The treatments were Control, NPK (Full dose of recommended fertilizer), FYM, Compost 1 (Prarambha dhulo enriched), Compost 2 (Prarambha Jhol enriched), Compost 3 (Jeevatu enriched), Compost 4 (Sathi enriched) and Compost 5 (sanjivani enriched). The composting time lasted for 40 days. The results showed that, not all waste decomposer enriched compost showed good results. However, most of the waste decomposer enriched compost showed higher yield (Maximum 17 t/ha) and other yield attributes as compared with control and chemical fertilizers in both years.

Keywords: Waste, Waste decomposer, Compost, Broccoli**PROTEIN ENRICHED BANANA TOFFEE - A VIABLE TOOL FOR CONVENIENCE, NUTRITIONAL ENHANCEMENT AND WASTE MANAGEMENT****SOUVIK CHAKRABORTY*, IVI CHAKRABORTY****Department of Post Harvest Management, Faculty of Horticulture, BCKV, Mohanpur- Nadia, West Bengal, India**

In India, ripe bananas suffer severe post harvest losses of upto 30-40% of their overall yields. Majority of these losses owes to over-ripening of the fruits during storage and transportation. Fruit toffees are processed, value-added goods designed to extend the fruits' limited shelf life. These toffees can be created with overripe fruits, which are rich in nutrients that fresh fruit does not provide. This study aimed to develop banana toffees enhanced with protein by physico-chemical investigation and sensory evaluation. The protein enriched banana toffees were prepared with 10% added skimmed milk powder and varying amount of pulse powder and flavourings. Addition of the protein supplements increased the protein contents of the toffee from 1.05% to 9.02%. Treatment with 2% pulse powder and coffee + cocoa flavouring (@ 1% each) showed better overall consumer acceptability and all the prepared toffees can commercially be marketed as nutritious value added ready to eat (RTE) confectionary products. Banana toffees could address the problems of post harvest losses in bananas as well as the protein deficiency prevailing in India.

Keywords: Banana toffee, protein enrichment, shelf life, consumer acceptability.

ESTIMATION OF CROP WATER DEMAND AND CROP WATER PRODUCTIVITY OF MALAPRABHA RIVER BASIN USING REMOTE SENSING AND GIS TECHNIQUES

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The global demand for food and water is growing with the population and urbanization, which puts pressure on both land and water resources, which needs assessing and quantifying water requirements for field crops. Adopting efficient irrigation techniques to optimize water use is essential in this situation. In this study, crop water demand (CWD), crop water productivity (CWP) of major crops of the Malaprabha command area in northern part of Karnataka state in peninsular India were estimated using Landsat 8 & 9 satellite images during the Rabi 2021-22 season. The above ground biomass production (AGBP) and actual evapotranspiration (Eta) values were used to derive crop water demand and crop water productivity of Bengal gram, chilli, cotton, maize, safflower, sorghum, sugarcane, sunflower and wheat. Malaprabha irrigation Command is one of the major irrigation project with 0.20 million hectare as the ultimate irrigation potential. So far the fullest irrigation potential is not realized due to uncertainty in the rainfall and diversion of irrigation water to the domestic water use of Hubli – Dharwad twin cities. Hence, there is need to devise the best interventions for effective on farm water management. Landsat images were processed in a GIS environment to calculate ETa. The approach suggests developing a CWP database for the important crops to improve irrigation water management. Analyzing the CWD and CWP of major crops, water scarcity challenges can be tackled by selecting the most feasible irrigation methods. The above ground biomass production (AGBP) normalized differential vegetation index (NDVI), Crop water demand (CWD) and Crop water productivity (CWP) of the Malaprabha command area is calculated by using PySEBAL for the whole rabi season of 2021-22. The objectives of this study are to estimate and analyze the difference in the CWP and evapotranspiration of major crops for the command area. It comprises four districts of Karnataka state that comes under the Malaprabha command area. The growing periods for bengal gram, chilli, cotton, maize, safflower, sorghum, sugarcane, sunflower and wheat. in the Malaprabha command area are 120, 145, 160, 120, 125, 120, 250-300, 115 and 120 days, respectively. The results of CWD ranged from 400 mm/season to 600 mm/season. The range of CWP values ranged from 0.14 kg/m³ to 4.9 kg/m³. This study estimated the crop water productivity of the entire command area effectively using satellite images and helps to estimate accurate irrigation scheduling through the canal system. The AGBP, CWD and CWP of crop regression analysis were carried out. It is seen that the magnitude of coefficient of determination (R²) is 72 per cent. Where the Pearson Correlation between CWD and AGBP is positively significant, which shows both are correlated. But Correlation between CWD and CWP are Non-significant to each other and relation between AGBP and CWP is positively significant. The estimated ETa of the Malaprabha command area and CWP were in good agreement with the literature-reported values. Hence, enhanced agricultural productivity can be achieved by making considerable investments to improve agricultural research and extension systems.

Keywords: Crop water productivity; crop water demand; NDVI; evapotranspiration; above ground biomass; remote sensing and GIS; pySEBAL.

PERFORMANCE OF PERENNIAL HORTICULTURAL CROPS UNDER ORGANIC AND NATURAL FARMING: A COMPARATIVE STUDY

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The ecological farming practices such as natural and organic farming are more relevant in the present agrarian situation owing to the negative impacts of the excess use of external chemical inputs in crop production. With an intention to investigate the performance of perennial horticultural crops under organic and natural farming systems, a field study was conducted under the University of Horticultural Sciences, Bagalkot, Karnataka, India at three locations consecutively for four years (2019 to 2022) and the results of the same were compared with conventional farming systems. There were four treatments viz., T₁: Package of Practice, T₂: Farmers' Practice, T₃: Natural Farming and T₄: Organic Farming and were replicated five times. The field investigation revealed that sapota (78.0 q/ha), custard apple (102.38 q/ha) and cashew (23.57 q/ha) grown under natural farming (T₃) recorded lower yields whereas, guava recorded higher yields in organic farming (166.32 t/ha) followed by natural farming (102.38 t/ha) practices. Net return and B: C ratio in guava and cashew (2.17:1 and 3.65: 1, respectively) was found higher in natural farming treatment (T₃). Custard apple grown under organic farming (T₄) recorded higher net return and B: C ratio (3.55: 1). Compared to the conventional farming practices (T₁ & T₂), improvement in soil organic carbon content and higher infiltration rate was recorded in both natural and organic farming. There was improvement in soil biological activities in organic and natural farming in terms of higher microbial biomass carbon, higher number of arthropod and earth worm population.

Keywords: Organic farming, Natural farming, Horticultural crops, Yield, Biological activities

EVALUATION OF PLANT ESSENTIAL OILS AGAINST THREE SUCKING INSECT PESTS UNDER GREENHOUSE CONDITION**D. N. KAMBREKAR^{1*}, S. A. JAHAGIRDAR², P. U. KRISHNARAJ³, SHIVALEELA ULLAGADDI⁴, KARTIK NIDAGUNDI⁴, SAHANA M⁴ AND NAVEEN V⁴**¹Senior Scientist and Head, ICAR-KVK, University of Agricultural Sciences, Dharwad 580005, Karnataka, India²Professor, Department of plant pathology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India³Professor and Head, Norman Borlaug International Centre for Agricultural Development, UAS, Dharwad, Karnataka, India⁴Department of Entomology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India

Aim The goal of the present investigation was to evaluate toxicity of mixed formulations of plant essential oils against three major sucking insect pests under greenhouse condition. **Methodology** The study was conducted under greenhouse conditions during 2019 and 2020. Cowpea, bhendi, tomato and guava seedlings were grown in pots and maintained in greenhouse. Aphid (*Aphis craccivora*), mite (*Tetranychus urticae*), whitefly (*Bemisia tabaci*) and spiralling whitefly (*Aleurodicus dispersus*) were released onto their respective hosts and population was maintained before spray. Three sprays were taken at 10 days interval. The mortality of insects in each treatment was observed. **Results:** The findings revealed that mint oil + thyme oil + mustard oil recorded mortality of 90.00, 87.00, 92.00 and 94.00 per cent in *A. craccivora*, *T. urticae*, *B. tabaci* and *A. dispersus*, respectively at a higher concentration (15 ml/l) after third spray. **Interpretation** Since each plant essential oil is having different components responsible for toxicity, mixed formulations of these plant essential oils with different mode of action can well fit into integrated pest management.

Key words *Aleurodicus dispersus*, *Aphis craccivora*, *Bemisia tabaci*, *Tetranychus urticae***RESPONSE OF RICE GENOTYPES FOR THEIR INTERACTION WITH *BACILLUS SUBTILIS* FOR BLAST DISEASE RESISTANCE****J. R. DIWAN^{1*}, SHIVASHANKARAGOUDA PATIL², ABHISHEK K GOWDA³, S A DESAI⁴, SUMA S BIRADAR⁵, ABHISHEK V. KARADAGI⁶**^{1*}Professor, Department of Genetics and Plant Breeding, College of Agriculture, UAS, Dharwad (Karnataka), India^{2,3}Ph.D. Student, Department of Genetics and Plant Breeding, College of Agriculture, UAS, Dharwad (Karnataka), India⁴Professor, Department of Genetics and Plant Breeding, College of Agriculture, UAS, Dharwad (Karnataka), India⁵Professor, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad 580005, Karnataka, India⁶MSc Student, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad 580005, Karnataka, India

Rice (*Oryza sativa* L.) is a crucial staple for 3.5 billion people globally, facing threats from diseases like bacterial blight, sheath blight, and the devastating rice blast caused by *Magnaporthe oryzae*. In a study at the Agricultural Research Station, University of Agricultural Sciences, researchers evaluated twenty rice genotypes' response to blast, treated with *Bacillus subtilis* and untreated. Results indicated significant reduction of blast incidence in treated IR-64, GNV 1905, and IET-25220 genotypes compared to untreated, with 17 genotypes exhibiting moderate resistance. This reduction suggests *B. subtilis* potentially activates the plants' defense responses, perhaps through Induced Systemic Resistance (ISR). The interaction likely triggers defense-related genes in pathways involving salicylic acid (SA) and Jasmonic acid (JA), enhancing plant resilience. These findings underscore *B. subtilis* as a promising bioinoculum for blast control, offering prospects to bolster rice yields. This study illuminates the potential of biocontrol agents like *B. subtilis* in sustainable disease management, thereby safeguarding global food security amidst looming challenges in agricultural production.

Keywords: *Bacillus subtilis*, Blast disease, PGPR, Rice**NUTRACEUTICAL PROFILING OF POTENTIALLY BIOFORTIFIED ADVANCED BREEDING LINES AND MARKER TRAIT ASSOCIATION FOR ALPHA LINOLENIC ACID (ALA) IN LINSEED (*LINUM USITATISSIMUM* L.)****SUMA MOGALI*, NAIDU G.K AND SUMA BIRADAR*****Professor (Genetics and Plant Breeding), University of Agricultural Sciences, Dharwad**

The global health scenario is rapidly changing due to the negative effects of over-medication and inadequate food processing, and as a result, plant-based products are gaining more attention. Flaxseed has been a potent functional food ingredient owing to the presence of omega - 3 fatty acid and SDG. Keeping these points in view, we have developed biofortified genotypes through induced mutagenesis which will serve as functional foods and aid in preventing the diseases. The genotype 44-2 (DLV7) has recorded highest SDG content of 24.2 mg/g dry matter which amounts to 40.6 percent higher than the best check with 17.2 mg/g dry matter, Flax seeds are also known for their prophylactic effect as they are rich source of w-3 and w-6 fatty acid. The genotype ILS 153 recorded highest ALA with 60.25%. (Data not shown) Molecular marker analysis revealed that the SSR markers Lua60, Lua49B, Lub14, Lu138 and Lu144a were reported to be linked to ALA content (Lua60, Lua49B), oil content (Lub14) and number of capsules per plant (Lu138, Lu144a). The microsatellite marker Lu 60 with amplicon size 200bp was linked to ALA content. High yielding and also biofortified genotypes with ALA content (60.25 %) and SDG (24.2mg/g of dry matter) along with higher yield of 747kg/ha . (DLV- 4, DLV- 6, DLV- 9 and DLV- 15) serve as a Source of functional ingredients and aid in reduction of atherogenic risk, anticancer, anti-inflammatory and laxative effects. SDG is a phytoestrogen with several pharmacological properties including cardio-protective and anti breast cancer properties and also possess chemo preventive properties in animals and humans. Therefore these biofortified linseed varieties can be promoted as functional food or source of functional ingredients, because it contains alpha-linolenic acid and lignans both of which have positive effects in disease prevention.

IMPACT OF IRRIGATION WATER RELEASE TIMINGS ON DIFFERENT CROPPING SYSTEMS AND THEIR ECONOMIC RETURN IN MALAPRABHA COMMAND IN PENINSULAR INDIAU. K. SHANWAD¹, S. RAJKUMARA², B. C. PUNITHA³, NAGAPPA GOVANAKOPPA⁴, K. D. LAMANI⁵ AND KOFFI DJAMAN⁶¹Scientist (Agronomy), ICAR- KVK, University of Agricultural Sciences, Dharwad, Karnataka, India²Professor, Department of Soil Science, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India³Assistant Professor, Department of Soil Science, College of Agriculture, Hanumanamatti, Karnataka, India⁴Head, Fodder Research and Production Unit, University of Agricultural Sciences, Dharwad, Karnataka, India⁵Scientist (Agronomy), AICRP on Wheat, University of Agricultural Sciences, Dharwad, Karnataka, India⁶Department of Plant and Environmental Sciences, Agricultural Science Center at Farmington, New Mexico State University, 300 County Road, 4063, Farmington, NM 87401 USA

A field experiment was conducted during 2013-14, 2014-15 and 2016-17 seasons at the Irrigation Water Management Research Center (IWMRC), Belvatagi in Northern Karnataka to evaluate six different cropping systems for their sustainability and water use efficiently under varied water release situations in Malaprabha Command area. Four water release timings including mid July, end July, mid August and end August. The six cropping systems include Full season hybrid Maize -chickpea, Pusa Extra Early Hybrid maize (PEEHM 5)--chickpea, PEEHM 5-safflower, Sunflower-chickpea, Bt cotton, and PEEHM 5-durum wheat were tested in split plot design for three growing seasons. Results shows that sowings at the early release of canal water in mid July resulted in higher maize equivalent yield (94.81, 82.42 and 64.89 q/ha during 2013-14, 2014-15 and 2016-17, respectively) and maize equivalent yield decreased with delayed water releases. Water use efficiency (11.86, 11.24 and 8.11 kg/ha mm during 2013-14, 2014-15 and 2016-17, respectively), pooled gross returns (Rs. 1,16,080/ha), pooled net returns (Rs. 68,580/ha) and pooled BC ratio (2.48) were also higher in mid July irrigation water release situation than the respective variables under the other water release situations.

Full season hybrid maize -chickpea cropping system gave the highest maize equivalent yield in all three seasons (102.58, 87.52 and 76.62 q/ha during 2013-14, 2014-15 and 2016-17, respectively) among all cropping systems. The same system also showed the highest water use efficiency (13.55, 13.13 and 10.29 kg/ha mm during 2013-14, 2014-15 and 2016-17, respectively), the highest (economic gross returns of Rs. 1,24,520/ha, the highest net returns of Rs. 74,520/ha and the highest BC ratio of 2.49.

Key words: Crops and cropping systems, irrigation command, different water release timings, water use efficiency.

TRACKING SLOW LEAF RUST RESISTANCE AND ITS COMPONENTS IN DURUM WHEAT (*TRITICUM DURUM* DESF.): GENETIC INSIGHTSSUMA S. BIRADAR^{*1}, RASHMI K.M⁸, S. A. DESAI¹, P.V. PATIL², YASHAVANTHKUMAR K.J³, LALITA JAGGAL⁸, MAHALAXMI K. PATIL⁹, BORANAYAKA M. B.¹, HANCHINAL R.R.⁴, AARATHI YADAWAD⁵, SANJAY KUMAR SINGH^{*6}, ABHISHEK K. GOWDA⁹, CHETHANA C.K⁷, SHIVASHANKARGOUDA PATIL⁹, VEERESH B.A⁹.¹Suma S. Biradar^{*1} - Professor, AICRP on wheat, University of Agricultural Sciences, Dharwad 580005, Karnataka²Rashmi K.M⁸ - M.Sc. Student, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad³S. A. Desai¹ - Professor, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad⁴P.V. Patil² - Professor, Department of Plant Pathology, University of Agricultural Sciences, Dharwad 580005, Karnataka⁵Yashavanthkumar K.J³ - Associate Professor, Agarkar Research Institute, Pune, India⁶Lalita Jaggal⁸ - Senior Research Fellow, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad⁷Mahalaxmi K. Patil, Senior Research Fellow, Department of GPB, University of Agricultural Sciences, Dharwad⁸Boranayaka M. B: Technical Officer, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad⁹R.R. Hanchinal : Ex-Chairperson, PPV&FRA, New Delhi¹⁰Aarathi Yadawad Assistant Professor, Department of Genetics and Plant Breeding, UASHS, Agricultural and Horticultural Research Station, KAPIKAD, Ullal, Mangaluru¹¹Sanjay Kumar Singh, Principal Scientist, Genetics Division, ICAR-IARI, New Delhi¹²Abhishek K. Gowda⁹ - Ph.D. Scholar, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad¹³Chethana C.K⁷⁻⁷ Assistant Professor cum Jnr. Scientist (PBG) Department of Plant Breeding and Genetics, BAU, Sabour, Bihar¹⁴Shivashankargouda Patil Ph.D. Scholar, Department of GPB, University of Agricultural Sciences, Dharwad¹⁵Veeresh B.A⁹ - M.Sc. Student, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad

Aim: Non-race specific durable resistance, characterized by the phenomenon of slow rusting has garnered increasing attention in recent years. However, such investigations remain scarce in the context of durum wheat. **Methodology:** Therefore, the present study aims to investigate the components contributing to slow leaf rusting in durum wheat and identifying the associated genes using genic markers.

The **results:** showed wide spectrum of disease severity response indicated by AUDPC values ranging from 7.0 to 989 in durum wheat germplasm lines possessing known adult plant resistant (APR) genes. Notably, the *Lr46* gene emerged as the most prevalent among the tested genotypes, demonstrating robustness and conferring enhanced resistance to leaf rust compared to the *Lr68* gene. Intriguingly, none of the genotypes carried both genes concurrently. **Interpretation:** The identification of these genotypes holds promise for advancing the development of durable disease resistance in durum wheat, thereby offering valuable insights for breeding programs aimed at enhancing crop resilience to biotic stresses.

Key words: Durum wheat, Slow rusting, Durable, AUDPC, Minor genes

THE ECOLOGICAL ROLES ON INSECTS IN AGRICULTUREK. V. DESHMUKH¹, A. S. INGALE², A. V. DESHMUKH³¹Assistant Professor of Entomology, Govt. College of Agriculture, Nandurbar (MS)²Assistant Professor of Entomology, RCSI College of Agriculture, Kolhapur (MS)³Ph.D Research Scholar, Department of SSAC, COA, Nagpur (MS)

Insects are essential for supporting agricultural production through their provision of ecosystem services, including pollination, biological pest control and nutrient cycling. Pollination by insects is vital for the reproduction of many crops and has an estimated global economic value of billions of dollars. Insects also act as natural enemies of agricultural pests thereby reducing the need for chemical pesticides and promoting sustainable agricultural practices. Additionally, some insects facilitate nutrient cycling in agricultural systems by decomposing organic matter. However, human activities such as habitat destruction and pesticide use are causing a decline in insect populations which threatens agricultural productivity and ecosystem functioning. Therefore, it is crucial to understand the ecological roles of insects in agriculture and to develop effective conservation strategies to support their populations.

Key words: Climate change, insect pests, agriculture, pollination, pest control, natural enemies

COMPARATIVE STUDY ON VARIABILITY AND CORRELATION OF YIELD RELATED TRAITS IN DIVERSE WHEAT GENOTYPES UNDER IRRIGATED AND DROUGHT STRESS CONDITIONSOINAM BOBOCHAND SINGH¹, SHREENIVAS DESAI², NAVEENKUMAR K. S¹., BASAVARAJ BAGEWADI³, ABHISHEK. K. GOWDA⁴, LALITA JAGGAL¹, MAHALAXMI K. PATIL⁴, SHIVASHANKARAGOUDA PATIL⁴, BORANAYAKA M. B⁵., SUMA S. BIRADAR⁶ AND SANJAY KUMAR SINGH⁷¹M.Sc. Student, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India²Professor, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India³Associate Professor (Biotechnology), IABT- University of Agricultural Sciences, Dharwad⁴Ph.D. Scholar, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India⁵Technical officer, Department of Genetics and Plant Breeding UAS Dharwad⁶*Professor, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India⁷*Principal Sciences, ICAR-Indian Agricultural Research Institute, New Delhi India

A study was conducted to explore and compare genetic variability and correlations among yield and its component traits under drought (stress) and irrigated (non-stress) conditions using 212 wheat genotypes evaluated in an augmented design. High phenotypic coefficient of variation (PCV) and genetic coefficient of variation (GCV) values were observed along with high heritability and genetic advance over the mean for grain yield, biomass, and number of productive tillers. Correlation studies revealed that traits such as biomass, harvest index, canopy temperatures, relative water content, and early vigor exhibited significantly positive correlations with grain yield under stress conditions as compared to irrigated conditions. The combination of high GCV with high heritability suggests minimal environmental influence on the expression of these traits, making them ideal criteria for selection. Additionally, the identified correlated traits with yield could be utilized for indirect selection, thus contributing to genetic improvement strategies for wheat.

Keywords: variability, correlation, heritability, wheat, drought.

ISOLATION, GENOMIC CHARACTERIZATION OF ENDOPHYTIC FUNGI AND ACTINOBACTERIAL EXTRACTS AGAINST SUCKING PESTS OF CAPSICUM UNDER LABORATORY CONDITIONSK. LOGESWARAN^{1*}, D. N. KAMBREKAR¹, P. U. KRISHNARAJ², C. P. MALLAPUR¹ AND M. S. BIRADAR³¹Department of Agricultural Entomology, College of Agriculture, Dharwad, University of Agricultural Sciences, Dharwad, India²Department of Agricultural Microbiology, College of Agriculture, Dharwad, University of Agricultural Sciences, Dharwad, India³Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Dharwad, India

Aim: Endophytic microorganisms, a diverse group of microorganisms such as fungi, bacteria and actinobacteria *etc.* residing within the internal tissues of plants. This study was carried out to assess the insecticidal effects of endophytic fungi and actinobacterial extracts.

Methodology: The screening of 10 isolated endophytic fungi and one actinobacteria from three botanical plants such as *Azadirachta indica*, *Pongamia pinnata* and *Ocimum santum* at four different concentrations (20, 30, 40 and 50 ml/l). Among them, three extracts found most effective against sucking pests such as nymphs of *Thrips parvispinus*, *Polyphagotarsonemus latus* and *Aphis gossypii* and adults of *Bemisia tabaci* through laboratory bioassay. **Results:** When tested at different concentrations of endophytic extracts, 50ml/l was exhibited the highest mortality and increased significantly in dose dependent manner. The laboratory studies revealed that *Phomopsis* sp., *Phomopsis asparagi*, *Diaporthe pseudomangiferae* and *Phomopsis asparagi* were found to be effective against *T. parvispinus*, *P. latus* and *A. gossypii* and *B. tabaci* and exhibited the mortalities of 73.30, 66.60, 73.30 and 70.00 per cent at 72 hours after application.

Interpretation: The results of this present study could help to develop endophytes based commercial insecticides and holds significant potential for reducing the environmental impact of conventional pesticides.

EMPOWERING RESILIENCE: MARKER-ASSISTED PYRAMIDING OF MAJOR AND MINOR GENES FOR ENHANCED DURABILITY IN HIGH-DEMAND VARIETIES

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Aim: Wheat rusts caused cruel losses in the production of this cereals in the history. The leaf rust is of main standing during the world. The resistance founded on solitary chief genes has often not been sturdy. The extent and competence of the rust resistance genes exploited inside a wheat cultivar can be enhanced by pyramiding multiple resistance genes in the identical cultivar. **Methodology:** Hence, the examination was approved out to pyramid two operative slow rusting genes, *Lr34* and *Lr68* from the donor EC 693306 into 'BIL-DWR 162' background which carries major genes, *Lr24* and *Lr28* finished marker assisted selection using markers *csgs68*, *wmc313*, *SCS73719* and *cssfr-5* for *Lr34*, *Lr28*, *Lr68* and *Lr24* genes, respectively was carried. **Results:** BC₁F₁ generation was estimated for leaf rust resistance under insincerely inoculated state along with molecular confirmation. Various combinations of major/minor genes exhibited varied response to leaf rust and agronomic traits. It has been observed that Lr 28 and Lr 34 associated with higher yield. **Interpretation:** The present results envisages that breeders in future, can rely on the major genes like Lr 24 and Lr28 together with minor gene like Lr34 to enhance both yield and durable disease resistance.

Key words: Slow rust, wheat, leaf rust, gene pyramiding, major and minor

INFLUENCE OF POLLINATOR ATTRACTANT CROPS ON ABUNDANCE OF HONEYBEES AND YIELD PARAMETERS OF ONION

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Aim: Pollinators play a pivotal role in the seed production of cross-pollinated crops like onion. Of the pollinators major share was contributed by the honey bees. There is a decline in pollinator abundance and diversity due to various reasons. Hence this investigation on the influence of the marginal crops on pollinator abundance of onion was carried out. **Methodology:** Two rows of marginal crops were grown all along the borders of the onion crop and the abundance of pollinators visiting different treatments was compared. **Results:** The results revealed that the highest activity of pollinators was found in onion with coriander as a marginal crop, followed by onion border cropped with buckwheat. The highest diversity indices of pollinators of onion (H and 1-D) were seen in the case of onion bordered with coriander. Further, the quantitative parameters and qualitative parameters of onion seed were recorded higher in the treatment of onion with coriander as a border crop when compared to other treatments. **Interpretation:** The bees that are attracted towards flowering border crops were then shifted to the main crop and provided pollination service from the first opened flower itself, thereby enhancing seed quantity and quality in the main crop.

Keywords: coriander, honey bees, marginal crop, onion

UNVEILING NOVEL SPOT BLOTCH RESISTANCE IN DICOCCUM WHEAT (*TRITICUM DICOCCUM* (SCHRANK.) SCHÜBL.) THROUGH MARKER-ASSISTED INTROGRESSION: PAVING THE PATH TO ENHANCED QUALITY

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Aim: The aim of the study is to comprehend the molecular mechanisms and pathways underlying disease resistance in wheat, particularly against spot blotch caused by *Bipolaris sorokiniana*, ultimately aiding in the development of resistant lines in the near future. **Methodology:-** Utilizing marker-assisted introgression for the development of BC2F1 lines.- Confirming the BC2F1 lines at the molecular level.- Simultaneously selfing and backcrossing heterozygous lines to generate BC3F1s and BC2F2s.- These generated lines will serve as valuable genetic materials for conducting functional genomics and expression studies. **Results:** The methodology outlined aims to comprehend the molecular mechanisms and pathways underlying disease resistance in wheat.- It also aims to develop resistant lines against spot blotch in the near future. **Interpretation:** The utilization of marker-assisted introgression and subsequent generation of BC2F1, BC3F1, and BC2F2 lines is anticipated to provide valuable insights into the molecular basis of disease resistance in wheat. This understanding can lead to the development of resistant wheat lines, which is crucial for ensuring sustainability in wheat production, particularly in regions vulnerable to spot blotch.

Keywords: Emmer wheat, MAS, spot blotch.

PLANT ESSENTIAL OILS: FEATURING INSECTICIDAL PROPERTIES AGAINST SUCKING INSECT PESTS

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Aim The goal of the present investigation was to evaluate toxicity of 17 different plant oils and extracts against five major sucking pests

Methodology The study was conducted under laboratory conditions during 2019 and 2020 at the Department of Entomology, University of Agricultural Sciences, Dharwad. Tender leaves were selected from cowpea, okra, cotton and guava seedlings, and were immersed in the essential oil solution (1, 2, 3, 5 and 7 ml/l) for 10 sec and then air-dried naturally. Twenty nymphs of aphid (*Aphis craccivora*), mite (*Tetranychus urticae*), adults of whitefly (*Bemisia tabaci*) and spiralling whitefly (*Aleurodicus dispersus*) were released onto their respective essential oil treated leaves. Each treatment was replicated three times. The mortality of insects in each treatment was recorded at 24 and 48 hours after treatment and the LC₅₀ values were computed following standard procedure. **Results** The findings revealed that mean LC₅₀ values of 24 and 48 hrs after treatment with rosemary oil (0.690 ml/l) and fenugreek extract (0.730 ml/l) against *A. craccivora*, mint oil (0.520 ml/l) and chilli extract (0.435 ml/l) against *T. urticae*, thyme oil (0.295 ml/l) and pepper extract (0.420 ml/l) against *A. dispersus*, basil oil (0.185 ml/l) and chilli extract (0.240 ml/l) against *B. tabaci* exhibited high toxicity demonstrating effective population control capabilities.

Interpretation Plant essential oils since showing greater toxicity against sucking pests, can be better integrated into pest management

Keywords Basil oil, Garlic oil, Lemon grass oil, Mint oil, Rosemary oil

FROM PARENT TO PROGENY: GENETIC INSIGHTS INTO DICOCCUM WHEAT YIELD AND MICRONUTRIENT TRAITS

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Aim: To explore the genetic diversity of local dicoccum wheat germplasm rich in micronutrients to facilitate biofortification of wheat varieties. **Methodology:** Biparental crossing of three highyielding genotypes with 15 micronutrient rich donor parents to produce 45 F₁ hybrids. Phenotypic and genotypic evaluations were conducted for agro-morphological traits and grain micronutrients. Statistical analyses included ANOVA, and Mahalanobis D² statistic. **Results:** The PCA analysis revealed significant trait associations in wheat genotypes, first two PCs explained 32.28% and 16.50% of the total variation respectively, with PC1 predominantly linked to traits related to plant height, grain weight, and nutrient content, while PC2 highlighted grain quality traits. The intra-cluster D² values indicated that cluster II (D² = 59.94) had the maximum genetic diversity within the genotypes of that group. The highest inter-cluster distance (D² = 572.23) was between solitary clusters, namely V and cluster VI. Variability analysis showed significant differences between parental lines and F₁ hybrids across multiple agronomic and quality traits suggesting the need for strategic breeding approaches to simultaneously enhance yield and nutritional quality. **Interpretation:** Our findings provide valuable insights for breeding programs aimed at enhancing wheat yield and nutritional quality simultaneously, emphasizing the importance of considering trait associations and genetic diversity in crop improvement strategies. **Keywords:** PCA, cluster, local germplasm and grain micronutrients

INVESTIGATIONS ON GENETIC VARIABILITY AND PRINCIPAL COMPONENT ANALYSIS (PCA) FOR YIELD AND YIELD ATTRIBUTES FOR *TRITICUM AESTIVUM* UNDER DROUGHT CONDITION

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Aim: Breeding for drought tolerance in bread wheat (*Triticum aestivum* L.) stands as a paramount global imperative amid the profound shifts in climate patterns. An investigation was undertaken to elucidate the mechanisms of drought tolerance within a diverse association mapping panel comprising various genetic backgrounds. **Methodology:** This endeavor involved the evaluation of four hundred and fifty genotypes under drought conditions, employing an alpha lattice design, at the All India Coordinated Wheat Improvement Project, MARS, University of Agricultural Sciences, Dharwad, during the rabi season of 2020-2021. The study encompassed the assessment of twenty-one traits across the genotypes under both drought and irrigated conditions to discern variability. **Results and Interpretation:** Significantly, diverse responses were observed among the genotypes across different traits associated with drought tolerance. Notably, phenotypic variances (σ^2_p) outweighed genotypic variances (σ^2_g) across all traits, mirroring similar trends in their respective coefficients of variation. The phenotypic coefficients of variation (PCV) consistently surpassed the genotypic coefficients of variation (GCV) across traits, with values closely aligned. Traits such as leaf waxiness and tillers per meter exhibited pronounced variability under both conditions, characterized by high GCV and PCV. Conversely, traits like grain yield exhibited heightened PCV and GCV under drought conditions, indicative of substantial variability. Conversely, moderate PCV and GCV were noted for grain yield under irrigated conditions. Traits including days to heading, days to anthesis, grain filling duration, leaf waxiness, grains per spike, thousand grain weight, tillers per meter, and grain yield exhibited high heritability coupled with high genetic advance under drought conditions.

Key words: Genetic variability, Principal Component Analysis, *Triticum aestivum*, drought tolerance

RESPONSE OF N, P, K ON CORM PRODUCTION, VEGETATIVE GROWTH AND SPIKE OF RED GINGER VARIETY OF GLADIOLUS UNDER PARTIAL SHADES OF APPLE ORCHIDS IN JAMMU**¹MANOJ NAZIR AND ²JOGINDER SINGH****¹Directorate of AGRICULTURE, Krishi Bawan, Talab Tillo, Jammu****²Department of Horticulture, J.V. College, Baraut, UP, India**

Investigations were carried out to study the effect of fertilizer levels on vegetative growth, flowering and com production attributes in gladiolus Cultivar Red Ginger under partial shades of apple orchard. Significantly number of leaves per plant and number of florets per spike remaining open at a time, were recorded with treatment $N_{50}P_{25}K_{25}$ g/m², whereas significantly maximum plant height was obtained by application of $N_{40}P_{20}K_{20}$ g/m². Treatment $N_{10}P_5K_5$ g/m² advanced the time for showing colour in the first floret. Application of $N_{40}P_{20}K_{20}$ g/m² significantly increased spike length, number of florets per spike, diameter of first floret, life of spike at well as durability of whole spike under field and thus found as optimal dose for these floral characters. A gradual, steady and significant increase in corms produced per plant, corm size and weight as well as number of cormels per plant was observed with increasing fertilizer levels recording highest values at $N_{50}P_{25}K_{25}$ g/m²

Key words: Corm, gladiolus, Apple, nitrogen, phosphorus, potassium, and spike.**MESTA (*HIBISCUS CANNABINUS* L.): A BEST CANDIDATE FOR BIO-DIESEL AND HOPE FOR CLIMATE RESILIENT SOLUTIONS UNDER RAINFED CONDITIONS****U. K. SHANWAD¹, NAGAPPA GOVANAKOPPA², G. N. MARADDI³, G. M. HIEMATH⁴ AND B. N. ARAVINDKUMAR⁵****¹Scientist (Agronomy), ICAR-Krishi Vigyana Kendra (KVK), Dharwad 580 005, Karnataka State, India****²Head, Fodder Research and Production Unit, University of Agricultural Sciences, Dharwad, Karnataka, India. Email:****³Professor, Department of Agriculture Extension Education, University of Agricultural Sciences, Dharwad 580 005, Karnataka State****⁴Professor, Department of Agriculture Economics, University of Agricultural Sciences, Dharwad 580 005, Karnataka State, India****⁵Professor, Department of Agronomy, University of Agricultural Sciences, Dharwad 580 005, Karnataka State, India**

Agriculture is the backbone of India and the energy is the backbone of industry will converge at one place and bring prosperity to India. Considering the present Indian demand / consumption level of 50 million tonnes per annum of petroleum/diesel, it would be possible to consume around 10 million tonnes per annum of bio-diesel by replacing 20 per cent of diesel with bio-diesel. Now-a-days everyone is concerned with the depleting fossil fuel reserves. There is lot of speculation about the availability of "Black stuff" and the price. The price is at its height now. The world is working out on alternate renewable energy sources such as solar, wind, water, hydrogen, nuclear, plant-based oil etc., Clearly, plant based oils, commonly referred as biodiesel, have become the buzzword of the day. India being a developing country, demand for petroleum is increasing tremendously. India is importing 78 per cent of its crude oil requirements at a cost of more than Rs.1.0 lakh crores. Now, the international market is more volatile resulting in greater problems. Such situation demands that we have to find alternate energy sources to reduce imports. Sustainable alternatives include bio-fuels from non-edible oils as a means of improving energy self reliance. Bio-fuels are the excellent transportation fuels and can reduce emission of ozone depleting compounds and carbon monoxide. Karnataka is one of the potential states for growing several bio-fuel crops like Jatropha, Simaruba, Pongamia etc are all perennial tree plants, one need to wait for 5 to 6 years to get seed bearing and importance was not given for annual underutilized oil seed crops. Among several crops Mesta is the one such crop can be exploited for bio-fuel having 16 - 20 per cent oil content belongs to the family Malvaceae and comes up very well in dry lands. It is a boon to depend on annual crop like Mesta, so that seeds can be obtained for oil crushing regularly every year unlike perennial bio-fuel trees. It has good edible, industrial and medicinal properties. So far no efforts have been made to study the importance of Mesta seed oil for bio-fuel. Therefore, there is a need to develop strategies and facilities to exploit the seed yielding potential and oil content of the seeds by taking appropriate studies. In this direction, this study was conducted during *kharif* seasons of 2012-13 and 2013-14 at Main Agricultural Research Station, UAS, Raichur. The results revealed that out of 13 genotypes tried H-local, AMV-4 and HS-2 performed better with respect to seed yield and oil content. Later, oil was extracted and tested for its use as a biodiesel in 50 hp agricultural tractor (2WDMahindra 585DI) for tillage operations. The blends were prepared on volume basis in proportions of 20:80, 40:60 and 60:40 and designated as B20, B40, and B60 compared with petro-diesel (B0). The specific draft, fuel consumption and fuel efficiency of the tractor at three selected forward speeds 2.5, 3.5 and 4.5 km h⁻¹ were assessed during tillage operations. Results showed that the specific draft of tractor was not affected by the blends but significantly affected by the forward speed. The blends and forward speed of operation affected both the fuel consumption and fuel efficiency significantly, whereas lower fuel efficiency was found for the blends beyond B20 that was attributable to the lower energy content of the biodiesel. Among the blends tested, B20 had very similar performance with petro diesel in terms of specific draft, blend of biodiesel with petro diesel may be recommended to use in agricultural tractor for tillage operations.

Keywords: Mesta, Biodiesel, Oil content, Fuel consumption, Fuel efficiency, Specific draft.

UNDERSTANDING DURUM WHEAT (*TRITICUM TURGIDUM* L. SUBSP. DURUM) RESPONSES TO HEAT STRESS: MULTIVARIATE ANALYSIS OF YIELD AND ATTRIBUTES

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Aim: Economic significance of Durum wheat (*Triticum durum* Desf.) is underscored by its distinct features, end products, and notable resilience to abiotic stress compared to other wheat varieties. In heat stress breeding programs, multivariate analysis techniques like principal component analysis (PCA) and cluster analysis prove instrumental in dissecting the diversity among wheat genotypes, elucidating the underlying variations. **Methodology:** A total of 217 genotypes were assessed in an augmented block design at the AICRP on Wheat, UAS, Dharwad under stress conditions and the comprehensive genetic variability was analyzed, revealing 24 distinct factors. **Results & Interpretation:** Notably, the initial eight components elucidated over 69 per cent of the overall variation. The first two principal components predominantly correlated with morphological and yield-related traits, while the third and fourth principal components were chiefly associated with agronomic and physiological characteristics. The strategic selection of representative genotypes from these specific groups could serve as a targeted approach in hybridization programs, aimed at augmenting heat tolerance mechanisms and fostering the development of exceptionally heat-resistant varieties. According to the stress tolerance index (STI), 95 genotypes were classified as tolerant, while the stress susceptibility index (SSI) identified 71 genotypes as tolerant. Taking into consideration the SSI, STI, and stress tolerance evaluation (STE) indices, UAS_5, UAS_14, UAS_15, UAS_28, UAS_42, UAS_53, IC138843, IC0536356, IC0535726, IC0535812, IC265331, and UAS DW-31138 emerged as the most heat stress-tolerant. Additionally, physiological traits like leaf waxiness, NDVI II, SPAD I, and SPAD II were identified as associated with grain yield, underscoring their importance in conferring heat stress tolerance. These traits merit prioritization in the selection of heat-tolerant genotypes.

Key words: Durum Wheat, Heat stress, STI, SSI, STE, Principal Component Analysis

CARBON SEQUESTRATION THROUGH VEGETABLE FARMING

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The urgent need to mitigate climate change has driven increasing interest in various carbon sequestration methods, including agricultural practices that can help remove and store atmospheric carbon dioxide (CO₂). One promising approach is vegetable farming, which has the potential to contribute to carbon sequestration through soil carbon storage, crop biomass production, and other mechanisms. This study examines the current state of research on carbon sequestration by vegetable farming, exploring the key processes, factors, and strategies involved. The review discusses the various mechanisms by which vegetable farming can contribute to carbon removal and storage, the factors that influence these processes and the strategies and management practices that can optimize carbon sequestration in vegetable production systems. It also addresses the challenges and limitations associated with quantifying and verifying the carbon sequestration potential of vegetable farming, as well as the broader implications and opportunities for leveraging this approach as part of a holistic climate change mitigation strategy. The review highlights the importance of continued research, collaborative efforts, and policy support to unlock the full climate change mitigation potential of vegetable farming.

Keywords: Soil carbon storage, crop biomass, climate change mitigation, ecosystem services.

PHYSICO-CHEMICAL STUDY OF RADHA KUND (HOLY WATER RESERVOIR) AT GOVERDHAN, MATHURA (UP)

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An attempt has been made to analyse the physico-chemical parameters of the Radha Kund water during July 2022 to June 2023. Radha Kund is one of holiest water reservoir of the Braj Kshetra. It is believed to be created by beloved of Lord Krishna named Radha. Three sampling sites of the kund were selected for the monthly sampling. For critical analysis Temperature, Turbidity, pH, DO, BOD, COD, Ammonia etc. parameters were taken. The water was found to be severely polluted. Almost all parameters were found to very high above the permissible limit.

Keywords: Pollution, Goverdhan, BOD, Radha Kund

ZOONOTIC DISEASES, AMR & FOOD SAFETY: MITIGATION STRATEGIES AT THE CONFLUENCE OF ONE HEALTH APPROACH**UDIT JAIN¹ & VIKAS PATHAK²****¹Associate Professor & In-charge, Department of Veterinary Public Health & ²Professor & Head, Department of Livestock Product Technology, C. V. Sc. & AH, DUVASU, Mathura, UP**

One Health Defined: One Health is the collaborative effort of multiple disciplines—working locally, nationally, and globally to attain optimal health for people, animals, and our environment (King et al., 2008). The scale and complexity of food safety issues demand that scientists, researchers, and others move beyond the confines of their own disciplines, professions, and mindsets and explore new organizational modes of team science, and the One Health concept embodies this declaration. The scope of One Health is impressive, broad, and growing. Much of the recent focus of One Health has been limited to emerging infectious diseases, yet the concept clearly embraces environmental and ecosystem health, social sciences, ecology, noninfectious diseases and chronic diseases, wildlife, land use, antimicrobial resistance, biodiversity, and much more. As the world is growing fast, public health challenges do not now exist only at local, regional or national levels, but have become global issues. There are numerous challenges like food safety, emerging and re-emerging zoonotic diseases, antimicrobial resistance, increased globalization, lack of hygiene and sanitation in low income countries, changes in land use pattern, life style, hidden threat of non-communicable diseases and environmental issues including climate change. The zoonotic diseases can cause extensive global outbreaks resulting into considerable socio economic burden and public health threat. This is particularly true in rural settings and low resourced areas, where livestock play an important role in day to day life, with a close interaction between human and animals through daily routine animal husbandry practices and even shared housing. The ritual practices followed by some of the communities and lack of awareness towards food safety and zoonoses result in increased threat of transmission of zoonotic food borne pathogens. Human practices and environmental selection pressure contribute to acquire antimicrobial resistance. Climate change has influence on many natural and social systems and processes, which are essential for civilization. Public health issues are prioritized for their effective management, mainly on the basis of magnitude and impact of the problem, cost-benefit analysis, resource availability, urgency and available solutions. **Zoonotic Diseases:** The zoonotic pathogens may spill over into human hosts and can cause significant health hazards. More than half of the known human infectious pathogens are transmitted from animals. Around 75% of emerging and re-emerging infectious diseases are of zoonotic origin. According to the literature, worldwide above 1 billion infections and around 1 million deaths every year attributable to zoonotic diseases, and vector-borne diseases result in additional health and socioeconomic burdens. Furthermore, intensive farm animal practices throughout the globe have a major effect on both safety and quality of the food consumed. The zoonotic microbes continue to evolve and adapt. **Conclusion:** One health interaction is a unique dynamic system. The health of humans, animals and the environment is inextricably interconnected and interdependent. Accordingly, the achievement of One Health shall depend on certain criteria such as the level of joint planning, accomplishment of institutional collaboration and coordinated comprehensive surveillance for the prompt detection and prevention of health hazards. A standard national policy programme is immediately required to desectoralize plant, animal, human and ecosystem health and to take a more interconnected, integrated and logical approach towards human and animal health. Eliminating the interdisciplinary hurdles that still separate environmental, ecological and evolutionary sciences from animal and human medicine is a main challenge to the application of the “One Health” concept, which goes beyond science and impacts politics (agriculture, land management, aquaculture, biological conservation, urbanism and health), law and ethics. It is necessary to provide evidence on the additional value of “One Health” approach for researchers, governments, stakeholders and funding bodies. In conclusion, promoting the integrative benefits anticipated of the “One Health” concept needs a new interface with animal, human, social and legal sector that has to be created. Policy Implementation and strict compliance by statutory bodies need to be ensured for various stakeholders.

‘मुण्डा’ जनजाति में प्रकृति पूजा: करम पूजा के संदर्भ में विशेष अध्ययन

माधुरी सामन्त

शोधार्थी, हिन्दी विभाग, एस सी टी एल एल, किस् - डी यू , भुवनेश्वर, उड़ीसा

प्रस्तुत लेख ‘ मुण्डा ’ जनजाति समुदाय के प्रकृति पूजा, प्रकृति प्रेम एवं प्रकृति संरक्षण के विचार को परिभाषित करता है । ‘ मुण्डा ’ आस्ट्रोएशियाटिक भाषा परिवार की जनजाति है जो मुख्य रूप से झारखंड, उड़ीसा, पश्चिम बंगाल, असम आदि क्षेत्रों में निवास करती है । ‘ मुण्डा ’ समुदाय में प्रकृति का विशेष महत्व है ये प्रकृति को ईश्वर (सिंगबोंगा) मानकर पूजा-अर्चना करते हैं । आदिकाल से ही भारत के जनजातीय समुदाय अपने जीवन – यापन के लिए प्रकृति पर निर्भर रहते आए हैं जिसके कारण प्रकृति से उनका गहरा संबंध है वे अपने प्रत्येक पर्व – त्योहार में प्रकृति की पूजा – अर्चना करते हैं। ‘ करम ’ पर्व ‘ मुण्डा ’ जनजाति के मुख्य त्योहारों में से एक त्योहार है । ‘करम ’ पर्व भादो एकादशी या ग्रामसभा द्वारा नियत तिथि में मनाया जाने वाला त्यौहार है । ‘ करम पूजा ’ के अवसर पर अंकुरित बीजों (जावा) को लक्षित कर प्रार्थना की जाती है कि ये अंकुर अच्छी तरह बढ़ें , उसमें कीड़े न लगे । कुछ स्थानों में यह बीजों की सुरक्षा प्रार्थना का विस्तार बहनों द्वारा भाईयों के मंगलकामना के रूप में हो गया है । करमपूजा के अवसर में ही कुल के देवी – देवता को नया अन्न अर्पित करने के बाद ही उसका उपभोग शुरू होता है । वास्तव में यह पर्व प्रकृति को शुक्रिया अदा करने का पर्व है । आज मानव अपने स्वार्थ की पूर्ति के लिए प्रकृति से छेड़छाड़ कर रहा है जिसके कारण पारिस्थितिक संतुलन बिगड़ रहा है जलवायु परिवर्तन हो रहे हैं अब हमें प्रकृति को संरक्षित करने की बहुत जरूरत है। ‘ मुण्डा ’ जनजाति समुदाय अपने परम्पराओं से, रीति – रिवाजों से प्रकृति को संरक्षित रख कर पूरे विश्व को प्रकृति संरक्षण का संदेश देता है ।

बीज शब्द : मुण्डा जनजाति , प्रकृति , सिंगबोंगा , संरक्षण ।

समकालीन हिन्दी कथा-साहित्य में पर्यावरणीय चेतना और सतत् विकास : रणेन्द्र के ‘गायब होता देश’ का आदिवासी जीवन दर्शन, संस्कृति और परंपरा के संदर्भ में विशेष अध्ययन

आशा रानी सुन्डी

शोधार्थी, हिन्दी विभाग, एस. सी. टी. एल. एल., कीस-डी.यू., भुवनेश्वर, ओड़िशा, भारत

प्रस्तुत शोध आलेख २१वीं सदी के नव-उपनिवेशवाद, भूमंडलीकरण, औद्योगीकरण, अत्यधिक उत्खनन और आर्थिक विकास की अंधी दौड़ में प्रकृति के अंधाधुंध दोहन से उत्पन्न पारिस्थितिक संकट, पर्यावरणीय चेतना और सतत् विकास को परिभाषित और व्याख्या करता है । प्रकृति को आलिंगन करने वाले आदिवासी सामूहिकता, सह-जीविता व सह-अस्तित्व पर विश्वास रखते हैं और प्रकृति में रहने वाले समस्त जीव-जन्तुओं से प्रेम करते हैं । आदिवासी सदियों से प्रकृति की रक्षा करता आया है, उसने कभी प्रकृति को नुकसान नहीं पहुँचाया, जितनी आवश्यकता थी उतना ही लिया प्रकृति से और अनावश्यक कभी भी कुछ ज़्यादा नहीं लिया । हिन्दी के प्रतिष्ठित उपन्यासकार रणेन्द्र अपने उपन्यास 'गायब होता देश' में आदिवासी समाज और उनकी संस्कृति पर भूमंडलीकरण और औद्योगीकरण के यथार्थ प्रभाव को दर्शाते हैं। रणेन्द्र के उपन्यास का अध्ययन रामचंद्र गुहा के उत्तर-औपनिवेशिक पारिस्थितिक साहित्यिक सिद्धान्त के आधार पर किया गया है। रणेन्द्र अपने उपन्यास के माध्यम से हमारे समक्ष विकास बनाम मानव अस्मिता एवं अस्तित्व का ज्वलंत मुद्दा उठाते हैं। क्या विकास के लिए संस्कृति, प्रकृति और पर्यावरण का विनाश औचित्यपूर्ण है? आदिवासी दर्शन यही कहता है कि वे सिर्फ अपना नहीं सोचते बल्कि पूरी सृष्टि के कल्याण की बात करते हैं। आज मानव के समक्ष सबसे बड़ी चुनौती पर्यावरण और आधुनिकीकरण के बीच सामंजस्य बैठाना है। पर्यावरण संरक्षण और सतत् विकास के लिए आदिवासी दर्शन, उनकी संस्कृति, उनकी परंपरा, उनकी आर्थिकी और उनके इतिहास को समझने की आवश्यकता है।

बीज शब्द: नव-उपनिवेशवाद, भूमंडलीकरण, औद्योगीकरण, पर्यावरण, चेतना, सतत् विकास

स्वतंत्रता संग्राम में हिंदी पत्र पत्रिकाओं की भूमिका

प्रोफेसर डॉ हेमलता सुमन

हिन्दी विभाग, नारायण कॉलेज शिकोहाबाद

हिंदी पत्र पत्रिकाएं लोकतांत्रिक समाज की व्यवस्था संचालन में अत्यंत शक्तिशाली भूमिका निभाती हैं सामाजिक तथा राजनीतिक जीवन में पत्र पत्रिकाएं जनता की पथ प्रदर्शन एवं शुभचिंतक होती हैं ज्ञान विज्ञान इतिहास दर्शन राजनीति एवं समाज विज्ञान आदि विषयों को प्रतिबिंबित करने में तथा उन्हें एक मंच प्रदान कर जन सामान्य से संबंध करने में यह प्रमुख होने के साथ साथ जनतांत्रिक शासन व्यवस्था को सुचारू रूप से चलने के लिए उचित वातावरण का निर्माण करती हैं। इसलिए पत्र पत्रिकाओं को राज्य के चतुर्थ अवयव की संज्ञा दी गई है।-1 व्यापारिक प्रतिष्ठानों के विज्ञापन उनकी नीतियां रोजगार संबंधी समाचार विज्ञापन औद्योगिक क्रांति में निष्पक्ष मध्यस्थ की भूमिका निर्माण पत्रिका ही करती हैं साथी वित्तीय समस्याओं पर वे सर्वेक्षण आत्मक रिपोर्ट प्रकाशित कर उनके प्रति जनता के विचारों को भी स्पष्ट करती हैं सामाजिक आर्थिक समस्याओं की ओर ध्यान आकर्षित करते हुए उनके समाधान का माहौल भी बनती है यह पत्र पत्रिका ही है जो जनसंपर्क के सशक्त माध्यम के रूप में न केवल प्रभावी भूमिका का निर्वाह करती है वर्णन जनतांत्रिक शासन व्यवस्था को चारों रूप से चलने के लिए उचित वातावरण भी तैयार करती हैं जो समाज में शीर्षक हैं और जनजीवन के विभिन्न पक्षों को किसी न किसी रूप से नियंत्रित एवं संचालित करते हैं उनके समस्त क्रियाकलापों पर पत्र पत्रिकाओं की दृष्टि रहती है इस प्रकार यह विचार संघर्षों की सहायक अस्त्र होती हैं।-2

व्यक्ति समाज एवं सरकार तीनों के लिए ही पत्र पत्रिकाएं अत्यंत उपयोगी हैं इसके माध्यम से जन सामान्य अपनी बात सरकार एवं व्यवस्था तक पहुंचाते हैं। पत्र-पत्रिकाएं न केवल कानून की सीमाओं का संकेत करती हैं वरन् उनकी सर्वांगीण उपयोगिता की माध्यम भी बनती हैं, किंतु इन्हें निष्पक्ष होना चाहिए। प्रसिद्ध विद्वान वेंडले फिलिप ने लिखा है कि - 'आज का समाचार पत्र एक बारगी जन वर्ग का माता-पिता; स्कूल, कॉलेज, शिक्षक, थिएटर आदर्श और उचित परामर्शदाता एवं साथी हो गया है।-3 इसलिए पत्र पत्रिकाओं की स्वतंत्रता और स्वायत्तता का पहला अनिवार्य नियम है जिसे प्राप्त करने के लिए यह तत्व शताब्दियों से संघर्षरत है। पत्रों की स्वतंत्रता का तात्पर्य बिना सेंसर के समाचारों को प्रकाशित करने और बिना किसी दबाव में आलोचना करने की स्वतंत्रता से है।-4 वॉल्टर किप मैन ने पत्र पत्रिकाओं की महत्ता को स्पष्ट करते हुए लिखा है कि-"अपने सूची रूप में पत्रिकाएं समाज और अन्य संस्थाओं के लिए एक सेवक और अभिभावक के रूप में होती हैं परंतु यदि वे गलत हाथों में पड़ जाए तो सामाजिक अव्यवस्था और शोषण का कारण भी बन सकती हैं।-5 भारत में साहित्यिक पत्रकारिता का उदय सन 1780 में अगस्त हिंदी के "हिंदीज गजट" नामक पत्र से मना जिसे जेम्स अगस्त हिंदी ने कोलकाता से निकला था। गंगाधर भट्टाचार्य के संपादकत्व में "बंगाल गजट" (बंगाल में) सन 1816 में तथा इंडियन वर्ड 1793 ईस्वी में प्रकाशित किया इसके अतिरिक्त देशी भाषाओं के और भी पत्र निकले जो सम्यक रूप से साहित्य सेवा में संलग्न थे जिनमें उर्दू का जमाना, बंगला का "भारत वर्ष", "भारत प्रवासी" मराठी का "मासिक मनोरंजन", 'चित्रमय जगत' तथा अंग्रेजी का हिंदुस्तान रिव्यू एवं मॉडर्न रिव्यू आदि महत्वपूर्ण हैं।

भारतीय पत्रकारिता का सच्चे अर्थों में शुभारंभ राजा राममोहन राय के सत्प्रयासों से सन 1821 में बंगाल में 'संवाद कौमुदी' के प्रकाशन से माना जाता है, जो राष्ट्रीय चेतना एवं सुधारवादी दृष्टि का प्रमुख पात्र सिद्ध हुआ। इस पत्र में समाज में व्याप्त कुरीतियों, कुप्रथाओं को समाप्त करने में महत्वपूर्ण भूमिका निभाई। सन 1829 में राजा राममोहन राय ने 'बंगाल हेराल्ड' एवं 'बंग दूत' का प्रकाशन किया। इसके साथ द्वारिकानाथ टैगोर, श्याम सुंदर सेन, ईश्वर चंद्र विद्यासागर आदि ने अवरोधों के बीच संघर्ष करते हुए भारतीय पत्र कारिता को विकसित एवं पल्लवित किया। भारतीय हिंदी पत्रकारिता का प्रथम पत्र 'उदंत मार्तंड' का प्रकाशन कोलकाता से पंडित जुगल किशोर शुक्ल ने 30 में सन 1826 में निकला इसके प्रकाशन हेतु सरकार से लाइसेंस लेने की दरखास्त दी, 16 जून 1826 को मंजूरी मिली तब जाकर इस पत्र को निकाला गया। -6 किंतु सरकारी सहायता के अभाव में यह पात्र मात्र डेढ़ वर्ष चलकर ही बंद हो गया इसके बाद शुक्ल जी ने 'साम्यदंड मार्तंड' का प्रकाशन किया। जो भारतीय पुनर्जागरण एवं सांस्कृतिक चेतना के स्तंभ रूप के रूप में जाना गया। 19वीं सदी भारतीय इतिहास में राष्ट्रीयता के विकास की दृष्टि से अत्यंत महत्वपूर्ण है। 'बनारस अखबार' उत्तर प्रदेश से प्रकाशित होने वाला पहला हिंदी पत्र है जिसे काशी से शिव प्रसाद गुप्त सितारे हिंद ने 1845 में नागरि लिपि में प्रकाशित किया, जिसकी भाषा शैली उर्दू थी। इसके बाद 1850 में तारा मोहन ने 'सुधाकर' का एवं 1852 में मुंशी सदा सुखलाल ने 'बुद्धि प्रकाश' का प्रकाशन किया। भारतेंदु हरिश्चंद्र ने 1867 में 'कवि वचन सुधा' का प्रकाशन कर पत्रकारिता को नये आयाम दिए। इसके साथ पंडित प्रताप नारायण मिश्र ने भी राष्ट्रीय चेतना को अत्यंत मुखर किया। प्रताप नारायण मिश्रा जी का 'देसी कपड़ा' ने स्वाधीनता तथा मातृभूमि की निर्भीकता एवं ओजस्विता को गति दी। 19वीं सदी के परवर्ती काल में हिंदी के अनेक यशस्वी और विचारशील पत्र प्रकाशित हुए जिन्होंने राष्ट्रीय चेतना के निर्माण में सहयोग दिया। ऐसे पत्रों में कोलकाता के 'भारत मित्र' (1873) 'सार सुधानिधि' (1897) 'उचित वक्ता' (1880) तथा हिंदी 'बंगवासी' का विशेष स्थान है। 16 जुलाई 1893 को सर्वश्री बाबू श्याम सुंदर दास, पंडित राम नारायण मिश्र एवं शिव कुमार सिंह के महान प्रयत्नों ने हिंदी भाषा को प्रतिष्ठित करने हेतु काशी में नागरी प्रचारिणी सभा की स्थापना की, यह भाषा एवं संस्कृति के क्षेत्र में राष्ट्रीय विद्रोह की प्रथम प्रतीक बनी।-7

1896 और 1898 के बीच भारत में अकाल और प्लेग फैलने से देश अशांति फैल गई। सरकारी असहयोगात्मक नीतियों ने जनता को विद्रोही बना दिया सरकार के दमनकारी रवैये के कोप भाजन का शिकार लोकमान्य तिलक जैसे नेता बने, केसरी में लिखे लेख के कारण उन पर मुकदमा चलाया गया एक ओर जहां भारतीय पत्रों पर सरकारी प्रहार दिनों दिन बढ़ता जा रहा था वहीं दूसरी ओर राष्ट्रीय पत्रकारिता जनहित एवं मातृभूमि की सेवा के पुनीत पथ पर दृढ़ संकल्प एवं एडम उत्साह के साथ बढ़ रही थी। 1867 तक हिंदी पत्रकारिता के विकास की गति अत्यंत धीमी रही।-8

हिंदी के महान लेखक तथा पत्रकार बाबू हरिश्चंद्र भारतेन्दु एवं उनके सहयोगियों सा धर्मियों के प्रश्नों के फल स्वरूप 1867 के पश्चात हिंदी पत्रकारिता के विकास को नहीं मिलता मिली यह चरणों के नाम से विख्यात हुआ हिंदी पत्रकारिता का भारतेन्दु युग उसे दरबारी संस्कृति और रीतिकालीन साहित्य पर प्रश्न था जो एक छोटी सी सीमा में बंद कर रबड़ हो गया था भारतेन्दु जी उनके साथियों ने इस सीमा को तोड़कर राष्ट्रीय विचारों से उत्पन्न वास्तविक जैन साहित्य की स्पष्ट की हिंदी साहित्य का द्विवेदी युग अपनी साहित्यिक आदर्शवादिता के लिए प्रसिद्ध हुआ इस युग की हिंदी पत्रकारिता का मूल स्वर साहित्य होते हुए भी राष्ट्रीयता के उन्नयन की दृष्टि से दृष्टि सरकार के प्रति प्रहरात्मक और राष्ट्रपति से पूर्ण था सन 1900 में सरस्वती इलाहाबाद के प्रकाशन के बाद राष्ट्रीय चेतना के सुर और भी मुखर हो गई द्विवेदी युगीन पत्र पत्रिकाओं में सुदर्शन काशी राजपूत एवं स्वदेशीबांधने आगरा हिंदू शारदा काशी मर्यादा इलाहाबाद मनोरंजन कानपुर आदि तत्कालीन राजनीतिक जीवन को स्पष्ट करने वाली रचनाएं थी राष्ट्रीय चेतना को उत्तेजित करती हुई सरस्वती की गिरधर शर्मा नवरत्न की निम्न पंक्तियां द्रष्टव्य हैं जो अग्र स्वर में नारी समाज को संबोधित करती हैं

-हे भानुनियों कुल कामनियों

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स्वदेशी के प्रति समर्पण की भावना से ओतप्रोत 'नागरी प्रचारक' की निम्नलिखित पंक्तियां स्वदेशी विरोधियों को धिक्कारती हुई चेतावनी देती हैं -

" इस भारतवर्ष में भला कौन ऐसा विचार वान और शिक्षित पुरुष होगा जो इन स्वदेशी आंदोलनों का विरोधी हो यदि ऐसा पुरुष हो भी तो उनको विचारवान और शिक्षित न कह कर भारत माता के कुपूत और इसके पक्ष में हो, उन्हें सपूत कहना चाहिए ।" बालकृष्ण भट्ट के हिंदी मासिक पत्र 'हिंदी प्रदीप' की प्रखरता ने सत्ता को चुनौती थी जिससे सरकार कुपित ही रहती थी। इस पत्र में प्रकाशित माधव शुक्ल की कविता 'बम क्या है' से बौखलाई सरकार ने इस पर रोक लगा दी थी जो सरकार की दमन नीति को बयान करती है। निस्संदेह रूप से कहा जा सकता है कि हिंदी पत्रकारिता ने स्वदेश प्रेम और राष्ट्रीयता को जन-जन तक पहुंचाकर पराधीनता की असीम वेदना से पूर्ण लोगों के सोए प्राणों में जान फूंक दी। श्री बाल मुकुंद गुप्त, माता दिन शुक्ल, आचार्य शिवपूजन सहाय, भारतेन्दु हरिश्चंद्र, बालकृष्ण नवीन, मुंशी प्रेमचंद, श्री बनारसी दास चतुर्वेदी, गणेश शंकर विद्यार्थी आदि ने हिंदी पत्रकारिता को नवीन आयाम दिए तथा भारतीयों में नवीन चेतना का संचार किया।

20वीं सदी के आरंभिक दो दशकों की भारतीय राजनीति के केंद्र बिंदु लोकमान्य बाल गंगाधर तिलक थे। अपने राजनीतिक विचारों को सामान्य जनों तक पहुंचाने का तिलक के पास अपनी लेखनी का बहुत बड़ा संकल्प था। वह एक तेजस्वी पत्रकार थे 'केसरी' और मराठा जैसे प्रसिद्ध राजनीतिक पत्र तिलक की तेजस्विता के परिचायक थे। ' 4 जनवरी 1981 में निकाले गए केसरी' की भाषा मराठी थी तथा 'मराठा' पत्र की भाषा अंग्रेजी थी जो 2 जनवरी 1881 में निकला था। केसरी का लक्ष्य था जनता में राजनीतिक जागृति उत्पन्न करना था-

"लोगों के प्रति जागृति, संघ शक्ति और उत्साह उत्पन्न करना यही पत्रकार की दृष्टि से पहला कर्तव्य है ऐसा हम मानते हैं यह शक्ति, उत्साह और संपूर्ण आग पाठकों के मन में उतरे इसी हेतु लिखते हैं.....!!-10

तिलक ने 'केसरी' के मुख्य पृष्ठ पर गर्वित ब्रिटेन को चेतावनी देते हुए लिखा-

"सावधान! निश्चित होकर ना विचरना, जब देश की जनता नींद से उठ जाएगी तब तुम्हारी खैर नहीं"।

तिलक का लक्ष्य 'केसरी' द्वारा सोए हुए शेरों को जगाना था।-11

मदन मोहन मालवीय द्वारा संपादित 'अभ्युदय' साप्ताहिक हिंदी पत्र था जो अपनी उदारवादी नीति के कारण प्रमुख पत्र बना, परंतु अभ्युदय की उदारवाद नीति अधिक दिन तक स्थिर न रही और कालांतर में स्वतंत्रता आंदोलन के उग्र प्रभाव में प्रवाहित होकर यह पत्र उग्रवादियों का पक्षधर बन गया। प्रारंभ से अंत तक 'अभ्युदय' के महान संपादक संपादकों की ऐसी संख्या है जिन्होंने देशभक्ति के साथ राष्ट्रवादी साहित्य के विकास में अपना महत्वपूर्ण योगदान दिया। इसके बाद पुरुषोत्तम दास टंडन, सत्यानंद जोशी, बनारसी दास चतुर्वेदी आदि संपादक रहे। सरकारी हिंसा और दमन पर उत्तेजित लोगों के अतिरिक्त इन हिंदी पत्र पत्रिकाओं ने स्वतंत्रता आंदोलन को प्रेरणा प्रदान करने तथा राजनीतिक प्रचार हेतु अभियान जारी रखा। 1920 में कानपुर से गणेश शंकर विद्यार्थी के संपादकत्व में मासिक राजनीतिक पत्रिका 'प्रभा' का प्रकाशन हुआ, देशवासियों को स्वतंत्रता संग्राम में आने का आह्वान करती इस पत्रिका ने महत्वपूर्ण रूप से कहा-

" आओ कर्म क्षेत्र में आओ
उन्नति बाधा चलो हटाओ
अंधकार को तोड़ विश्व में
दिव्या प्रभा दिखलाओ "

1921 में गांधी जी के नेतृत्व में स्वाधीनता आंदोलन में हिंदू मुस्लिम एक होकर सहभागिता निभा रहे थे , गांधी जी ने अपनी उपाधि "केसर ए हिंद" का परित्याग कर दिया। हजारों वकीलों ने अपनी वकालत तथा विद्यार्थियों ने स्कूल कॉलेज छोड़ स्वतंत्रता आंदोलन के महायज्ञ में कूद पड़े । कांग्रेस के सदस्यों की संख्या 50 लाख तक बढ़ गई । मादक द्रव्य तथा विदेशी कपड़ों का आविष्कार होने के कारण सरकार को भारी क्षति उठानी पड़ी। इस समय हिंदी पत्रकारिता अपने विकास के चरम पर थी। उपर्युक्त अध्ययन से स्पष्ट है कि भारत में आधुनिक पत्र पत्रकारिता का जन्म 18 वीं सदी के अंतिम चरण अर्थात् 1780 में कोलकाता में हुआ और इसी के साथ ब्रिटिश शासकों की भारतीय पत्रकारिता के प्रति दमनकारी कार्यवाहियां भी प्रारंभ हो गईं। प्रजाहितैषी, बुद्धिप्रकाश, मजहरुल, सरुर, ग्वालियर गजट, धर्मप्रकाश, भारतखंडामृत, ज्ञान प्रदायिनी पत्रिका, वृत्तांत विलास आदि पत्रों ने उत्तर भारत में राष्ट्रीयता का बीज बो दिया। राष्ट्रीय जागरण, स्वदेश-प्रेम, मुद्रण कला का विकास तथा अंग्रेजी साहित्य के संपर्क से स्वतंत्रता-आंदोलन का अंकुरण हुआ। भारत के स्वतंत्रता संग्राम में प्रेस की बहुत महत्वपूर्ण भूमिका थी । समाचार पत्रों ने विचारों के प्रचार- प्रसार में मदद की जिससे ब्रिटिश सरकार के खिलाफ जनमत बनाने में मदद मिली । साथ ही इन्होंने औपनिवेशिक सरकार द्वारा उठाए गए अन्यायपूर्ण उपायों के बारे में जागरूकता फैलाने में भी मदद की, जिसने अंग्रेजों के खिलाफ विरोध और क्रांतिकारी कृत्यों को और विकसित किया । समाचार पत्रों के माध्यम से स्वतंत्रता सेनानियों ने देशवासियों को दुनिया भर के नवीनतम विचारों से भी अवगत कराया । ब्रिटिश सरकार मुद्रण कला और पत्रकारिता को विकास को अपने साम्राज्य के प्रतिकूल समझती थी। इसलिए उसके विकास में अनेक अवरोध उत्पन्न करती रहती थी। राजा राममोहन राय, ईश्वरचंद्र विद्यासागर, द्वारकानाथ टैगोर आदि अनेक प्रबुद्ध भारतीयों ने अवरोधों के बीच संघर्ष करते हुए भारतीय पत्रकारिता की नींव को न केवल आधार प्रदान किया वरन् उसके विकास को राष्ट्रीयता के विकास से भी संबद्ध किया। महत्वपूर्ण पत्र पत्रिकाएं , भाषा संस्थापक और उनका प्रकाशन वर्ष इस प्रकार है -

- 1780 बंगाल गजट अंग्रेजी अखबार जेम्स ऑगस्टस हिककी
- 1819 संवाद कौमुदी बंगाली साप्ताहिक समाचार पत्र राम मोहन राय
- 1822 मिरात-उल-अकबर फारसी भाषा जर्नल राजा राम मोहन राय
- 1853 हिन्दू देशभक्त अंग्रेजी साप्ताहिक मधुसूदन राय
- 1854 रास्त गोफतार गुजराती अखबार दादाभाई नौरोजी
- 1858 सोम प्रकाश साप्ताहिक अखबार ईश्वर चंद्र विद्यासागर
- 1862 इंडियन मिरर अखबार देवेंद्र नाथ टैगोर
- 1868 अमृता बाजार पत्रिका अखबार शिशिर कुमार घोष और मोतीलाल घोष
- 1871 तहजीब-उल-अखलाक पत्रिका सर सैयद अहमद खान
- 1878 हिंदू अखबार वीर राघवाचार्य और जी.एस अय्यर
- 1881 केसरी मराठी समाचार पत्र बाल गंगाधर तिलक
- 1888 सुधारक अखबार गोपाल गणेश आगरकर
- 1896 प्रबुद्ध भरत अंग्रेजी मासिक पत्रिका पी. अय्यासामी, बी.आर राजम अय्यर, जी.जी नरसिंहाचार्य और बी.वी कामेश्वर अय्यर
- 1899 उद्बोधन पत्रिका स्वामी विवेकानंद
- 1903 इंडियन ओपिनियन अखबार एम के गांधी
- 1905 बंदे मातरम अंग्रेजी भाषा का अखबार अरबिंदो घोष
- 1910 बॉम्बे क्रॉनिकल अंग्रेजी भाषा का अखबार फिरोज शाह मेहता
- 1911 साथी साप्ताहिक अंग्रेजी अखबार मौलाना मोहम्मद अली
- 1912 अल-बलाघ उर्दू साप्ताहिक समाचार पत्र अबुल कलाम आजाद
- 1912 अल हिलाल उर्दू साप्ताहिक समाचार पत्र अबुल कलाम आजाद
- 1913 प्रताप हिंदी भाषा का अखबार गणेश शंकर विद्यार्थी
- 1914 नवभारत अंग्रेजी भाषा का दैनिक समाचार पत्र एनी बेसेंट
- 1919 स्वतंत्र अखबार मोतीलाल नेहरू

- 1919 यंग इंडिया साप्ताहिक पत्रिका एम के गांधी
1920 मूक नायक मराठी साप्ताहिक बी.आर अंबेडकर
1924 हिंदुस्तान टाइम्स अंग्रेजी दैनिक समाचार पत्र सुंदर सिंह लायलपुरी
1929 नव जीवन साप्ताहिक अखबार एम के गांधी
1932 हरिजन साप्ताहिक पत्रिका एम के गांधी
1936 आज़ाद हिन्दुस्तान पत्रिका तारक नाथ दास
1936 हिन्दुस्तान दैनिक हिन्दी समाचार पत्र एम.एम मालवीय।
इस प्रकार स्वतंत्रता आंदोलन में हिंदी पत्र पत्रिकाओं ने अत्यंत महत्वपूर्ण भूमिका निभाई।
संदर्भ सूची -
1-कमलापति त्रिपाठी पत्र और पत्रकार प्रश्न 06
2 -जॉन जी ब्रैडली द्वारा संकलित 'द इंटरनेशनल डिक्शनरी आफ आर्ट्स
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5- वॉल्टर किप मैन: पब्लिक ऑपिनियन पृष्ठ 363 से 64
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7- आचार्य नंददुलारी बाजपेई :नया साहित्य : नए प्रश्न पृष्ठ 207
8- एस नटराजन: ए हिस्ट्री ऑफ़ द प्रेस इन इंडिया पृष्ठ 104
9 - सरस्वती नवंबर 1906
10 -राम रतन भटनागर द राइज एंड ग्रोथ ऑफ़ ट्रस्ट 541 से 42
11 -विद्या वाचस्पति इंद्र लोकमान्य तिलक और उनका युग पृष्ठ 22.
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ABSTRACT

TEMPORAL AND STRUCTURAL CHANGES IN COST AND RETURNS IN GROUNDNUT CULTIVATION IN INDIA

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The research investigates the growth patterns in Cost A1, C2, C3, gross returns, and yield, analyzing the per cent change in various cost components across different states of India over an eighteen-year period (2004-05 to 2021-22). Notably, the upward trajectory in Cost A1 for groundnut cultivation surpassed Cost C3, indicating a more rapid increase in input and paid-out costs compared to indirect expenses such as land rent and fixed capital interest across all Indian states. Maharashtra stood out with the highest growth in Cost C (20.64%), contrasting with a lower rate observed in Orissa (9.27%). Negative yield changes were identified in Odisha, whereas Gujarat and Karnataka demonstrated improved performance. Interestingly, Gujarat, Maharashtra, and Tamil Nadu exhibited a less pronounced trend in manure expenditure, unlike the rest of India, where a substantial increase was noted. Despite escalating costs in both manures and chemical fertilizers, the study underscores the importance of strategic planning to mitigate input cost escalation, especially in light of the relatively lower growth in yield.

Keywords: Cost, Groundnut, Temporal and Structural Changes

INNOVATIVE TECHNOLOGIES IN FOOD PACKAGING: A REVIEW OF SMART (ACTIVE AND INTELLIGENT) PACKAGING SOLUTIONS

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The health of public and the wellness of society are significantly impacted by food safety. Real-time food quality monitoring across the entire food supply chain is one potential strategy for reducing food-borne infections. Recent years have seen a significant acceleration in the development of emerging technologies, with a focus on educating customers about food quality. Examples of these technologies include Smart packaging (active and intelligent packaging). According to Grand View Research Company (San Francisco, California, the United States), in 2024, the packaging market in the United States will generate \$6 billion for AP and around \$3.45 billion for IP (Nano-enabled Packaging Market report). To preserve or increase the product quality and shelf life, active packaging is the integration of an active component within the packaging. In order to offer information about the quality of the food product throughout transit and storage, the intelligent systems can keep an eye on the state of packed food. The creation of new materials, tools, and different sensing systems to check food quality has been made possible by developments in the disciplines of sensors and biosensors. In this Review, we concentrate on a thorough overview of the most recent technology developments that have the potential to be applied into food packaging to guarantee food quality, safety and monitoring of spoiling. These advanced sensor systems often monitor the growth of microorganisms, humidity, temperature and gas production in the packaged foods. The technologies covered here have a lot of potential for use in food packaging and get us closer to making it possible to track food in real time along the supply chain.

Keywords: Food safety, Food-borne infections, Active packaging, Intelligent packaging, advanced sensors, food quality, real-time monitoring, smart packaging, Biosensors

EFFECT OF DIFFERENT SEED TREATMENT AND MEDIA ON ROOT GROWTH OF ASHWAGANDHA *WITHANIA SOMNIFERA* (L.) DUNAL

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The Indian Ginseng, known as Ashwagandha, holds significant prominence within the Ayurvedic medicinal tradition and is widely recognized as a vital herbal remedy. Its utilization extends globally, showcasing its widespread importance in Indian botanical medicine. This study investigates the influence of various seed treatments on the root growth of Ashwagandha (*Withania somnifera* (L.) Dunal). Among the applied treatments, soaking seeds in a solution of KNO₃ (250 ppm) for a duration of 1 minute (referred to as treatment S5) resulted in notable enhancements in root development. Specifically, this treatment yielded the highest measurements for main root length (21.49 cm), girth of the main root (0.90 cm), root fresh weight (5.02 g) and root dry biomass (3.10 g). These findings shed light on an effective method to promote the root growth of Ashwagandha, offering valuable insights for its cultivation and potential medicinal applications. Media combination Red soil + Vermicompost + FYM (1:1:1) which was treatment (M3) gave significantly highest result in context to length of main root (23.43 cm), root girth of main root (0.96 cm), root fresh weight (5.35 g) and root dry biomass (3.32 g).

Keywords: Seed treatment, Media, Ashwagandha and GA₃

HYDROLOGICAL STATUS OF HARSOOL DAM, AURANGABAD, (M.S.) INDIA.**A. S. MUNDE¹, P. R. MORE² AND S. E. SHINDE³**¹Department of Zoology, Sambhajirao Kendre Mahavidyalaya, Jalkot Dist. Latur, (M.S.) India.²Department of Zoology, kai. Rasika Mahavidyalaya, Deoni Dist. Latur, (M.S.) India.³Department of Zoology, M. J. P. V. Arts, Commerce, and Shri. V. K. K. Science College, Dhadgaon Dist. Nandurbar (M.S.) India.

Water, the common name for the liquid form (state) of the compound of hydrogen and oxygen, i.e., H₂O. Water is an odorless, tasteless, and transparent liquid. It is necessary for digestion and food intake, helps maintain correct muscle tone; it supplies cells with oxygen and nutrients and acts as a natural air conditioning system. The water is necessary for all living beings, without which neither life nor any development is possible. People's daily requirement for drinking water is usually 70% of their body weight. Therefore, it is essential for healthy growth. Still, it can be lethal if water is contaminated with harmful or toxic substances and pathogenic microbes is used in combination with poor hygiene. The present study deals with assessing the water quality, seasonal variations, and Correlation between parameters of Harsool Dam at Aurangabad [M.S.] India. The Physico-chemical characteristics were studied and analyzed from July 2009 - June 2010. The results revealed that the condition of these dam in various seasons concerning the parameters.

Keywords: Hydrology, water quality, seasonal variations, and Harsool Dam

STUDY OF SOME MEDICINAL PLANTS FOUND IN COLLEGE CAMPUS AREA OF SONAI VILLAGE.**A. T. AYANAR AND DR. A. R. TUWAR**

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Medicinal plants are backbone of Ayurveda. Ayurvedic system of medicine to treat various diseases is depend on medicinal plants. Different plants parts contain active chemical compound which shows wound healing, antibacterial, antioxidant, anti-inflammatory, antidiabetic, antipyretic, anticancer properties. By using different parts of plants, Ayurvedic systems of medicine help for the prevention and treatment of various diseases including fever, fatigue, diarrhea, rheumatism, digestive disorders, cough, influenza, sore throat, bronchitis, asthma, liver diseases, skin diseases and migraine, Therefore, proper identification and conservation of Ayurvedic medicinal plants is important. Sonai is a small town located at a distance of 5 km from the temple of Shani Shingnapur in Ahmednagar district. 15 medical plant presents in New Arts Commerce and Science College Sonai campus area have been studied. Important information about medicinal plants such as botanical name, common name, family, chemical compound and medicinal uses are recorded in this paper. Present investigation helps to know you which medicinal plants are present in Sonai college campus area along with their medicinal use and at the same time how need to conserve them.

Key words: Ayurveda, Medicinal plants, Chemical compound, Conserve.

EFFECT OF FEEDING TAMARIND (*Tamarindus indica*) SEED ON GROWTH PERFORMANCE OF GROWING CALVES**A. T. LOKHANDE*, KACHAVE A. G., D. K. DEOKAR AND D. K. KAMBLE**

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The experiment was conducted for period of 90 days at Research Cum Development Project on Cattle, Deptt. of A.H.& D.S.,M.P.K.V., Rahuri, Maharashtra, India with objective to study the effect of feeding tamarind seed on growth performance, to assess chemical composition of different feed and to work out economics of feeding. Twenty growing calves were divided into four groups on the nearness of age and weight. Four feeding treatments were studied namely T0 (Dry roughages + Green fodder + Concentrate), T1 (Dry roughages + Green fodder + 90% Concentrate + 10 % crushed tamarind seed), T2 (Dry roughages + Green fodder + 80% Concentrate + 20 % crushed tamarind seed), T3 (Dry roughages + Green fodder + 70% Concentrate + 30 % crushed tamarind seed). It was observed that the tamarind seed offered to the calves during experiment period by mixing with concentrate were containing 88.20, 19.21, 7.60, 8.88, 57.00 and 7.31 per cent of DM, CP, EE, NFE, CF and Total ash, respectively. The daily feed intake of the calves during the experiment was observed 4.26, 4.48, 4.55 and 4.40 kg under T0, T1, T2 and T3 treatment, respectively. Daily feed intake was observed significantly higher in treatment T2 (4.55 kg) than other treated groups. However, treatment T1 (4.48 kg) and T2 (4.55 kg) were at par with each other. Lowest feed intake was observed in treatment T0 (4.26 kg). Daily DM intake was differing significantly (P<0.05) among the treatments. The average daily dry matter intake was 1.82, 1.92, 2.05 and 1.84 kg/day/calf in T0, T1, T2 and T3 groups, respectively. The DM intake was observed significantly highest in treatment T2 followed by treatment T1, T3 and T0 group of growing calves. Whereas, treatment T3 (1.84 kg) and treatment T0 (1.82 kg) were at par with each other. The daily body weight gain of calves indicated significant difference among various treatment groups during experiment. It was observed that highest body weight gain per day per calf was observed in treatment T2 (0.29kg) and treatment T1(0.26 kg), T2 (0.29 kg) and T3 (0.28 kg) were at par with each other. The highest body weight gain per week per calf was observed in T2 (2.06 kg) followed by T1 (1.96 kg), T3 (1.82 kg) and T0 (1.63 kg). Period total weight gain of calves was significantly highest in treatment T2 (26.60 kg) than all other treatment viz. T0 (21.00 kg), T1 (25.26 kg) and T3 (23.40 kg). Observation related to body measurements of calves during experimental period are total body length gain over experimental period was 6.75, 9.60, 10.85 and 7.98 cm in T0, T1, T2 and T3, respectively. This mean maximum gain in body length of calves was obtained significantly highest in treatment T2 which was at par with treatment T1 and treatment T3 and T0 were at par with each other, the total gain in body height over an experimental period was significantly highest in treatment T2 (12.10 cm) whereas treatment T0 (8.20 cm), T1 (9.45 cm) and T3 (8.44 cm) were at par with each other and the total gain in body height over an experimental period was significantly highest in treatment T2 (12.10 cm) whereas treatment T0

(8.20 cm), T1 (9.45 cm) and T3 (8.44 cm) were at par with each other and with respect to chest girth significant differences were observed among different treatments gain in chest girth was highest in T2 (12.45cm) treatment and treatment T0 (9.04cm), T1 (10.40cm) and T3 (10.05cm) were at par with each other. The cost of feeding/day/calf was lowest in T3 (25.01 Rs) as compare to T2 (27.81 Rs), T1 (28.18 Rs) and T0 (28.30 Rs) indicated that higher proportion of crushed tamarind seed used in calf feeding decreased the cost of feeding however, cost per kg weight gain was observed lowest in treatment T2 over rest of the treatments. Hence, it is concluded that growing calf can be efficiently raised by feeding tamarind seed supplemented diet (T2) as evident from the increased dry matter intake which is resulted into significantly more body weight gain in calf.

Keywords: tamarind (*Tamarindus indica*) seed, growing calves, DM, CP, EE, NFE, CF

ORGANIC FARMING: A TOOL FOR ENVIRONMENTAL MANAGEMENT STRATEGY IN REWA DISTRICT OF (M.P.)

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Organic farming has experienced remarkable growth in recent decades as community interest in environmental management. Research has shown that relative to conventional agriculture, organic farming is more efficient in its use of non-renewable energy, soil quality management of it exhibits sustainability in water quality and biodiversity. Research Studies have had more mixed findings, however, when assessing the impact of organic farming on greenhouse gas (GHG) emissions and climate change. Life cycle assessments (LCAs) in particular have showed that organic farming have often exhibited in higher GHG emissions per unit product as a result of low yields. The organic movement has the opportunity to highlight the factors of LCA and utilize this information in developing tools for site-specific assessments that can indicate toward strategies for improvements. Mitigating effectively to the climate change crisis should be at the core of the organic movement's values. Societal-level behavioral and policy changes will be required to reduce waste and shift diets to achieve essential reductions in GHG emissions throughout food systems, organic farming should be open to carefully considering emerging technologies and strategies apart from that to improve its efficacy and reduce GHG emissions at the production stage.

Keywords: organic farming; climate change; greenhouse gas emissions; life cycle assessment.

SEASONAL VARIATION IN PROLINE CONTENT OF PENTATROPIS NIVALIS (J. F. GMEL.) D. V. FIELD & J. R. I. WOOD WITH REFERENCE TO SALINITY CONDITION FROM BARAMATI TEHSIL (M.S.) INDIA

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Pentatropis nivalis (J. F. Gmel.) D. V. Field & J. R. I. Wood plant belongs to the family Asclepiadaceae, its family used treatment of various diseases. *Pentatropis nivalis* (J. F. Gmel.) D. V. Field & J. R. I. Wood is native to Tropical Africa, Madagascar, Egypt to India and commonly called as white milkweed, Proline is an amino acid plays an important role protect plant from various stress, Accumulation of proline in part of plant it is one of the stress induced response .This study focused on the seasonal variation in proline content in *Pentatropis nivalis* (J. F. Gmel.)D. V. Field & J. R. I. Wood with reference to salinity condition from Baramati Tehsil. Plant sample were collected from the adjacent villages of Baramati tehsil. Selected 4 sites namely Songaon, Mekhali, Medad and Bahrampur during summer, winter and rainy season. Proline content was estimated by Bates et al, 1973 method. Concentration of proline was maximum in leaves as compare to stem and root. The concentration of proline was maximum during summer season was observed. The *Pentatropis nivalis* (J. F. Gmel.) D. V. Field & J. R. I. Wood indicating the role in stress tolerance.

Keywords: *Pentatropis nivalis*, proline, salinity, seasonal variation, stress tolerance.

GENETICS AND BREEDING: INTERPLAY FOR OPTIMIZING TRAITS AND SUSTAINABILITY

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Genetics and breeding are intertwined disciplines that play pivotal roles in shaping the characteristics of organisms, from plants to animals. Genetics delves into the study of heredity and variation, unraveling the mechanisms governing traits passed down through generations. It encompasses molecular processes like DNA replication, gene expression, and mutations, elucidating how genetic information influences an organism's phenotype. Breeding harnesses genetic knowledge to optimize desirable traits in populations. Whether enhancing crop yield, improving livestock productivity, or refining disease resistance in organisms, breeding methods aim to achieve specific goals. Traditional breeding involves selecting individuals with desired traits and crossing them, relying on genetic recombination and segregation to generate diverse offspring. Modern techniques like marker-assisted selection and gene editing have revolutionized breeding by enabling precise manipulation of genetic material. The synergy between genetics and breeding has spurred advancements in agriculture, medicine, and conservation. By understanding genetic principles and employing strategic breeding practices, scientists can cultivate resilient crops, develop disease-resistant livestock, and conserve endangered species. This symbiotic relationship between genetics and breeding continues to drive innovation, fostering sustainable solutions to global challenges in food security, health, and biodiversity conservation.

NUTRIENT ENRICHED BIOCHAR: A POTENTIAL SOURCE FOR ENHANCING SOIL HEALTHAADARSH POUDEL¹, NABIN KUMAR SINGH¹, PRADIP KUMAR THARU¹, YAMUNA DHITAL¹, ASHMITA LAMSAL¹, AJAY JAISHI^{1*}

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Intensive cultivation of agricultural land decline soil health, which emphasizes the need for sustainable soil management. Organic soil amendments improve soil health and harness agricultural and environmental sustainability. Biochar, a solid material obtained from the thermochemical conversion of biomass in an oxygen-limited environment, has emerged as a promising soil amendment to increase crop production and improve soil health in degraded soils. Considering the importance of biochar, an experiment was set up at Kathmandu University, Panchkhal from 20th November 2023 to 10th March 2024 to evaluate the effect of nutrient-enriched biochar on soil properties and crop productivity. Biochar was prepared from the Lantana camara and marigold plant residue in a locally developed low-cost Kon-tiki. Biochar was added with cattle urine, farm yard manure, and chemical fertilizers in both granular and solution forms and applied to potato crops. Conversion efficiency of plant residues to biochar by low-cost Kon-tiki was noted at 19.5%, in which 25 kg of biochar was achieved by burning 128.2 kg of substrates. Organic matter content of biochar was 69.88% and its pH, and electrical conductivity were 9.85 and 0.00588 dS/m respectively. The number of tubers and productivity were increased by 22% and 15% in biochar applied plot (8.56, 27.05 Mt/ha) in comparison to biochar absent plot (7, 23.5 Mt/ha). There were no significant differences in soil chemical properties in first season cultivation. Furthermore, residual effect of biochar in spring maize will be analyzed as a subsequent crop.

Key words: Soil health, Biochar, Soil properties, Nutrient-enriched, Residual effect

IMPACT OF M.S.P. IN INDIAN AGRICULTURAL FARMING AND FARMERS INCOME & ECONOMY

AAKASH DEEP

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The significance of and types of public support for farming in India are key topics of discussion in light of the new farm regulations passed by the Indian Parliament. The main topics of discussion include fair trade, income stabilization, price support, and the role of the government. In order to help farmers, the Indian government and the state governments have recently started a number of initiatives. The Minimum Support Price (M.S.P.) mechanism in India has long been a cornerstone of agricultural policy, aimed at ensuring remunerative prices to farmers for their produce and stabilizing agricultural incomes. A number of the Central Government's policy efforts marked significant shifts from previous practices. In 2018, a comprehensive price support initiative known as PM-AASHA was introduced, featuring significantly higher minimum support prices (MSP). In order to give farmers immediate transfer payments, a direct income support program (PM-KISAN) was introduced for the first time in 2019. This research explores the complex effects of M.S.P. on agricultural production in India, farmer income, and the overall economy. Moreover, it evaluates M.S.P.'s direct and indirect effects on rural livelihoods, farmer income, agricultural productivity, and overall economic growth. It discusses in detail how M.S.P. helps to promote agricultural diversity, improve market access for farmers, and lessen price volatility. It also investigates the socioeconomic effects of M.S.P. on various farmer categories. It clarifies how M.S.P. distributional affects vary between geographies, crops, and socioeconomic classes. It has enhanced our understanding of the M.S.P. framework's advantages, disadvantages, and possible reforms in India. As a result, stakeholders, researchers, and policymakers can gain important insights into how to advance inclusive economic growth and sustainable agricultural development.

Keywords: Agricultural policy; minimum support price; public support; food security; farm regulation.

EFFECT OF MICROBIAL CONSORTIUM ON GROWTH OF GLADIOLUS CV. ROSE SUPREME FOR SUSTAINABLE AGRICULTURE*AAKASH DEEP KAMBOJ¹, B. D. BHUJ², NAVNEET PAREEK³, RANJAN K SRIVASTAVA⁴, AJIT KUMAR KAPOOR⁵, GURDEEP BAINS⁶
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Gladiolus (*Gladiolus grandiflora*) is important cut flower, produces beautiful flower spike having florets of highly dazzling colours of white, red, pink, purple, orange, yellow, salmon, etc. along with bicolour and multicolour. The cut spikes are used for various decoration purposes and to make bouquets. The major hurdle for gladiolus cultivation is infestation of disease during the cultivation period. Microbial consortium is usually referred as group of diverse microorganisms that have the ability to act together in a community. They are able to suppress soil-borne plant pathogens and to stimulate plant growth by different direct or indirect mechanisms, such as production of phytohormones, mycoparasitism and competence with plant pathogens, decomposition and mineralization of organic matter and enhancing the bioavailability of mineral nutrients such as phosphorus and iron. To keep these point in consideration an experiment was conducted at Model Floriculture Centre, G.B. Pant University of Agriculture and Technology Pantnagar during 2022-23 to study the "Effect of microbial consortia on vegetative growth of gladiolus cv. Rose Supreme". Experiment was laid out in factorial concept of randomized block design (RBD) in open field conditions. Medium sized (8-10 cm) corms of gladiolus cv. Rose Supreme were used as experimental material, which was treated with different treatments of microbial consortia. The result revealed that most of the vegetative parameters (viz. plant height, number of leaves, number of tillers, etc.) were found to be best with treatment of microbial consortium. On the basis of current findings, it can be concluded that the use of microbial consortium inoculant *Rhizobium* with PGPRs having various PGP traits would be an effective approach for improving the yield of gladiolus and soil health.

Key words: Microbial consortium, gladiolus, corms, vegetative parameters, etc.

ISCHEMIC HEART DISEASE: A GROWING THREAT TO GLOBAL HEALTH**AANCHAL KUMARI****Sharda University, UP, India**

Ischemic heart disease (IHD), also known as coronary artery disease, remains a leading cause of morbidity and mortality worldwide. Characterized by a restricted blood flow to the heart muscle due to narrowed arteries, IHD can lead to angina (chest pain), heart attack, and heart failure. This review explores the key risk factors associated with IHD, including traditional factors like dyslipidemia (abnormal blood fats), hypertension (high blood pressure), diabetes, and smoking, as well as emerging risk factors such as chronic inflammation, air pollution, and psychosocial stress. The current diagnostic strategies for IHD, encompassing clinical evaluation, electrocardiography (ECG), stress testing, and imaging techniques like coronary angiography, are discussed. Additionally, the paper highlights the importance of preventive measures like lifestyle modifications (healthy diet, regular exercise, smoking cessation) and pharmacological interventions with medications like statins and antiplatelet drugs. Finally, the review briefly touches upon emerging treatment options such as coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) for patients with established IHD.

Keywords: Ischemic heart disease, coronary artery disease, angina, heart attack, risk factors, diagnosis, prevention, treatment, lifestyle modifications, medication.

BOTANICAL-PRINTING: SUSTAINABLE TECHNIQUE OF TEXTILE PRINTING USING LEAVES OF CARICA PAPAYA WITH AN ORGANIC MORDANT**AANCHAL MANUJA¹ AND DR. MONISHA SINGH²****¹Research Scholar, ²Assistant Professor, Department of Family and Community Sciences, Faculty of Sciences, University of Allahabad, Prayagraj, Uttar Pradesh, Bharat**

After food and Shelter, clothing is one of the basic needs of human, it protects our body from surrounding, also has many functions like modesty, status, adornment, protection and identification. Humans, from very early age, loved to adorn their clothes with distinct techniques of value addition. Textile printing is one of them. It is the process of transferring a coloring material over the fabric surface. The application of textile printing was also found in 2500 BC in Egypt Coptic Civilization. There are various popular methods of textile printing that are used in domestic level nowadays like block printing, screen printing, stencil printing, hand printing etc. in which botanical-printing is in vogue. Botanical printing is a technique of imprinting a real colour of plant material on fabric by wrapping them directly in between the layers of fabric. This method of printing produces attractive and detailed prints which are eye catching, feel fresh and natural. In this study, an attempt is made to produce papaya plant's fresh leaves print over cotton and silk fabric material, standardizing the process and testing the colourfastness of the prints by using pounding and steaming technique. The prepared samples were examined for colorfastness to laundering, dry cleaning, perspiration, dry and wet rubbing, and sunlight exposure by following various ISO and AATCC standards, developed products were also considered eco-friendly as there is no chemical were used in entire processing. The study shows that the papaya printed cotton fabric produces clear outline, sharp vein pattern printed over the fabric, it also produces good colorfastness to wash, perspiration, dry cleaning, wet and dry rubbing fastness but they produces low colorfastness in sunlight exposure. On other hand papaya printed silk fabric produces distorted print all over the fabric without any defined outlines.

Keywords: Eco-printing, Papaya leaf, ISO standards, Eco-friendly, Alum, Cotton fabric, Silk fabric, AATCC standards, Colourfastness.

ENVIRONMENTAL INFLUENCES ON INCIDENCE OF RICE LEAF FOLDER, CNAPHALOCROCIS MEDINALIS UNDER MID-HILL CONDITIONS OF HIMACHAL PRADESH**AARUSHI SHARMA^{1*}, DEVIKA SHARMA¹, KARTHIK R¹, SURESH KUMAR MAHALA² AND DAMODHARA GN³****¹Ph.D. Scholar, Department of Entomology, CSK Himachal Pradesh Krishi Vishvavidyalya Palampur, 176 062, India****²Ph.D. Scholar, Department of Entomology, Maharana Pratap University of Agriculture & Technology Udaipur, Rajasthan****³M.Sc. student, Department of Sericulture, Manasa Gangotri college, Mysore, Karanataka**

Rice leaf folder, *Cnaphalocrocis medinalis* Guenee (Lepidoptera: Crambidae) is one of the most important insect-pests in Indian subcontinent. The pest once considered a minor threat to paddy fields, has attained the status of major pest in some parts of India including Himachal Pradesh due to injudicious cultivation practices. Insects are susceptible to the constantly changing environmental conditions. Recognizing the correlation between abiotic factors and insect-pests is crucial for predicting potential crop losses and implementing timely pest management strategies. Thus, a study was conducted in Kharif 2021, to analyze population trends and evaluate the impact of abiotic factors on *C. medinalis* in rice crop. Seasonal incidence of *C. medinalis*, revealed maximum per cent infestation of 19.86 during October (40 SMW), decreasing thereafter. The adults of *C. medinalis* started appearing during 2nd week of August (SMW 32), increased and attained peak population of 18.33 adults per five sweeps in 2nd week of October (SMW 41). Weather parameters showed non-significant effect on population buildup of *C. medinalis*. The pest was negatively correlated with relative humidity and minimum temperature. Contrarily, maximum temperature favoured the growth of pest, displaying a positive correlation for both per cent infestation and adult populations, with *r* values of 0.514 and 0.416, respectively. Additionally, rainfall negatively influenced the pest's appearance and structure, registering *r* values of -0.074 for adults and -0.220 for per cent infestation.

Keywords: leaf folder, weather, temperature, humidity, rainfall, adult population

SIGNIFICANCE OF SUSTAINABLE DEVELOPMENT GOALS: SPECIAL REFERENCE INDIAN HEIs**Aashish Dhiman and Vinky Sharma****Dewan Institute of Management Studies, Meerut, Delhi NCR, India**

The purpose of this research is to investigate the potential role of Indian Higher Education Institutions at Delhi NCR, India in driving the world's progress towards achieving the SDGs (India). The objective of the study includes rectifying the challenges faced by the Indian HEIs while integrating the SDG into their system. A conceptual analysis is made considering the previous work in the last 5 years on SDGs in the Indian Context. This study is overly based on primary data collected by a Semi-structured questionnaire developed to know the perception using stratified random sampling from 157 working academicians from private HEIs. The descriptive design was used and analyzed by descriptive statistics. Identify priorities for the most impactful SDGs for Indian HEIs to maintain ecological balance, inadequate collaboration and communication, obstacles to engagement from societal factors, and political and economic influence over SDGs prioritization in the strategic planning. The results indicate that the scope of research is limited at Indian Higher Education Institutions. However, governmental change in economic and energy policy was highlighted as a favorable measure to accelerate the adoption of SDGs by the Indian HEIs.

Keywords: Indian HEIs, Sustainable Development Goals (SDGs), Ecological Balance, Strategic Planning.

EFFECT OF COLD PLASMA TREATMENT ON THE FUNCTIONAL PROPERTIES OF CHIA SEEDS FLOUR**AASHITA BHARDWAJ¹*, CHETNA¹, TANYA L. SWER¹, RACHNA SEHRAWAT²****¹Department of food science and technology, National Institute of food technology entrepreneurship and management, Kundli, Haryana 131028, India****²Department of Food Process Engineering, National Institute of Technology, Rourkela, Odisha 769008, India**

Chia seeds have received significant interest for their exceptional nutritional profile, functional versatility, and potential health benefits. Cold plasma treatment is a promising tool in the food industry as an alternative to traditional food preservation methods for enhancing the quality and functionality of food products. The objective of this study is to determine the effect of cold plasma treatment on functional properties of chia seeds flour. Chia seeds were treated at three different power levels of 10kV, 20kV, and 30kV with exposure times of 10 min, 20 min, and 30 min. Water and oil absorption capacity, swelling capacity, emulsifying capacity, gel hydration properties, color, bulk and true densities of the control and plasma-treated flour were studied. Results indicated the significant impact of cold plasma treatment on the physical and functional properties of chia seeds flour depending on the exposure time and voltage. To illustrate the results, water absorption capacity (12.16 ± 0.25 - 9.17 ± 0.03 g/g), oil absorption capacity (1.53 ± 0.03 - 0.73 ± 0.01 g/g), swelling capacity (12.17 ± 0.20 - 9.19 ± 0.26 ml/g), emulsifying capacity (30.28 ± 0.25 - 30.28 ± 0.25 %), water solubility index (0.59 ± 0.37 - 2.22 ± 0.11 %), water absorption index (8.34 ± 0.01 - 8.65 ± 0.02 g/g) and swelling power (6.23 ± 0.17 - 7.54 ± 0.14). From the analysis, it was found that plasma treatment could improve the flour hydration and gel hydration properties of the flour. A significant change in the color of flour with an increase in lightness was also observed. It can be concluded that cold plasma treatment can be a promising technology for improving the functionality of chia seeds flour.

Keywords: Cold Plasma treatment; Chia seeds; Functional properties; Technological properties

MORPHO-VARIATIONS IN HAWK-MOTH PERGESA ACTEUS (CRAMER, 1779), (SPHINGIDAE: BOMBYCOIDEA)***AASTHA AND DR. AMRITPAL SINGH KALEKA****Department of Zoology and Environmental Sciences, Punjabi University, Patiala (Punjab, India)**

The order Lepidoptera is the second largest order of class Insecta under the largest phylum Arthropoda. This order includes butterflies, moths and skippers. The moths, usually being nocturnal, constitute one of the most notable groups as pests, pollinators and biological indicators. The family Sphingidae includes large sized moths which are commonly known as Hawk moths. Morpho-variations in moths, like in other insect groups, is quite remarkable. The moths exhibit a wide range of morphological variations both within and between species. The possible cause of such variations can be combination of genetic factors, environmental influences and developmental processes. Different forms of morpho-variations such as coloration, wing maculation, sexual dimorphism, seasonal variations can be seen in moths. During present study, field survey was undertaken in Chandrot in District Kangra of Himachal Pradesh. The morpho-variations were observed in *Pergesa acteus* (Cramer, 1779). The genus *Pergesa* Walker, 1856 is a monotypic genus under family Sphingidae with *Pergesa acteus* (Cramer, 1779) as its type-species. A clade of 14 specimens were collected with green and brown wing maculation. The male genitalic features of both forms were examined to ascertain their authentic identification. The genitalic features of both forms showed no differences at all which forms the basis to conclude that *Pergesa acteus* (Cramer, 1779) is a morpho-variant species and the genus *Pergesa* Walker, 1856 is a monotypic genus. Overall, this study of morpho-variations in moths not only enriches our knowledge of their biology and evolution but also draws attention to the remarkable diversity of life on earth and intricate ways in which organisms have adapted to their environment with time.

Key words: Lepidoptera, Bombycoidea, Sphingidae, Monotypic, Adults, Morpho-variants, Polymorphism, Genitalia.

ETHNOBOTANICAL STUDIES OF MEDICINAL PLANT IN PALAMPUR REGION OF NORTH-WESTERN HIMALAYA, INDIA**AASTHA AND MUNIT SHARMA****Department of Botany, Thakur PG College of education, Dhaliara**

The study of medicinal plants in relation to humankind and societal welfare was conducted through ethnomedicinal research in Palampur region of North-western Himalaya India. Ethnomedicinal study was done in order to document the traditional knowledge of medicinal plant by the communities residing in this region. To analyze the produced data, a quantitative factor was employed. With aid of local informants and healers from various research areas, a total of 90 species, representing 20 families, were identified and collected. Out of 90 species, 55 plants are of rich medicinal value and 15 plants are used as aromatic. Total 10 medicinal plant species were reported for a new or less known ethno medicinal uses. Two plant species which is threatened were collected from the study area. The highest number of species belong to family Lamiaceae (7), Fabaceae (7), Asteraceae (7), Moraceae (4 species). Local informants used many plant parts including leaves, galls, latex, stem, root, bark and rhizomes. It was also noted that the majority of the plants species were utilized to cure gastrointestinal problems, Skin disorders and Respiratory disorders. Traditional medicinal plants have immense potential to provide a raw material for the discovery of bioactive compounds and medicine.

Keywords: Biodiversity, Traditional knowledge, Medicinal plants, Human health care**STUBBLE BURNING: EFFECTS ON HEALTH & ENVIRONMENT****ABHA SHARMA, KSHITIJ PARMAR, ABHAY SHARMA*, GUNESHORI MAISNAM, AJAY TOMAR AND DHANANJAY SURESH GAIKWAD****Amity University, Noida Uttar Pradesh*****Horticulture Research Station, Seobagh, Kullu, Himachal Pradesh**

Rice-wheat system is the extensively practiced cropping system in north-western states of India and generates a huge amount of agricultural wastes in the form of straw and stubbles. The agricultural residue are utilized as animal fodder, roofing and shedding of homes, cattle shed, domestic usage fuel and small-scale industries raw material and fuel. Still, a bulky part of the stubbles and straw is not employed and remains in the agricultural farms. The dumping of huge quantity of farm yield remains is a far-reaching trouble for the farmers. In situ burning of crop residue is adopted to clear the agricultural field promptly and allocating tillage practices for sowing of next crop. This incident is spread universal and also a significant cause of poor air quality throughout the globe affecting soil fertility by eroding nutrients, damaging soil structure and resulting in poor drainage and inefficient transfer of water and nutrients loss of soil organic carbon, heat from burning residues elevates soil temperature causing death of bacterial and fungal populations, repeated burning in the field, permanently diminishes the microbial population. Stubble burning leads to respiratory diseases like Bronchitis, Asthma, Eye irritation and increases disease mitigation expenses and also affects working capacity. The crop residue burning can be curtailed by off-farm utilization (straw removal), in-situ management (straw incorporation and straw mulch/surface retention) of crop residue and by following government policies.

INFLUENCE OF PRE-SOAKING TREATMENTS ON SEED GERMINATION BEHAVIOR AND SEEDLING VIGOUR OF JACK FRUIT**ABHAY BISEN****Pt. S.K.S College of Agriculture and Research Station, Rajnandgaon, IGKV, Chhattisgarh, India**

Jackfruit (*Artocarpus heterophyllus* Lam.) is a native fruit of India and it is preferred in homesteads as a shade tree or a mixed crop. It is estimated that about 1.53 lakh hectare area is covered by this crop with production of 17.22 lakh tones in India. At present, soft wood grafting technique is being followed for production of jackfruit grafts. However, graft production is limited due to lack of availability of the rootstock year round. Loss of viability of jackfruit seeds due to recalcitrant nature imposes a problem in getting seedlings year round. The recalcitrant seed have a characteristic feature that they require the moisture levels above some critical value. If water reaches below this level then the seeds lose the ability to germinate. The recalcitrant behavior of jackfruit has been studied by several researchers. Loss of viability may be either due to the moisture content falling below a certain critical value or simply a general physiological deterioration with time. Jackfruit is such kind of perennial species where storage of seeds is a constraint. Plant growth regulators and some chemicals are widely used in increasing the seed germination percentage and for vigorous and healthy growth of seedlings. GA₃, KNO₃, and Thiourea are being used on a large scale for increasing seed germination, stimulating the growth of various parts of plants and enhancing the rate of elongation of young seedlings. For enhancing, the seed germination and growth of seedling we can use PGR's like GA₃, Ethrel, chemicals like KNO₃, Thiourea, and cow dung slurry. The present experiment was carried out at Instruction Farm, Pt. KLS College of Horticulture and Research Station, Rajnandgaon during the year 2023-24. The experiment was laid out in Complete Randomized Design (CRD) with three repetitions. In all, there were twelve presoaking treatments, control (T₁), water soaking (T₂), Cow-dung Slurry (T₃), GA₃ 150 mg/l (T₄), GA₃ 200 mg/l (T₅), GA₃ 250 mg/l (T₆), KNO₃ 0.5 % (T₇), KNO₃ 1.0 % (T₈), KNO₃ 1.5 % (T₉), Thiourea 0.5 % (T₁₀), Thiourea 1.0 % (T₁₁), Thiourea 1.5 % (T₁₂). It can be concluded from the result obtained from the experiment that, seed treatment with Gibberellic acid 200 mg/l, to Jackfruit seed (24 hrs soaking) was found beneficial for days to first germination, germination percentage, root length, fresh weight of root and dry weight of root, as well as survival percentage.

COMPARATIVE STUDY OF DIFFERENT SOWING METHOD OF WHEAT CROP IN SUB-TROPICAL ZONE OF SAMBA DISTRICT, J&K**ABHAY KUMAR SINHA, NEERJA SHARMA, SAURAV GUPTA, SUNIL KUMAR MISHRA AND SANJAY KOUSHAL**
Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu

Wheat (*Triticum aestivum* L.) is one of the most widely grown cereal crop in the world and increasing the grain yield is an important national goal to face the continuous increasing food needs. Technique of sowing is one of the important factors affecting the yield of wheat. Sowing is a process of planting seeds into the soil. Sowing plays an important role in farming. A perfect seeding gives – the right amount of seed per unit area; the correct depth at which seed is placed in the soil; and the correct spacing between row-to-row and plant-to-plant. Number of sowing techniques is being used by farmers. Out of which three techniques namely sowing of seed using super seeder, zero till drill and conventional sowing systems were selected. The conventional sowing systems require well prepared fields. For the field preparation after the harvest of rice is prepared by 3-4 times tillage operations which consume enormous time, labour and energy besides causing delay in sowing with increased cost of cultivation. The study was conducted to evaluate the performance of treatment T1: broadcasting method of seed sowing after four times cultivator, T2: zero tillage for sowing of wheat crop T3: Super seeder for sowing of wheat crop on farmers' field in subtropical zone of district Samba in J&K during the crop season 2021-22 and 2022-23. It was found that yield and net return for sowing seed by of broadcasting method of seed sowing after four times cultivator, zero tillage and super seeder was 24.3q/ha and Rs. 37,000/ha, 28.70q/ha and Rs. 43,600/ha and 37.76q/ha and Rs. 59,800/ha respectively. The benefit cost ratio was 2.15, 2.70 and 3.65 respectively for these methods of sowing. Increase in yield by super seeder was 54.60 percent over sowing by broad casting after four times cultivator. Super seeder being a new technology was used by very few farmers but it has also helped in getting yields higher than zero till drill and conventional system.

Key words: Super seeder, Zero till seed cum fertilizer drill, broadcasting, net return, benefit-cost ratio and yield.

ECONOMIC ANALYSIS OF SUSTAINABLE AGRICULTURE IN CROP PRODUCTION**ABHILASHA GEHLOT, S. S. SISODIA****Department of Extension Education, RCA, MPUA&T, Udaipur, Rajasthan**

The economic dimensions of sustainable agricultural practices, focusing on their impact on crop production systems. Through a comprehensive analysis of existing literature and empirical data, the study examines the economic viability and efficiency of sustainable farming methods such as organic farming, integrated pest management (IPM), and conservation agriculture. The research evaluates key economic indicators including production costs, yields, profitability, and market demand for sustainably produced crops compared to conventional farming practices. Furthermore, the study investigates the role of government policies, subsidies, and market incentives in promoting sustainable agriculture and enhancing farmers' adoption of environmentally friendly practices. It also explores consumer preferences and willingness to pay premiums for sustainably produced agricultural products, thus shedding light on the market dynamics and potential economic benefits for farmers. The findings of this research contribute to a deeper understanding of the economic drivers and barriers associated with sustainable agriculture, providing valuable insights for policymakers, agricultural practitioners, and stakeholders in formulating strategies to foster a more sustainable and resilient food production system in the face of global challenges such as climate change, resource scarcity, and food security concerns.

Keywords: Economic analysis, Sustainable agriculture, Crop production, Organic farming, Willingness to pay.

UNVEILING NOVEL SPOT BLOTCH RESISTANCE IN DICOCCUM WHEAT (TRITICUM DICOCCUM (SCHRANK.) SCHÜBL.) THROUGH MARKER-ASSISTED INTROGRESSION: PAVING THE PATH TO ENHANCED QUALITY**ABHISHEK. K. GOWDA^{1*}, SHIVASHANKARAGOUA PATIL², S. A. DESAI³, SUMA. S. BIRADAR⁴, I. K. KALAPPANAVAR⁵, NEHAA D. R⁶****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

Wheat stands as the second most crucial staple food crop following rice (*Oryza sativa* L.). All three varieties of wheat, namely bread wheat (*Triticum aestivum* L.), durum wheat (also referred to as Kathia or macaroni wheat) [*T. turgidum* L. subsp. *Durum* (Desf.) van Slageren], and emmer/dicocum wheat (also known as Khapli wheat) [*T. dicoccon* Schrank; syn. *T. turgidum* L. subsp. *dicoccon* (Schrank) Thell], are cultivated across the country. Wheat, being a primary staple food, is vulnerable to various fungal diseases, with spot blotch, caused by *Bipolaris sorokiniana*, emerging as a significant threat to wheat yield and grain quality, particularly in dicocum/emmer species within warm and humid regions of India and neighbouring South Asian countries. Given its wide prevalence and escalating severity, controlling the yield losses attributed to this disease is crucial for ensuring sustainability in wheat production. Utilizing marker-assisted introgression can facilitate the development of BC2F1 lines, which can be confirmed at the molecular level. Heterozygous lines can be simultaneously selfed and backcrossed to generate BC3F1s and BC2F2s, serving as valuable genetic materials for conducting functional genomics and expression studies. This approach aims to comprehend the molecular mechanisms and pathways underlying disease resistance, ultimately aiding in the development of resistant lines in the near future.

TAILORING SODIUM ALGINATE - POLYVINYL ALCOHOL (SA-PVA) HYDROGEL BEADS EMBEDDED WITH CNC/ESSENTIAL OIL FOR SUSTAINED RELEASE BY CROSSLINKING CA²⁺ AND BORIC ACID FOR THE APPLICATION AGAINST POSTHARVEST PATHOGENS OF MANGIFERA INDICA

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The need for the development of agrochemical-controlled release (CR) technologies has increased recently. In this research, we have tailored sodium alginate - polyvinyl alcohol (SA-PVA) hydrogel beads embedded with CNC/Essential oil for sustained release by crosslinking with Ca²⁺ and boric. First, using the acid hydrolysis approach, Cellulose Nano Crystals (CNC) was effectively recovered from the waste of *Amorphophallus paeoniifolius* (Elephant foot yam) and evaluated in terms of their size, shape, and thermal stability in order to fabricate hydrogel beads. The influences of Sodium alginate (1-3% w/w), Cinnamon Bark Essential Oil (1-10% w/w) and cellulose nano crystals (10-40% w/w) on the Encapsulation efficiency (EE), Loading capacity (LC) and Bead Size (BS) were investigated using Response Surface Methodology (RSM) based on Box Behnken Design (BBD). The RSM revealed that the Sodium alginate, Essential oil and cellulose nano crystals produced optimum hydrogel beads. The FT-IR data demonstrated the encapsulation of EO/CNC in the beads by revealing new bands in the filled hydrogel beads spectra. Scanning electron microscopy was used to assess the surface morphology of the beads. The alginate concentration has been shown by SEM to have an impact on the hydrogel beads surface shape. Strong antifungal activity was demonstrated by the alginate hydrogels containing EO/CNC against *Lasiodiplodia theobromae*. The amount of calcium ion and sodium alginate in the filled hydrogels affected their ability to scavenge free radicals (DPPH). Lowering the alginate raises the release of essential oil. Finally, the inclusion of EO/CNC into PVA-SA beads may have a significant influence in delivering a long-lasting antifungal agent against mango postharvest pathogens throughout storage conditions.

Keyword: Controlled release, Cellulose Nano Crystals, Cinnamon Bark Essential Oil, Response Surface Methodology, Box Behnken Design.

GREEN GROWTH: ORGANIC AND NATURAL ECO-FRIENDLY FARMING MADE SIMPLE

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Introduces accessible methods for adopting organic and natural ecofriendly farming practices, presenting a pragmatic approach to sustainable agriculture. The paper outlines fundamental principles and techniques aimed at minimizing environmental impact while promoting agricultural productivity and resilience. Organic farming is characterized by the exclusion of synthetic chemicals and genetically modified organisms (GMOs), instead favouring natural inputs and processes. Key practices include crop rotation, composting, and biological pest control, all of which are explored in a user-friendly manner to facilitate implementation. Additionally, the paper emphasizes the importance of soil health and biodiversity in organic farming systems, highlighting their role in enhancing crop yields and resilience to pests and diseases. Natural ecofriendly farming extends beyond organic practices to incorporate holistic approaches such as agroforestry, permaculture, and regenerative agriculture. These methods are presented in a simplified manner, focusing on their potential to mimic natural ecosystems and promote sustainable land management. By integrating trees, crops, and livestock, natural ecofriendly farming systems aim to enhance biodiversity, improve soil fertility, and mitigate climate change. It underscores the importance of knowledge sharing, supportive policies, and market incentives in fostering widespread adoption of sustainable farming practices. In summary, the paper advocates for the feasibility and benefits of embracing organic and natural ecofriendly farming methods, aiming to empower farmers to contribute to a greener, healthier future.

Keywords: Natural ecofriendly farming, sustainable farming, agroforestry, organic farming, biodiversity

GREEN LEAFY BRASSICA PRODUCTION WITH ALTERED PLANT CONFIGURATION FOR ENHANCING FARMERS YIELD AND PROFITABILITY

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Oilseeds are essential to the Indian economy. Rapeseed-mustard is one of the important edible oilseed crops in north India. During initial stage of crop, it also used as a green leafy vegetable. In oilseed rape, row spacing, or plant density varies considerably worldwide, depending on the environment, production system and cultivar. The growth phase of the crop should synchronize with optimum environmental conditions for better expression of growth and can be useful to vegetable leaf production as initial growth is low. So initial closer spacing helps to use it as a leafy vegetable and remove before grand growth picking up. In north India, there is a demand for green leafy mustard. So, it can become a good source of income for farmers during initial days of crop growth, which required good amount of money for doing various cultural operation and for purchasing off farm inputs. Some of the species of brassica like *E. sativa*, *B. rugosa*, *B. juncea* can be used for this purpose without affecting crop yield with initial alteration of plant configuration.

Key words: Oilseed, Mustard, Green Leaf

EXPLORING THE PRINCIPLES AND PRACTICES OF NATURAL FARMING: A SUSTAINABLE APPROACH TO AGRICULTURE**ABHISHEK RAI, ASUTOSH KUMAR AND GLORY JAIN****School of Agriculture Science, LNCT University Bhopal - M.P. (India)**

A holistic farming method called "natural farming" emphasises growing crops in balance with nature as opposed to battling it. By eschewing artificial chemicals and fertilisers in favour of native biodiversity and ecological processes, this approach lessens farmers' reliance on costly inputs. Fundamentally, natural farming is about improving the health of the soil by enriching the organic matter in the soil through practices like mulching, composting, and cover crops. Due to the reduced starting costs associated with chemical inputs, natural farming has the potential to be more profitable economically than conventional farming. Furthermore, the possibility for farmers to make more money is increased by the premium price at which naturally cultivated goods can be sold under organic labels. This agricultural technique contributes to ecological sustainability by greatly reducing pollutants and protecting biodiversity. Natural farming is an essential practice for the development of sustainable agriculture since it helps to mitigate climate change by lowering greenhouse gas emissions linked to chemical manufacture and application. As a result, natural farming provides farmers with a wide range of advantages and promotes a return to agricultural methods that are more ecologically friendly, economically feasible, and sustainable.

EPIDEMIOLOGICAL STUDY OF BRUCELLOSIS IN DAIRY CATTLE OF MATHURA DISTRICT**DR. ABHISHEK RATHEE, DR. UDIT JAIN, DR. PARUL, DR. BARKHA SHARMA, DR. ASHIMA, DR. ISHTA AGHNIHOTRI****Department of Veterinary Public Health, College of Veterinary Science and Animal Husbandry, U.P. Pandit DeenDayal Upadhyaya Pashu-Chikitsa Vigyan Vishwavidyalaya Evam Go-AnusandhanSansthan, Mathura, India**

Seroprevalence study of Brucellosis in dairy cattle and human of various blocks of Mathura district, India, was done using different serological tests viz. RBPT, STAT, i-ELISA, c-ELISA, MRT, CMT. A total of 405 serum samples were collected comprising dairy Cattle (372), male (33) and Human (80) and 165 raw milk samples were also collected from dairy cattle. On analysis of 405 animal samples, RBPT recorded in dairy cattle 49 (13.17%) whereas 0 (0%) in human. STAT showed 43 (11.55%) in dairy cattle, 4(50%) in human. Similarly, i-ELISA revealed 55 (14.78%) and 6 (7.5%) in human. Similarly, c-ELISA revealed 8 (2.15%) in dairy cattle. MRT and CMT showed 22(13.34%) and 24(14.54%) respectively in dairy cattle which shows that the Brucellosis is one of the factor of causing Sub-clinical mastitis in the dairy cattle of Brucella positive animals. PCR detected amplicons of 223bp in tissue samples employed whereas only 3 sample was detected with B. abortus, B. melitensis, B. ovis, B. suis by AMOS PCR at 498bp, 285bp, 976bp & 731bp. Histopathology and mZN staining was also performed on the tissue sample (liver, spleen, foetal stomach content). Pink colour coco Bacilli and histopathological changes were seen in the tissue samples of aborted fetus. Risk factor analysis was also done on the basis of questions asked to the farmers of the Mathura district. Factors like herd size, climate, region of origin, level of hygiene, breeds was not significant for brucellosis in dairy cattle by P value was more than 0.05. Similarly odd ratio was also calculated for the risk factor analysis and it shows region of origin, level of hygiene, knowledge and awareness at farms are the main risk factor for the endemic spread of Brucellosis in various blocks of Mathura district. Taking i-ELISA as standard test the sensitivity and specificity of RBPT and STAT for dairy cattle and STAT for humans were calculated. Result shows (89.09%) sensitivity & (86.61%) specificity of RBPT, (78.18%) sensitivity & (88.05%) specificity of STAT for dairy cattle and (66.7%) sensitivity, (94.87%) specificity of STAT for Humans. Economic loss was also calculated as per the economic model to estimate the loss due to the Brucellosis to farmers of Mathura district. The result shows that the loss was estimated Rs. 62,95,129/- per annum which is a huge economic loss to the farmers of dairy cattle of dairy farms/gaushalas of various blocks of Mathura district.

Key words: Brucellosis, sensitivity, specificity, economic model, B.suis, B.melitensis, B. abortus, B.ovis, c- ELISA.**STUDY ON ISOLATION AND IDENTIFICATION OF FUNGAL COMMUNITIES FROM DECOMPOSING PADDY CROP RESIDUE****ABHISHEK SAINI AND RAJ SINGH****Department of Bio-Sciences and Technology, Maharishi Markendeshwar (Deemed to be University), Mullana, Ambala, Haryana**

The present work aims to isolate and identify fungal community from the compost samples (Paddy crop residue). Fungi are the major degraders of organic matter in natural environments, and almost every naturally occurring organic compound can be degraded by one fungus or another. An enormous range of organic compounds can be utilized by fungi, especially the major organic compounds such as cellulose, xylene and lignin from compost. Compost preparation was carried out at Department of Bioscience & Technology, MMDU, Mullana during 2021 and 2023 by biodegradable waste using paddy crop residue. The qualitative and quantitative composition of individual, composts (biodegradable waste, paddy crop residue) was used for the isolation. The fungi were isolated on Potato Dextrose Agar (PDA) and at different temperature 30°C. Substantially qualitative differences in the species composition of different vegetables composts were observed. A total of 4 entities were isolated from compost samples at 37°C. This report demonstrates that the qualitative and quantitative characterization of individual composts and fungal communities essential for decomposition of paddy crop residue. Fungi are the major degraders of organic matter in natural environments, and almost every naturally occurring organic compound can be degraded by one fungus or another. An enormous range of organic compounds can be utilized by fungi. The Composting of solid organic wastes is an essential requirement of organic farming to minimize the chemical pollution in agriculture.

Keywords: Isolation, Identification, Fungal Communities, Biodegradable waste, Compost

EFFECT OF CONJOINT USE OF BIO-NPK AND BIO-ZN WITH CHEMICAL FERTILIZERS ON YIELD OF SOYBEAN (GLYCINE MAX L. MERRILL)**Abhishek Sharma^{1*}, M.D. Vyas², B.K. Sharma³, Shubham Ahirwar⁴****R. A. K. College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior (M.P.) India**

Soybeans are a large oil seed crop and legume that may be produced in a variety of soils and climates. A crucial micronutrient needed by humans, animals, and plants is zinc. As there is a greater concern to sustain the deteriorating soil health due to indiscriminate use of chemical fertilizers and hence exerting the lack of beneficial microbes in the soil. Therefore, lack of essential nutrients in the soil is a global concern for the yield of food crops. The present investigation was carried out during kharif 2021 on Research farm of R.A.K. College of Agriculture, Sehore (M.P.) to evaluate the Effect of Conjoint use of Bio-NPK and Bio-Zn with Chemical Fertilizers on Yield of Soybean. The studies have been found beneficial to fetch the more production of the crop. The experiment was laid out in Randomized Block Design with seven treatments in combinations in three replications consisting of treatments T1: Control; T2: 100% Recommended dose of fertilizers (RDF); T3: 75% RDF; T4: 75% RDF + Bio-Zn; T5: 75% RDF + Bio-NPK; T6: 75% RDF + Bio-Zn + Bio-NPK; T7: 75% RDF + Rhizobium japonicum. Revealed that yield was increased with the inoculation of microbial cultures as compared to uninoculated control and highest seed yield was found in treatment T2 (100% RDF) 1008 kg ha⁻¹ and it was at par with T3 (75% RDF), T4 (75% RDF + Bio-Zn), T5 (75% RDF + Bio-NPK), T6 (75 % RDF + Bio-Zn + Bio-NPK) and T7 (75% RDF + Rhizobium japonicum) having yield 840 kg ha⁻¹, 889 kg ha⁻¹, 941 kg ha⁻¹, 949 kg ha⁻¹ and 914 kg ha⁻¹ respectively. Straw yield of soybean found non-significant and treatment T2 (100% RDF) recorded highest straw 869 kg ha⁻¹. Highest net monetary return was recorded under T2 (20996 ₹ ha⁻¹) i.e. 100% RDF followed by treatment T6 (19349 ₹ ha⁻¹) i.e. 75% RDF+ Bio-Zn + Bio-NPK and T5 (19096) i.e. 75% RDF+ Bio-NPK as compare to control.

Keywords: Bio-Zn, Bio-NPK, Chemical Fertilizers, Black Soil, Soybean.**ARTIFICIAL INTELLIGENCE, MACHINE AND DEEP LEARNING, CLOUD, IOT TOOLS IN NEXT-GENERATION SUSTAINABLE AGRICULTURE****Abhishek Sonkar^{1*}, Aman Kumar Maurya², Brijesh Patel¹ and Niharika Singh³****¹Research Scholar, Department of Fruit Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya****²Research Scholar, Department of Fruit Science, Rani Lakshmi Bai Central Agricultural University, Jhansi (U.P.)****³Research Scholar, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya**

The integration of Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL), Cloud Computing, and Internet of Things (IoT) tools is transforming next-generation sustainable agriculture. These advanced technologies address key challenges in modern farming, such as resource optimization, crop management, and environmental sustainability. AI and ML algorithms drive precision agriculture by enabling data-driven decision-making, which enhances yield predictions, pest and disease detection, and soil health monitoring. DL models further refine these capabilities by analyzing complex patterns and images from agricultural datasets. Cloud computing provides scalable storage and processing power for vast amounts of agricultural data, ensuring real-time accessibility and efficient data management. IoT devices, including sensors and drones, continuously monitor and collect data from the field, supporting efficient water usage, nutrient management, and climate control. By creating a smart agricultural ecosystem, these technologies promote sustainable practices, reduce environmental impact, and improve food security. This paper explores the applications and benefits of AI, ML, DL, Cloud, and IoT tools in sustainable agriculture, emphasizing their role in revolutionizing the agricultural landscape. The integration of these technologies not only enhances productivity and sustainability but also empowers farmers with actionable insights, leading to more informed and effective farming practices. As the global population continues to grow, the adoption of these innovative tools in agriculture is crucial for ensuring a sustainable and secure food supply.

Keywords: Artificial Intelligence (AI), Machine Learning (ML), Cloud Computing, Internet of Things (IoT), Precision Agriculture, Smart Agriculture, Food Security.**EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD OF ONION (ALLIUM CEPA L.) CV. PUSA SHOBHA ABHISHEK TIWARI¹, M. L. MEENA², RINKI SHUKLA³****^{1,2} Department of Horticulture, School of Agricultural Sciences & Technology, Babasaheb Bhimrao Ambedkar University (A Central University) Vidya-Vihar, Raebareli Road, Lucknow, Uttar Pradesh, India****³Department of Agriculture, Rama University, Kanpur, Uttar Pradesh, India**

The experiment conducted during Rabi season in the years, of 2021-22 and 2022-23 both the year at Horticulture Research Farm, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar Raebareli Road Lucknow, (U.P.). The experiment was laid out in randomized block design (RBD) with three replications and fourteen treatments. Results revealed that the treatment T9- 75% RDF + FYM (5 t/ha) + Vermicompost (2 t/ha) + Azotobacter (5 Kg/ha) + PSB (5 Kg/ha) performed better with integrated approach of Vermicompost, FYM and biofertilizer respect to yield characters such as average bulb weight (99.36g), polar diameter (6.22cm), equatorial diameter (6.2cm), neck thickness (0.94cm), number of scales/bulb (9.44) and total bulb yield (259.25q/ha) onion bulb.

Keywords: INM, RDF, Yield, Biofertilizer, Vermicompost and Farmyard manure.

ADVANCING AGRICULTURAL SUSTAINABILITY: A REVIEW ON INTEGRATING COMPUTER VISION AND DEEP LEARNING FOR PRECISION DISEASE MANAGEMENT**ABHISHEK UPADHYAY¹, NARENDRA SINGH CHANDEL²**¹ICAR-Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh²Agricultural Mechanization Division, ICAR-Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh

Plant diseases are thought to be a danger to food security since they severely harm growing crops and significantly reduce yields. Plant disease detection, identification, assessment, and diagnosis are essential for crop protection and precision agriculture. Crop disease diagnostics using computer vision technology has a major impact on agricultural modernization advancement and production efficiency enhancement. Its precision, speed, real-time response, and non-destructiveness are among its best attributes. The most recent development in computer vision, deep learning, has drawn attention to agricultural plant protection research, particularly in identifying plant diseases and assessing pest ranges. When used with deep learning, plant disease detection can lessen the drawbacks of artificially picking disease spot characteristics, enhance the objectivity of feature extraction, and accelerate the creation of new technologies. This paper provides an in-depth analysis of the methods and instruments used for autonomous disease detection, cutting-edge deep learning models, and current developments in DL-based image analysis. Model architectural design and computer vision techniques were used to identify manuscripts. We believe that, by providing legitimate agricultural models, our work will aid scholars and researchers. The country's economy, as well as the lives of farmers, would benefit from this study.

Keywords: Computer vision, Convolutional neural network, Deep learning, Plant diseases, Vision transformers.**MONITORING OF INSECT PEST COMPLEX ASSOCIATED WITH PEA AT EASTERN U.P. CONDITION****ABHISHEK YADAV¹, SOMENDRA NATH¹, TARA YADAV² AND MOHIT TIWARI³****Krishi Vigyan Kendra, Sohaon, Ballia (U.P.)****1Department of Entomology, Agriculture University, Jodhpur (Rajasthan)****2Department of Entomology, CSAUA&T, Kanpur (U.P.)**

The pest spectra comprised of nine species were observed to attack pea at different stages of crop growth in an overlapping manner. Among them Surface Grasshopper, Chrotogonus trachypterus, stem fly, Ophiomyia phaseoli (Tryon) leaf miner, Phytomyza atricornis, whitefly, Bemisia tabaci and aphid, Acyrthosiphon pisum, blue butterfly, Lampides boeticus and Semilooper, Plusia orichalcea has assumed the status of minor pests. Whereas, Gram pod borer, Helicoverpa armigera and pea pod borer and Etiella zinckenella, were recorded as major pests during two consecutive seasons i.e. rabi, 2022-23 and 2023-24 under KVK cafeteria and Farmer field condition.

Keywords: Aphid, farmer field, grasshopper, rabi, kvk, pod borer, pea pod borer and stem fly.**IMPACTS OF HSD ALONE AND IN COMBINATION WITH RUTIN ON HSP70 EXPRESSION, FREE RADICAL PRODUCTION, AND HEMOCYTE SURVIVABILITY OF DROSOPHILA MELANOGASTER****ABHRATANU GANGULY AND PREM RAJAK****Toxicology Research Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, West Bengal, India**

Sucrose is a widely used ingredient in various food preparations across the globe. It is abundant in cookies, fruit juices, soft drinks, candies, and in many other food items. However, recent findings have suggested that consumption of excessive sucrose can be detrimental to the health. Rutin is a bioflavonoid that has multiple health promoting efficacies. Nonetheless their beneficial impacts against High Sucrose Diet (HSD) have not been assessed. Hence, the present study aims to explore the health promoting impacts of rutin against HSD induced changes in HSP70 expression, free radical generation, and hemocytes in a model organism, Drosophila melanogaster. Results of the study indicated that chronic exposure to HSD (30%) induced free radical generation, and protein denaturation as evidenced by elevated HSP-70 expression. Furthermore, HSD was found to inflict hemocyte mortality in treated individuals. Interestingly, treatment with rutin (200µM) was found to minimize HSD induced oxidative stress, and hemocyte mortality in D. melanogaster.

Keywords: High Sucrose Diet, Rutin, Oxidative stress, Drosophila melanogaster

BIODEGRADABLE MRNA NANOPARTICLES FOR TARGETING THE CHITINASE GENE IN PEST MANAGEMENT: UTILIZING NANOPORE SEQUENCING FOR ENVIRONMENTAL MONITORING**ADHAAR KOHLI AND SONAM CHAWALA*****Department of Biotechnology, Jaypee Institute of Information Technology, Noida, Sec-62, Uttar Pradesh, India**

In the quest to combat pesticide resistance, this study investigates the application of biodegradable mRNA nanoparticles engineered to specifically silence the Chitinase gene in agricultural pests. Chitinase is integral to chitin biosynthesis, a critical component for insect exoskeletal structure. Utilizing targeted gene silencing via these nanoparticles provides a potent biocontrol strategy against pests. This research employed long-read nanopore sequencing (MinION platform) to assess the temporal and spatial transcriptomic dynamics of the Chitinase gene expression within treated pest populations. Additionally, advanced bioinformatics analysis, including differential gene expression analysis and sequence homology mapping, was utilized to predict the ecological footprint and assess off-target effects on non-target species. This method ensures that the nanoparticles are both effective in reducing pest populations and have a minimal impact on the ecosystem. Our findings suggest that mRNA nanoparticle-mediated gene silencing represents a viable and sustainable alternative to traditional chemical pesticides.

Keywords: Biodegradable mRNA nanoparticles, Chitinase gene silencing, nanopore sequencing, biocontrol, transcriptomic analysis, bioinformatics, sustainable pest management, ecological impact, MinION sequencing technology.

COMBINING ABILITY STUDIES OF TWO SEASONS IN F2 POPULATION OF HEXAPLOID WHEAT (TRITICUM AESTIVUM L.)**DR. ADITI R. RAJANE, DR. PALLAVI R. SASANE, DR. S.U. BORALE, DR. N. R. POTDUKHE, DR. SUVARNA C. NAGRALE, DR. BHAGYASHREE P. BAHATKAR, VIVIDHA M. SIRSAT.****Institute: Department of Agricultural Botany, Dr. Panjabrao Deshmukh Krushi Vidyapeeth, Akola, 444104**

The present investigation was undertaken to estimate general combining ability effects of parents and specific combining ability effects of crosses and its component traits. The experiment was conducted during two seasons at Wheat Research Unit. Dr. Panjabrao Deshmukh Krushi Vidyapeeth, Akola (Rabi 2018-19 and 2019-20). The experimental material consists of 145 genotypes, which include 12 parents, 132 F2 crosses and 1 check (WB-2) and were grown in randomized block design with three replications. The data was recorded on nine quantitative characters. Results show that, parents, AKAW-4924, GW-322 and MACS-6222 were found as best general combiners for grain yield per plot in pooled data. Based on high mean performance, significant SCA effect four promising (two direct and two reciprocal crosses) crosses WB-2 x GW-322, HPBW-01 x WB-2, GW-322 x AKAW-4925 and GW-322 x WB-2 are identified as best. Therefore, these crosses can be utilized to obtain transgressive segregants. Two direct crosses MACS-6222 x WB-2 and MACS-6222 x HPBW-01 recorded high mean performance and highly significant residual useful heterosis, non-significant SCA effects and all the parents involved had good general combining ability effects for the grain yield per plot. This indicates the important role of additive x dominance gene interaction in high ranking per se performance of these crosses.

Keywords: General combining ability, specific combining ability, residual useful heterosis, transgressive segregants, gene interaction

UTILIZATION PATTERN AND KNOWLEDGE OF MAJOR CROPS GROWN IN DHARWAD AND BELAGAVI DISTRICT OF KARNATAKA**ADITYA ARUNKUMAR BIKKANNAVAR AND RENUKA S. SALUNKE****Department of Family Resource Management, University of Agricultural Sciences Dharwad**

Agriculture is emerged as the primary occupation for the majority of respondents, with subsidiary occupations such as business and agriculture-related activities. A study focusing on farm families in Dharwad and Belagavi districts sheds light on their socio-demographic profile and agricultural practices. Among 240 surveyed families, agriculture was emerged as the primary occupation, often supplemented by other activities like business. The majority (36.4%) of respondents were in the middle age group, with a significant portion being educated beyond middle school, including graduates. Marital status leaned heavily towards marriage, reflecting the prevalent family-centric agricultural communities. With respect to caste Other Backward Classes (OBC) constituted a significant portion (81.67%). However, income disparities were apparent, with many falling into the low-income category, indicating potential economic challenges within the farming sector. Further the study highlighted the utilization patterns of farm waste, with notable reliance on wastes from wheat, cotton, maize, and sugarcane. Yet, there existed a lack of awareness among farmers regarding alternative uses for these materials. While some farmers utilized crop waste for purposes like fuel or manure production. Regarding knowledge, it is clearly found that, 55.42 per cent of farmers were fully aware and making manure by wheat crop waste, while 15.00 to 40.00 per cent of farmers were partially aware and wheat waste can be used to make foot mats, carpets, bags disposable food containers, and baskets. Overall, the research provides valuable insights into the socio-demographic characteristics and agricultural practices of farm families in the region. It emphasizes the need to enhance awareness and knowledge among farmers regarding the utilization of crop waste, which could significantly contribute to economic sustainability and environmental conservation. Targeted interventions and further research are necessary to address these gaps and promote more efficient agricultural practices in Dharwad and Belagavi districts of Karnataka.

Keywords: Knowledge, Utilization pattern, Agriculture, Crops, Farmers

UTILIZATION OF SUGARCANE, MAIZE, COTTON AND WHEAT WASTE AMONG THE FARMERS**¹ADITYA ARUNKUMAR BIKKANNAVAR, ²DR. RENUKA SALUNKE AND ³DR. SWATI VANNUR****¹Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad****²Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad****³Programme officer under DST Project, Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka**

Agriculture plays a vital role in the economies of many regions, with farm families forming the backbone of agricultural activities. Indian agriculture is a diverse and vital sector that plays a pivotal role in the country's economy and sustenance of its vast population. Keeping this in view a study was conducted on Utilization of Sugarcane, Maize, Cotton and Wheat waste among the farmers. The research design used for the study was exploratory design. This research design was used to explore the utilization practices of farm waste by the selected respondents of Dharwad and Belagavi district. The study covered 240 farm families i.e. each 60 farm families from Dharwad, Kundgol, Kittur and Bailhongal taluka. The results revealed that most of the respondents belonged to old age group followed by middle age group. Whereas irrespective of district 80.00 per cent of farmers were using wheat waste for mulching (I rank) compost making for 72.00 per cent (II rank), further used for animal bedding and shelter purpose was found to be 69.00 per cent (III rank). More than 70% of people are aware of how biogas plant waste, mushroom waste, wheat trash, mustard, and horticultural waste can be used.

Key words: Agriculture, crop waste, utilization pattern, farmers**DEVELOPMENT OF HEADGEAR WITH AIR CIRCULATION MECHANISM****ADITYA RAJ¹, DR. SANWAL SINGH MEENA² AND *NARENDRA KUMAR YADAV³****¹M. Tech. Scholar, ²Associate Professor and Head and ³Phd Research Scholar, Department of Farm Machinery and Power, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan**

India has a 329 M.ha. geographical area with variations in climate and temperature from region to region. Summers are very harsh in many parts of the country where temperature exceeds 45°C. Most of the agricultural operations in the country are performed by manual labour in such a warm climate where it becomes difficult for the body to maintain its heat balance with the environment. In leads to heat stress many a time. Heat stroke is the most serious among these disorders and it may lead to death if not properly treated. To minimize heat stress in warm climate many techniques are used. One of them is the use of headgear which protects the head. Farmers are using towel, pagdi, caps etc. as headgear from the last many years. However they are less effective because either they do not cover complete head or do not provide proper shadow and ventilation. Scientists have also worked on many headgears like white pagdi, bamboo hat, hat with 95 mm brim width and headgear with solar fan system. These headgears increased the comfort of the workers but still they had certain lacunas because of which they did not become popular. It was, therefore, felt that a solar headgear with air circulation system is needed which can reduce the risk of heat stress and improve the comfort of agricultural workers. The developed solar headgear consists of 3 W solar panel, brushless motor (6 volt, 2.5W), fan, potentiometer (470k), and on/off switch. The potentiometer was used to regulate the speed of the fan. On/off switch was provided to use the fan as and when required. The results of the research showed that thermal parameters like oral, head, forehead, left lower hand, upper right hand temperatures of farm workers increased with increase in WBGT due to heat stress. However, forehead temperatures decreased with increase in WBGT, due to perspiration and evaporative cooling. Physiological parameters like resting and working heart rate as well as resting, due to heat stress. The use of headgear reduced the effect of heat stress significantly on thermal parameters and physiological parameters. The developed solar headgear with air circulation mechanism was found best among the headgear in reducing the ill effects of heat stress.

Keywords: WBGT, Solar headgear, Brim Width, heat stress and bamboo hat**OPTIMIZATION OF NITROGEN DOSES FOR HIGH YIELD POTENTIAL OF WHEAT (TRITICUM AESTIVUM L.)****ADITYA SHRI*, SUMAN KUMARI, SEEMA, SUSHANT, MAHENDRA SINGH, S. N. SINGH****Department of Agronomy, Bihar Agricultural University, Sabour, Bhagalpur**

Wheat (*Triticum aestivum* L.) its quality and yield mainly depends upon the factors like environment, genotype, and their interactions. Low soil fertility, especially nitrogen (N) deficiency, is one of the major constraints limiting wheat production in India. To find out the standardization of various doses of N for enhancing the productivity of wheat grown in middle Gangetic plain zone of Bihar, this research work was formulated at Bihar Agricultural College, Sabour, Bhagalpur, with the title of "Optimization of nitrogen doses for high yield potential of wheat (*Triticum aestivum* L.)" For this experiment ten treatments were taken i.e. T1-[Control], T2-[50% RDF of N], T3-[75% RDF of N], T4-[100% RDF of N], T5-[125% RDF of N], T6-[150% RDF of N], T7-[100% RDF of NPK], T8-[T5-[125% RDF of N], T9-[150% RDF of N with PGR], and T10-[150% RDF of NPK with PGR], with three replications in RBD design. Our results revealed that treatment T10 was found best in terms of Growth parameter like number of tillers m⁻², leaf area index, dry matter accumulation per meter square and crop growth rate stage at first node and boot leaf stage. And also the highest grain (51.71 qt. ha⁻¹) and straw yield (65.38 qt. ha⁻¹) was found in T10 followed by T7: 100% RDF of NPK (49.23 and 63.85 qt./ha grain and straw yield respectively). However, the highest agronomic efficiency and apparent recovery were found in T7. The maximum cost of cultivation (Rs. 47,670.00) was incurred with 150% RDF of NPK with PGR. Application of 100% RDF of NPK achieved the highest B: C ratio (1.96) and net return (Rs. 81,819.33). On the basis of above finding it can be concluded that maximum yield with higher net return was observed with treatment T7- (100% RDF of NPK).

Keywords: wheat production, PGR, nitrogen efficiency, soil fertility

EFFECT OF JEEVAMRUTHA ON GROWTH, YIELD AND QUALITY OF HYBRID TMOH 375 & SAMRAT IN OKRA (*Abelmoschus esculentus*) UNDER AGROCLIMATIC CONDITION AT PRAYAGRAJ**ADITYA YADAV AND VINKY SHARMA****Department of Horticulture, (NAI) Sam Higginbottom University of Agriculture, Technology Sciences, Prayagraj (Allahabad) UP**

A field experiment was carried out at Vegetable Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj (U.P.) to evaluate the "Effect of jeevamrutha on Growth, Yield, and Quality of Hybrid TMOH 375 & SAMRAT in Okra (*Abelmoschus esculentus*) Under Agroclimatic Condition At Prayagraj" during the period from February to June, 2023. The ten jeevamrutha treatments which were laid out in a factorial randomized design replicated thrice. Analysis of the data revealed that various jeevamrutha treatments significantly affect the growth and yield parameters of okra. Among all the different parameters of growth, yield and quality significantly higher [Germination percentage (80%), Number of days to germination(6.00), Plant height (120.03 cm), Days taken to 50% flowering (53.03), Individual pod weight (13.00 g), number of pods per plant (21.0), fruit yield per plant (280.05 g), Total yield of fruits (175.52 q/h)] were found in the Treatment T4 (jeevamrutha 10%) cv. TMOH 375].

Keywords: Okra, jeevamrutha, growth, yield**STUDY OF CLEANING SYSTEM FOR PV SOLAR PANELS****ADITYANSHU TRIPATHI*, P K MISHRA, MANISH KUMAR, PAUL ARJUN SANJAY, SANDEEP PANDEY, RAM JEET SINGH, ASHU SINGH, SHUBHAM YADAV, SHASHANK VERMA, ARPIT TIWARI, SURYAMANI DIXIT****Mahamaya Collage of Agricultural Engineering and Technology, Akbarpur, Ambedkar Nagar U. P. (A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya, U.P.)**

The solar panel cleaning systems, which are currently available in market, are very costly, complicated in design. These are designed by keeping large scale work in mind, so there is huge need to design such a cleaning system that is able to clean number of solar panels very easily and in very low cost. The developed portable solar panel cleaner is best suited for small scale solar powered industries as well as in agricultural operations because it has low initial cost as well as low operating & maintenance cost. Because of its simple design, there are no complications in handling of portable solar panel cleaner. The design of solar panel cleaner is made by keeping different aspects in mind. The dimensions such as height, length, and width are selected by keeping dimensions of solar panels as well as the inclination angle at which solar panel is installed in mind. For creation of 3D design, NX 12 software has been taken into use. After creation of components, drafting of each component has been done through this software. The different components of portable solar panel cleaner have been fabricated first and subsequently assembled. By the use of this portable solar panel cleaner, the solar panels can be cleaned very efficiently within very short duration of time.

Keywords: Solar panel, Cleaning mop, battery, motor, chain and sprocket etc.**EXPLORING WORK-RELATED DISCOMFORT AMONG FLOOR-SITTING KAUNA HANDICRAFT WORKERS****MS. AELENA TAKHELLAMBAM¹, DR. SEEMA KWATRA²****Ph.D. Scholar¹, Professor², Department of Family Resource Management, College of Community Science, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India**

Work-related musculoskeletal disorders (WMSDs) encompass a spectrum of painful conditions stemming from the repetitive strain exerted on muscles, joints, nerves, tendons, and soft tissues during work activities, often resulting in discomfort and decreased productivity. Among various occupations, handicraft manufacturing stands out as a domain with heightened vulnerability to these ailments due to the repetitive and physically demanding nature of tasks involved. This particular research hones in on kauna (water reed or *Cyperus pangorei*) handicraft workers situated in Manipur, India, with the principal aim of meticulously assessing and identifying risk factors correlated with work-induced discomfort within this specific demographic, constituting a sample size of 120 individuals. Employing a comprehensive methodology integrating cross-sectional surveys and face-to-face interviews, the study employs a tailored adaptation of the Standardized Nordic Questionnaire to systematically gather and analyze pertinent data. Results gleaned from the investigation notably underscore the prevalence of discomfort localized primarily in the buttocks and lower back regions, while the occurrences in the neck, shoulders, and upper back are comparatively less frequent. Consequently, the study advocates for the implementation of targeted interventions, including regular physical exercise routines and ergonomic optimizations of workstations, as viable strategies to alleviate the discomfort experienced by kauna workers. Despite the evident pervasiveness of WMSDs within this occupational sphere, there remains a conspicuous dearth of concerted efforts within the handicraft industry aimed at addressing and mitigating these pressing occupational health concerns. This critical oversight underscores the imperative for heightened awareness, proactive measures, and enhanced support mechanisms to safeguard the well-being and longevity of workers operating within this sector.

Keywords: floor sitting, handicraft workers, musculoskeletal disorders

GENETIC DIVERSITY, TRAIT RELATEDNESS AND CAUSE EFFECT ANALYSIS IN BIRD OF PARADISE ((STRELITZIA REGINAE AIT.) GENOTYPES**AIRADEVI P. ANGADI*1, SARASWATI SAMPAGAVI2, JAYASHRI PATTAR 3, ARCHANA BAJANTRI4, SHREESHAIL S.5 AND RAVI Y.6*****1 Scientist (Horticulture), ICAR-KVK, Dharwad, UAS, Dharwad, 2Junior Horticulture scientist, AICRP-Potato, MARS, UAS, Dharwad, 3 Scientist (Animal science), ICAR-KVK, Dharwad, 4Assistant professor (Horticulture), College of Agricultural Sciences, Iruvakk, KSNUAHS, Shivamogga, 5Assistant professor (Plant pathology), AICRP on Arecanut, ZAHRS, Navile, KSNUAHS, Shivamogga, 6Senior scientist (FN), AICRP-WIA, MARS, UAS, Dharwad,**

Genetic diversity is the first and important parameter in crop improvement programme. In the present investigation, hundred Bird of paradise genotypes were assessed to know the nature and magnitude of genetic diversity using correlation coefficient, path analysis and Mahalanobis D2 statistics. The Bird of paradise genotypes demonstrated highly significant differences for all the traits studied, indicating that the wide variability is present among the bird of paradise genotypes. The results of correlation analysis at genotypic and phenotypic levels revealed that no. of flowers per hill of genotypes showed positive and significant correlations with plant height, stem girth, leaf length, leaf width, no. of leaves/plant, number of suckers/hill, flower stalk length and flower stalk girth. Negative correlation was found with no. of leaves/plant. Hence, the selection of these characters would be effective in improving yield. Genetic divergence of hundred Bird of paradise genotypes were assessed to using cluster and principal component analysis. The genotypes was grouped into twenty five clusters. The stem girth, flower stalk length, flower stalk girth, number of suckers/hill, number of flowers and vase life in days components were found main parameters contributing towards divergence and played dominant role in the improvement of bird of paradise quality. The distribution pattern indicated that Cluster-I retained maximum number of treatments which showed genetic similarities. Cluster VI with 6 genotypes and rest of the clusters were of solitary type which have considerable differences in their parents. Therefore, selection for divergent parents based on these traits is recommended for getting desirable hybrids in Bird of Paradise.

Keywords: Bird of paradise progenies, Cluster mean, Correlation, Genetic divergence Heritability, Path analysis**DEVELOPMENT OF PERILLA SEED OIL BASED TRANS-FAT FREE MARGARINE RICH IN OMEGA-3 FATTY ACIDS****AISHWARYA DHIMAN1, RAJNI CHOPRA2*****1Ph.D. Scholar, 2*Professor and Head, Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana**

The study aimed to develop a novel, nutritious margarine with zero trans-fats and high polyunsaturated fatty acids (PUFA), thus offering consumers a healthier alternative to traditional margarine. The margarine was developed using perilla seed oil as a primary ingredient as it is a rich source of omega-3 fatty acids, however has limited application due to susceptibility to oxidative and thermal degradation. This can be improved by techniques like blending and interesterification. However, blending lacks uniformity, which can be overcome by interesterification. Enzymatic interesterification conditions namely, temperature, time, enzyme load and substrate molar ratio (Perilla seed oil: Palm stearin) were optimized using RSM for the formulation of margarine fat while degree of interesterification, hardness and slip melting point were studied as the dependent variables. The optimized interesterified fat was subjected to detailed characterization, encompassing analysis of its fatty acid profile and triacylglyceride composition. Comprehensive evaluations were conducted to assess its physicochemical, textural, rheological, and thermal properties, alongside oxidative stability. These analyses collectively aimed to determine the overall quality of the trans-fat free margarine fat rich in PUFA. The triacylglycerides (TAG) composition of the resulting structured lipid (SL) was significantly modified with increased development of triunsaturated TAGs like LnLnLn and LnLnL, but a reduction in trisaturated TAGs like PPP. The optimized structured lipid was then used in margarine formulation and was observed to be comparable to the traditional margarine in terms of its techno-functional properties revealing the potential application for utilization of Perilla seed oil in healthy margarine formulation. The oxidative stability and functional properties of interesterified fat significantly improved.

Keywords: Structured Lipid, Enzymatic Interesterification, Omega-3 fatty acid, Trans-fat free, Bakery Fat.**BOOSTING SOYBEAN YIELD AND ECONOMICS: UNVEILING THE POWER OF BIOSTIMULANTS****AISHWARYA GOLSHETTI*1, G SOMANAGODA2, R CHANNAKESHAVA3 AND SHIVASHANKAR K4****1Department of Agronomy, College of Agriculture, V C Farm, Mandya, Karnataka, India****2Professor and head of All India Coordinated Research Project on Soybean, MARS, University of Agriculture Sciences, Dharwad, Karnataka, India****3Scientist (Entomology), All India Coordinated Research Project on Soybean, MARS, University of Agriculture Sciences, Dharwad, Karnataka, India****4Ph.D. Scholar Dept of Agronomy College of Agricultural Sciences, University of Agriculture Sciences, Dharwad, Karnataka, India**

Cultivation of soybean presents a promising avenue for agricultural advancement, with potential yields ranging from 3 to 4 tons ha⁻¹. However, realizing these yields necessitates diligent monitoring and innovative approaches due to certain genetic and environmental challenges. The study was undertaken with an objective to enhance the growth yield and economics of soybean through use of biostimulants during 2021 Kharif season at the Agriculture Research Station, University of Agriculture Sciences, Dharwad, Karnataka, India. Randomized complete block design with three replications was employed. Statistical analyses including ANOVA, correlation coefficient and linear regression were conducted. T8-foliar application of Crop Max @ 750 mlha⁻¹ at flower initiation (FI) and Biozyme @ 625 mlha⁻¹ at pod

formation (PF) along with the RDF and FYM, resulted in significantly taller plants and higher dry matter production. T8 also exhibited substantial increases in leaf area and relative leaf water content at 60 DAS. Additionally, produced significantly higher 100 grain weight (9.23 g), grain yield (2693 kg ha⁻¹), higher haulm yield (3977 kg ha⁻¹) and harvest index (40.40 %) with higher gross returns (Rs. 1,48,751 ha⁻¹), net returns (Rs. 1,03,702 ha⁻¹) and BC ratio (3.4). It was found on par with T7 (Crop Max @ 625 ml ha⁻¹ (FI) followed by Biozyme @ 625 ml ha⁻¹(PF)), T6 (Crop Max @ 500 ml ha⁻¹ (FI) followed by Biozyme @ 625 ml ha⁻¹ (PF)) and T4 (Crop Max @ 750 ml ha⁻¹ (FI) followed by Crop Max @ 750 ml ha⁻¹(PF)). The model aims to optimize soybean yield by considering weather impacts. Significant correlations were found between temperature, rainfall and yield. While temperature had no impact, rainfall positively affected yield ($R^2 = 0.557$). Regression analysis underscored the importance of biostimulation in enhancing yield attributes, suggesting simultaneous improvement of these traits is achievable.

SEED GERMINATION AND GROWTH STUDIES IN ROYAL PALM

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1,3&4Ph.D. Scholar, 2Associate Professor, Department of Floriculture and Landscape Architecture, Post Graduate Institute, Dr. P. D. K. V., Akola

Palms belong to the family Arecaceae. Which includes about 2400 – 2600 species of evergreen trees, shrubs and lianas, most of which occur in the tropics and subtropics. Royal palm are woody ornamental plants can only propagate from seed. There is slow and uneven seed germination. Seeds appear to have immature embryos at the time that fruit fall and thus will not germinate early. The palm grower can maximize success with germinating palm seed by paying careful attention to the number of basic guidelines and adopting different mechanical and chemical method. The investigation entitled 'Seed germination and growth studies in royal palm' was carried out in July to December with objectives to study the effect of different seed treatments on germination and growth in royal palm and find out the suitable seed treatment for better germination and growth in royal palm. The experiment was laid out in Completely Randomized Design with three replications and twelve treatments. The treatments are control, hot water, brine solution 2%, Cow dung slurry, H₂SO₄ for 10, 20 and 30 min, GA₃ @ 500, 1000 and 1500 ppm and KNO₃ 0.2% and 0.3%. The result of present investigation indicated that significantly maximum germination, early germination, maximum leaf length, maximum shoot length, maximum plant height, maximum leaf area were recorded with GA₃ @1500 ppm. In respect of germination, minimum days to germination were 61.63 days and germination percentage was 84.84% with GA₃ @1500 ppm seed treatment. The parameter like, length of root, number of roots plant⁻¹, root volume, root collar diameter were recorded maximum with GA₃ @1500 ppm similarly, length of leaf, stem girth, vigour index, survival percentage, fresh and dry weight of plant were recorded maximum with seed treatment GA₃ @1500 ppm.

RECENT ADVANCEMENTS IN MUNICIPAL SOLID WASTE MANAGEMENT

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The challenging problem of municipal waste management (MWM) presents major global environmental, social, and economic challenges. Deeply exploring the complexity of MWM, this work highlights important problems, creative solutions, and new developments in the field. Beginning with an overview of the scope of the MWM issue, the research explains the enormous amounts of waste produced by cities globally and the resulting pressure on landfills, ecosystems, and public health. It examines the varied makeup of municipal waste, highlighting the need for specialized treatment methods by examining everything from organic matter and plastics to hazardous elements. The review then explores the development of MWM techniques, following the shift from conventional landfill-centric methods to integrated waste management systems that prioritize energy recovery, reuse, recycling, and trash reduction. It highlights some of these important projects, like waste-to-energy and extended producer responsibility. The abstract also looks at the difficulties that come with MWM, such as poor infrastructure, limited resources, and inequality in society. It examines the effects of inappropriate garbage disposal on greenhouse gas emissions, biodiversity loss, and air and water quality, highlighting how urgent it is to implement sustainable waste management techniques. The research revealed a range of creative MWM methods and technologies in response to these difficulties. A wide range of strategies are presented, including improved waste sorting technology, circular economy models, distributed composting systems, and community-based recycling programs. The presents work also looks at how new technologies like blockchain, decentralized finance, and artificial intelligence might improve MWM operations and increase accountability and transparency. Stakeholder involvement public awareness campaigns and capacity-building initiatives are highlighted throughout the abstract. The promotion of sustainable consumption and waste reduction methods, as well as the development of behavioral change, are found to require community empowerment and engagement. The review concludes by highlighting how critical it is to implement comprehensive, multidisciplinary approaches to MWM that take into account social, economic, and environmental factors. It urges governments, corporations, academic institutions, and civil society organizations to recommit to working together to create a future in waste management that is more adaptable and environmentally friendly. This abstract intends to inform and inspire stakeholders involved in MWM activities worldwide, inspiring collective action toward a cleaner, greener, and more sustainable urban environment through its thorough examination and synthesis of current information and creative approaches.

Keywords: waste treatment, recycling, disposal, landfills, management, sustainable development

A REVIEW ON NEMATODES ASSOCIATED WITH MANGIFERA INDICA**AISHWARYA SHARMA^{1,2} AND NISHA RANA^{1,2}****1Keral Verma Subharti College of Science; 2R & D Cell, Swami Vivekanand Subharti University, Meerut**

Nematodes are most significant animal groups connected to plants and can lower the production and occasionally kill the plant host. The tiny, round-bodied, unsegmented worms known as plant nematodes are found in soil. All nematodes can endure physical phases, whether they are free-living in the soil or parasitic on plants and animals. Typically, they are dimorphic, thread-like, tiny, triploblastic, bilaterally symmetric, and pseudocoelomate invertebrates. By May of 1888, root-knot nematodes (*Meloidogyne* spp.) were the first plant-parasitic forms found in the United States. The mango, or *Mangifera indica* L., is a tropical fruit cultivated practically everywhere in the world and a member of the Anacardiaceae family genus. The this review Paper is focused on nematodes associated to *Mangifera indica*. Around 29 spp. are associated with *Mangifera indica*. Mango nematode infections have had severe physiological and economic effects on people worldwide. Nematode infestations have limited the export and production of mangos. These organisms cause severe crop damage and yield losses by attacking the roots, flowers, leaves, stems, seeds, and other sections of the plant. A root infestation can cause gall formation, foliar wilting, stunting, and chlorosis of the leaves.

Keywords: Nematodes, plant-parasitic, *Meloidogyne* *Mangifera indica*.**STUDIES ON THE INFLUENCE OF GROWTH REGULATORS AND MICRONUTRIENTS ON GROWTH, YIELD AND QUALITY OF CUSTARD APPLE (*Annona squamosa* L.) cv. BALANAGAR****AISHWARYA, A*¹ AND ANAND G. NANJAPPANAVAR²****1,2Department of Fruit Science, College of Horticulture, University of Horticultural Sciences, Bagalkot, Karnataka, India**

A field experiment was conducted on “Studies on the influence of growth regulators and micronutrients on growth, yield and quality of custard apple (*Annona squamosa* L.) cv. Balanagar” at Division of Fruit Science, MHREC, University of Horticultural Sciences, Bagalkot during 2022-23. The experiment was consisting of twelve treatments with three replications and performed under RCBD. The treatments were imposed at flowering, fruit setting and fruit development stage. The results revealed that, the significantly the maximum plant height (2.57, 3.07, 3.32 and 3.75 m) and the maximum canopy volume (1.95, 2.24, 2.39 and 2.54 m³) at 30, 60, 90 and 120 days after treatment imposition (DATI), respectively was recorded in treatment (T3), which comprises 75 ppm GA₃. As per the yield and yield attributing parameters are concerned, the treatment T8 (GA₃ 75 ppm + ZnSO₄ 0.5 % + FeSO₄ 0.5 % + Boric acid 0.3 %) recorded the minimum number of days taken for flowering (30.33), seed weight (16.00 g) per fruit, whereas treatment T3 recorded the maximum fruit set (14.96 %) percentage and T8 recorded the maximum number of flowers (561.60) per plant, number of fruits (82.39) per plant, fruit weight (187.66 g), volume of fruit (195.00 ml), fruit yield (20.77 kg/plant and 10.26 t/ha). Similarly, the quality parameters such as fruit firmness (1.46 N), TSS (25.20 °Brix), TSS: Acid ratio (146.72), total, vit C content (22.83 mg/100g), pulp percentage (60.44 %) and B: C (3.30) was recorded the maximum in treatment T8. Whereas, titratable acidity (0.17 %), rind percentage (27.31 %), rind to pulp (0.51) ratio, seed number (25.00) per fruit and seed percentage (7.90 %) was recorded minimum in T8. So, it is concluded that, the custard apple plants treated with treatment T3 showed more influence on growth parameters and treatment T8 exhibited the highest influence on yield and quality aspects of fruit.

Keywords: Balanagar, growth regulators, micronutrients, DATI.**ISFM PRACTICE IMPROVED GROWTH AND PRODUCTIVITY OF CAULIFLOWER****AJAY JAISHI^{1*}, BABU RAM KHANAL²****1Department of Life Sciences, School of Science, Kathmandu University, Kavre, Nepal****2Department of Soil Science and Agricultural Engineering, Faculty of Agriculture, Agriculture and Forestry University, Rampur, Chitwan, Nepal**

Integrated soil fertility management practice using urine-enriched biochar and chemical fertilizer increases soil health and crop productivity. Considering this as a center point, a field experiment was conducted in Rampur, Chitwan, Nepal, to assess the effect of urine-enriched biochar and chemical fertilizers on yield and yield attributing characteristics of cauliflower on Inceptisols. The experiment was laid out with six treatments and four replications in a Randomized Complete Block Design i.e., control, urine-enriched biochar (UEB 100%), recommended dose fertilizer (200:120:80 NPK kg ha⁻¹) (RDF 100%), UEB 75 % + RDF 25 %, UEB 50 % + RDF 50% and UEB 25 % + RDF 75 %. Biochar was produced from *Lantana camara*, in a low-cost Kon-Tiki under slow pyrolysis conditions. Biochar was mixed with cattle urine in a 1:1 ratio (weight basis) and applied at the root zone. Plant height, leaf numbers, canopy diameters, stem weight, root length, root weight, and yield were significantly different between the treatments. The highest plant height, leaf number, and stem diameter were observed for UEB 50 % + RDF 50%. Similarly, the highest curd yield (47.30 Mg ha⁻¹) was recorded from UEB 50 % + RDF 50%. The highest root weight (108.35 g) was recorded from UEB 100%. The plot treated with UEB 100% resulted in the highest total variable cost of production (US\$ 4888.29 ha⁻¹) whereas the plot treated with UEB 50 % + RDF 50% recorded the highest total gross return (US\$ 6522.43 ha⁻¹). The experiment indicates that the combined application of UEB and chemical fertilizer results in higher yield and yield attributing characters of cauliflower over the sole application of UEB and chemical fertilizers.

Keywords: Cauliflower, Chemical fertilizer, Inceptisols, ISFM, UEB

POTENTIALITY OF BIOAGENTS APPLICATION: PSEUDOMONAS FLUORESCENS AND TRICHODERMA SPP. APPLIED FOR BIOCONTROL OF CROP DISEASE

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Two common organisms found in agricultural soils that are well suited to growing in the rhizosphere are *Pseudomonas fluorescens* and *Trichoderma harzianum*. These rhizomicrobe bioagents have a variety of characteristics that enable them to function as biocontrol agents and enhance plant growth. It is mass-producible and develops quickly in vitro. It spreads quickly through the rhizosphere and phyllo-sphere, colonizing and multiplying there while making use of exudates from seeds and roots. It fights fiercely with other microbes in the plant rhizosphere, produces a broad range of bioactive metabolites, including growth-promoting chemicals, siderophores, antibiotics, and volatiles, and responds to environmental challenges. Furthermore, some soilborne diseases naturally repress themselves due to the presence of pseudomonads. By producing antibiotics, bacteriocins, and other compounds, it inhibits the growth of pathogenic germs.

Keywords: Biogents, Trichoderma and *Pseudomonas fluorescens*, Disease, PGPR

A STUDY ON MICROWAVE ROASTING ON FUNCTIONAL PROPERTIES OF TRADITIONAL FISH PANEER

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Fish is found abundantly in all natural waters. It is valuable source of food and has been used by man from antiquity. Fish oil contains highly unsaturated fatty acids having from 4 to 6 unsaturated linkage. Most of the fish consumers find difficulty while consuming fish due to bones and off smell as well. Consumers afraid of bones as they might get stuck inside the throat. With the ever-growing demand of paneer have created a new thought to develop new types and varieties of paneer from fish which would be better solution in term of nutrients quality as well as shelf-life in comparison of milk. Common carp fish was selected for the experiment. From the experimental design by using RSM (Box-Behnken), having highest desirability i.e. fish-paneer composition level 3, microwave power of 180 W and time of roasting for 5 minutes, were selected. The product was investigated for functional characteristics of fish paneer, where the highest value of quality attributes i.e. moisture content, protein content, fat content, total flavonoid content, total phenolic content and antioxidant activity were 33.76, 35.30, 11.47, 0.16, 0.75 and 0.80% respectively. Microwave roasted fish-paneer composition level 3, microwave power of 180 W and time of roasting for 5 minutes gives the best quality using tradition fish.

Keywords: TPC, TFC, Antioxidant properties; Microwave roasting; Fish Paneer

STUDIES ON THE EFFICACY OF ESSENTIAL OIL OF OCIMUM SPECIES AGAINST PLANT PATHOGENS IN-VITRO

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Plants contain different volatile substances and they have many properties including antibacterial and antifungal properties. In the present study, essential oils extracted from *Ocimum sanctum* and *Ocimum basilicum* were used to inhibit the growth of *Lassiodiplodia theobromae*. The experiment comprises of twenty-four different treatments with three replications and the design followed was three factorial completely randomized designs (CRD). The Poisoned food technique was used to check the antimicrobial activity of essential oil. Six different concentrations of essential oil (10, 20, 30, 40, 50 and 60 ppm) were used. Comparing the source of essential oil, *Ocimum basilicum* showed less growth of the fungal pathogens and more inhibitory effect. Essential oil @ 60 ppm concentration was more active in inhibition of both of the fungi and 10 ppm concentration show least inhibition. *Lassiodiplodia theobromae* recorded less fungal growth and Maximum mycelia growth inhibition (79.99%) was recorded when the essential oil of *Ocimum sanctum* (60 ppm followed by 50 ppm) in whereas *Ocimum basilicum* inhibited (76.49%) the same pathogen. Hence, it can be concluded that the essential oil of *Ocimum* species can be used as a fungistatic agent in biological control of plant diseases.

ORGANOLEPTIC AND NUTRITIONAL POTENTIAL OF BUCKWHEAT BITE ENRICHED WITH MUSKMELON SEED FLOUR

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Gluten free buckwheat and muskmelon seed flour are well known to contain high amount of nutrients like protein, carbohydrate, fiber, vitamins, minerals and antioxidants with nutraceutical properties. This study aimed to evaluate the organoleptic and nutritional potential of buckwheat bite as a functional food. The Buckwheat bite were prepared by using composite blends of buckwheat flour (BWF) and muskmelon seed flour (MSF) in different combination such as 50:0 (BWF) sample code T0, 40:20 (MSF 20%) T1, 30:20 (MSF 20%) T2, 20:30 (MSF 30%) T3, and 10:40 (MSF 40%) T4 respectively. Proximate compositions of buckwheat bites were determined according to the AOAC methods, and their organoleptic attributes by using 9-point Hedonic Scale. Organoleptic quality of the samples revealed that, T4 had highly acceptable as compared to control sample. A proximate composition showed that treatment T4 buckwheat bite contained protein (18.3%), carbohydrate (22.3%), and fat (36.9%), iron (7.8 mg) and energy content (493.7 Kcal/100g). The nutritious buckwheat bite gained acceptability in terms of organoleptic attributes hence was concluded to be a healthy product for under nutrition and celiac disease with micro nutrient deficiency. Therefore, the newly developed buckwheat bite with balanced nutrition composition is beneficial to society as well as our food industry.

Keywords: Nutritional potential, Organoleptic properties, Gluten free, Buckwheat bite

EXPLORING THE INFLUENCE OF PRE-TREATMENTS AND PROCESSING TECHNIQUES THROUGH METABOLOMIC PROFILE IN LEGUMES: A STUDY IN FOOD PROCESSING AND VALUE ADDITION**AKANKSHA NEGI*, NARPINDER SINGH, DEEPIKA KATHURIA****Department of Food Science & Technology, Graphic Era (Deemed to be University), Dehradun, Uttarakhand, India**

Legumes, referred as poor man's meat is a rich source of protein (~18-25%) especially for those people living in developing or under developed nations. Besides protein, legumes are also rich sources of bioactive compounds such as phenolics, carotenoids, and other phytochemicals, offering numerous nutritional and health benefits. However, their widespread utilization gets hindered due to presence of anti-nutritional compounds, off-flavors, and hard-to-cook defect, leading to low cooking efficiency. To address these challenges, various pre-treatment and processing methods such as steeping, germination, roasting, pressure cooking etc have been proposed to reduce anti-nutrient content and enhance the nutritional quality of the end products. Metabolomic approach widely identifies the metabolite present in legumes as well as further explores the potential changes taking place in the identified metabolites during different processing techniques. Thus, metabolomic studies are useful in understanding the relationship between processing techniques and the nutritional and/or sensory quality of processed legumes. Hence, the present article provides the importance of applying processing techniques and analyzing through metabolomic approaches to produce value-added legume-based food products. Through the integration of scientific analysis and innovative processing methods, this article aims to contribute to the advancement of sustainable and health-promoting food solutions.

Keywords: Metabolomics; Legumes; Food processing; Value addition**STATUS OF BEEKEEPING IN THE WESTERN HIMALAYAN REGION, UTTARAKHAND****AKANKSHA SINGH AND HIMANSHU PANDE****Department of Zoology, D. S. B. Campus, Kumaun University, Nainital**

Beekeeping in the Himalayas is very primitive. It is the oldest traditional practice followed by beekeepers for domestic and commercial purposes. Beekeeping is a seasonal and most common agricultural-related operation carried out worldwide. The present study was conducted in four villages of the Nainital district: Mangoli, Bajoon, Aghora and Faguniakhet. The data on the methods and strategies adopted for beekeeping and honey extraction techniques was collected through in-depth interviews and questionnaires during the year 2022-23. Beekeeping with *Apis cerana indica* is a common practice in Kumaun Hills, and it has mostly been performed using traditional methods in the long past. People have indigenous knowledge of beekeeping, which is passed on from generation to generation. Honey bees are reared in wall hives (81%), log hives (7%) and miscellaneous hives (2%), which are prepared by the indigenous people with locally available materials. Now, modern bee hives (10%) have also come into practice. Traditional wall hives are more suitable for beekeeping in hilly areas. It was found that the number of wall hives is decreasing with an increasing number of modern cemented houses in the villages. Honey bee farming is now becoming popular due to its market demand nationally as well as internationally. Uttarakhand has huge potential regarding honey bee rearing because of plenty of flora availability and climate suitability in hilly areas. Unfortunately, farmers are not very aware of modern beekeeping practices and are still dependent on traditional methods. It was encouraging to observe that people are interested and have adopted beekeeping for their livelihood. It was also observed that females have the slightest interest in honey bee farming, possibly because of the hustle of shifting colonies for good-quality nectar and pollen. The study suggests that Uttarakhand has tremendous potential in beekeeping for commercial purposes, and knowledge of honey bee pollination of diverse flora present here is required to use it to its full potential.

Keywords: *Apis cerana indica*, Beekeeping, Nainital, Traditional hives, Western Himalayan Region**EXPLORATION OF GUT MICROBIOME IN APIS CERANA****AKANKSHA THAKUR AND DR. S. MOHANKUMAR****Master of Science (Agriculture) in Biotechnology, Tamil Nadu Agricultural University**

Every region of an animal's body contains microbial communities, but those connected to the gastrointestinal system are home to various microorganisms which are significant because of the variety of effects they have on animal health. The honey bee's gut also has a unique microbiome, and previously, the gut bacteriome of honey bees was studied using the culturing method. This did not provide us with a comprehensive picture of the bacterial ecology, though. This investigation was carried to study the diversity of the gut microbiome in the honey bees, *Apis cerana*, using the 16s rRNA gene as the marker. Honey bees were sampled from different unifloral (Cashew, coconut, coffee and rubber) and multi floral host vegetations of Kerala and Tamil Nadu. For the bacteriome studies, the whole guts were dissected and both the cultivable and the non-cultivable approaches were utilized. The cultivable method was utilized using different growth media for the cultivation of different types of bacterial populations that were present in the gut environment of the honey bees. Further, the DNA isolates were amplified for 16s rRNA gene analysis by using universal 8F and 1492 R bacterial primers for amplification. A 1.5 kb amplicon was obtained which was used for Sanger sequencing and BLAST analysis. The major genera to be reported cultivable in the honey bee guts were *Apibacter*, *Citrobacter*, *Lactobacillus* and *Enterobacter* in *A. cerana*. For the non-cultivable bacterial populations, the next generation sequencing approach was utilized. The bacteria were detected by the metagenomic sequencing. The isolated DNA from the gut tissue of the honey bees was utilized followed by the sequencing of the entire V1-V9 region of the 16s rRNA gene as the target. The metagenomics approach revealed four phyla as the major members in the bacterial composition of the *Apis cerana* gut. Based on our investigation it was reported that the *Apis cerana* guts were majorly dominated by four bacterial phyla, viz., Proteobacteria, Actinobacteriota, Firmicutes and Bacteroidota. The major bacterial families reported in the study belonged to the Oxalobacteropopulationae and Orbaceaea family. A total of 76

unique OTU's (Operational Taxonomical Units) for the honey bee samples from different flora hosts were reported in our study. Out of 76 reported, 48 were detected from the hill and plain populations and 28 for uniflora and multi floral host honey bees. The Shannon vector algorithm was utilized to check the diversification of the microbiome in the gut for the samples and the entropy ranged from 1.1 to 2.8. In the hill and plain population honey bees, hill population bees reported higher diverse nature of the gut bacteriome with entropy of 2.8. In multi flora and uniflora host however, the highest entropy level recorded was just 2.2 in multi flora host honey bees and they showed the most diverse microbiome as compared other honey bees studied.

Keywords: Indian honey bees, gut bacteriome, 16s rRNA gene, V1-V9 region, Operational Taxonomical Units (OTU's)

ACHIEVING SUSTAINABILITY THROUGH MUSHROOM CULTIVATION : A INNOVATIVE WAY TO ENCOURAGE FARM INCOME

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About 58% of the population is employed in the agriculture industry, which also contributes 19.9% of the GDP. 80 percent of the farming community belongs to marginal and landless farmers. By growing mushrooms, vertical space use and agri-residue management may be effectively used to provide supplementary revenue. Growing mushrooms using innovative production technologies has lead to tremendous increase in yield and income of farmer by using minimum available input. It's the method of artificially growing mushrooms for food purposes. This is one of the farming practices that has negligible impact from biotic and abiotic stress. For marginal and landless farmers mushroom farming offers a reliable source of income due to the growing demand in both local and international markets. Consumers are choosing mushrooms over animal protein thus the demand of mushroom commodities trend is growing on the global market. As a hill state, Uttarakhand has enormous potential for producing mushrooms because of its chilly, damp environment, which promotes the growth and development of mushrooms. Due to its immense nutritional and meditative benefits, mushroom farming has a lot of potential in the current agricultural market. In light of the foregoing debate, a survey of mushroom producers in Uttarakhand's Nainital district was undertaken. A research was carried out in 2022 with a focus on the state of mushroom growing in the region at the time. The data was collected with the help of interview schedule and questioner. The finding of the study revealed that lack of proper infrastructure was perceived as the major constraints by the mushroom growers followed by social taboo associated with the venture, disease occurrence and management. Major proportion of the respondents Marketing strategies (1.516) followed by Finance (1.45), Environmental conditions of mushroom house (1.305), Compost making (1.245), Crop protection measures (1.194), Mushroom cultivation (1.03), Harvesting and processing (1.0416), Spawn and method of spawning (0.988) and Recycling of spent mushroom substrate (0.9160).

Keywords : Mushroom cultivation, Livelihood security, Hill agriculture, Training needs, Constraints.

CLOUD SEEDING (ARTIFICIAL RAIN)

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Water is an integral and pivotal renewable resource that is scarce on the earth in many drought-prone regions, including parts of Africa, India, Australia, the Middle East and certain areas in Asia and North America, which results in water scarcity, crop failure, certain economic impacts, etc. As 80% of global cropland will experience water scarcity, an annual agricultural damage of millions of hectares is caused by hailstorms and unseasonal rain. To encounter this predicament, "Cloud Seeding" technology has been used. It is a serendipitous discovery by Dr Vincent Schaefer. It is a method of altering the weather to increase cloud precipitation. It entails distributing materials into clouds, such as dry ice, potassium iodide, or silver iodide, to promote the development of ice crystals or raindrops, which may result in more rainfall. It can take around 30 minutes to an hour for rain to occur. Cloud seeding is generally done by using aircraft, planes, or ground-based generators. Nowadays, cloud zapping is used, which induces the current in the clouds. Countries like China, the US, the UAE, and Bulgaria use cloud seeding technology the most; among them all, Thailand used it the best to cope with the effects of the 1955 drought. In India, states like Tamil Nadu, Karnataka, and Maharashtra are using this technology to counter the effects of severe drought. Currently IIT Kanpur successfully used this technology in June 2023 with efficient and incredible results according to India's diverse topography and temperature-affected environmental conditions. Cloud seeding, a technique that uses current atmospheric conditions, including humidity, temperature etc., can increase precipitation and promote cloud formation in areas with reduced humidity while also meeting agricultural needs. The technology of cloud seeding doesn't have any negative impact on ecological, environmental or health hazards. If we use it in an appropriate quantity, it only speeds up the condensation process in the clouds. Lastly, agriculture gets fine with applying cloud seeding science, and henceforth, we can say that it can rain out when we need it the most.

Keywords: Cloud precipitation, Cloud Zapping, Topography

COMPARATIVE ANALYSIS OF ARIMA AND EXPONENTIAL SMOOTHING MODELS FOR WHEAT PRICE FORECASTING IN RAJASTHAN**AKASH MHASKEY^{1*}, DR. G. L. MEENA² AND DR. HARI SINGH³****^{1*}Ph.D. Research Scholar, Department of Agricultural Economics and Management, RCA, MPUAT, Udaipur****^{2,3}Associate Professor, Department of Agricultural Economics and Management, RCA, MPUAT, Udaipur, Rajasthan**

The study investigated the forecasting of wheat crop prices in the Kota market, Rajasthan, utilizing monthly wholesale price data spanning from January 2008 to December 2022. The primary objective is to evaluate the efficacy of different models, including ARIMA and Exponential Smoothing methods, in predicting wheat prices for the year 2023. The research initially utilised the ARIMA model, analysing the Auto-Correlation Function (ACF) and Partial Auto-Correlation Function (PACF) of wheat prices. The data were found to be non-stationary, corrected by first differencing ($d=1$). Several ARIMA configurations were tested, with ARIMA (1, 1, 1) selected as the best model based on the lowest Akaike Information Criterion ($AIC = 1813.43$) and Schwarz Bayesian Criterion ($SBC = 2031.55$). For comparative analysis, Simple Exponential Smoothing (SES), Double Exponential Smoothing (DES) and Triple Exponential Smoothing (TES) models were also employed. The SES model predicted higher wheat prices throughout 2023 compared to ARIMA, which forecasted a decrease in prices towards the end of the year. Model accuracy was assessed using Mean Absolute Deviation (MAD), Root Mean Square Error (RMSE) and Mean Absolute Percentage Error (MAPE). The ARIMA (1, 1, 1) model demonstrated superior accuracy with MAD (40.16), RMSE (7.72) and MAPE (2.42), outperforming the exponential models. SES, while also effective, showed slightly higher errors with MAD (51.22), RMSE (7.15), and MAPE (2.06). In summary, the ARIMA (1, 1, 1) model proved to be the most reliable for wheat price forecasting in this study, demonstrating robust predictive capabilities despite some limitations in accuracy during specific months. Future studies may focus on integrating additional variables or hybrid models to further enhance forecasting accuracy.

Keywords: Wheat Price Forecasting, ARIMA Model, Exponential Smoothing, , Predictive Modelling.**MANAGEMENT OF BROWN PLANT HOPPER IN RICE****AKHILESH KUMAR, SMITA SINGH, SANDEEP SHARMA, MANJU SHUKLA AND RAJESH SINGH****JNKVV-Krishi Vigyan Kendra, CoA, Rewa (M.P.)**

The BPH is distributed throughout Australia, Bangladesh, Bhutan, Burma (Myanmar), Cambodia, China, Fiji, India, Indonesia, Japan, North and South Korea, Laos, Malaysia, India, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Taiwan, Thailand, and Vietnam. The brown plant hopper (BPH), *Nilaparvata lugens* (Stål) (Hemiptera: Delphacidae) is a plant hopper species that feeds on Rice plants (*Oryza sativa* L.). These insects are among the most important pests of rice, which is the major staple crop for about half the world's population. They damage rice directly through feeding and also by transmitting two viruses, rice ragged stunt virus and rice grassy stunt virus. Up to 55-60% yield loss is common in susceptible rice cultivars attacked by the insect. In order to evaluate the performance of technology in Rice crop under irrigated condition assess the efficacy of deep summer ploughing, alley planting with 30 cm gap after 2.5 to 3 meter planting with spacing of 20 x 15 cm, application of Chlorantraniliprole 0.3G @10kg/ha in nursery 5-7 days before uprooting of seedlings, Need based application of insecticides Fipronil 5 SC spray @ 1000ml/ha after based on ETL (RP) in different location of Rewa (MP) on 10 famers' field with two treatments in 2023 to 2024. To evaluate the performance of recommended practice and compared with farmers practices (FP) was found more infestation of BPH than recommended practice (RP). Economics and benefit cost ratio of both FP and RP plots were worked out. The no. of insect/hill in Rice was recorded lowest in RP (7.15), while 23.60 no. of insect/hill was recorded in FP. Rs. 66755.00/ha was recorded net profit under RP while in FP it was Rs. 41953.00/ha was recorded. Benefit cost ratio was 2.96 under RP, while 2.45 was in FP. The technology of recommended practice is found most suitable for reduced BPH population and most economic for the management of BPH losses in Rice in comparison with farmer's practices. The IPM modules for management of BPH in Rice were profitable to farmers along with health concerned and eco-friendly to environment.

SISORID CATFISHES (SILURIFORMES: SISORIDAE) OF DEHRA DUN (UTTARAKHAND, INDIA) WITH THEIR LOCAL DISTRIBUTION**AKHLAQ HUSAIN****(Zoological Survey of India, former Scientist-E) 41, Hari Vihar, Vijay Park, Chakrata Road, Dehra Dun, Uttarakand, India**

Present study deals with sisorid catfishes (Siluriformes: Sisoridae) of Dehra Dun (Uttarakhand, India) with their local distribution. These belong to six species under two genera (*Glyptothorax* Blyth, 1860 and *Psueudecheneis* Blyth, 1860) and two subfamilies (Sisorinae and Glyptosterninae).

Keywords: Sisorid catfishes, Dehra Dun.

INVESTIGATING THE IMPACT OF SEAWEED EXTRACT AND BIOCHAR ON GROWTH YIELD AND QUALITY OF STRAWBERRY**AKHILESH KUSHWAHA*1 AND SAKET MISHRA*2*****1 Ph.D. Horticulture (Fruit Science), Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Naini, Prayagraj.*****2 Assistant Professor, Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Naini, Prayagraj.**

This research delves into the application of seaweed extract and biochar as organic amendments to enhance the growth yield and quality of strawberry (*Fragaria × ananassa*). With a focus on sustainable agricultural practices, the study aimed to assess the effects of these amendments on various growth parameters, yield quantity, and fruit quality attributes. The experiment was conducted at the Research Farm of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj during 2021-22 and 2022-23. The experiment consisted of thirteen treatments in Factorial Randomized Block Design with three replications. A controlled experiment was conducted in which strawberry plants were subjected to different treatments, including varying concentrations of seaweed extract and biochar, both individually and in combination. Growth parameters such as plant height, leaf area, and root development were monitored throughout the growth stages, while yield quantity, including total fruit weight and number of fruits per plant, were recorded at harvest. Results demonstrated significant improvements in growth parameters and yield quantity with the application of seaweed extract and biochar. Individually, seaweed extract exhibited a notable enhancement in plant vigour and yield, attributed to its rich nutrient content and plant growth-promoting properties. Similarly, biochar application contributed to improved soil structure and nutrient retention, consequently enhancing plant growth and yield. Furthermore, the combined application of seaweed extract and biochar demonstrated synergistic effects, resulting in even greater improvements in growth yield and fruit quality. Quality attributes such as fruit size, color, and sugar content were also enhanced, indicating the potential of these organic amendments to improve marketability and consumer acceptance of strawberries.

Keywords: Strawberry, Yield, Quality, Seaweed and Biochar.**EVALUATION OF ECOSYSTEM SERVICES FROM MELIA DUBIA BASED AGROFORESTRY SYSTEMS****AKSHAY F MADIWALAR1 AND GIRISH B. SHAHAPURMATH1*****1Assistant Professor, College of Forestry, Sirsi, Uttara Kannada district, Karnataka, India**

Forest in general and agroforestry in specific has played vital role in extending wood and non-wood resources. Agroforestry is not only known for its tangible benefits but also for its intangible services like carbon sequestration, climate amelioration, enrichment of soil and cultural services. Agroforestry is having great potential in extending ecosystem services but studies on quantification of those services are very limited. The present study was carried out to quantify the ecosystem services mainly intangible service of Meliadubia based agroforestry system. The agroforestry system consists of tree component (Meliadubia), fodder component (*Sesbania grandiflora*), food component (vegetables) and flower. The results from the present study showed that the provisioning services contributed more with multifarious products (Wood, Food, Fodder and flower), which generated higher economic returns at the end of the study period. In regulating services microclimatic factors were influenced by the Meliadubia based agroforestry viz., the air temperature was 1-2 oC low under trees, higher light intensity (982.73 lux) was recorded in the open area compared under Meliadubia and higher soil moisture and lower soil temperature was observed under agroforestry system compared to open area. Holistically the total carbon sequestered by pulpwood trees and soil from pulpwood based agroforestry was 4.25 tons and 34.10 Mg/ha.

Keywords: Carbon sequestration, Agroforestry, Intangible benefits, Meliadubia**EFFECT OF FOLIAR APPLICATION OF ZINC SULPHATE AND PLANT GROWTH REGULATORS ON YIELD AND PHYSICAL CHARACTERISTICS OF GUAVA (PSIDIUM GUAJAVA L.) CV. HISAR SURKHA****AKSHAY MEHTA1*, BIJENDER SINGH2, SATPAL BALODA1, ALKESH YADAV1 AND AMAN KUMAR1****1Department of Horticulture, CCS Haryana Agricultural University, Hisar****2Department of Horticulture, Maharana Pratap Horticultural University, Karnal**

Guava, botanically known as *Psidium guajava* L. belongs to the family Myrtaceae. It can be grown in a variety of soils and climatic conditions and has become one of the most common fruit in India. Due to its availability at moderate rates, it is of great importance to the persons of average means and is aptly known as 'poor man's apple'. Micronutrients are the key elements in growth and development of plant. Zinc is an essential trace element for plants, being involved in many enzymatic reactions. Plant growth regulators play an important role in increasing the fruit size and yield. NAA plays an essential role in plant growth, increasing yield and improving the fruit quality. GA3 helps to induce the flowering and increase the fruit setting and fruit retention percentage. A study was done to find the effect of foliar application of zinc sulphate and plant growth regulators on yield and physical characteristics of guava (*Psidium guajava* L.) cv. Hisar Surkha. The foliar application of GA3 @ 100 ppm proved to be the best treatment in producing minimum number of seeds/fruit (204.4), minimum seed weight (1.95 g), maximum volume of fruit (165.9 cc), minimum fruit firmness (6.06 kg/cm²), average fruit weight (117.6 g) and fruit yield (42.7 kg/plant).

Keywords : Climatic, micronutrients, flowering, yield.

CHARACTERISATION OF INDIGENOUS WAXY RICE (ORYZA SATIVA L.) LANDRACES OF ASSAM**AKSHAY R. UIKE1 AND N. SARMA BARUA2****1,2Dept. of Plant Breeding and Genetics, Assam Agricultural University, Jorhat, Assam, INDIA**

One hundred and sixty-five indigenous waxy rice landraces, collected from AAU-Zoonal Research Station, Karimganj were characterised for 18 quantitative and 35 qualitative traits as per the list of descriptors given in DUS Guidelines for rice (PPV & FRA). The experiment was conducted during kharif, 2022 at the ICR farm, Assam Agricultural University, Jorhat, Assam in Augmented Block Design with six check varieties. All the eighteen quantitative characters studied reported significant amount of variation among all the genotypes indicating wide genetic variability among the genotypes. Among the thirty-five qualitative characters studied, four characters viz., Leaf-collar, ligule, shape of ligule and panicle- presence of secondary branching showed no variation and found distinct among all the cultivars. The descriptors registered maximum variation were, Stem- length, panicle- length of main axis, lemma and palea- colour and Panicle- Attitude of branches. Among all the genotypes studied twenty-six genotypes were found with purple stigma while rest were found with white stigma and fifty-one genotypes can be identified for presence of Awns. Out of thirty-five qualitative characters studied, four characters were found monomorphic, eleven were dimorphic, eight were of trimorphic and eight were in tetramorphic state. Lemma- anthocyanin coloration of apex, decorticated grain shape and decorticated grain colour showed five states of expression, whereas, lemma and palea colour recorded six states of expression. This detailed characterization of indigenous waxy rice of Assam is very important from the standpoint of selection, restoration and conservation of different landraces of rice for further utilisation in crop improvement programmes.

Keywords: Waxy rice, Characterisation, Indigenous landraces, DUS, Genetic diversity.

ANTIFUNGAL POTENTIAL OF STREPTOMYCES ROCHEI AGAINST FUSARIUM SOLANI IN CAPSICUM***AKSHAYA, S.B1, KRISHNAMOORTHY A.S.2AND NAKKEERAN, S3****1Assistant Professor, Department of Plant Pathology, SRM College of Agricultural Science, SRMIST, Chengalpattu****2Professor, Department of Plant Pathology, TNAU, Coimbatore****3Dean, Agricultural College and Research Institute, Kudimiyanmalai**

Fusarium wilt complex is a destructive fungal disease caused by *Fusarium solani*. Typical symptoms include yellowing of leaves, stunted growth, and wilting of plants. The indiscriminate use of chemical fungicides to control plant diseases poses a significant threat to the environment, humans, and non-target organisms. As a proactive alternative, scientists are looking forward to the use of beneficial bacteria to effectively combat plant diseases. In the present study, cell-free culture filtrate of *Streptomyces* spp viz., *S. aurantiogriseus*, *S. griseoviridis*, *S. rochei*, *S. hundugensis*, *S. fungicidicus*, and *Streptomyces* sp tested against *F. solani*. The result revealed that the cell-free culture filtrate of *S. rochei* reduced the mycelial growth (52.2 percent, respectively). The ethyl acetate fraction of crude metabolites of *S. rochei*, *S. hundugensis*, *S. griseoviridis*, and *S. aurantiogriseus* were tested at different concentrations viz., 250, 500, 750, and 1000 ppm against *F. solani* by agar well diffusion method. Among these, the ethyl acetate fraction of *S. rochei* at 1000 ppm inhibited the mycelial growth of *F. solani* (71.00 percent, respectively) and the zone of inhibition recorded was 18.11 mm, respectively after 96 h. The GC-MS (Gas Chromatography and Mass Spectrometry) analysis of the ethyl acetate fraction of CFC of *S. rochei* indicated the presence of 24 compounds. Among these, the highest peak area was recorded in n Hexadecenoic acid (15.21 RT), Isopropyl palmitate (12.94 RT), cis-Vaccenic acid (10.18 RT), and Pyrrolidine (10.16 RT), which might have antimicrobial activity against the pathogen. The major metabolic key pathway is the fatty acid biosynthesis pathway, which was detected with high intensity. Glycolipid metabolism, plasmalogen synthesis, and mitochondrial beta-oxidation of long-chain fatty acids are also identified. This study infers that *S. rochei* possesses antimicrobial activity against *F. solani*. Further research focused on discovering new compounds for developing effective bio-fungicidal formulations.

Keywords: Antifungal activity, cell-free culture filtrate, Metabolic Pathway, metabolite interaction, and GCMS.

COMBINING ABILITY ANALYSIS IN PUMPKIN [CUCURBITA MOSCHATA DUCH. EX POR.] FOR YIELD AND RELATED TRAITS**AKSHITA BISHT, S. K. MAURYA, DHIRENDRA SINGH, LALIT BHATT AND SUDHANSHU VERMA****Department of Vegetable Science, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand**

Crop improvement has become essential to human existence due to the growing demand for more food and better nutrition. One possible answer to this issue is the use of hybrid varieties. Heterosis is now the cornerstone of a global agro-business worth billions of dollars, and it has greatly enhanced crop productivity. So in this context an experiment was conducted to know the combining ability of parents and F1 hybrids in pumpkin for fruit yield and its components, involving 28 F1 hybrids obtained from a diallel set of eight parents (excluding reciprocals). The parental lines used were PPU-1, PPU-2, PPU-3, PPU-4, PPU-5, PPU-6, PPU-7, and PPU-8. Narendra Agrim and Narendra Upkar were used as standard check. The experiment was conducted at the Vegetable Research Centre (VRC) of the G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar, Uttarakhand. Evaluation was done over one seasons viz., summer season 2023. The experiment was laid out in a randomized block design (RBD) using three replications, each genotype had one row, 5 m long with a plant spacing of 3 × 1 m. For majority of the traits studied, PPU-2, PPU-5 and PPU-7 were identified as good general combiners. Overall, the F1 hybrid PPU-2 × PPU-7 was identified as the best cross combination for number of fruits and fruit yield. This hybrid exhibited strong heterosis for majority of traits studied and can thus be utilized for heterosis exploitation and released as promising hybrids after following multilocation testing.

Keywords: Combining ability, Heterosis, Hybrid and Pumpkin

A PRELIMINARY INVESTIGATION TOWARDS THE INVESTIGATION OF LI ION BATTERY WASTE IN HP**AKSHITA SHARMA, AMAN RANA, UMANG SINGH, DEEPAK PANT*****School of Earth and Environment Science, Central University of Himachal Pradesh**

Li ion waste approximation is all the way a major challenge towards its quantification. Li ion batteries (LIB) are majorly used in portable electronics as a source of rechargeable power supply. In the recent years the generation of LIB have increased drastically with the surge in usage of mobile phones and laptops. Despite such large numbers no formal data about the battery waste generation is available, this study aims to provide a preliminary overview regarding this context. Primary data was collected from the respondents by conducting a random stratified survey in the 12 districts of Himachal Pradesh. The survey showed a massive generation of battery waste on a monthly basis with variation according to the population density of the area.

DIVERSITY AND TRADITIONAL KNOWLEDGE OF MEDICINAL AND AROMATIC PLANTS USED BY LOCAL COMMUNITIES OF DISTRICT KANGRA , HIMACHAL PRADESH***AKSHITA SHARMA, *ANMOL, 1MUNIT SHARMA AND **ANIKITA CHOUDHARY*****Research Scholar, Deptt of Botany, Thakur PG College of education, Dhaliara****1Assistant Professor: Deptt of Botany, Thakur PG College of Education**

The Himalayas are the highest and youngest mountains in the World and have a great altitudinal range for the repository of Medicinal and Aromatic Plants. Traditional Knowledge associated with these plants is obtained from the tribes residing in these areas. There are more than 1000 species that have been documented in the Himalayan range as temperate forests, Sub-Alpine, and Alpine meadows. The majority of the population lives in the villages and belongs to diverse cultures and communities with specific Traditional Knowledge. District Kangra is the most popular district of H.P which covers geographical area of 5,739 km². During the investigation, 112 plant species belonging to 42 families and 12 major diverse group of diseases were recorded. These plants have been identified, classified, and enumerated systematically according to Bentham and Hooker's System of Classification. The area under study consists of 21 species belonging to 11 families viz., Poaceae (Cynodon dactylon, Imperata cylindrica, Eulaliopsis binata, Vetiveria zizanioides, Saccharum spontaneum, Saccharum munja, and Ischaemum rugosum, Asteraceae (Ageratum conyzoides, Eclipta alba, Parthenium hysterophorus) etc. A total of 22 species belonging to 8 families viz; Fabaceae (3 species i.e., Butea monosperma, Cassia fistula, Dalbergia sisso), Moraceae (3 species i.e., Ficus virens, Ficus religiosa, Ficus benghalensis) etc. Medicinal plants, provide evidence for Biodiversity Conservation, and new areas of research. These plants are further used for phytochemical screening and Pharmacological analysis.

Keywords: Traditional Knowledge, Indigenous Communities, Healthcare Practices, Medicinal and Aromatic Plants**JACKFRUIT SEED PROTEIN ISOLATE AS A POTENTIAL WALL MATERIAL FOR THE ENCAPSULATION OF L. PLANTARUM****ALICE SINGH1*, TANYA L. SWER1****1Department of food science and technology, National Institute of food technology entrepreneurship and management, Kundli, Haryana, India**

This study aims to evaluate the cell viability, encapsulation efficiency, and in-vitro survival of Lactobacillus plantarum encapsulated with jackfruit seed protein isolate (JSPI). Microencapsulation provides a matrix to the probiotic cells which act as a physical barrier against stress conditions and keeps them viable while passing through the digestive system and until they get at their intended location, which is where the probiotic bacteria cells should break down and be released. In this study, the utilization of novel protein sources namely JSPI as an encapsulation matrix is proposed. Functional properties of JSPI namely thermal stability, solubility, emulsification capacity, and emulsion stability of were evaluated to check its compatibility for encapsulating L. plantarum probiotic cells. The analysis revealed that the denaturation temperature of the protein was 89.1°C, and the solubility was determined to be 77.21% with emulsion capacity and stability (72.13% and 57.6%). Utilizing these properties, microcapsules were developed with JSPI, demonstrating initial viability of 10.63 log CFU/gm on the 0th day and 8.54 log CFU/gm on the 90th day. Encapsulation efficiency was found to be 86.87%, with microcapsule particle sizes ranging from 24-30 µm. Microcapsules exhibited a maximum 2-log reduction in in-vitro gastric and intestinal conditions. Thus, our study confirms that JSPI is a suitable material for microencapsulation of L. plantarum for potential food applications.

Keywords: Jackfruit seed; protein isolate; microencapsulation; probiotics capsules; functional properties.**ASSESSMENT OF GENDER DIFFERENCES IN EMOTIONAL INTELLIGENCE****Alka Chandrakanta* and Aditi Vats****PhD Scholar*, Department of Family Resource Management, College of Home Science, GBPUA&T, Pantnagar- (Uttarakhand)****Professor and Head, Department of Family Resource Management, College of Home Science, GBPUA&T Pantnagar- (Uttarakhand)**

The ability to identify one's feelings as superior to others, to motivate oneself, and to effectively manage one's own emotions and relationships is known as emotional intelligence(EI). The current study looked into police officers' EI in both male and female respondents. There were sixty respondents in the research sample. Thirty male respondents and thirty female respondents were chosen through a random sampling technique. The respondents' emotional intelligence was measured using the emotional intelligence scale. The findings of the study show that male police officers have higher emotional intelligence than female respondents. Research studies on police personnel's EI could significantly enhance efficiency, welfare, and flexibility, fostering a more resilient and emotionally intelligent force to handle work challenges.

Keywords: emotional intelligence, motivate,

GENETIC DIVERGENCE IN BARLEY (HORDEUM VULGARE L.)**ALIZA MARIYAM****Ph.D. Research scholar, Department of Genetics and Plant breeding, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan**

The experiment was conducted to assess genetic variability and genetic diversity in 35 genotypes of barley. During the Rabi 2021-22 growing season, three replications of a randomized block design were carried out at the Instructional Research Farm of the Rajasthan college of Agriculture in Udaipur. The observations were recorded on the 12 different characters. The genetic divergence measured by Mahalanobis' D2 statistics grouped thirty-five genotypes into eleven clusters. Maximum genetic divergence was observed between cluster IX and X followed by cluster VIII and XI, cluster V and XI, cluster VI and XI, cluster VII and XI, cluster V and VIII, cluster IV and VI, cluster VI and VIII, cluster VII and X, cluster VII and VIII and cluster X and XI. The attributes, viz., number of grains per spike, followed by plant height, biological yield per plant and 1000- grain weight had highest contribution towards total genetic divergence. Hence, selection for divergent parents based on these four characters would be useful for exploitation of heterosis breeding in cotton if commercially feasible. The extent of difference among cluster means for different characters was found to be prominent. The variation for days to 75% heading was ranged with high mean value from cluster VII to cluster IV and V), days to maturity ranged for high mean value from cluster VII to cluster IX, plant height high mean value ranged from cluster VI to cluster VIII, Number of effective tillers per plant from cluster VI to cluster IX, spike length from cluster IX to cluster III, for number of grains per spike it was ranged from cluster XI cluster VIII, grain weight per spike was ranged from cluster XI to cluster V, 1000-grain weight ranged from cluster XI to cluster VI.

Keywords: Genetic divergence, Barley, Mahalanobis**ANTIMICROBIAL EFFECT OF VISIBLE LIGHT (420 NM) EXPOSURE ON CUT-CARROT SURFACE****ALKA MISHRA1*, NACHIKET KOTWALIWALE2, MANOJ KUMAR TRIPATHI1, SUBIR KUMAR CHAKRABORTY1, SAROJ KUMAR GIRI3, LALITA1, PURAMSHETTI LAVANYA1 AND PRABHA HALDKAR4****1ICAR-Central Institute of Agricultural Engineering, Bhopal (India)****2ICAR-Central Institute of Post-Harvest Engineering and Technology, Ludhiana (India)****3ICAR-National Institute of Secondary Agriculture, Ranchi (India)****4ICAR-Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur (India)**

Light Emitting Diodes (LEDs) find wide applications in killing surface microbes by a process called photodynamic inactivation. This study investigates the efficacy of 420 nm LED exposure on the surface microbial contamination of cut carrots while evaluating its impact on quality parameters. Results indicate a significant reduction in microbial counts with increasing irradiance and exposure time. Optimal conditions of 12 W/m² irradiance for 30 minutes exhibit the best balance between microbial inactivation and preservation of quality parameters. While higher irradiance levels achieve superior microbial reduction, they also adversely affect colour, texture, and TSS of carrots. This underscores the importance of balancing antimicrobial efficacy with quality maintenance. LED treatment presents a promising method for surface decontamination of vegetables, particularly in scenarios where minimal initial microbial load is present, such as post-processing before packaging or in foodservice settings. The study highlights the potential of LEDs as a safe and environmentally friendly alternative for food decontamination, emphasizing the need for further research to refine optimal treatment conditions and application strategies.

Keywords: Aerobic plate count, Endogenous photosensitizer, Fungal count, Irradiance, Photodynamic inactivation, Reactive oxygen species**MORPHOLOGY AND DISTRIBUTION OF OLFACTORY AND NON-OLFACTORY SENSILLA IN PUMPKIN FRUIT FLY, BACTROCERA TAU (WALKER) (DIPTERA: TEPHRITIDAE)****ALKA RANA AND SUNIL KUMAR*****Department of Animal Sciences, Central University of Himachal Pradesh, Kangra, Himachal Pradesh, India**

Bactrocera tau is one of the most destructive and serious global insect pests affecting a wide range of fruits, vegetables and nuts. This invasive dipteran pest, predominantly found in Southeast Asia and the South Pacific, poses significant ecological and economic challenges due to its wide host range, rapid reproduction, and cryptic behavior. In the present study the external morphology, typology, density, and distribution of olfactory and non-olfactory sensilla on full bodies of both adult male and female B. tau were described using a scanning electron microscope. The observed sensilla showed organ as well as sex specific differences. Seven previously reported sensilla and a new sensillum named as "branched sensilla" were identified. The olfactory sensilla were reported on the compound eyes for the first time. Majority of the olfactory sensilla were reported on the head. The potential roles of observed sensilla were hypothesized through comparative analysis with prior research. The study offers insights into the diversity of sensory structures in B. tau, along with specific morphological distinctions and functions across sexes. Such insights can be instrumental in devising strategies to control and manage these insect pests more effectively.

Keywords: Sensilla, Olfaction, Bactrocera tau, Morphology, SEM.

POPLAR TREES ARE USEFUL IN VARIOUS ENVIRONMENTAL APPLICATIONS**DR. ALPANA RANI****Department of Botany, MMH College, Ghaziabad**

Poplar (*Populus*; Family- *Salicaceae*) trees, apart from being a promising bioenergy crop are useful in various environmental applications. Poplar farms can sequester carbon, improve water quality and clean up contaminated industrial sites. Carbon sequestration means growing poplar trees can help counter climate change. Poplar trees are fast growing in nature it has an excellent capacity to purify the air by capturing CO₂. Plantation of poplar can help clean up the environment. The focus of poplar planting has extended toward ecosystems and environmental services, such as phytoremediation, shelterbelt construction, carbon sequestration, degraded land rehabilitation and soil stabilization, among other uses. There are many environment and landscape benefits that sustainably managed poplar forest and plantations provide beyond the economic and social ones. Poplars are great source of ecosystem services. Their capacity to protect bodies of water is also remarkable. Their roots improve the infiltration in flood areas, producing a flood effect that helps to reduce the negative impacts of the floods of the river. Planting poplars has always been combined with the goals of wood production and environmental protection and improvement. Due to the global shortage of timber and worldwide demand for wood products, fast-growing species of poplar were widely planted around the world for producing wood and fibre. With the increasing depletion of fossil energy, poplars also began to be grown as a short-rotation woody crop for bioenergy feedstock production. Windbreaks and shelterbelts have a long history dating back to early agricultural settlement and poplars have been an important part of these planting.

Keywords: bioenergy, carbon, ecosystem, environment, plantation, poplar**EVALUATION OF DIFFERENT VARIETIES AND GENOTYPES OF AONLA (*EMBLICA OFFICINALIS* GAERTN.) UNDER SODIC SOIL CONDITION OF EASTERN UTTAR PRADESH****AMAN KUMAR MAURYA^{1*}, BHANU PRATAP², ABHISHEK SONKAR³, SARANSH GAUTAM⁴****^{1,2,3}Department of Fruit Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, (U.P.)****⁴Department of Silviculture and Agroforestry, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh**

The present investigation entitled “Evaluation of different varieties and genotypes of aonla (*Emblica officinalis* Gaertn.) under sodic soil condition of Eastern Uttar Pradesh.” was carried out at the Main Experimental Farm, Horticulture, Department of Fruit Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.) during the year 2020-2022. The experiment was conducted in Randomized Block Design with eleven varieties and genotypes viz., NA-6, NA-7, NA10, NA-20, BSR-1, Anand-1, Chakaiya, CHES-1, NA-25, NA-26 and NA-27 considered as treatments and replicated three times, considering one plant as a unit. The observations were recorded for their flowering and fruiting behavior and physico-chemical properties comprising quantity and quality characters such as fruit drop, yield, weight, length, diameter, volume, specific gravity, pulp weight, stone weight, TSS, acidity, ascorbic acid and sugars were estimated. From the findings of the present investigation, it can be inferred that the initiation of flowering was recorded earliest in NA-6 (2nd week of March) than that of other varieties. The maximum flowering duration among the varieties was recorded in BSR-1 (27 days) followed by NA-25 (26.67 days), whereas, the minimum duration of flowering was observed in NA-6 (23 days) and Chakaiya (23 days). Among the selected varieties and genotypes fruit weight, length and diameter were recorded maximum in NA-25 and the maximum fruit drop at maturity stage was found in BSR-1 (80.60%) followed by Anand-1 (79.22%). The maximum yield (kg/plant) was recorded in NA-26 (80.35 kg/plant) followed by NA-25 (40.66 kg/plant) whereas, minimum yield (kg/plant) was recorded in BSR-1 (6.15 kg/plant) followed by NA-20 (7.15 kg/plant). The maximum fruit volume was recorded in NA-25 (54.2) with the maximum pulp weight (55.02 g). The maximum specific gravity was recorded in Anand-1 (1.07). Ascorbic acid was recorded maximum in NA-7 (559.40 mg/100g) and pulp: stone ratio was recorded highest in NA-25. Based on the present investigation it is concluded that variety NA-26 is superior in terms of the highest yield and quality attributes followed by NA-25 and NA-20.

Keywords: Fruit volume, Specific gravity, Ascorbic acid, Flowering duration and Acidity**EFFECT OF PRUNING TIME AND INTENSITY ON VEGETATIVE GROWTH OF BER (*ZIZIPHUS MAURITIANA* LAMK.) CV APPLE BER.****AMAN SHARMA*, SATPAL BALODA, SUSHIL SHARMA AND VINAY****Department of Horticulture, CCS Haryana Agricultural University, Hisar**

Ber (*Ziziphus mauritiana* Lamk.) is a hardy plant that belongs to the genus *Ziziphus* in family *Rhamnaceae* and was originated in Central Asia. It is referred to as “King of arid fruits, poor man’s fruit or crop of 21st century”. Pruning is an essential operation to maintain vigour of trees, fruit productivity and yield of ber. It also helps to maintain the uniform shape, vigour of tree, making harvesting, cultural and plant protection operations easier. This study was done to find the effect of pruning time and intensity on vegetative growth of ber (*Ziziphus mauritiana* Lamk.) cv. Apple Ber. It was carried out at the Experimental Orchard of Department of Horticulture, CCS Haryana Agricultural University, Hisar during the year 2021-22. Forty-eight uniform plants of four years old age were selected and pruning was done at different intensities i.e., retaining 2 buds, 4 buds, 6 buds, 8 buds, 10 buds, 12 buds, 14 buds and control (no pruning) in 2nd week and last week of May. The trees retaining 2 buds pruned in 2nd week of May showed best results for bud sprouting (73.27%), shoot length (74.25 cm), shoot diameter (1.89 cm) and leaf area (31.49 cm²). While the control (no pruning) showed best results for number of shoots (24.64).

Keywords: Apple Ber, Pruning, Bud sprouting, Leaf area

GENOME-WIDE ASSOCIATION STUDIES FOR ABIOTIC STRESS MANAGEMENT IN WHEAT: UNVEILING GENETIC INSIGHTS INTO HEAT STRESS RESPONSES**AMANDEEP KAUR*, VISHNU KUMAR¹, SK SINGH², SOMVEER NIMBAL³, RENU MUNJAL³, GYANENDRA SINGH AND VIKAS GUPTA****ICAR-Indian Institute of Wheat & Barley Research, Karnal****¹Division of Genomic Resources, NBPGR, New Delhi****²Deptt of Genetics & Plant Breeding, IARI, New Delhi****³Deptt of Genetics & Plant Breeding, College of Agriculture, CCSHAU, Hisar***

Genome-wide Association Studies (GWAS) have emerged as powerful tools for unraveling the genetic basis of complex traits in crops like wheat. Among the various stressors affecting wheat productivity, heat stress stands out as a major threat exacerbated by climate change. This study delves into the recent advancements in GWAS pertaining to heat stress management in wheat, elucidating the genetic insights into heat stress responses. It discusses the methodologies employed in GWAS, highlighting the significance of high-throughput genotyping technologies and phenotyping platforms. Furthermore, it explores the genetic variations associated with heat stress tolerance, emphasizing candidate genes and genomic regions identified through earlier studies. The impact of heat stress on wheat productivity is staggering. Studies have shown that for each 1°C increase in temperature above the optimum during the grain filling stage, wheat yields can decline by as much as 6% to 8% globally (Lobell et al., 2011). In regions already grappling with high temperatures, such as South Asia and parts of Africa, the losses can be even more severe, with yield reductions reaching up to 20% to 30% (Wheeler et al., 2013). These statistics underscore the urgent need for genetic solutions to mitigate the detrimental effects of heat stress on wheat crops. Additionally, this study addresses the challenges and future prospects of utilizing GWAS-derived knowledge for breeding resilient wheat varieties capable of withstanding heat stress. With the global population projected to exceed 9 billion by 2050 [Desa, U. (2015)], ensuring food security in the face of climate change-induced challenges like heat stress is paramount. Through comprehensive genetic analyses facilitated by GWAS, researchers are poised to unlock the genetic potential of wheat, paving the way for the development of heat-tolerant varieties crucial for sustainable agriculture in a warming world.

Key words: Wheat, Heat stress, Genome-wide association studies (GWAS), Genetic insights, Crop resilience**INTEGRATED APPROACHES OF ORGANIC AND INORGANIC SOURCES OF NUTRIENTS FOR INFLUENCE GROWTH AND YIELD OF MUSTARD (BRASSICA JUNCEA L.) IN VERTISOLS****AMAR SINGH GAUR¹*, JAGANNATH PATHAK², DEEPAK PRAJAPATI³, AJEET JAISWAL AND¹ SURAJ MISHRA³****¹Assistant Professor, Jannaka Chandra Shekhar University Ballia (U. P.)****²Professor & Head, Department of Soil Science and Agricultural Chemistry, ³PhD Scholar, Department of Soil Science and Agricultural Chemistry, Banda University of Agriculture and Technology, Banda (U. P.)**

A field experiment was conducted at Agriculture Research Farm, Banda University of Agriculture and Technology Banda (Uttar Pradesh) during two successive rabi seasons of 2021-22 and 2022-23. The experiment was laid out in randomized block design, consisted of 15 treatments of different INM, and was replicated thrice. The mustard var. RH-0749 was taken as a test crop. Physical properties of soil like bulk density (1.32-1.34 Mg-3), particle density (2.62-2.68 Mg-3), porosity (49.52-50.55), and physico-chemical properties like soil pH (7.52-7.83) and EC (0.18-0.21 dSm-1) did not affect up to the level of significance due to INM treatments. After two years of experimentation, soil of experimental field was low in organic carbon (0.37-0.38%), total carbon (1.39-1.43 %), total nitrogen (.078-.107 %) medium to high in available phosphorus (16.41-25.20 kg ha-1). The experimental results indicated that application of 100% RDF+5-ton FYM+ Bio-consortia+ Nano Zn, (T7) significantly increased plant height, dry matter accumulation plant-1, leaf area index plant -1, number of branch plant -1, number of siliqua plant -1 and number of seeds siliqua-1 thereby seed yield of mustard increased significantly in over to control (T1). Reduction of 25 % of RDF along with FYM and bio consortia + Nano Zn, had similar results (T14 and T11). Overall, the study recommends addition of FYM (5 t ha-1) and bio consortia with 100% RDF to mustard crop during both years for better productivity, and to sustain the soil fertility. As 75 % RDF with FYM and bio consortia + Nano Zn also performed better than the other treatment except T7. Long-term studies on INM with various sources of nutrients, thus, are required in order to monitor changes in soil properties and reduce fertilizer dose across a wide range of ecologies.

BIODIVERSITY CONSERVATION**DR. AMIT KUMAR*****Department of Genetics and Plant Breeding, M.B.C.O.A, Tonk Affiliated to S.K.N.A.U, Jobner**

Biodiversity refers to the diverse range of life on Earth, including plants, animals, and microorganisms, as well as their genes and ecosystems. Variation refers to genetic, ecosystem, and species diversity within a region, biome, or planet. It enhances the aesthetic value of the natural environment and provides utilitarian benefits such as food, fodder, fuel, timber, and medicine. Biodiversity is a life support system. Biodiversity ecosystem services include soil formation and protection, water conservation and purification, hydrological cycles, biochemical cycle regulation, pollutant and waste breakdown, and natural climate regulation.

Human mismanagement of biological resources, exacerbated by imprudent economic policies, pollution, and faulty institutions, as well as climate change, is a major threat to species and ecosystems. Conserving biodiversity is crucial for promoting equity among generations. Existing biodiversity conservation measures include reforestation, zoological gardens, botanical gardens, national parks, biosphere reserves, germplasm banks, breeding techniques, tissue culture, and social forestry to reduce exploitation of forest resources.

ECOLOGICAL INSIGHTS INTO FISH SPECIES AND THEIR HABITAT IN DEHAR KHAD KOTLA (HIMACHAL PRADESH): A CONTEMPORARY ASSESSMENT**AMISHA RANA AND AMIT KUMAR SHARMA****Department of Animal Science, Central university of Himachal Pradesh**

Assessing and managing fish variety in aquatic systems is essential part of environmental conservation efforts in light of the global biodiversity crisis. This study offers a thorough and integrated method for evaluating and tracking fish diversity throughout time. Dehar Khad is one of the largest tributaries of river Beas in Himachal Pradesh and sustains a rich fish biodiversity as cold-water fishery resource. The goal of this study was to examine the current state of fish species and the ecology of their habitats in the Dehar Khad. Nine different fish species from four different families were identified during the current investigation in a few chosen Dehar Khad sampling zones. While *Cyprinus carpio*, or common carp, was the main species in the impoundment part of Pong reservoir, the major goal of this study was to examine the current state of fish species and the ecology of their habitats in the Dehar Khad. Few other fish species of *Barilius*, and *Xenentodon* etc. also have been recorded during the study. The comparison of the present result with earlier reports delighted that endemic fish fauna has to be diminished with the progression of time in the Beas River system, which may because of debasement and fractures of riverine natural habitats caused by various natural and anthropogenic activities. The environmental change in the natural water flow pattern of rivers and hydrological characteristics, including indiscriminate fishing practices and other natural calamities is the main factors for decline the fishery resources in Beas River.

Keywords: Fish Diversity, Habitat ecology, Dehar Khad, Beas River, HP**POPULATION DYNAMICS OF TOR PUTITORA (HAMILTON, 1822) IN BEAS RIVER BASIN (HIMACHAL PRADESH)****AMIT KUMAR AND AMIT KUMAR SHARMA****Department of Animal Science, Central University of Himachal Pradesh**

Rivers played a critical role in the growth of human civilization across the globe and have been well known as habitants of thousands of biotas including many rare, endangered, threatened, endemic, and charismatic species of great interest. The biodiversity of rivers is characteristics as by high species richness disproportionate to the area. We carried out the investigation in the Beas River with a stretch of around 460 km for the *Tor putitora* population from 2023 to 2024. Sampling was carried out upstream and downstream during pre-and post-monsoon periods. Results revealed that the *Tor* population has been reduced to a great extend ranging from 0.8% to 7.0%. The minimum percentage was observed from 2022 to 2023. Therefore, the standard protocol for breeding and hatchery management is necessary for its rehabilitation and conservation. Suitable policies at different levels need to be formulated and implemented for improving its status and to bring this fish into the mainstream of aquaculture. The aim of present study will describe the status of *Tor* in Beas River, it's breeding and hatchery management practices, conservation issues, and policies, so that we can perceive this fish in the mainstream of aquaculture in the near future.

Keywords: *Tor putitora*, Population dynamics, Beas River, Himachal Pradesh, India.**PHYTOPATHOGENIC FUNGI: A BIOCONTROL AGENCY FOR CONTROLLING THE AGRICULTURAL PATHOGENS****AMIT KUMAR*1 AND ASHU TYAGI****Dept. of Botany Maharana Pratap Memorial Degree College Shimlana, Saharanpur, Uttar Pradesh, India**

Today, commercial agriculture depends mainly on the application of chemical fungicides to protect crop plants against myco-pathogens. The overuse of chemical fungicides has led to toxic effects on life forms and the environment. Moreover, many of the fungal pathogens become tolerant to the specific chemical fungicides by overcoming its lethality. Therefore, the development of healthy, non-toxic, and eco-friendly alternate approaches to chemical and synthetic fungicides can be very helpful in the control of plant fungal infections. These safe and effective alternative control means against plant fungal diseases include biological control of phytopathogenic fungi microbial fungicides, as well as fungal cell deactivation and evacuation. Phytopathogenic fungi secrete a variety of chemical compounds (toxins) that have the ability to interact with host plant during the process of infection. These chemicals are referred to as effector proteins which play an important role in functioning of plant cells and thus affect the communication of pathogens with hosts during the infection. To date, micro-biotechnologists have cloned some pathogenic effectors from *Cladosporium fulvum*, *Magnaporthe oryzae*, *Leptosphaeria maculans*, *Blumeria graminis*, *Melampsora lini* and *Fusarium oxysporum*. Phytopathogenic toxins are secondary metabolites which are responsible for disease symptoms such as wilting, growth inhibition, chlorosis, necrosis and leaf spotting. These toxins affect the cell membrane, mitochondria, and chloroplasts of host plants resulting in direct interference and disturbance with host's metabolism. Phytopathogenic fungi have been used as biocontrol agents for controlling Pests, Locust, *Spodoptera frugiperda* etc. Besides these, nine species of *Trichoderma* such as *T. harzianum*, *T. viride*, *T. polyspora*, *T. koningii*, *T. reesei* and *T. hametam* have great biological control against bacteria and other fungi. Among these, *Trichoderma harzianum* is of great importance as it has wide application in biocontrol engineering of bacteria. *T. harzianum* T82 and *Trichoderma* strain NF9 are effective in controlling soil mycobiota including *Sclerotium rolfsii*, *Rhizoctonia solani* and *Pythium aphanidermatum*. Thus, it can be concluded that the phytopathogenic fungi are double edge sword as they are harmful to crop plants as well as beneficial on another side by controlling the crop pathogens. It is therefore necessary to elevate the biotechnological and engineering practices for maximizing the results from phytopathogenic fungi in the field of biological control.

Keywords: Phytopathogenic Fungi, Biocontrol, Crop plant, Pest control

LIGHT MICROSCOPIC STUDIES ON THE CEREBELLUM OF UTTARA FOWL**AMIT SINGH VISHEN¹, MEENA MRIGESH² AND ISHWAR SINGH³**¹**Department of Veterinary Anatomy, College of Veterinary and Animal Sciences, RLBCAU, Jhansi, U.P.**^{2,3}**Department of Veterinary Anatomy, College of Veterinary and Animal Sciences, GBPUAT, Pantnagar, Uttarakhand**

The present study was conducted on the brain of 12 apparently healthy Uttara fowl divided into two groups i.e. 3 months and 6 months old containing 6 fowl in each group, under natural lighting in the month of September. The birds were procured from Poultry Farm, GBPUAT, Pantnagar. The cerebellum was surrounded on the outside by a thin layer of connective tissue called pia matter. The cerebellum was composed of cerebellar cortex and cerebellar medulla. The cerebellar cortex was composed of molecular layer, Purkinje cell layer and granular layer. The molecular layer of the cerebellar cortex surrounded by the pia mater and contained the superficial stellate cells with basophilic nuclei and basophilic cell cytoplasm and the deep Basket cells having eosinophilic cell cytoplasm with light stained nuclei containing single nucleolus. The Purkinje cell layer with a large number of piriform neurons or round neurons called Purkinje cells had the vesicular nuclei with light basophilic cell cytoplasm. The granular layer had large numbers of small, spherical neurons called granular containing dense basophilic nuclei with blood capillaries and pyramidal or fusiform neurons. There was the presence of Golgi cells having chromophobic cell cytoplasm with large lightly stained basophilic nuclei as compared to granular cells. The medulla region had the myelinated axons of neurons. The collagen fibers were found in the blood vessels present in medulla and cortex region.

Keywords: Brain, cerebellum, light microscopy, Uttara fowl**IMPACT ANALYSIS OF INDIAN MUSTARD VARIETY DRMR 1165-40 UNDER CLUSTER FRONT LINE DEMONSTRATIONS (CFLDs) IN DISTRICT AMROHA OF WESTERN UTTAR PRADESH REGION****AMIT TOMAR, A.K. MISHRA, S.P. SINGH, H.H. KHAN & PRACHI PATEL****ICAR-Krishi Vigyan Kendra, Gajraula-244235, Amroha (Directorate of Extension) Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, U.P., India**

Cluster Front Line Demonstrations (CFLDs) on Indian Mustard (*Brassica juncea* L. Czern & Coss) was conducted in Eleven villages namely; Raipur Shumali, Khajoori, Dhanora Mafi, Dhanora Mandi, Nagla Mafi, Rehmapur Mafi, Baldana Asgar Ali, Fatehpur Chitra, Nanai, Gajraula Basti & Salempur Gonsai of Districts Amroha during Rabi, 2022-23. The high yielding varieties/hybrids namely; DRMR 1165-40 was used for distribution of seed under CFLDs on Indian Mustard (*Brassica juncea* L. Czern & Coss) during Rabi-2022-23 in Western Uttar Pradesh region. The average yield of these varieties/hybrids are 18-22 q/ha. and mature in medium duration. Total 60 farmers were selected on the basis of their socio-economic conditions. The main objective of the CFLDs to improve the socio-economic condition of the marginal farmers, increasing the Indian Mustard (*Brassica juncea* L. Czern & Coss) cultivated area during Rabi season in Eastern Uttar Pradesh region and also utilization of the Rabi fellow land for cultivation of Mustard as a sole crop/Inter-cropping model. The results revealed that farmers were benefitted from the CFLDs practice in comparison to their own traditional practices. The average yield production of Indian mustard from farmers practices and from CFLDs practices was 10.25 quintals per hectare and 16.81 quintals per hectare, respectively. The cost: benefit ratios from farmers & CFLDs practices was 2.32 & 3.59, respectively.

Key words: *Brassica juncea*, Cluster Front Line Demonstrations (CFLDs), Indian Mustard & Rabi.**THE GREEN SPIRIT: TEMPLES AND THEIR CONTRIBUTION TO PLANT CONSERVATION IN DISTRICT JAMMU****DR. AMITA SHARMAⁱ AND DIKSHA SHARMAⁱⁱ**ⁱ**Professor, Department of Botany, Raghunath Girls' Post Graduate College, Meerut, UP**ⁱⁱ**Research Scholar, Department of Botany, Raghunath Girls' Post Graduate College, Meerut, UP**

This Study deals with the often overlooked role of temples in plant conservation efforts within district Jammu. Temples deeply intertwined with cultural and religious practices, serve as vital hubs for biodiversity preservation through rituals, act as guardians of indigenous flora and promote awareness and conservation. This study examines the symbiotic relationship between religious traditions and ecological stewardship shedding light on the significant contribution of temples to the conservation of plant species in Jammu district. For traditional plant enumeration, field survey of 29 temples in Jammu city was conducted. Some renowned temples of Jammu district are Bawa Da Talab Jhiri, Sacred grove Bab Jitto Jhiri, Bua Dati Temple Chuhadi, Baba Ballo Mathwar, Kameshwar, temple sacred grove Akhnoor, Mera Mandriyan Sacred grove, Village Rehani Sui Simbli, Kanhachak etc. Traditional ancient trees are grown and nurtured in the temples which enhance the beauty of the area. During the survey of plants associated with temple rituals and nurtured in the religious places, it was observed that temples had rich biodiversity of ancient sacred trees like *Acacia catechu*, *Aegle marmelos*, *Bambusa arundinaceamutans*, *Butea monosperma*, *Crataeva nurvala*, *Dalbergia sisso*, *Emblia officinalis*, *Muraya koenigii*, *Terminalia arjuna* etc. A total of 83 plants were studied, representing 44 families and 70 genera. Among these 32 plants were utilized for religious rituals, all were valued for their medicinal properties, 20 plants were consumed as food, 11 were cultivated for ornamental purposes and 13 were revered as scared and worshipped in various rituals. In the field study, the majority of plants belong to families Fabaceae and Moraceae. The information provided in the study will help further to research into these plant families and unveil additional ethnobotanical insights, contributing to our understanding of traditional knowledge and biodiversity conservation strategies for future generations.

Key Words: Temples, Plant conservation, Jammu District, Sacred Groves, Biodiversity preservation, rituals, Indigenous flora, ecological stewardship.

BIODIVERSITY CONSERVATION, GREEN ENERGY AND CARBON CREDITS TO COMBAT GLOBAL WARMING INDUCED CLIMATE CHANGE**AMITA SHARMA****Professor, Department of Botany, Raghunath Girls' Post Graduate College, Meerut**

The present review paper deals with biodiversity conservation, the use of alternate energy sources, and carbon credits to fight global warming-induced climate change. Long-term shifts in temperature and weather patterns are termed as climate change due to natural, volcanic, or anthropogenic activities. Greenhouse gas emission and water vapor trap heat in the atmosphere, and don't allow heat to return to space. Biodiversity conservation, carbon sequestration, afforestation, reforestation, and organic and sustainable agricultural practices act as carbon sinks. Such practices offset CO₂ in the atmosphere. The paper deals with natural carbon sequestrations like afforestation, soil carbon sequestration, wetland mangroves, blue carbon sinks, and ocean carbon storage. Windmills, biogas, solar panels, etc. are some renewable energy interventions that help to solve global warming-induced climate change. Ecofriendly green technology-based industries, vehicles, power plants, etc. reduce greenhouse gas emissions in the atmosphere. Focus on protecting and restoring coastal ecosystems will encourage blue carbon sequestration. Oceans are the biggest carbon sink. To offset one ton of CO₂ from the atmosphere, 31-46 trees are required. Carbon capture, utilization, and storage framework is the part of the Indian Planning Body to capture 750 million mt/year CO₂ by 2050. India is the 3rd largest emitter of CO₂ and has a target to cut CO₂ emissions by 50% by 2050 and achieve net zero by 2070, therefore a long-term need for decarbonizing solutions. The paper in the end discusses about carbon trading and carbon credits generated by sustainable forest management as an important and valuable commodities to the fight against climate change. The future is the carbon credits, which promote environmentally friendly practices and also offset carbon emissions. With growing awareness of climate change, purchasing carbon credits from sustainable forest management can be a proactive step for businesses and individuals alike to reduce their carbon footprints and contribute to a greener future. This reviewed paper is a new push to fight climate change from forests. It shows a growing marketplace that pays to keep carbon sequestered in forests.

Keywords: Biodiversity conservation, climate change, greenhouse gases, carbon sequestration, carbon credits**MORPHOLOGY OF POLLEN IN SOME MEDICINAL PLANTS OF FAMILY APIACEAE****AMITA SHARMA¹ & DR. SAVITA MALIK****¹Professor, Department of Botany at Raghunath Girls Degree College, Meerut**

This paper deals with the study of morphology of pollen that is an expression of part of the genome in three plants of family Apiaceae that includes *Centella asiatica* (L.) Urban, *Foeniculum vulgare* Mill. and *Trachyspermum ammi* (L.) Sprague which includes observation of pollen characters under Light microscope, Phase contrast microscope and Scanning electron microscope. Pollens material collected through acetolysis from the flowers obtained from plants grown in kitchen garden. That was further studied in the Laboratory of R.G.P.G. College Meerut. Studied characters were pollen shape, pollen size, number of aperture, size of colpi, thickness of exine, and exine ornamentation in three plants. During studies largest pollen size is found in *C. asiatica* and smallest in *T. ammi*. Number of apertures observed was one in *C. asiatica*, two in *F. vulgare* and no aperture was observed in *T. ammi*. Pollens of three plants were tricolporate during SEM studies. Variation of exine ornamentation was clearly observed in SEM investigation in all three species. During SEM studies rugulate exine ornamentation was visible in *C. asiatica*, striated was found in *F. vulgare* and striated perforate was found in *T. ammi*. Thickness of exine is highest in *F. vulgare*. Pollens were ovate in *C. asiatica*, elongated in *F. vulgare* and elliptical in *T. ammi*. *C. asiatica* is active ingredient of several formulations including CNS, skin and gastrointestinal disease. This plant also improve alertness and relieve anger. *F. vulgare* is used as a traditional food and medicine. It provides a noteworthy basis in pharmaceutical biology for the development of new drugs and future clinical use. *T. ammi* is used as a remedial agent in flatulence, atonic dyspepsia, diarrhea, abdominal tumours, abdominal pains, piles and bronchial problems, lack of appetite, galactagogue, asthma and amenorrhoea properties. The variable structure of pollen grains is necessary for the delimitation of species and hence important for taxonomical and biodiversity conservation purposes.

Keywords: Apiaceae, Aperture, Exine, Pollen, and tricolporate.**EFFECT OF POST HARVEST CHEMICALS ON SHELF LIFE AND PHYSIOLOGICAL CHANGES OF BANANA (*Musa paradisiaca* L.) CV. GRAND NAIN UNDER AMBIENT AND REFRIGERATED STORAGE CONDITION****AMLANJYOTI SAR^{1*} AND SUJATA V. DHUTRAJ²****^{1&2}Department of Horticulture, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra,**

The present investigation was carried out during 2023 at Dept. of Horticulture, VNMKV, Parbhani to envisage the effect of different post harvest chemicals on shelf life and physiological changes of banana cv. Grand Naine under ambient and refrigerated storage condition. The experiment was laid out in Factorial Completely Randomized Design (FCRD) with two factor i.e., storage condition with two levels viz., ambient storage (S₁), refrigerated storage (S₂: 13°C ± 1 temp. and 85% RH) and chemical treatment with five levels viz., C₁: GA₃ @ 150 ppm, C₂: benzyl adenine @ 50 ppm, C₃: salicylic acid @ 2 mM, C₄: hexanal @ 1% and C₅: KMS @ 1% with ten treatment combinations which were replicated three times. Interaction effect of storage condition and chemical treatment on physical properties of fruit was found significant. Highest shelf life (33.89 days) was recorded in fruits stored in treatment combination S₂C₁ (Refrigerated Storage + GA₃ @ 150 ppm). Among the treatments, post harvest dipping of fruits in GA₃ @ 150 ppm and stored in refrigerated condition (S₂C₁) significantly recorded minimum PLW, higher fruit firmness and peel thickness, minimum pulp to peel ratio and respiration rate, higher organoleptic score along with progressing of storage period at every 4 days interval.

MORPHOLOGICAL STUDIES ON IMMATURE STAGES OF YELLOW TAIL TUSSOCK MOTH, *SOMENA SCINTILLANS* WALKER, 1856 (LEPIDOPTERA: EREBIDAE: LYMANTRIINAE) FROM HIMACHAL PRADESH (INDIA)**AMRITPAL SINGH KALEKA AND YACHANA KAPOOR*****Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab**

Insects are the dominant group of organisms on earth, in terms of both taxonomic diversity (>50% of all described species) and ecological function. Diversity of insect species represents an equivalent variety of adaptations to variable environmental conditions. Taxonomy is an initial step towards the study of insects which is helpful in the direction of exploring their relationship with the biodiversity and ultimately in the welfare of all the living organs which have a direct or indirect relationship with them. Lepidoptera is the most recognizable insects order in the world. It includes butterflies, moths and skippers. It is well known that fruit trees all over the world are susceptible to attacks of the caterpillars of numerous lepidopterans such as leaf miners, flower webbers, flower, bud, bark, stem and fruit borers. This study aimed to update the taxonomic data of Yellow tail Tussock moth, *Somena scintillans* Walker, 1856 which was earlier emphasized mainly on the taxonomic characteristics of adult specimens like wing venation, wing maculation, male and female genitalic features. In the present study, the immature stages of the *Somena scintillans* Walker, 1856 are described and larval chaetotaxy of last instar larva and pupal morphology also discussed and illustrated with the help of photographs and well labeled diagrams in detail for the first time from Kullu District of Himachal Pradesh. It takes 33 to 57 days to complete its life cycle with five larval instars from oviposition to emergence as adult. In addition, we reported Plum tree (*Prunus salicina* Lindley) and Bitter dock weed (*Rumex obtusifolius* Linnaeus) as new host plants for this species. From the results, it is evident that the life histories, chaetotaxy and morphology of immature stages will help in identification and differentiation of various taxa at each stage and will be beneficial for planning conservation and pest control strategies.

WHAT MAKES US DIFFERENT? A COMPARATIVE ACCOUNT OF ULTRA-STRUCTURES IN LARVAE OF TWO SPECIES OF SUBFAMILY LYMANTRIINAE**AMRITPAL SINGH KALEKA & ARSIMRAT KAUR DULAI*****Department of Zoology and Environmental Sciences, Punjabi University Patiala, Punjab, India**

Being serious crop pests, the moths spend a significant part of their life cycle as larvae. The larvae are voracious feeders and their food preferences rely heavily on chemoreception of the environmental cues. The sensilla play an important role as chemoreceptors and are the fundamental units of chemoreception in larval instars. These ultra-structures are mainly present on the antenna and mouthparts of the larvae. In order to practice effective pest control methods, it's better to target moths during their larval stage as they are less agile. The present study reveals a comparative account of these ultra-structures of the antennae and mouthparts in larvae of two tussock moth species namely *Euproctis latifascia* and *Artaxa vitellina*, referable to the same subfamily Lymantriinae of Family Erebidae and delineates the distinctions that lie in their sensory armature. Notable differences have been observed in the distribution of medial sensilla on maxillary palp and basiconic sensilla on antenna in larval stages of these two moth species. Furthermore, this research highlights the importance of larval morphological characteristics in providing additional insights for taxonomic strengthening. This approach can also aid future electrophysiological inquiries in understanding the behavioural mechanisms of pest species, while simultaneously bolstering phylogenetic analyses.

ENHANCING NUTRIENT SECURITY IN NORTHEAST INDIA: THE RELEVANCE OF SMALL INDIGENOUS FISH SPECIES**ANAMIKA DEBNATH****Ph.D. Student, The West Bengal University of Animal and Fishery Sciences, West Bengal**

Northeast India, with its unique cultural diversity and geographical features, faces significant challenges in ensuring food and nutrient security among its population. This abstract explores the pivotal role of small indigenous fish species (SIFS) in addressing the region's nutritional needs. SIFS, comprising a diverse array of fish species, are integral to the traditional diets and socio-cultural fabric of Northeast India. However, their significance extends beyond cultural practices, as they serve as rich sources of essential nutrients, including proteins, vitamins, and minerals. Moreover, SIFS exhibit resilience to local environmental conditions and are well-adapted to the region's aquatic ecosystems. Despite their nutritional and ecological importance, SIFS have often been overlooked in regional food policies and development strategies. This abstract advocates for the recognition and promotion of SIFS-based aquaculture and fisheries management initiatives as sustainable solutions to enhance nutrient security in Northeast India. By integrating traditional knowledge with modern scientific approaches, stakeholders can harness the nutritional potential of SIFS while safeguarding biodiversity and supporting local livelihoods. Embracing the relevance of SIFS represents a promising pathway towards fostering resilient food systems and improving the overall well-being of communities in Northeast India.

Keywords: Small indigenous species, animal protein, micronutrient, sustainable management

EFFECT OF NANO- POTASSIUM ON GROWTH AND FLOWERING OF DAMASK ROSE**ANAMIKA SAJWAN^{1*}, V. K. RAO², RAJEEW KUMAR³, AJIT KUMAR KAPOOR², GURDEEP BAINS⁴**¹Department of Horticulture, Ph. D Research Scholar, G.B. Pant University of Agriculture and Technology, Pantnagar, India²Department of Horticulture, Faculty, G.B. Pant University of Agriculture and Technology, Pantnagar India³Department of Agronomy, Faculty, G.B. Pant University of Agriculture and Technology, Pantnagar India⁴Department of Plant Physiology, Faculty, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Damask rose (*Rosa damascena* Mill.) is an ornamental as well aromatic plant recognized for its superior essential oil and having application in food, pharmaceutical and cosmetic industry. In addition to its commercial product such as rose oil, rose water, rose concrete and rose absolute, it also possesses wide range of biochemical activities such as analgesic, hypotonic, antispasmodic, etc. But the worldwide production of rose oil is almost half of the total demand. So, wide applications and low oil content of damask rose have made it mandatory to design best management practices which can increase its productivity. Nutrient management can play an important role in this regard. Potassium is an important macronutrient, that plays various roles in plant physiological processes including enzyme activity, osmotic stomatal conductance, photosynthesis maintenance, growth turgor and solute. But limited nutrient use efficiency and environmental constraints are the problems associated with the use of chemical fertilizers. Nanotechnology is emerging as a promising alternative to chemical fertilizer with better absorption and assimilation by plants.

Keywords: *Rosa damascena*, Nanotechnology, biochemical, ornamental plant, aromatic plant**ANALYSIS OF THE FACTORS INFLUENCING THE PRODUCTIVITY OF CAULIFLOWER CROP (*BRASSICA OLERACEA* VAR. *BOTRYTIS*): EVIDENCE FROM JAMMU & KASHMIR (UT), INDIA****ANAMIKA SHARMA, L. K. SHARMA****Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu**

In India, cauliflower (*Brassica oleraceae* var. *botrytis*) holds significant importance both nutritionally and economically, being one of the primary vegetables cultivated nationwide. India ranks as the world's second-largest producer and exporter of cauliflower, following China. The country dedicates approximately 465 thousand hectares to cauliflower cultivation, yielding around 9083 thousand metric tons. In the Jammu and Kashmir (Union Territory) region, cauliflower farming spans approximately 3.40 thousand hectares, yielding a total production of 105.40 thousand metric tons. A detailed study conducted in the Jammu district of the Jammu region during 2020-2021 aimed to understand the factors contributing to the region's notably high cauliflower productivity. Jammu and Kashmir (UT) distinguish themselves with an exceptional cauliflower productivity of 31 tons per hectare, surpassing both the national average (19.2 tons per hectare) and other state averages. The study adopted a multistage sampling approach, enlisting 160 cauliflower growers for analysis. Results indicate that a majority (63%) of farmers in the study area have adopted unique and unconventional cauliflower hybrids such as Girja, Maharani, Garima, White Excel, and others. Interestingly, these hybrids lack endorsement from the State Agriculture University (SKUAST-J) and have not been documented elsewhere. Despite this, they exhibit remarkable productivity, averaging 33.17 tons per hectare in the study area, alongside superior growth performance, resistance to diseases and frost, among other attributes. In contrast, open-pollinated varieties yield an average productivity of 20.93 tons per hectare. Furthermore, a Multiple Linear Regression model applied in the study identified manures and fertilizers as significant drivers of cauliflower productivity, explaining 17.7% of the variability observed (R^2 value = 0.177).

Keywords: Cauliflower, Productivity, Hybrids, Open pollinated, Multistage sampling design, Factors**PERFORMANCE OF PERENNIAL HORTICULTURAL CROPS UNDER ORGANIC AND NATURAL FARMING: A COMPARATIVE STUDY****ANAND B. MASTIHOLI^{1*}, SOWMY B²., SHRIPAD VISHWESHWAR³, SUHASINI CHIKKALAKI² AND NAVEEN PUTTASWAMY⁴**^{1*}Special Officer (PPMC) and Professor of Agronomy, University of Horticultural Sciences, Bagalkot, Karnataka, India²Research Associate, University of Horticultural Sciences, Bagalkot, Karnataka, India³Assistant Professor (Agril. Economics), University of Horticultural Sciences, Bagalkot, Karnataka, India⁴Assistant Professor (FLA), Horticultural Research & Extension Centre, Kanabaraagi, Belagavi, Karnataka, India

The ecological farming practices such as natural and organic farming are more relevant in the present agrarian situation owing to the negative impacts of the excess use of external chemical inputs in crop production. With an intention to investigate the performance of perennial horticultural crops under organic and natural farming systems, a field study was conducted under the University of Horticultural Sciences, Bagalkot, Karnataka, India at three locations consecutively for four years (2019 to 2022) and the results of the same were compared with conventional farming systems. There were four treatments viz., T₁: Package of Practice, T₂: Farmers' Practice, T₃: Natural Farming and T₄: Organic Farming and were replicated five times. The field investigation revealed that sapota (78.0 q/ha), custard apple (102.38 q/ha) and cashew (23.57 q/ha) grown under natural farming (T₃) recorded lower yields whereas, guava recorded higher yields in organic farming (166.32 t/ha) followed by natural farming (102.38 t/ha) practices. Net return and B: C ratio in guava and cashew (2.17:1 and 3.65: 1, respectively) was found higher in natural farming treatment (T₃). Custard apple grown under organic farming (T₄) recorded higher net return and B: C ratio (3.55: 1). Compared to the conventional farming practices (T₁ & T₂), improvement in soil organic carbon content and higher infiltration rate was recorded in both natural and organic farming. There was improvement in soil biological activities in organic and natural farming in terms of higher microbial biomass carbon, higher number of arthropod and earth worm population.

Keywords: Organic farming, Natural farming, Horticultural crops, Yield, Biological activities

IDENTIFY THE SOURCE OF RESISTANCE AGAINST ALTERNARIA LEAF BLIGHT OF ISABGOL INCITED BY ALTERNARIA ALTERNATA**Anand Choudhary^{1*}, A. L. Yadav², Shipra Sharma³ and Sunita Choudhary⁴**^{1,2,3}**Department of Plant Pathology, CoA, Bikaner (Swami Keshwanand Rajasthan Agricultural University, Bikaner- 334006, (Rajasthan), India.**⁴**Department of Plant Pathology, Rajasthan Agricultural Research Institute (RARI) (Sri Karan Narendra Agriculture University) Jobner, Jaipur Rajasthan - 303329, India**

The most effective, safest for the environment, most economical and least expensive method of managing disease is through the use of resistant and tolerant cultivars. Thus, determining the source of resistance is an essential step in a breeding program to develop disease resistance. Hence, a total of seventeen varieties/genotypes were evaluated under artificially inoculated conditions at instructional farm, College of Agriculture, Bikaner, SKRAU Bikaner during Rabi season 2022-23 and 2023-24. Result revealed that among the seventeen germplasms/varieties assessed, six of them—Mayuri, Niharika, RI-130, PB-17, HI-5-100-5, and PB-61—were identified as moderately resistant to Alternaria leaf blight disease. Conversely, nine germplasms/varieties were found to be moderately susceptible, namely RI-168, RI-166, PB-96, HI-1, HI-2-R, RAUS-5-26, RI-89-600-52, RAU-28, and PB-62, while one, namely RI-1, was identified as susceptible. Notably, none of the germplasms/varieties found immune, resistant and highly susceptible against Alternaria leaf blight disease.

Keywords- Isabgol, screening, varieties, leaf blight, *Alternaria alternata***EXPLORING TREATED SEWAGE SLUDGE AS A NON-POLLUTING ALTERNATIVE FOR URDBEAN (VIGNA MUNGO) CULTIVATION****ANAND DINESH JEJAL****Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, India**

The ever-growing reliance on inorganic fertilizers has cast a shadow on environmental sustainability, leading to soil degradation and resource depletion. Organic sources are also limited in nature. This research unveils the potential of treated sewage sludge (SS) as a sustainable alternative for Urdbean (*Vigna mungo*) cultivation. Here, we explore the nutrient content (NPK) of SS compared to traditional manure. A randomized block design experiment evaluates the impact of varying SS application rates (125%, 100%, and 75% Recommended Dosage of Fertilizer - RDF) on the yield of Urdbean cultivar AKU 10 01. We further investigate the post-harvest effects of SS on soil properties, including fertility (pH, EC, OC, NPK), organic matter content, and most importantly, heavy metal content. Our findings reveal that 125% RDF of SS significantly enhances Urdbean yield compared to other treatments, demonstrating its potential as a fertilizer source. Additionally, increasing SS application rates positively influence soil fertility parameters like organic carbon, NPK content, and electrical conductivity. While continuous use of 125% RDF SS shows elevated heavy metal levels in the soil, these remain below the maximum permissible limits. This research paves the way for utilizing readily available SS as a non-polluting and effective organic fertilizer for sustainable Urdbean production, promoting an eco-friendlier agricultural future.

Keywords: Sewage sludge, Sustainable fertilizer, Urdbean, Soil health, Heavy metals, Organic matter,**CONSTRAINT ANALYSIS OF SMALL SCALE PIG FARMERS IN ALLAHABAD DISTRICT OF UTTAR PRADESH, INDIA****ANAND KUMAR^{1*}, PRISCILLA KERKETTA², DEEPAK SINGH³, RAMESH PANDEY⁴ AND MILIND SAGAR^{5*}**¹**Ph.D. Research Scholar, Department of Animal Husbandry & Dairy, Birsa Agriculture University, Kanke, Ranchi, Jharkhand**²**Assistant Professor cum Junior Scientist, Department of Veterinary, Birsa Agriculture University, Kanke, Ranchi, Jharkhand**³**Assistant Professor, Bhramanand PG College, Rath, Hamirpur**⁴**Professor, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, India**⁵**Ph.D. Research Scholar, Department of Agronomy, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (U.P.)**

A field survey was conducted to identify the constraints in pig farming in Chaka block of Allahabad district of Uttar Pradesh, India. Data was collected randomly from selected 60 pig farmers from 11 villages of Chaka block. The pig farmers were interviewed with a well structured questionnaire. Most of the respondents were engaged in pig farming as a secondary activity. The results revealed that pig farmers mostly local or non-descript pigs. Majority of piglet mortality is caused due to diarrhea 31.6% and crushing of piglets 20%. Majority of grower and adult pig mortality is caused due to diarrhea 26.6% and Swine fever 23.3%. The main constraint was lack of capital, high cost of feed, religious taboos lack and piglet mortality. Other constraints reported were lack of awareness among the farmers, high cost of medicine, poor marketing and theft.

Key words: Constraint, diseases, pig farming, piglet mortality etc.

RIBOFLAVIN (VITAMIN B2) FORTIFICATION OF PROBIOTIC SOYMILK THROUGH IN-SITU FERMENTATION TO PREVENT RIBOFLAVIN DEFICIENCY USING RIBOFLAVIN-PRODUCING STRAINS *LACTIPLANTIBACILLUS PLANTARUM* MTCC 25432 & MTCC 25433 AND IMPROVED NUTRITIONAL AND FUNCTIONAL ATTRIBUTES OF FERMENTED SOYMILKAnanya Rana¹, Neetu Kumra Taneja^{1,2*}, Tejpal Dhewa³¹ Department of Inter Disciplinary Sciences, NIFTEM, Sonapat, Haryana, India² Centre for Advanced Translational Research in Food Nanobiotechnology (CATR-FNB), NIFTEM, Sonapat, Haryana, India.³ Department of Nutritional Biology, Central University of Haryana, Jant-Pali, Mahendergarh, Haryana, 123031

The preparation of soymilk-based products with probiotics is a novel approach in non-dairy fermented functional foods for people with lactose intolerance. This study aimed to develop riboflavin-enriched fermented soymilk in combination with two riboflavin-producing probiotic strains of *Lactiplantibacillus plantarum* (MTCC 25432, MTCC 25433) and a traditional starter culture of *Lactobacillus acidophilus* (NCDC 2902). Furthermore, the functional properties of the developed product were examined. Compared to non-fermented soymilk, the fermented soymilk made with the combination of *L. plantarum* MTCC 25432, MTCC 25433, and NCDC 2902 had considerably improved functional properties. This study further focused on the effects of lactobacilli that produce riboflavin (B2) on the antioxidant status, isoflavone conversion, reduction of off-flavor, amino acid profile, and viscosity of B2-enriched fermented soymilk. The findings demonstrated that B2 in fermented soymilk increased significantly for co-fermentation by *L. plantarum* MTCC 25432 & *L. plantarum* MTCC 25433, rising from 25.9 µg/L to 449 µg/L. The apparent viscosity significantly changed with an increase in acidity and protein agglutination. Moreover, after 12–24 hours of fermentation, a significant amount of the glycoside form of isoflavones was deglycosylated into bioactive aglycones. The antioxidant status of soymilk was significantly improved by its B2 content and isoflavones. The final product had a higher probiotic count (9 log cfu/mL), also necessary for probiotic-containing functional foods to exert host health benefits. This research helps demonstrate the strategy for strain development for B2-bio-enriched fermentation to extend the health-promoting benefits of soymilk and soy-related foods.

Keywords: Riboflavin-bio-enriched soymilk, Fermentation, Lactobacilli, Antioxidant, Isoflavones, Viscosity**EVALUATION AND GENETIC VARIABILITY ESTIMATION FOR PLANT GROWTH AND FLOWER YIELD-RELATED TRAITS AMONG THE DIVERSE GENOTYPES OF *TABERNAEMONTANA DIVARICATA***

ANASUBAI S HOSAGOUDAR*, SATEESH R PATIL, SARVAMANGALA CHOLIN, BALAJI S KULKARNI, SHANKAR METI, LAXMAN KUKANOOR AND H P MAHESWARAPPA

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In the present experiment sixteen crepe jasmine (*Tabernaemontana divaricata*) genotypes in a Randomized complete Block Design with two replications at UHS, Bagalkot during 2020-22. The genotypes comprised eleven single-flower types and the remaining five were double-flower types. Among the single flower types, three were dwarf types and four were variegated. A total of nineteen quantitative traits including growth and yield parameters were recorded. Analysis of variance revealed significant variation among the genotypes for all the parameters studied indicating the scope for improvement. Among the genotypes, UHSB_ CJ 14 recorded the highest plant height (110.41cm), whereas, UHSB_ CJ 8 the highest plant spread (N-S and E-W) was recorded in (102.48cm and 102.38 cm respectively). Among the flowering parameters, bud and flower diameter, bud length, and corolla length were recorded as highest in genotype UHSB_CJ11 (12.83 mm, 5.29 cm, 2.40cm, and 4.44cm respectively). Bud weight per plant was highest in UHSB_CJ 8 (171.99g). Among the genetic variability estimates, higher Genotypic coefficient of variation (GCV), Phenotypic coefficient of variation (PCV) and high estimates of heritability (h^2) coupled with genetic advance (GA) high genetic advance over percent of mean and were observed for all majority of the evaluated traits. The presence of genetic variability and superiority among the genotypes is attributed to both genetic and environmental influence. Some of the genotypes with higher yields and unique flower types were found suitable for commercial cultivation and landscaping.

CLIMATE RESILIENT STRATEGIES FOR SUSTAINABILITYANCHAL KAROL^{1*}, SWATI KUNJAM¹, SUMIT JAT²¹Ph.D. Research Scholar, ²M.sc Agronomy^{1,2}Maharana Pratap University of Agriculture and Technology, Udaipur-Rajasthan, India

India will also start to experience more seasonal temperature variance, with winters warming up more than summer. With rising night time temperature and hotter days, heat waves have lasted longer across India in recent years, and this tendency is anticipated to continue. With a doubling of CO₂ concentration, it is estimated that the average temperature change will be 2.33 °C to 4.78°C. according to world food programme (WFP) report of 2018 increase in crop yield per hectare is significantly slower as compared to rates of rising population. As per food and agriculture organization (FAO) data published in 2016, if the current situation continues then by the year 2100 there will be decline in the production of major cereal crops (20-45% in maize yields, 5-50% in wheat and 20-30% in rice). According to US national oceanic and Atmospheric Administration, an impending shift in climate is the rise in global temperature brought on by higher concentration of greenhouse gases, such as carbon dioxide and nitrous oxide (NOAA). World population is expected to reach 9.7 billion by 2050 which would magnify the pressure on agricultural lands to meet the growing food demands already affected by the impact of climate change. This can be achieved by climate smart agriculture system. Adaptation is the key when it comes to climate change while at the same time adapt to climate change. Climate- smart agriculture includes many practices that farmers already use, conservation tillage, cover cropping, nutrient management, agroforestry, GM crops other practices to reduce GHG emission. CSA simultaneously tends to achieve increased productivity, enhanced resilience and reduced emission.

Keywords: Adaptation, Rising Temperature, Climate- Smart Agriculture,

A STUDY ON HANUMAN LANGUR (*SEMNOPITHECUS ENTELLUS*) FOR HOME RANGE AND SOCIAL STRUCTURE IN JHALAWAR, RAJASTHAN

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Hanuman Langurs (*Semnopithecus entellus*) are prevalent nonhuman primates across India, yet their status and distribution remain underreported in the Jhalawar district of Rajasthan, India. This study was aimed to fill this gap by assessing the current population and distribution of Hanuman langurs in the region. Through field observations, 36 troops were identified comprising a total of 386 individuals, including 82 adult males, 203 adult females, 82 juveniles, and 19 infants. The research findings reveal that Hanuman langurs were present at eight distinct sites, with an average population density of 48.25 individuals per site. Statistical analyses indicate non-significant differences in social compositions across these sites (ANOVA, $F= 2.65$, $P= 0.78$, $P>0.05$). Troop sizes ranged from 3 to 20 individuals, with a mean troop size of 10.17 individuals (t -Test: $\alpha = 0.05$, $P= 0.132$, $P< \alpha$, significant), highlighting significant variations in troop compositions. Adult females constituted the majority of the population at 52.5%, followed by adult males and juveniles at 21.2% each, and infants at 4.9%. The age-sex ratio revealed an estimated ratio of 82 adult males to 203 adult females, and a balanced ratio of adult females to juveniles and adult males to juveniles, with a ratio of 1:1 for the latter. This study provides crucial insights into the demography and distribution of Hanuman Langurs in the Jhalawar region, contributing to our understanding of primate populations in this habitat.

Keywords: Primates, Age-sex ratio, Distribution, Demography, Troops

LANTANA CAMARA AND TAGETES ERECTA OPERATIVE FOR CONSERVATION OF THE SORGHUM BICOLOR FROM THE INFESTATION BY SITOPHILUS ZEAMAI FOR THE WELLBEING OF HUMAN HEALTH

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In 1960, the Green Revolution was started by M. S. Swaminathan for modernization in agricultural practices to report food supply for high population. But unfortunately, nowadays the same revolution becomes an anxiety to the environment and human health because of the use of different chemicals pesticides, and fertilizers. The residues of different pesticides and Chemical fertilizers such as heavy metals become problematic soil physiochemical properties, water, and directly or indirectly to human health. So, In India nowadays we speak about organic farming and so on. Looking towards challenges of infections of different food grains by *Sitophilus zeamais*, the present investigation emphasizes eco-friendly and natural origin pesticides to control it. To be sustainable towards human health and the environment. Bioformulations of Leaves of *Lantana camara* and flowers of *Lantana camara*, *Tagetes erecta* (Yellow), and *Tagetes erecta* (Orange) by different organic solvents using Soxhlet apparatus. The Butanol and Ethanol formulation of plant materials of *Lantana camara* and *Tagetes erecta* were highly effective against the growth of the major stored grain pest *Sitophilus zeamais* as compared to aqueous extract. It was shown that the extracts of plant materials *Lantana camara* and *Tagetes erecta* effective against the growth and survival of *S. zeamais* in stored food grains such as sorghum, maize, wheat and rice. The concentration of extract of *L. camara* and *T. erecta* are directly proportional to the mortality rate of *S. zeamais*. As per references cited the plants *L. camara* and *T. erecta* have medicinal values which will add to *Sorghum bicolor* when we use one of the preservative materials for food grains, has no side-effect, and might boost immunity.

Key Words: Green revolution, *Sorghum bicolor*, *Sitophilus zeamai* *Lantana camara*, *Tagetes erecta*, etc.

EFFECT OF NUTRIENTS AND BIOFERTILIZERS ON GROWTH OF GUAVA (*PSIDIUM GUAJAVA* L.) CV. HISAR SAFEDA ANEJA NAIR M¹ AND ARVIND MALIK²

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The experiment entitled “Effect of nutrients and biofertilizers on growth of guava (*Psidium guajava* L.) cv. Hisar Safeda” was carried out in a well maintained guava orchard of a progressive farmer at Aryanagar, and CCSHAU, Hisar during rainy and winter season of 2019-20. A total ten treatment including control with three replications were laid out in a randomized block design. Various combinations of treatments consisting of fertilisers, micronutrients, biofertilisers, FYM, vermicompost were applied. During the period of investigation, the treatments showed varied response. Superior quality fruits were found in winter season. The highest per cent increase in plant height, plant spread in East-West and North-South direction was recorded in T₈ (RDF 75 % + ZnSO₄+MnSO₄ + Borax + PSB + *Azotobacter*+ FYM) .

Keywords: Biofertiliser, guava, micronutrient ,vermicompost.

CLIMATE CHANGE, AIR POLLUTANTS AND HUMAN HEALTH: A CASE STUDYANGITA¹, VINIT KUMAR², EKTA PANDAY³¹Research Scholar Environmental Science, Bundelkhand University, Jhansi²Associate Professor, Institute of Environmental Science, Bundelkhand University, Jhansi³Associate Professor, Applied Science Dept. Bundelkhand Institute of Eng. & Tech., Jhansi

Climate change, air quality, and human health are intricately connected in a complex relationship that has profound implications for ecosystems and societies worldwide. This paper presents a thorough examination of how climate change exacerbates air pollution and, in turn, detrimentally affects human health. It explores the mechanisms by which increased greenhouse gas emissions contribute to the greenhouse effect, leading to altered weather patterns and degraded air quality. The study delves into the direct health impacts of poor air quality, including respiratory and cardiovascular diseases, and the indirect effects such as the spread of infectious diseases and increased allergens. It also assesses the vulnerability of different populations to these health risks and the effectiveness of mitigation and adaptation strategies. The such as affects human health depends on sensitivity of regions. By integrating data from various disciplines, this paper aims to provide a comprehensive understanding of the challenges posed by climate change and air pollution, and to inform policy decisions that prioritize human health in the face of environmental change.

Keywords: Air Pollutants, Human Health, Climate Change, Air Quality and Greenhouse gases Emissions etc.

INFLUENCE OF GIBBERELIC ACID AND HAND POLLINATION ON QUALITY PARAMETERS OF CUSTARD APPLE (*ANNONA SQUAMOSA* L.) CV. ARKA SAHAN

ANIL KHINCHI

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Custard apple (*Annona squamosa* L.) belongs to the Annonaceae family, chromosome number $2n = 14$, and small shrub of genus *Annona*. There are several species of *Annona* which are usually edible and used for direct consumption. (Pritchard and Edwards, 2015). Arka Sahan is an interspecific hybrid variety that evolved by mating between Island gem (*Annona Atemoya* Hort.) x Mammoth (*Annona squamosa* L.). It is a very popular variety, and the pulp quality is very fine and sweet, but self-pollination and fruit set are key limiting factors in annonaceous fruits like Arka Sahan and *Atemoya*, hence, hand pollination must be done. (Jalilop and Kumar, 2007). Many studies have demonstrated that plant growth regulators, i.e., gibberellins, auxins, and cytokinin, can increase fruit setting and a lower number of seeds in many species without pollination. The application of GA_3 , which has been standardized particularly for sugar apples, is presently in extensive use. Savedra (1979) presented the first study on the use of GA_3 in custard apples and described how it acts as a plant growth regulator to increase fruit length and diameter and produce seeds-free cherimoya fruits, among other benefits. Hand pollination is one of the methods for achieving the quality produce, but it is laborious and expensive due to a lack of skilled labour. As a result, there is an urgent need to replace hand pollination with growth regulators to improve flowering, fruit set, yield, and quality of custard apple. The experiment was carried out in Randomized Block Design (RBD) with ten treatments and three replications. The results indicated positive influences of GA_3 on the total soluble solid (TSS) content of sugar apple, T_9 (GA_3 200 ppm + hand pollination) recorded the highest total soluble solids content (28.02 °B) and titratable acidity was recorded highest (0.42%) in T_2 (hand pollination). Maximum ascorbic acid was reported in T_8 (26.96 mg/100) at the rate of GA_3 150 + hand pollination whereas, highest total sugar content best found in T_8 (GA_3 150 ppm + hand pollination) (24.85%) and was shown to be considerably better than all other treatments. Similarly, the reducing and non-reducing sugar percentages were maximum in T_8 (GA_3 150 ppm + hand pollination) (22.28% and 2.44%). Hence, it is concluded that treatment, T_8 (GA_3 150 ppm + hand pollination) was found overall best with respect to the quality parameters of custard apple.

THE CRUCIAL ROLE OF CHEMISTRY IN ENVIRONMENTAL SUSTAINABILITY

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Chemistry plays a fundamental role in shaping and sustaining our environment. This abstract explores the multifaceted contributions of chemistry to environmental conservation, pollution mitigation and sustainable development. At the forefront, chemical processes govern the composition and behaviour of natural systems, influencing everything from air and water quality to soil fertility. Understanding chemical interactions is imperative for managing ecosystems and safeguarding biodiversity. Chemistry also underpins the development of innovative technologies aimed at mitigating environmental challenges. From catalytic converters that reduce vehicle emissions to advanced water treatment methods, chemical innovations are pivotal in combating pollution and preserving environmental integrity. Furthermore, chemistry contributes to the design of eco-friendly materials, renewable energy sources and biodegradable products, thereby fostering a more sustainable society. Moreover, chemistry plays a critical role in addressing global environmental threats such as climate change. Through the study of greenhouse gases and carbon capture technologies, chemists strive to mitigate the impacts of anthropogenic activities on the Earth's climate system. Additionally, chemistry informs policies and regulations aimed at protecting the environment, ensuring that scientific knowledge translates into effective strategies for conservation and sustainable development. In conclusion, the role of chemistry in the environment is indispensable for promoting ecological balance, mitigating pollution, and fostering sustainable practices. Through research, innovation and collaboration, chemists continue to drive progress towards a greener and more resilient planet.

Keywords: Environmental conservation, pollution mitigation, ecosystem, biodiversity, climate change.

GENETIC VARIABILITY AND G X E INTERACTION STUDIES FOR AGRO-MORPHOLOGICAL AND PHYSIO-BIOCHEMICAL TRAITS IN MUNGBEAN [VIGNA RADIATA (L.) WILCZEK]

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Mungbean is an ancient pulse crop widely cultivated under different agro-ecological situations in India. It is the potential source of protein, essential minerals and vitamin-B (vitamin-C in sprouting grains). Genotype and its interaction with the prevailing environment is the basic factor determining the final yield. The genotype x environment interaction is particularly important in the expression of quantitative characters, which are controlled by polygenes and are greatly modified by environmental influences. Thus, in order to have unbiased estimates of various genetic components, it is imperative that the experiment must be repeated over different environments. The evaluation of genotype x environment interaction gives an idea of the stability or buffering ability of the population under study. Genotype x environment interaction is of common occurrence and often creates manifold difficulties in interpreting results and thus hampers the progress of breeding programme aiming at the further genetic improvement of crop plants. Hence, the knowledge of magnitude and nature of genotype x environment interaction is very useful to a breeder for proper understanding and assessment of his material. So it is necessary to screen and identify phenotypically stable genotypes which could perform more or less uniformly under different conditions. **Objective:** The current study aimed to identify the high potential stable genotype and appropriate sowing time for mungbean cultivation in hot arid zone of Rajasthan. **Methods:** A field experiment was conducted with 35 mungbean genotypes over four environments created by four different dates of sowing in RBD with three replications at SKRAU, Bikaner during summer-2019 and *Kharif*-2019 using the model of Eberhart and Russell (1966). **Result:** Stability parameters revealed that genotype IC-39269 exhibited stable performance for number of seeds per pod, biological yield per plant and harvest index across the environments; whereas, IPM 02-3, MH 2-15 and RMG-344 exhibited stable performance for seed yield under favourable environment i.e. *Kharif* season; and genotype IC 103059 for stressed environment i.e. summer season. **Implication:** IPM 02-3, MH 2-15 and RMG-344 exhibited stable performance for seed yield under favourable environment i.e. *Kharif* season.

Keywords: G x E Interaction, mungbean, agro-morphological and physio-biochemical traits, stability, seed yield.

EVALUATION OF DIFFERENT MEDIA FOR THE GROWTH AND SPORULATION OF *A. ALTERNATE*

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Brinjal (*Solanum melongena* L.) also known as eggplant or aubergines or garden egg member of Solanaceae family is a popular vegetable crop grown almost all over the world. *Alternaria* leaf spot disease of brinjal symptoms appeared initially as small water soaked flecks on the leaves, after 7-9 days becoming dark brown, irregular flecks with concentric rings on the leaves. The present investigation was carried out in Laboratory studies on various aspects at PG laboratory, Department of Plant Pathology, College of Agriculture, Gwalior. A total of fourteen solid culture media were tested to assess their effect on cultural characters and sporulation of *A. alternata*. At seven days after inoculation the maximum fungal growth was recorded in Potato Dextrose Agar (86.67 mm), followed by Richard Agar (79.67 mm), Asthana and Hawkers (74.33 mm), Oat meal Agar (71.67 mm), Malt Extract Agar (58.00 mm), Brinjal fruit dextrose agar (54.33 mm), Czapek's Dox Agar and Brown's agar (52.00 mm), Elliot's agar (50.67 mm), Coon's Agar (48.67 mm), V8 juice agar (45.33 mm), Ashby's mannitol Agar (45.00 mm), Potato leaf agar (44.00 mm), while minimum mycelium growth was recorded in Brinjal leaf agar (41.00 mm). Grayish-white colony colour were found in four media whereas black colony were found in Potato Dextrose Agar, Brinjal leaf agar, Oat meal Agar, V8 juice agar, Potato leaf agar, Richard Agar, Ashby's mannitol Agar, Coon's Agar, Elliot's agar and Brown's agar. Smooth colonies were noticed with Malt Extract Agar, Czapek's Dox Agar, Brinjal fruit dextrose agar and Asthana and Hawkers. Potato Dextrose Agar, Oat meal Agar, Richard Agar and Asthana and Hawkers exhibited excellent (++++) sporulation. Poor (+) sporulation were exhibited Brinjal leaf agar and Coon's Agar.

Key word: Brinjal, Media, *Alternaria* leaf spot, *Alternaria alternate*.

RECENT DEVELOPMENTS IN RECYCLING OF HUMAN EXCRETA FOR ENERGY GENERATION: A CRITICAL REVIEW

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Due to continuous depletion of natural resources currently used for electricity generation, it is imperative to develop alternative energy sources. Human excreta is nowadays being explored as an efficient source to produce bio-energy. Safe and hygienic way of disposal of human wastes is an increasing problem resulting in mortality, morbidity and decreasing community health, sanitation and consequently productivity. Almost a billion people in developing world have no access to toilet and practice open defecation. But that waste should not go waste. Rather than tainting the environment and transmitting diseases, it could actually be harnessed to generate heat or power for millions of homes. The review paper will discuss about utilization of human excreta to produce biogas/energy as an alternative renewable energy. Utilization of human waste is considered beneficial in terms of the process because it does not require additional starter (micro-organisms seeds) and a supply of micro-organisms occurs continuously during the feeding of raw materials. Product gas resulting from typical dry human feces have LHV and energy values of 17.2 MJ/kg and 24 MJ/kg, respectively, at optimum equivalence ratio of 0.31 values that are comparable to wood biomass. Non- sewerer Sanitary Systems (NSS) are emerging as one of the solutions to poor sanitation because of the limitations of the conventional flush toilets. The new sanitary systems are expected to safely treat fecal waste and operate without any external connections to sewer, water supply or energy source. The Nano Membrane Toilets (NMT) is unique domestic -scale sanitary solution to treat human waste on site. The Reinvent The Toilet Challenge (RTTC) is one of the pioneering schemes initiated in 2011 under the Water, Sanitation And Hygiene (WASH) programme of the Bill and Melinda Gates Foundation to increase access to safe, sustainable and affordable sanitation. In the present communication merits, demerits, advantages, limitations of various engineered technologies currently utilized through the world will be critically reviewed on the basis of their innovations, user friendliness, cost effectiveness, maintenance etc. Also, health aspects of biogas generated, design and R&D aspects of biogas plant fed by human excreta with or without supplementary feed stocks, treatment of slurry and its use, strategy for promotion and integration with other programmes will be thoroughly discussed.

MILLETS: ECONOMIC PERSPECTIVE AS A SOLUTION TO NUTRITIONAL INSECURITY

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Agricultural lands with irrigation facilities have been exploited to maximum and hence we need to focus on drylands to further increase grain production. Owing to less fertility, utilization of unirrigated lands to produce sufficient quality grains is a big challenge. Millets as climate change compliant crops score highly over other grains like wheat and rice in terms of marginal growing conditions and high nutritional value. Millets are considered as a “Low-cost grain” as they can grow under drought conditions and need much less water vis-a-vis other crops. These crops are viewed as important for health and wellness of people and can help in preventing many kinds of diseases related to modern life style including obesity and diabetes. In India, total area under the millets crops has declined and the production of total millets also declined. Non-availability of high yielding varieties, quality seeds of small millets, fast changing food habits, easy access of consumer to rice and wheat through public distribution system, lack of assured procurement and non-supply of millets under public distribution system and lack of dedicated millet processing unlike rice are some of the reasons for decrease in the area and production of millets. So, there is a need for development and distribution of high yielding varieties and hybrids of millets, with improved agronomic practices, creation of awareness about the nutritional benefits of the millet products among the consumers. A value chain model is needed with emphasis on value addition and development of value-added products from millets. Millets play vital role on nutritional security and climate change. The millet crops act store house of various nutrients which is essential for various key function of human body. Especially, finger millet contains considerable quantity of calcium support born development. The millets help in anti-aging factor, strengthening muscles and bones, synthesising various amino acid, etc. Hence, Incentives for increasing production and productivity, coupled with awareness campaigns through the media and other means, can help increase the supply of millets and allow nutritionally vulnerable populations to gain access to them through state-led food distribution programs.

Keywords: Production, Productivity, nutritional security, millets

INFLUENCE OF DIFFERENT MANURES AND FERTILIZERS ON GROWTH AND YIELD OF CARROT (DAUCUS CAROTA L.)

CV. KASHI ARUN

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A field experiment was conducted during rabi 2022-2023 at the experimental unit, Department of Horticulture, Tilak Dhari Post Graduate Collage, Jaunpur, Uttar Pradesh, India, to study the effect of manures and fertilizers on growth and yield parameters of carrot. The experiment was carried out with the eight treatments i.e. T₁-Control, T₂-25% NPK + Neem Cake, T₃-25% NPK + FYM, T₄-25% NPK + Vermicompost, T₅-50% NPK + Neem Cake, T₆-50% NPK + FYM, T₇-50% NPK + Vermi compost and T₈-100 % NPK in Randomized Block Design and replicated thrice. Among the treatments, T₈-100% NPK registered significantly higher plant height (63.34 cm), more number of leaves/plant (20.01), fresh weight of leaves (127.43 g) and dry weight of plant (32.46g). Whereas, T₇-25% NPK + Neem Cake registered significantly maximum fresh weight of plant (277.31 g), tallest root length (30.55 cm), maximum diameter of root (5.86 cm), highest dry root weight (8.74g), highest fresh root weight (132.95 g), highest root yield/plot (2.91 kg) and highest root yield/ha (260.1 q).

Keywords: Carrot, Vermicompost Fertilizers, Neem cake, Dry weight, Plant height.

EXPLORING NUCLEAR RADIOACTIVE POLLUTION, ECOLOGICAL CRISIS AND QUEST FOR SUSTAINABLE ENVIRONMENT IN MAHUA MAJI'S *THE TOXIC TRIBAL LAND OF MARANG GODA***ANIL KUMAR TIRIYA¹ AND ASHA RANI SUNDI²**¹Assistant Professor, P. G. Department of English, Berhampur University, Ganjam, Odisha²Research Scholar, Dept. of Hindi, SCTLL, KISS-DU Bhubaneswar, Odisha

The paper attempts to define and explain the ecological crisis arising from the indiscriminate exploitation of nature in the epoch of globalization, liberalization, industrialization in 21st century. It highlights the environmental imbalance, alerts threats to human existence and appeals to mankind to establish harmony with nature by changing his lifestyle. Mahua Maji is one of the greatest women writers of Indigenous literature who wrote the novel *Marang Goda Neelkanth Hua* in 2012. Rajesh Kumar translated it into English as *The Toxic Land of Marang Goda* in 2022. Mahua Maji raises the issue of environmental crisis and sustainable problem arising due to globalization and industrialization in *The Toxic Tribal Land of Marang Goda* and discusses the threatening consequences for the identity and existence of the 'Ho' tribe due to the adverse effects of uranium radiation and pollution in Marang Goda. The protectors of nature, tribal people who believe in collectivism and coexistence, undergo identity and existence problem because of uranium mining by UCIL. The ecological crisis and quest for tribal identity and existence have been analyzed and interpreted in Ramchandra Guha's postcolonial ecocritical theoretical framework. The 'Ho' tribal people consider nature as a deity and worship it, but they do not know that the minerals hidden within it is driving them away from their own land. Due to illegal mining and industrialization, tribals are being displaced from their original habitat. Mahua Maji expresses the problems of displacement, pollution and radiation in a delicate way in her novel *The Toxic Tribal Land of Marang Goda*. The writer becomes an activist and wanders in the forests of Saranda, goes to the uranium mines and expresses her views on the fatal consequences of radiation. The biggest challenge, the human beings are facing today, is how to establish harmony between environment and modernization. Man is exploiting nature in the name of rapid economic development. Mahua Maji raises the issue of 'development' versus 'human identity and existence in the novel *The Toxic Tribal Land of Marang Goda*. Is the destruction of nature, environment, beliefs, traditions and culture justified for development? Mahua Maji warns us about the adverse effects of uranium radiation and pollution and alarms fatal consequences for the human identity and existence in the world. There must be balance between environment, ecology and development to preserve life cycle on earth. We can save our earth by striking balance between nature, environment and sustainable development. Indigenous way of life can show us the way how to save planet.

Keywords: Globalization, industrialization, uranium, radiation, environmental crisis, ecology, identity & existence**QUEST FOR SOCIALISM AND ENVIRONMENTAL JUSTICE FOR SUSTAINABLE FUTURE IN ARNOLD WESKER'S *I'M TALKING ABOUT JERUSALEM*****ANIL KUMAR TIRIYA****Research Scholar, P.G. Department of English, Berhampur University, Ganjam, Odisha**

Drama is a mirror of human life in action on stage. Kitchen Sink Drama that developed in post war British theatre depicts the domestic situations of working class Britons living in cramped rented accommodation and spending their off-hours drinking in grimy pubs. The protagonists of Kitchen sink dramas are disillusioned, dissatisfied, frustrated and express their intense anger and hatred for upper class people who deprive them of all opportunities for development and make them rebellious. Kitchen Sink Drama is a theatrical art that performs class discrimination, social inequality and quest for environmental justice in the society. Post war British playwright Arnold Wesker exhibits the class conflicts, inequalities, social evils and exploitations in capitalist society and presents socialism and quest for environmental justice as panacea for sustainable future in *I'm Talking about Jerusalem*. The environmental justice is typically a distributive justice which shows the equitable distribution of environmental risks and benefits. It is a human right concerned with both the 'fair treatment' and the 'significant involvement' of poor working class people in environmental policy and natural resources. Dave Simmonds and his wife Ada Kahn are dissatisfied with mechanical hectic life of industrial capitalist society; so they move from London to a desolate countryside Norfolk where they can establish New Jerusalem in which there may be liberty, equality and harmony between work, family, life and nature. When socialism collapses, although the protagonist Dave makes his utmost effort to establish equality and fraternity in a remote countryside in Britain, yet he fails to do so and faces utter frustration; but he doesn't surrender and expects that his individual socialism will succeed one day. The disillusionment, frustration and protest of angry young man Dave can be analyzed in George Lukas's Socio-historical Marxist and Sigmund Freud's Psychoanalytical theoretical frameworks. Arnold Wesker says that socio-psychological factors society, family, wealth, religion and beliefs shape the personalities of human beings, so angry young man, anti-hero and social rebel peter who behaves peculiarly in different adverse conditions and raises voice for environmental justice for sustainable future alone cannot be held responsible for his failures in his life.

Keywords: Drama, kitchen sink, discrimination, protest, socialism, environmental justice

COMBINING ABILITY AND STABILITY ANALYSIS FOR TERMINAL HEAT TOLERANCE, YIELD AND ITS CONTRIBUTING CHARACTERS IN INDIAN MUSTARD [BRASSICA JUNCEA (L.)]**ANITA*, DEEPAK GUPTA AND MANOHAR RAM****Department of Genetics and Plant Breeding, SKN College of Agriculture, SKN Agriculture University, Jobner, Jaipur, Rajasthan**

The present investigation entitled “Combining Ability and Stability Analysis for Terminal Heat Tolerance, Yield and its Contributing Characters in Indian Mustard [*Brassica juncea* (L.)]” was carried out to study heterosis, heterobeltiosis, combining ability, components of genetic variance and stability analysis in three varying environments created by three different dates of sowing viz., normal, late and very late sowing for yield and its attributing traits by performing diallel analysis (Griffing Method II, Model I) and Hayman’s graphical analysis. To achieve the objectives of the present investigation, ten genetically diverse parents, namely, BPR 543-2, BPR 349-9, DRMR 2017-15, PM 25, NRCHB 101, PM 28, IC 122449, EC 766136, RAJAT and LAXMI were crossed in diallel fashion excluding reciprocals in *Rabi* 2021-22. These ten parents along with their 45 F₁ progenies were evaluated in a randomized block design with three replications during *Rabi* 2022-23 at Instructional Farm of S.K.N. College of Agriculture, Jobner (Rajasthan). The GCA and SCA variances were significant for all the traits in all three environments which indicated the importance of both additive and non-additive genetic control of all the attributes under investigation. The GCA/SCA variance ratio was found below unity which indicated the preponderance of non-additive gene action in governing the inheritance of these traits. An overall evaluation of GCA effects over the environments showed that the parent BPR 349-9 in all three environments. On the basis *per se* performance, SCA effects, heterosis and heterobeltiosis, the crosses BPR 543-2 x DRMR 2017-15, BPR 349-9 x LAXMI and NRCHB 101 x RAJAT in all the environments, emerged as good crosses for seed yield per plant with other related traits. The evaluation of components of genetic variation manifested that both additive (D) and dominance (H₁ and H₂) components were significant for most of the characters in all three environments which indicated that both components were operating in the expression of the characters. The graphical analysis revealed that there was partial, complete and over-dominance for different characters under normal, late as well as very late sown conditions. The scattering of array points indicated the existence of genetic diversity among the parents for most of the traits. Consideration of both mean performance and stability parameters showed that the parent PM 28 x EC 766136 was most stable for seed yield and other yield attributing characters, therefore, it was considered suitable for all the environmental conditions. The crosses BPR 349-9 x DRMR 2017-15 and PM 25 x RAJAT exhibited better agronomic conditions. On the other hand, parent BPR 543-2 and crosses NRCHB 101 x LAXMI, BPR 543-2 x BPR 349-9, EC 766136 x LAXMI and BPR 543-2 x RAJAT suitable for poor agronomic condition. On the basis of heat susceptibility indices (HSI) indicated parent LAXMI and cross, DRMR 2017-15 x PM 28 were found most desirable as they possessed high heat tolerance for most of the characters and could be used as promising breeding material for the development of new heat tolerant cultivars of mustard.

PATTERNS OF DIVERSITY IN BENTHIC MACRO-INVERTEBRATE COMMUNITY IN THE RIVERINE ECOSYSTEMS OF AN ECOREGION: THE DHAULADHAR RANGE OF WESTERN HIMALAYA**ANITA KUMARI AND SANDEEP KUMAR****Department of Animal Sciences, Central University of Himachal Pradesh**

The study describes the diversity patterns of the benthic macro-invertebrates in four riverine ecosystems: Chambhi stream, Boh stream, Gaj River, and Dhehar River originating from Dhauladhar range of the Western Himalaya. An extensive sampling approach using D-frame kick net was adopted for the sample collection. The riverine sections (100-200 m) were sampled nearly at the same altitude c.a. 600-680m ASL except Boh stream which was sampled at two location Boh station 1 (BS1, 1590m ASL) and Boh station 2 (BS2, 610m ASL). Samples were preserved in 70% ethanol and identified using stereomicroscope upto genus/family level following standard literature. Shannon diversity and taxonomic richness was minimum (1.4, 5) at Boh S2 and maximum (2.09, 21) in Gaj river. Evenness was higher (0.87) at BS1 and low (0.34) at Gaj. The β -diversity (0.37) demonstrated 63% overall similarity in the community. It showed high similarity between Gaj-Chambi (0.37) and BS1- Dhehar River (0.38) while least similarity between BS1-BS2 (0.68), a notable variation. Two taxa (Hydropsychidae and Baetidae) occurred at all the sections, while seven (*Tabanus*, *Leucrocota*, *Gyrinus*, *Elmidae*, *Polycentropodidae*, *Ophiogomphus* and *Euphaea*), four (*Haxatoma*, *Ephemerillidae*, *Epeorus* and *Stenopsychidae*) one (*Blapherocera*) and one (*Rithrogenia*) exhibited restricted distribution at Gaj, Boh S1, Dhehar and BS2 respectively. The variations in the diversity and distribution patterns in these riverine ecosystem located in the same ecoregion underpin the need of more studies to be carried out in this aspect. The study provides baseline data and can be considered as benchmark for the effective management and conservation of the rivers in the Western Himalaya.

Keywords: β -diversity, macro-invertebrates, Dhauladhar range, Himalayan Rivers, river management.**SUSTAINABLE SYNTHESIS OF COPPER NANOPARTICLES FROM LEAF EXTRACT****ANITA RAJKUMAR GHANDHE^{A*}****^ADepartment of Soil Science & Agriculture Chemistry, University of Horticultural Science, Bagalkot**

Nanoparticles are gaining interest in biomedical applications due to its importance such as anti-bacterial, anti-fungal and anti-cancer agents. Nanomaterials has been increasingly gaining popularity due to its eco-friendly nature and cost-effectiveness. In the present study, we synthesized copper nanoparticles (CuNPs) by using *Ocimum sanctum* leaf extract as a bio reducing agent. First we prepared leaf extract of *Ocimum sanctum* in de ionized water. This extract added to 1mMol, 2mMol and different concretion of copper sulfate solution and we observed the change in color of the solution from colorless to colored solution, this indicates that there is a formation of Cu nanoparticles. These biosynthesized Cu nanoparticles were characterized with the help of X-ray diffraction (XRD), Scanning Electron microscopy (SEM). It was observed that the *Ocimum sanctum* leaf extract of image nanoparticle 45nm to 70nm it conformed and can reduce copper ions into copper nanoparticles within 8 to 10 min of reaction time. Thus, this method can be used for rapid and ecofriendly biosynthesis of stable copper nanoparticles.

Keywords: *Ocimum sanctum* leaf, copper nanoparticle, X-ray diffraction (XRD), anti-bacterial

TO STUDY ANTIMICROBIAL PROPERTIES OF COPPER NANOPARTICLES OBTAINED USING THE EXTRACTS OF SYZYGIUM AROMATICUM VIA GREEN SYNTHESIS METHOD**ANITA RAJKUMAR GHANDHE^{A*} AND DEEPA TERDA^{LB}**^aDepartment of Soil Science & Agriculture Chemistry, University of Horticultural Science, Bagalkot^bDepartment of Postharvest Management, University of Horticulture Sciences, Bagalkot

We intend to use green synthesized copper nanoparticles obtained from *Syzygium aromaticum* (clove) flower bud extracts as antiviral nano-coating agents. Copper nanoparticles (CuNPs) have excellent antiviral properties as the Cu²⁺ ions inhibit and inactivate the virus on the surface by contact killing. Also, copper is cheaper than silver so this technology will be viable for low cost, large scale production of antiviral coatings. Also clove, a commonly used aromatic herb in Indian cooking has excellent antimicrobial capacity. Eugenol a major constituent of clove oil exhibits broad spectrum antimicrobial activities against both Gram-positive, Gram-negative and acid- fast bacteria, as well as fungi. Eugenol attacks the lipid coating of the enveloped coronavirus and stops secondary viral transmission. Additionally, both copper nanoparticles and clove oil have low cytotoxicity and safe to use in humans. These bio-derived copper nanoparticles are expected to show enhanced antiviral and antimicrobial activity to synthesize CuNPs, the antiviral and antimicrobial properties and incorporate them into antiviral spray-able product. This spray when coated over fabric, glass and plastic surfaces can inactivate corona virus and other microbes. In further we characterized the CuNPs UV, FTIR and SEM

Keywords: Antiviral coating, Antimicrobial coating, Copper Nanoparticles, Green synthesis, *Syzygium aromaticum***FEASIBILITY STUDY ON THE ROLE OF KEIBUL LAMJAO NATIONAL PARK IN PROMOTING ECOTOURISM AND SUSTAINABILITY IN MANIPUR****ANJALI CHANU MOIRANGTHEM*, VIVEK KUMAR PATHAK**^{*}Research Scholar, Arunachal University of Studies, India

Associate Professor, Arunachal University of Studies, India

This research paper presents a feasibility study on the role of Keibul Lamjao National Park in promoting ecotourism and sustainable development in Manipur, India. Keibul Lamjao National Park, located in the northeastern state of Manipur, is the world's only floating national park and is renowned for its unique ecosystem, particularly the presence of the endangered Manipur brow-antlered deer, popularly known as the Sangai. Despite its ecological significance and potential for ecotourism development, the park faces various challenges, including habitat degradation, encroachment, and insufficient infrastructure. This study aims to assess the feasibility of promoting ecotourism in Keibul Lamjao National Park as a sustainable development strategy. Through a combination of primary and secondary data collection methods, including surveys, interviews, and literature review, the study examines the park's ecotourism potential, existing infrastructure, visitor profiles, and socio-economic impacts. The findings reveal that Keibul Lamjao National Park has significant ecotourism potential, which, if harnessed sustainably, could contribute to the conservation of its unique biodiversity and support local communities. However, the study also identifies various challenges and constraints, including inadequate infrastructure, limited visitor facilities, and lack of community involvement. Based on the findings, the paper proposes a series of recommendations for enhancing the park's ecotourism potential while ensuring sustainability and minimizing negative impacts on the environment and local communities. These recommendations include improving infrastructure, visitor facilities, and interpretive services, strengthening community participation and benefit-sharing mechanisms, and implementing sustainable tourism management practices. Overall, this research contributes to the understanding of the role of Keibul Lamjao National Park in promoting ecotourism and sustainable development in Manipur, while also providing practical recommendations for policymakers, park managers, and other stakeholders involved in ecotourism development and conservation efforts in the region.

Keywords: Keibul Lamjao National Park, Ecotourism, Sustainable Development, Manipur, Biodiversity Conservation**HYDROTHERMAL SYNTHESIS OF MOLYBDENUM DISULFIDE FOR TEXTILE DYE REMOVAL****ANJALI DHARIWAL, D. BANERJEE**

Department of Physics, Thin Film and Nanotechnology Laboratory, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad

The existence of emerging contaminants in industrial wastewater presents a worldwide challenge necessitating suitable remediation methods. The work presents the synthesis of MoS₂ nanoflowers through a hydrothermal method.. The synthesized sample was characterized using XRD, FESEM and FTIR spectroscopy. The XRD spectra confirmed the proper phase formation of the sample, while the FESEM micrographs showed that the sample was developed in cluster form. FTIR spectra revealed the presence of several absorption peaks assigned to various chemical bonds. The sample demonstrated high efficacy in removing rhodamine B dye, with an efficiency of over 90% within 45 minutes. Kinetic studies indicated that the reaction mostly followed a pseudo first-order mechanism. Thus, the present work is supposed to serve as milestone in the associated field.

Key words: Hydrothermal, MoS₂, dye, Absorption, Efficiency

EFFECT OF GREEN NANOPARTICLES ON SEED GERMINATION OF TOMATO, CHILLI AND BRINJAL CROPS**ANJALI KANWAL AND RAJ SINGH****Department of Bio-Sciences and Technology, Maharishi Markandeshwar (Deemed to be University), Mullana-Ambala, Haryana,**

The present study focused on green synthesis and characterization of zinc, iron and manganese oxide nano-particles and their assessment on tomato, chilli and brinjal seeds germination by their aqueous solution. The extract of the pea peel used as reducing agent to synthesized zinc, iron and manganese oxide nanoparticles. The UV-visible spectrum of ZnO, Fe₂O₃ and MnO₂ NPs showed absorption peaks at 357, 265 and 360 nm respectively. FTIR confirmed ZnO, Fe₂O₃ and MnO₂ NPs synthesis due to the formation of the band in the region of 400–800 cm⁻¹, while FESEM confirmed the spherical shape, agglomerated multiform and globular dispersion of the particles whose size varies in the range of 40-120, 43-57 and 50-100 nm respectively. Sterilized seeds of tomato, chilli and brinjal were germinated and grown in plates, which were treated with foliar spray of ZnO, Fe₂O₃ and MnO₂ nanoparticles in various concentrations (10, 20 and 50 ppm) with three replications separately for each crop. The seeds were sprayed 3 times at the interval of 48 h with graded concentrations of these nanoparticles along with sticker. The growth parameters like shoot and root length, fresh and dry weight of shoot and root and number of seeds germinate were determined at the time of germination. Maximum mean germination frequency observed in brinjal crop sprayed with 10 percent solution of ZnF, FeMn and ZnFeMn nanoparticles. FeMn found effective for germination in all crops seeds. Maximum seed vigour observed in chilli crop with 20 percent Zn followed by tomato crop with 10 percent Fe and 20 percent Mn in brinjal crop. The present research proved to be cost-effective, less toxic, and eco-friendly which will also be beneficial for future perspectives. These can be used as a nano-fertilizer in agriculture to enhance yield.

Keywords: Nanoparticles; seeds germination; growth, UV-visible, FTIR, FESEM**MANAGEMENT OF WILT DISEASE OF CORIANDER THROUGH ORGANIC AMENDMENTS AND DIFFERENT DATE OF SOWING****ANJALI KAUSHIK¹, SUSHMA NEMA², REENA NAIR³ AND PRAGYA UIKEY^{4*}**¹Department of Plant Pathology, College of Agriculture, JNKVV, Jabalpur, M.P., India²Biotechnology Center, College of Agriculture, JNKVV, Jabalpur, M.P., India³Department of Horticulture, College of Agriculture, JNKVV, Jabalpur, M.P., India⁴Department of Vegetable Science, College of Agriculture, OUAT, Bhubaneswar, Odisha, India

The experiments were conducted in two locations: the Biotechnology Center, JNKVV, Jabalpur, conducted management research in pot conditions using various organic amendments, such as Neem cake, Cotton cake, Mahua cake, Karanj cake, Groundnut cake, and Mustard cake, and seven dates of sowing i.e. 13th October, 20th October, 27th October, 3rd November, 10th November, 17th November and 24th November. The field work was conducted at the Vegetable Research Centre, Department of Horticulture, College of Agriculture, JNKVV, Jabalpur. Data analysis revealed that the crop sown on 24th November had the minimum disease incidence and crop sown on 13th October showed maximum disease incidence whereas seed yield was lowest (3.156 q/ha) in the 13 October sown crop and 24th November sown crop recorded maximum seed yield (6.811 q/ha). Studies on the relative efficacy of organic amendments under pot conditions showed neem oil cake was significantly better than all other treatments resulting in minimum disease incidence (22.16%) and the highest vigour index (1985.34), followed by cotton cake with 27.76% disease incidence and 1007.82 vigour index.

Keywords: Coriander, coriander wilt, *Fusarium oxysporum* f.sp. *corianderii*, organic amendments, different date of sowing,**ROLE OF EDIBLE COATINGS AND FILMS IN THE PRESERVATION OF PERISHABLE FOOD SYSTEM****ANJALI SAHAL¹, SANJAY KUMAR^{1*}, ANKITA DOBHAL¹, AFZAL HUSSAIN²**¹Department of Food Science & Technology, Graphic Era Deemed to be University, Dehradun²Department of Pharmacognosy, College of Pharmacy, King Saud University, Riyadh

The intake of fresh fruits and vegetables got tremendous attention in society. Globally, international organisations (World Health Organization/WHO; Food and Agriculture Organization/FAO) have been urging the consumption of fruits and vegetables. Preserving the sound quality of food for a long time is challenging because both durable and perishable crops undergo postharvest physiological and biochemical changes significantly. The primary cause of their shorter shelf life is the high moisture content (over 75%), which can alter the nutrition, flavour, texture, and pigmentation, impacting the food quality. Additionally, improper storage conditions and microbial attacks are very much prone to putrefy the vegetables and fruits. Therefore, an increasing number of scientists, dieticians, and clinicians are looking at cutting-edge green techniques to extend the shelf life of postharvest agricultural products to maintain their quality, freshness, and sustainability as the most effective post-harvest techniques are of primary concern and need critical observation, which may lead to avoiding losses of agricultural commodities. This review discusses the importance, role, function and types of edible coatings that help extend the shelf life of fruits and vegetables by creating a barrier against moisture loss, gas exchange and degradation.

Keywords: food system, shelf life, edible coating, post-harvest losses, sustainable agriculture

FOOD SECURITY: THE IMPACT OF CLIMATE CHANGE**¹ANJALI YADAV AND ²SEEMA SONKAR****¹Research Scholar, Department of Food Science and Nutrition****²Associate Professor, Department of Food Science and Nutrition, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, Uttar Pradesh**

In the modern world, it is evident that it is crucial to preserve nature and avoid pollution and damaging the planet. The consequence may significantly affect the current population and the next generation. One of the most pressing concerns implies climate change and the rise of average temperature level. This problem appears to be extremely threatening for the life of humanity in the long run, and it has a direct link with sufficient food supplies. Since climate change affects the natural world, it is evident that it poses particular challenges for food security in the future. The negative consequences will have a considerable impact on crop yield and livestock and fisheries production. An increase in average temperature will lead to water shortage, droughts, floods, and a high concentration of CO₂ in the atmosphere, which worsen the quality and number of stable crops to a large extent. In addition, high temperature may make dry areas even more restricted in water supplies, which is destructive for crops. Thus, it is apparent that climate change is highly likely to result in a variety of challenges in food security for humanity. In the context of present-day developments, the population may perceive the negative consequences of this tendency only slightly. However, in the future, it is highly likely to threaten the life of the entire humanity. Climate change has a direct impact on food supplies and security, and for this reason, it is crucial to take appropriate measures in order to prevent the aggravation of the situation. Otherwise, droughts, lack of water, the rise of ocean level, and other numerous negative consequences may lead to global hunger, as food production will be impossible in these circumstances. Therefore, the necessity to address this pressing concern urgently is undeniable.

BIO-PROCESSING- AN ADVANCEMENT IN THE PRELIMINARY PROCESSING OF TEXTILES**ANJU KUSHWAHA¹ & DR. PRIYANKA KESARWANI²****¹Research Scholar & ²Assistant Professor, ^{1&2}Department of Family & Community Sciences, University of Allahabad, Prayagraj**

At present time the environmental issues related to the textile industry have gained global attention as it is producing large quantities of pollution and waste with various toxic substances and chemicals. Due to the growing awareness among people about the pollution caused by the textile industry, the chemical processes of the textile industry are being replaced with the bio-processing process. Textile bio-processing has become the preferred option to overcome the consequences of chemical treatment, as it is less harmful to the environment and also to the textiles. The use of enzymes in the textile industry can be considered as the best possible use of the bio-processing techniques. In the textile industry, enzymes are used at two different stages. The first stage is the preparatory stage and the second stage is the finishing stage. The enzymatic treatments like bio-retting, bio-scouring, bio-desizing, degumming of silk, bio-bleaching, etc. are used at the preparatory stage and enzymatic treatments like bio-polishing, wool finishing, bio-stoning of denim, shrink-proof wool, etc. are used at the finishing stage in the textile industry. The use of enzymatic treatments in the textile industry is very promising, as they are environmentally friendly, produce high-quality products, and reduce the use of water, energy, and time.

Keywords- Textile industry, Bio-processing, Bio-scouring, Enzymes, Environment**EFFECT OF SILVER BIO-NANOPARTICLES ON THE GROWTH OF *FUSARIUM OXYSPORUM******ANJU RANI¹, SWARNIMA TIWARI¹ AND CHHAYA SINGH²****¹Department of Botany, Keral Verma Subharti College of Science, Swami Viveknand Subharti University, Meerut (UP)****²Government PG College Thalain, Pauri Garhwal**

One of the most important technology in modern agriculture is nanotechnology, which is expected to become a major economic force soon. While nanotechnology uses new delivery methods and chemical agents to increase crop yield and reduce the need for bulk agrochemicals, it also has the ability to provide more intelligent solutions for today's agricultural issues. Nanotechnology is directly used in agriculture in the delivery of agrochemicals and nutrients, insecticides, nanoscale carriers etc. Direct uses of nanotechnology in agriculture include the delivery of different agrochemicals, the investigation of plant disease causes, and the enhancement of genomes. For biological and medicinal applications, the biocidal qualities of silver nanoparticles (AgNPs) made with biologically active substances appear to be particularly important. Present study focused on the bio-synthesis of silver nanoparticles and their antifungal activity against phytopathogenic fungi. Four plants viz., *Chenopodium album* (Jungli Bathua), *Mesua ferrea* (Nagkesar), *Syzygium cumini* (Jamun), *Cassia fistula* (Amaltas) were extracted and used to prepare nanoparticles and their antimicrobial activities were checked against *Fusarium oxysporum*. After preparation of bio-nano-particles, their absorbance was recorded. *Fusarium Oxysporum* showed maximum inhibition percentage in *Syzygium cumini* nanoparticles while *Chenopodium* nanoparticles showed minimum inhibition percentage. The main aim of the study is to protect agricultural crops from *Fusarium oxysporum*, a wilt pathogen.

Key words: *Fusarium oxysporum*, antifungal activity, Silver bio-nanoparticles, Plant extracts.

Evaluation of biocontrol agents in plant disease management under climate change**ANJU SHUKLA^{1*}, SHITAL DIPAKE¹****Ph.D. Research Scholar, ¹Department of Plant Pathology, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur**

Plant disease management primarily relies on the indiscriminant application of fungicides and pesticides to enhance agricultural productivity. However, only a fraction of these applied chemicals effectively eradicates pathogens and pests, while the remainder lingers as residues or disperses into the environment through volatilization or leaching. This not only leads to ecological and environmental degradation but also poses potential risks to human health. In recent years, biocontrol agents, such as *Trichoderma* spp., have gained significant attention as eco-friendly alternatives for pest and disease management in agriculture and serves as an outstanding candidate for utilization in green technologies owing to its extensive potential for biofertilization and biostimulation. *Trichoderma*, a genus of filamentous fungi, serves as a potent biocontrol agent against a variety of plant pathogens. It operates through mechanisms including mycoparasitism, competitive exclusion, and the production of antifungal metabolites. However, challenges, such as the need for standardizing product quality and formulation, continue to persist. Additionally, competition with other soil microflora also poses a challenge. In conclusion, *Trichoderma* shows great promise as biocontrol agents in agriculture, offering an effective, sustainable, and environmentally friendly approach to managing pests and diseases. Further research and practical implementation are crucial in fully unlocking the potential of these remarkable fungi, ultimately benefiting global food security and ecological sustainability.

Key words: *Trichoderma*, biofertilization, biostimulation, filamentous fungi, mycoparasitism, competitive exclusion, metabolites, ecological sustainability.

DISCUSS THE IMPORTANCE OF RESEARCH AND DEVELOPMENT IN DEVELOPING CLIMATE-RESILIENT TECHNOLOGIES TO ENSURE SUSTAINABLE AND ENHANCED PRODUCTIVITY OF SUGARCANE (*SACCHARUM OFFICINARUM* L.).**ANKIT****Ph.D. Student, Department of Soil and Water Conservation Engineering, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India**

Sugarcane is an essential tropical cash crop cultivated on over 4.918 million hectares in India, playing a significant role in the agricultural GDP and the socio-economic development of rural regions. India, the second-largest sugar producer globally, achieved a production of 28.1 million tonnes in 2014-15, which decreased to 25.1 million tonnes in 2015-16 due to a severe drought in Maharashtra. The sugar industry, ranking just behind cotton textiles, is crucial for generating income and employment for approximately 60 million farmers and numerous laborers. Sugarcane cultivation occurs in both tropical and subtropical zones, with the tropical regions contributing more to overall production. Important by-products include bagasse and molasses, which are utilized in various industries. Due to the variability in production caused by climate change, ongoing research and the development of climate-resilient technologies are vital for maintaining and increasing productivity. Worldwide, sugarcane accounts for 80% of sugar production, with more than 120 countries engaged in its cultivation.

Keywords: Sugarcane, Yield, Gross domestic product (GDP), Sugar

A REVIEW ON NUTRITIONAL AND TECHNOLOGICAL SIGNIFICANCE OF MILLETS IN FOOD PROCESSING**ANKIT KUMAR MADHAVA^{1*}, AASHITA BHARDWAJ¹, CHETNA¹****¹Department of food science and technology, National Institute of food technology entrepreneurship and management, Kundli, Haryana, India**

Millet is renowned for their high nutritional value, being rich sources of protein, dietary fiber, vitamins, and minerals. They are gluten-free and possess low glycemic index properties, making them suitable for individuals with gluten intolerance or diabetes. They are abundant in antioxidants, which play a crucial role in combating oxidative stress and reducing the risk of chronic diseases such as cardiovascular ailments and certain cancers. In addition to their health benefits, millets offer significant advantages in food processing. Their unique physicochemical properties, including high water absorption capacity and gelatinization characteristics, make them ideal ingredients for various food formulations. Millets also exhibit desirable rheological properties, which contribute to their functionality as thickening agents, stabilizers, and emulsifiers in food systems. These properties facilitate the development of stable emulsions, improved mouthfeel in dairy alternatives, and enhanced texture in gluten-free products. A handful of the numerous types of millets are Sorghum (Jowar), Pearl (Bajra), Finger (Mandua or Ragi), Foxtail (Kangni or Kanguni), Porro (China or Barre), Kodo (Kodon or Kodara), Little (Kutki), and Barnyard (Sanwa or Shyama). Millets can be incorporated into a wide range of food products, including baked goods, snacks, breakfast cereals, beverages, and extruded snacks, enhancing their nutritional profile and sensory attributes. Moreover, millets offer environmental sustainability benefits, requiring fewer inputs such as water and fertilizers compared to other cereal crops. Their ability to thrive in diverse agro-climatic conditions contributes to food security and agricultural resilience in the face of climate change. By adopting value-added millets, we could alleviate the negative consequences of agriculture and food security. This review focuses on the nutritional value, health benefits, and technological properties of millets making them a promising source for the development of nutritious and sustainable food products.

Keywords: Millets, Bajra, Jowar, Kodo, Nutritional Value, Food security

TRICHODERMA IN ALLEVIATING ABIOTIC STRESS AND ENHANCING PLANT GROWTHANKIT KUMAR SINGH ^{A,B*}, RAMJI SINGH ^C^aICAR-Indian Institute of Wheat and Barley Research, Karnal, (Haryana) India^bCCS Haryana Agricultural University, Hisar, (Haryana) India^cSardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India

In the last few decades, the application of various biocontrol agents in farming practices has had noteworthy results in terms of safe and nutritious food items. *Trichoderma harzianum* is one of the biocontrol agents that has drawn interest because of its phenomenal ability to fight against several abiotic factors. The maximum increase in rice plant height was observed in treatments where seeds were bio-primed and seedling roots were dipped in *T. harzianum* (IRRI-1), followed by *T. harzianum* (SV-3). These particular isolates were also highly effective in enhancing rice root growth when applied via seedling root dipping. Both application methods—seed bio-priming and seedling root dipping—with *Trichoderma harzianum* (IRRI-1) followed by *Trichoderma harzianum* (SV-3) resulted in the highest fresh and dry weights of roots. The highest fresh weight and dry weight of rice shoots were observed in plants treated with bio-priming using *Trichoderma harzianum* (IRRI-1), and *Trichoderma harzianum* (SV-26). A filamentous fungus *T. harzianum* has diverse methods of preventing diseases and accelerating crop growth have made it a desirable biocontrol agent. Several physiological processes in plants, including photosynthesis, stomatal conductivity, gas exchange, absorption of nutrients and assimilation, water use efficiency, etc., are positively regulated by *Trichoderma spp.* *Trichoderma spp.* enhanced root growth and the assimilation of mineral nutrients from soil. Leveraging *Trichoderma* potential offers a valuable path towards resilient and environmentally safe crop production even in difficult situations, as global agriculture seeks alternatives to toxic pesticides and excess consumption of fertilizers.

Keywords: Abiotic Stress, Trichoderma, Eco-friendly, Plant growth promotion.

TISSUE CULTURE PROTOCOL STANDARDIZATION FOR STRAWBERRY AND GENE EDITINGANKIT PATEL ⁻¹, NAINA TIRKE ⁻¹, PALLI TARUN KUMAR ⁻¹ ANAND MAURYA ⁻², AYUSH SINGHANIYA ⁻³¹MSc Molecular Biology and biotechnology, ²MSc Genetics and plant breeding, ³MSc biochemistry

Throughout the world, strawberries (*Fragaria x ananassa*) are among the most profitable fruit crops in terms of both economics and nutrition. It gains popularity from its delightful flavor, vibrant color, and diverse value additions, making it a favorite among consumers and a profitable crop for farmers. However, the cultivation of strawberries faces numerous challenges, like susceptibility to diseases, lack of planting material, limited genetic diversity, and seasonal variations in production. Overcoming these challenges requires innovative approaches in plant biotechnology, particularly in *in vitro* regeneration protocols. Different strawberry cultivars are distributed worldwide, with some commonly grown varieties like Albion, Chandler, Sweet Charlie, Carmine, Tristar, Hood, and Winter Dawn. Each cultivar has its regional preferences based on climate adaptations and market demand. However, common problems across cultivars include susceptibility to diseases like powdery mildew, verticillium wilt, anthracnose, and botrytis fruit rot. Chandler strawberries are known for their large size and firm texture, and they boast a brilliant red color with a glossy appearance. but they are susceptible to anthracnose, impacting their overall quality and yield. A variety, Winter Dawn shows a modest resistance to diseases caused by Botrytis, Colletotrichum crown rot, and anthracnose fruit rot. Winter Dawn variety is a good option for farmers in cooler climates or those who are looking to extend their strawberry harvest season. Also, they offer numerous advantages, including early ripening and cold tolerance. In the conventional method, runners that emerge from axillary buds on the plant crown are used for strawberry propagation. This approach has reduced agricultural productivity since it can only produce a small number of low-quality plantlets and also viruses can be carried by vascular bundles, it can transfer diseases from the stock plant, which is one of the important causes of viral diseases. *In vitro* regeneration, is a possible alternative for the propagation of strawberry which can ensure the provision of disease-free healthy planting materials. Moreover, according to reports, plants that were propagated through micropropagation have shown a tendency to produce a higher number of runners per individual plant. This means after the development of the cost-effective protocol for *in vitro* regeneration, there are many possibilities of getting enough amount of high-quality, healthy planting material at a low cost. CRISPR Gene Editing: We established methods for tissue culture and CRISPR gene-editing in three major strawberry cultivars: ‘Florida Radiance,’ ‘Winter Dawn,’ and ‘Florida Brilliance.’ A gene gun was used to deliver CRISPR constructs to strawberry cells. Tissue culture optimization allowed us to develop a robust regeneration system for the selected cultivars. CRISPR gene-editing technology holds promise for improving disease resistance, fruit quality, and other valuable attributes in strawberries. Notably, CRISPR gene-editing is distinct from GMO technology and is unlikely to be over-regulated, as the final product aligns with conventional breeding outcomes¹. Standardizing tissue culture protocols and integrating CRISPR gene-editing techniques can pave the way for developing superior strawberry cultivars with desirable traits. Our research contributes to advancing strawberry breeding efforts and enhancing crop productivity

AN ANALYSIS OF STATE-WISE FARMERS' INCOME DISPARITIES DUE TO THE PROCUREMENT POLICIES OF INDIA

ANKIT UPADHYAY

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To maintain the supply of food grains for public welfare schemes, the government should ensure the procurement of food grains from Indian farmers, and for this, the government offers MSP on 23 commodities. The study specifically focuses on wheat and rice because they are mostly distributed through government welfare schemes. This study utilises secondary data from various professional journals, reports and government department like State-wise Procurement of wheat and rice and state-wise production data have been extracted from Department of Food & Public Distribution and the Ministry of Agriculture and Farmers Welfare (GOI), respectively. The objective of the study is to identify the factors that impact procurement and to understand the disparities in contribution that ultimately impact farmers' income in different states of India. For analysing this, the study evaluated percentage procurement of wheat and rice out of production, and the major states were selected based on state-wise production. The study concluded that grain procurement is disproportionately concentrated in only a few states, and this uneven procurement is evident from the ratio of the number of farmers benefitted from MSP and the number of farmers registered under the procurement scheme. This study suggested that the government should increase the number of procurement centres based on state-level production, spread MSP awareness programme, and provide easy accessibility through mobile procurement centres to ensure income of marginal and small farmers in India.

Keywords: Farmers Income, MSP, Production and Procurement.

ANTIMICROBIAL PEPTIDE PREDICTION USING ARTIFICIAL INTELLIGENCE BASED APPROACHES FOR COMBATING ANTI-MICROBIAL RESISTANCE TOXICITY.

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Antimicrobial peptides (AMPs) aka 'nature's antibiotics' or 'host defense peptides' are a class of polypeptides (generally with 5-100 amino acids length) that exist in nature with broad-spectrum antimicrobial properties and play an important role in the innate and adaptive immune system of various living organisms namely, protozoa, bacteria, viruses, fungi, insects, amphibians, mammals and plants fighting against microorganisms. These small peptides are naturally encoded by genes and unlike antibiotics, exhibit a defense mechanism that comprises of different modes of action, broad array of structure, and expression patterns in addition to specific target site are capable of combating multi-drug resistant broad-spectrum microbes. They have been found to modulate various immune processes, viz, activating immune cells, their recruitment, wound healing, inflammatory, anti-inflammatory activity, and angiogenesis. Also, to cope with the severity of COVID-19 pandemic in 2020, antiviral peptides have been studied and introduced worldwide. The composition of plant AMPs is very complex making it more challenging and complex to classify. Wet lab discovery is slow, labor-intensive and time-consuming in terms of finding lead molecule and to discover natural AMPs. The computational approach and bioinformatics analysis may be of great help being economical and time saving process. Artificial intelligence including machine/deep learning can overcome the problem of Anti-microbial resistance (AMR) toxicity by predicting and classifying Antimicrobial peptides that are potential alternative to antibiotic.

Keywords: Antimicrobial peptides (AMPs), Anti-microbial resistance (AMR), Artificial intelligence.

IN-SILICO ANALYSIS OF CALOTROPIS PROCERA GENES

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Calotropis procera, which belongs to the Asclepiadaceae family, is a component of numerous ayurvedic formulas, including Arkelavana. Traditional medical systems have long been aware of *Calotropis procera*'s therapeutic potential due to the widespread use of its leaves. *C. procera* is abundant in hydrocarbons and includes substances that can be broken down biologically, just like other agricultural crops. Computational analysis at the molecular level is the primary step to study new biologically active genes, which lead to the discovery of new drugs. Computational analysis helps to study gene level comparison. Complete gene sequences of many medicinal plants are now available online. Though a number of studies have been conducted with the genes of medicinal plants exerting its health benefits, but no biomarkers has yet been developed for them. Therefore, the present study was planned to study gene analysis of *C. procera*. The sequence for *Calotropis procera* proteins i.e. rpoA and petD with accession number (YP_009574110.1 and YP_009574109.1) were retrieved from NCBI respectively and their computational analysis were studied. The physiochemical properties were studied by ProtParam server. 3-D structures were prepared by Swiss- model and validated by PSVS server. Gene mining has provided new insights into biology of a species specific. *In silico* analysis of genes of medicinal plants offers advantages of rapid, convenient and cost-effective testing. Detection of strain specific genes and their transcripts help in identification of novel genes. But multidisciplinary approach and traditional toxicity tests are required to be conducted to affirm *in silico* studies.

Keywords:- *Calotropis procera*, Medicinal plant, Computational analysis, *In silico* study.

ASSESSMENT OF PHYTOTOXIC EFFECTS, ANTIOXIDANT, AND ANTIMICROBIAL PROPERTIES OF A SENNA OCCIDENTALIS ON WINTER CROPS AND THEIR ASSOCIATED WEEDS

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Senna occidentalis (L.) Link, commonly referred to as "coffee senna" or "coffee weed," is a perennial shrub classified within the Fabaceae family. Originating from tropical and subtropical regions, *S. occidentalis* has attracted considerable interest in both traditional healing practices and scientific investigations owing to its broad spectrum of pharmacological attributes. Through phytochemical analysis, a diverse array of bioactive compounds has been identified within *S. occidentalis*, including alkaloids, flavonoids, phenolics, and terpenoids, each contributing to its pharmacological effects. The research aims to investigate the phytotoxic effects of given plant on different winter crops and their accompanying weeds, while also assessing the antioxidant and antimicrobial properties of these plants. To check the antioxidant property of senna occidentalis, DPPH Radical scavenging assay was used in which different concentration of 10µg/ml - 80µg/ml of plant overall showed IC50 value of 31.84µg/ml which represents plant as a good antioxidant and 80µg/ml showed highest RSA% value of 19.76% out of all concentrations. For antimicrobial property, different samples of bacteria that is *Bacillus cereus*, *Pseudomonas aeruginosa*, *Listeria monocytogenes*, *Escherichia coli*, *Staphylococcus aureus* were arranged and by using agar diffusion technique result was obtained which showed that *Listeria monocytogenes* showed highest zone of inhibition of 36% followed by *Escherichia coli* with 33.3% of zone of inhibition. Simultaneously, strains of fungi including *Penicillium purpurogenum*, *Aspergillus flavus*, *Aspergillus niger*, and *Rhizopus stolonifer* were subjected to testing. The poison food technique was employed for this assessment and Results revealed that *Aspergillus flavus* exhibited the most substantial zone of inhibition at 93.33%. For the evaluation of phytotoxicity, *Triticum aestivum* and *Brassica juncea*, along with their associated weed crops *Avena fatua* and *Chenopodium album*, were selected as test subjects. A sandwich method was employed, wherein different concentrations (10mg, 30mg, 50mg) of plant powder were treated alongside seeds. The seeds were placed on MS media to provide nutrient support. A control petri plate without any extract was also prepared to serve as a negative control. The results indicated that at the highest concentration of 50mg, there was a complete absence of seed germination across all tested seeds. Furthermore, at the 30mg concentration, most seeds exhibited negligible growth response. The observed phytotoxic effects of the plant extracts hold significant implications for agricultural practices. Phytotoxicity, particularly at higher concentrations, can effectively suppress the growth of unwanted plants, including weeds, thus potentially offering a natural and sustainable method for weed control. This has considerable relevance in agriculture, where the management of weeds poses a constant challenge to crop productivity and yield. Moreover, the findings of this research contribute valuable insights into the potential applications of plant-derived phytotoxic compounds in weed management strategies. Further exploration of the specific mechanisms underlying the observed phytotoxic effects, as well as the identification of key bioactive compounds responsible for these effects, could pave the way for the development of novel and environmentally friendly weed control solutions in agriculture.

DRONES IN AGRICULTURE

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With the increase in demand of food the traditional methods used by farmers for the crop production are not enough to meet the demand. As a result, new automated approaches like drone technology were introduced in agriculture. Drones are commonly used as a remote sensing platform to assess and monitor the crop. Drones can be used in wide variety of operation including precision farming, soil mapping, irrigation, pest management etc. External elements like weather, soil conditions and temperature are crucial in farming. Agriculture drone enable the farmers to adapt to their surroundings and make informed decisions. Agriculture drones are outfitted with variety of components to increase the crop productivity. GPS sensors, camera, multi- spectral and hyper spectral, flight propulsion system, power batteries and operational controller are among them. However, the wide spread adoption of drone technology faces various challenges including regulatory hurdles, cost barriers and technical limitations. By addressing these challenges and leveraging emerging innovations, the agriculture sector can harness the full potential of drones to achieve sustainable food production, mitigate environment impact and foster rural development. Agricultural Drone technology undoubtedly represents the future of India's farming sector, posed to revolutionize conventional farming methods Given the current distressed of modern youth in farming due to its demanding nature, the introduction of drones could spark their interest and involvement in agriculture.

Keywords - Drones, remote sensing, precision framing and rural development.

ANTIMICROBIAL EFFECT OF MEDICINAL PLANT AGAINST UROPATHOGENIC *ESCHERICHIA COLI***ANU SINGH****Department of Microbiology, Krishna College of Science and Rural Technology, Agra, U. P., India**

Objective(s): To evaluate the antibiotic activity by *Lantana camara* against multi drug resistant *Escherichia coli*. The antibacterial activities of leaf extracts of different solvents alone or in association with antibiotics were determined against bacterial strains. **Materials and Methods:** Evaluation of antibacterial activity and synergistic interaction between plant extracts and antimicrobial agents were evaluated using disk diffusion method. Plant extracts were prepared using soxhlet apparatus. Certain antimicrobial drugs, including ampicillin, cefepime, kanamycin, moxifloxacin, gatifloxacin, aztreonam, ceftriaxone/sulbactam and amikacin were used in this study. **Results:** The results showed antibacterial activities of the *lantana camara* extracts and synergistic effect between plant extracts and antibiotics against multi drug resistant bacteria. The most expressive effects were obtained with chloroform extract alone and combination with most of the antibiotics, in which moxifloxacin (30.00 ± 0.00 mm) and gatifloxacin (27.00 ± 0.82 mm) exhibited highest synergistic effect against *E. coli*. Whereas least synergistic effect were showed between aqueous extract and most of the antibiotics. This study showed that most of the combination of plant extracts and antibiotics exhibited highest inhibitory effect than each of them alone. **Conclusion:** These results may indicate that *Lantana camara* extracts potentiates the antimicrobial activity of antibiotics, suggesting a possible utilization of this herb in combination therapy for herb derived medicinal preparation against multidrug-resistance *Escherichia coli* to control urinary tract infections.

Keywords: *Lantana camara*, antibacterial activity, synergism, antibiotics, plant extracts, urinary tract bacteria.

CLIMATE-SMART AGRICULTURE: AN ESSENTIAL COMPONENT OF SUSTAINABILITY**ANUJ KUMAR¹, SUNEEL KUMAR²**

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A strategy called Climate-Smart Agriculture (CSA) aims to assist those in charge of agricultural systems in adapting to climate change. The triple goals of the CSA strategy are to reduce greenhouse gas emissions whenever feasible, adapt to climate change, and raise productivity and incomes in a sustainable manner. This is not to say that all practices should result in "triple wins" in every situation. Instead, by taking these goals into account to guide decisions at all scales from local to global—as well as over short- and long-term time horizons, the CSA approach aims to minimize trade-offs and foster synergies while generating locally acceptable solutions. The bulk of the world's impoverished are found in rural areas, where agriculture serves as their primary source of income. Over the next 20 years, attaining global food security will depend on how well smallholder systems for producing crops, livestock, fish, and forests are developed in terms of productivity and incomes. Developing nations are predicted to be most severely impacted by climate change. Rising sea levels, altered precipitation patterns, increased temperatures, and an increase in the frequency of extreme weather events are some of its effects. These all provide threats to food, water, and agricultural supply. That's why resilience is a major concern. One of the main causes of greenhouse gas emissions is agriculture. A key component of CSA is mitigation action that is congruent with national development aspirations for agriculture, as mitigation can frequently be a major co-benefit of efforts to improve food security and promote adaptability.

Keywords: Climate Smart Agriculture, Food Security, Adoptability

ASSESSING THE CONVERSION OF INITIAL TILLERS TO PRODUCTIVE TILLERS IN WHEAT (*TRITICUM AESTIVUM* L.) GENOTYPES UNDER TERMINAL HEAT STRESS**ANUKRITI SRIVASTAVA, GIRISH CHANDRA PANDEY****Dept. of Bioscience & Biotechnology, Banasthali Vidyapith, Tonk, Rajasthan, India**

Terminal heat stress, occurring during wheat's flowering and grain-filling stages, significantly impacts tiller development, a crucial determinant of grain yield. Understanding tillering mechanisms is pivotal for wheat breeding efforts. In a recent study conducted during the 2022-23 and 2023-24 crop seasons at Krishi Vigyan Kendra, Banasthali Vidyapith, Rajasthan, India, we meticulously planted 16 wheat genotypes in timely and late sown conditions, collecting tiller data from experimental plots. Each genotype was replicated thrice, and tiller counts were recorded for four central plants per plot. Notably, no prior research has explored the transformation of initial tillers into productive ones. Through our analysis, we calculated the reduction percentage of initial and productive tillers under both timely and late sown conditions. Among the genotypes tested, **DBW 90**, **DBW 107**, **UP301**, and **SWATI** exhibited exceptional tolerance to terminal heat stress, while **HD2985** and **GW190** displayed moderate tolerance. Conversely, **DBW222**, **HD2501**, and **GW173** were highly sensitive to heat stress. These findings underscore the importance of tillering dynamics in wheat resilience to temperature fluctuations, providing valuable insights for molecular breeding endeavors.

Keywords: Wheat, Initial tiller, Productive tiller, Temperature.

FRESHWATER ECOSYSTEM AND AQUATIC INSECTS**DR. ANUPAMA GAUR****Assistant Professor, Department of Zoology, M. M. H. College, Ghaziabad, UP**

Insects are important representatives of the biodiversity of ecosystems. A majority of the insect species lives in freshwater environments, such as swamps, ponds, lakes, springs, streams and rivers these are called aquatic insects. Aquatic insects are derived from various terrestrial ancestors that have secondarily invaded aquatic environments. These organisms spend at least a part of their life cycle in water and show diversity, so they are important for studies of changes in bio-diversity. Based on micro habitat they can be broadly classified such as: Sediment living (benthic fauna, Vegetation living (phytophilous-preferring plants), Sediment living benthic fauna can be further sub divided on their habitat preference like— Lithophilous (preferring stony substrate), Psammophilous (preferring sandy substrate), Burrowing, Xylophilous (preferring woody substrate). These animals live on rocks, logs, sediment, debris and aquatic plants during all or part of their life cycles. They play important ecological roles in keeping freshwater ecosystems functioning properly. They are an important part of the food chain, especially for fish. Many invertebrates feed on algae and bacteria which are at the lower end of the food chain. Some shred and eat leaves and organic matter that enters the water. Because of their abundance and position as middle man in the aquatic food chain, they play a critical role in the natural flow of energy and nutrients. As the insects die, they decay, leaving behind nutrients that are reused by aquatic plants and other animals in the food chain. Some insect orders contain only species that are aquatic in some life stages (e.g., mayflies, stoneflies, dragonflies, caddisflies, megalopterans), whereas other orders contain both aquatic and terrestrial species (e.g., beetles, bugs, butterflies, neuropterans, orthopterans, and dipterans). Aquatic insects are considered as model organisms in analyzing the structure and function of the freshwater ecosystem because of their high abundance, high birth rate with short generation time, large biomass and rapid colonization of freshwater habitat. The aquatic biodiversity gets affected by several factors such as industrial pollution or anthropogenic activities.

Key Words: Ecosystem, Energy flow, Benthic fauna, Psammophilous, Xylophilous.

INFLUENCE OF BORON DEFICIENCY AND TOXICITY ON CROP GROWTH AND PRODUCTIVITY**ANUPRIYA SHARMA¹ AND VIJESH KUMAR BARALA²**¹**Ph.D. Soil Science and agriculture chemistry, Sri karan Narendra Agriculture University, Jobner**²**M.Sc. Scholar, Agronomy, Dr. Rajendra Prasad Central Agricultural University Pusa, Samstipur, (Bihar)**

Boron is an essential micronutrient indispensable for the normal growth and development of plants. It is recognized as one of the most commonly deficient micronutrients in soils. The deficiency of boron in soils is a major cause of crop yield reduction in India, China, Nepal and Bangladesh. In India, about one third of the soils are deficient in B spreading over wide area and particularly in alluvial soils. Available B in Indian soils ranged from 0.75 to 8.0 mg/kg soil. In general, deficiencies of B are prominent in soils of light texture and high pH and in areas of heavy rainfall, dry weather and high intensity of light. Among the micronutrients, the boron plays an important role in flowering and fertilization process and hence boosting yield and quality of crop produce. Response of legume crops to boron application suggested that boron deficiency drastically reduced nodulation, growth and yield of legumes because of inadequate supply of carbohydrates to bacteria in the root nodules and insufficient conversion of starch to soluble sugars. Application of boron also markedly increases yield and quality of oil seed crops.

Keywords: Micronutrient, Deficiency and soil.

NUTRITIONAL AND HEALTH CHALLENGES DURING PREGNANCY**ANURADHA OJHA¹ AND DR. PRIYANKA KUMARI²**¹**Research Scholar, PG Department of Home Science, Magadh University, Bodhgaya, Bihar**²**Assistant Professor, Department of Home Science, G.B.M. College, Gaya, Bihar**

Maternal nutrition and health is precious for healthy birth outcomes. Optimum food both in quality and quantity required to meet the need of pregnancy. Poor maternal nutrition and lifestyle has risk factors for serious foetal complications and neonatal outcomes, including intrauterine growth restriction, congenital abnormalities, stillbirth, low birth weight (LBW), and neonatal death. In India mother mortality rate (MMR) is 97 (SRS, 2018-2020), neonatal mortality rate and infant mortality rate is still high that is 24.9 and 35.2 respectively. The aim of the study is to know the challenges and nutritional situation during Pregnancy in Bihar with respect to India. This study is based on secondary data that was conducted on pregnant women of 15-49 years on various parameters. This is analysis of nutritional condition of pregnant women of Bihar in respect to India on the basis of NFHS -V and NFHS- IV data. In Bihar 63.1 per cent of pregnant women were anaemic in respect to India that is 52.2 per cent. Even 11 per cent adolescent girls (15-19 years) were already mother or pregnant at time of survey in Bihar with respect to 6.8 per cent in India. Only one fourth of total pregnant women were getting four antenatal check-up and only 9 per cent women were consuming 180 tablets of IFA. (NFHS-V, 2019-2021). Various programme and implementation is going to be implemented to the community but still the result is not satisfactory due to the gap in level of awareness, implementation strategy, lack of resources and lack in access of services etc.

Key words: Pregnancy, Food, Health, Nutrition, Women

EFFECTS OF SALT STRESS ON WHEAT (*TRITICUM AESTIVUM* L) IN ZINC FERTILIZER APPLICATION.**ANURADHA SINGH AND DHANANJAYA SINGH¹****Department of Botany, Meerut College, Meerut (U.P)****¹Department of Crop Physiology, ANDUAT, Kumarganj, Ayodhya (U.P.)**

An experiment was conducted to evaluate the ameliorative effects of application of zinc fertilizer under salinity. Wheat varieties KRL 19, NW 1012 (salt-tolerant) and HD 2285 (salt-susceptible) were grown in pots under non-saline (0, 20 kg Zn) and saline (8.0 dSm⁻¹, 20 kg Zn + 8.0 dSm⁻¹) conditions. Observations were recorded at ear emergence stage on dry matter production, total chlorophyll content proline content and the plant harvested and shoot and root were analyzed under salinity. Three wheat varieties viz., KRL 19, NW 1012 (salt-tolerant) and HD 2285 (salt-susceptible) were grown in pots under two non-saline (0, 20 kg ZnSO₄) and two saline (8.0 dSm⁻¹, 20 kg ZnSO₄ + 8.0 dSm⁻¹). After 45 days, plant were harvested and the shoot and root were analyzed dry matter production, chlorophyll content, proline content, Zn concentration, and K/Na ratio. Study revealed that there was a significant reduction in the dry matter production of root and shoot, chlorophyll content and Zn concentration due to soil salinity whereas, K/Na and proline content was increased in all the wheat varieties grown in saline environments. Maximum reduction in these parameters was recorded in the susceptible variety (HD 2285) whereas, minimum in the salt tolerant varieties (KRL 19 and NW 1012). The K/Na ratio and proline content in leaf were significantly lower in salt-tolerant varieties (KRL 19 and NW 1012) and higher in salt-susceptible variety (HD 2285) under salinity. ZnSO₄ application @ 20 kg ha⁻¹ partially alleviated the adverse effects of salinity on dry matter production, chlorophyll content, proline content, Zn concentration, and K/Na ratio in the susceptible variety HD 2285 compared to no application.

Key words: Salinity, ZnSO₄, chlorophyll, proline content and wheat varieties.

ORGANIC FRUITS AND VEGETABLES PRODUCTION AT HOME: A SUSTAINABLE APPROACH TO SAFE AND HEALTHY LIFE**ANUSHI AND DR. V.K. TRIPATHI****Department of Fruit Science, College of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, U.P.**

The increasing awareness of health and environmental concerns has led many individuals to seek alternative methods for obtaining fresh, nutritious produce. This abstract explores the concept of producing organic vegetables and fruits at home, emphasizing a sustainable and environmentally friendly approach to agriculture. Home gardening has gained popularity as a viable solution to ensure a regular supply of organic produce, free from synthetic pesticides and fertilizers. This study delves into the various methods and techniques that can be employed for successful organic gardening, considering factors such as soil health, composting, and natural pest control. I have been harnessing the benefits of organic production for the past 10 years. Cultivating the crops years rounds from bedding preparation to ultimate harvesting creates an environment of health and peace for my whole family. We sown the beds for two seasons with tremendous fruits and vegetables. It includes potato, radish, carrot, Cole crops, leafy vegetables such as spinach, coriander, fenugreek, tomatoes, brinjal, crucifers, cucumber, pumpkin, etc. in vegetables to strawberry, mangoes, guava, banana, cape gooseberries in fruits. I also produce turmeric and red pepper in spices. This year-round cultivation can fulfill the demand of 70 percent of our needs. Moreover, it explores the role of technology in facilitating home organic farming, discussing innovative tools and applications that can assist individuals in managing their gardens effectively. The findings of this research suggest that cultivating organic vegetables and fruits at home not only contributes to individual well-being but also promotes sustainable agriculture on a smaller scale.

Keywords: Home, Fruits, Vegetables, Composting

DIVERSITY OF USEFUL WILD PLANTS OF NAHARGARH WILDLIFE SANCTUARY, JAIPUR**ANUSHKA CHOUDHARY* DR. SHILPI RIJHWANI** DR. REENU AGARWAL********Research Scholar; IIS (Deemed to be University), Jaipur******Prof. (Dept. of Botany) IIS (Deemed to be University), Jaipur*******Sr. Assistant professor (Dept. of Botany) IIS (Deemed to be University), Jaipur**

The present study depends upon interviews, survey and fieldwork investigations into the use of wild edible plants by rural populations in the vicinity of Nahargarh wildlife sanctuary, Jaipur District, Rajasthan State, India, between 2022 and 2023. A total of 80 wild plant species were identified in the study region during the current study. Among the collected plant specimens 26 are trees, 16 are shrubs, 31 are herbs, 4 are climbers, creeper 2 and 1 grass. Fabaceae (12), Asteraceae (9), Amaranthaceae (5) are the dominant families. It is natural for the indigenous inhabitants living in the vicinity of this sanctuary to depend on wild plants (WP) for food, medicine, fodder, fuel wood and tools. Wild plant resources and their indigenous knowledge of utilisation are in danger of disappearing, in locations where eating patterns and practices have changed due to fast environmental and cultural change. Household questionnaire surveys and interviews in ten villages were used to gather the data. For local populations, wild plants are essential to household economy, health care, nutritional variety, and food security. This Sanctuary is the major source of leaf fodder and ground flora in the study area. A list of plants along with their botanical name, common name, family, habit and uses are given.

Keywords: Nahargarh wildlife sanctuary, wild plants, indigenous knowledge, dominant vegetation

EXPLORING THE POWER OF WHITE FINGER MILLET: BOOSTING NUTRITION, TASTE AND BAKERY INNOVATION"**ANUSHREE R. K.¹, SAHOO S. S.¹, AGARKAR B. S.², OKRAM RICKY DEVI³**¹Department of Food Science and Nutrition, VNMKV, Parbhani²Associate Professor and Head, Department of Food Plant Operation, VNMKV, Parbhani³Agronomy Department, Assam Agricultural University, Jorhat, Assam, India

Finger millet, commonly known as Ragi, is renowned for its rich nutritional profile, boasting essential amino acids, dietary fiber and polyphenols. Its consumption offers a numerous health benefits, including anti-diabetic, antioxidant and antimicrobial properties. Moreover, it serves as a vital staple in numerous Asian and African countries, providing a significant source of nutrients such as calcium, iron, phosphorus and manganese, essential for maintaining bone health and preventing anemia. Despite its nutritional advantages, the dark color of traditional finger millet grains has hindered its widespread acceptance among populations. However, there's been growing interest in white finger millet due to its higher protein content, reduced tannins and greater consumer appeal. This has led to increased demand for white finger millet, particularly in urban areas and the baking industry. To meet this demand and capitalize on its potential, researchers have endeavored to develop white-grained finger millet varieties specifically tailored for value addition, particularly in the bakery sector. While several universities have made strides in developing such varieties, research on their pre-treatment and the creation of value-added products remains limited. Despite the superior attributes of white finger millet compared to traditional varieties, awareness about its benefits and potential remains low. There's a pressing need for further research in this area to fully realize its potential and promote its adoption. This calls for concerted efforts in policy-making and governmental support to enhance its availability and accessibility to the wider population.

Key words: White finger millet, Nutrient profile, Consumer appeal, Baking industry and Value addition

WATERBORNE DISEASES**ANUSKA CHAKRABORTY****Department of Microbiology, Student of St. Xavier's College, Autonomous, Kolkata**

Waterborne Diseases remains the leading cause of human morbidity and mortality rate worldwide. Over 95% of these are preventable Waterborne Diseases, and they can be the major cause of outbreaks which are associated with meals or suspected in foods. Infection with this pathogen results in a watery diarrhea which is associated with abdominal pain, followed by anorexia and vomiting, nausea in children. The number of enteric disease outbreaks which are associated with recreational water increases over the past decades. Illness also caused by chemicals in the water and cause indoor air problems. Waterborne outbreaks are still reported globally, despite the continued efforts to maintain water safety. Quantitative microbial risk assessment (QMRA) is a helpful tool used to estimate the risk of infection and illness when a population is exposed to microorganisms in the environment. It is used to evaluate the scenarios for pathogen contamination. This tool aims to present a research outlook on waterborne outbreaks that have occurred in the recent years. It also focuses on the main molecular techniques for detection of waterborne pathogens and the use of the QMRA tool to protect public health and hygiene.

REVOLUTIONIZING AGRICULTURE: HARNESSING PRECISION, SUSTAINABILITY AND INNOVATION WITH GREENHOUSE HYDROPONICS**APOORVA GUDDARADDI¹, MAHESH K. N.² AND EKTA RAJPUT³**^{1&3}Ph.D. Scholar, Dept. of Floriculture & Landscape Architecture, PGI, Dr. PDKV, Akola, Maharashtra²Research Scholar, Dept. of Vegetable Science, NAU, Navasari, Gujarat

The term 'Hydroponics' derived from the Greek words "hydro" meaning water and "ponos" meaning labor, hydroponics represents a contemporary agricultural method where crops are cultivated in a greenhouse environment using nutrient solutions instead of traditional soil. This technique facilitates rapid crop growth within controlled conditions. Commercially utilized hydroponic systems include deep flow technique (DFT), nutrient film technique (NFT), and aeroponic systems, all of which employ recirculated nutrient solutions. These methodologies offer superior advantages over traditional soil-based farming due to reduced consumption of water, space, and electricity. Precision agriculture, driven by technology, integrates tools like GPS, GIS, and IoT-based irrigation systems. Soilless cultivation emerges as a viable alternative for agricultural production, particularly in regions facing significant soil degradation and water scarcity. Moreover, this farming approach aligns with environmentally friendly agricultural practices and contributes positively to the overarching goal of food security.

Key words: Deep flow techniques, Hydroponics and Nutrient film technique

CROP DIVERSIFICATION IN MANIPUR**APSARA K P****Ph.D. Scholar, Department of Agricultural Economics, CoA, UAS, Dharwad**

Sustainable agriculture is recognized as the effective management of agricultural resources to meet evolving human needs while enhancing environmental quality and health, economic viability, and social fairness. Agriculture holds a prominent position in Manipur's economy, with approximately 80% of the state's population relying on it as their primary source of income. Growing population as well as climate change in the state is adding up pressure on agriculture sector of the state. Crop diversification emerges as a promising strategy to bolster agricultural sustainability. Hence, this study was conducted to know the extent of crop diversification in the state of Manipur. This study was based on secondary data collected from various published sources. The extent of crop diversification was assessed by estimating Simpson Index of Diversity. The study revealed that crop diversification, in terms of area under food crops increased as evident from increasing SID value of 0.47 in TE 2005-2006 to 0.55 in TE 2020-21. Cereals had the maximum area share of 64.55 percent in total area under food crops, followed by vegetables 14.19 percent in TE 2020-21. The SID for production was estimated to be 0.68 in TE 2005-2006, which increased to 0.73 in TE 2010-11, but later the SID decreased to 0.72 and 0.71 in TE 2015-2016 and TE 2020-2021, respectively. Cereals accounted for the largest share in production of 38.91 percent followed by vegetables (30.94%) and sugarcane (18.13%) in TE 2020-21. The study recommends that the farmers should be encouraged to increase area under other oilseeds like sesame and groundnut as the land allotted to vegetables has expanded over the time.

HISTOLOGICAL IMPLICATIONS OF MALACHITE GREEN ON GILL OF *CYPRINUS RUBROFUSCUS***AQUIB JAVED AND RESHMA SINHA****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, India**

The dye malachite green (MG) belongs to the family of tri-aryl methane. Many materials, including paper, leather, fur, and confections are coloured with it. Aquatic fauna that are not the intended target are negatively impacted by the uncontrolled release of dye effluents into the water. Despite being known to be harmful, MG is nevertheless used illegally in a number of Asian nations, including Bangladesh and India. Leuco-malachite green (LMG), is the reduced version of it, is found in fish and the environment for an extended period of time. The study investigates the long-term toxicity of MG in *Cyprinus rubrofasciatus* (weight 3.89 ± 0.14 and size 6.83 ± 0.13 cm). For 15 days, the carp ($n=40$) were exposed to 0.087 mg/L of MG, equivalent to $1/5^{\text{th}}$ of the 96h LC_{50} concentration. For the study, two groups were maintained in duplicates in 20L dechlorinated water: group I ($n=10$), served as control while group II ($n=10$), was treated with 0.087mg/L of MG, and kept at physicochemical properties (pH -7.2 ± 0.1 , temperature $-27 \pm 2^{\circ}\text{C}$) of water. Histological parameters were used for toxicological assessment. MG exposure resulted in histological alterations such as lamellar loss, lamellar curling and chloride cell hyperplasia in gills. As a result, the finding of this study offer valuable insight into potential implications associated with MG exposure on aquatic organism such as carp.

Keywords: Carp, Gills, Histology, Koi, MG, Toxicity,**EVALUATION OF THE BIO-EFFICACY OF PLANT EXTRACTS, FUNGICIDES AND BIOAGENTS IN VIVO AGAINST *BIPOLARIS SOROKINIANA* CAUSING SPOT BLOTCH IN BARLEY.****¹ARADHNA SAGWAL, ²RAJENDER BENIWAL, ³RAVINDRA KUMAR AND ⁴POOJA****^{1,2,4}Department of Plant Pathology, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India****³Department of Crop Protection, Indian Institute of Wheat and Barley Research, Karnal, Haryana, India**

Barley (*Hordeum vulgare* L.) stands as one of the world's major cereal crops, however, the cultivation of barley faces numerous challenges, fungal diseases being a significant concern. Among these diseases, Spot blotch caused by the fungus, *Bipolaris sorokiniana* is a devastating foliar disease affecting barley crops globally. The experiment was conducted at CCSHAU, Hisar, India for two consecutive years during Rabi 2021-22 and 2022-23 under artificial epiphytotic conditions. All the selected botanicals, fungicides and biocontrol agents significantly increased the grain yield and reduce spot blotch severity. The most effective fungicide was Propiconazole 0.1% against spot blotch of barley and its foliar sprays resulted in producing yield of 37.60 q/ha as compared to untreated control (22.62 q/ha) followed by treatment of Propiconazole @ 0.05% + Garlic 10% + *T. harzianum* and Propiconazole @ 0.05% + Garlic 10%. The least effective was *T. harzianum* and its foliar sprays resulted in producing yield of 24.50q/ha.

Key words- Barley, *Bipolaris*, Biocontrol agents, Yield

PERFORMANCE EVALUATION OF ELITE TURMERIC (*CURCUMA LONGA* L.) VARIETIES IN COASTAL AND NORTHERN DRY AGRO-CLIMATIC ZONES OF KARNATAKA**ARATI YADAWAD*, MARUTESH A. M. AND NISHMITA K****Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka**

Turmeric, a globally cultivated spice is also referred to as "the golden spice" due to its abundant medicinal values of industrial importance and is a very popular ingredient in South Asian cuisine. Present study aimed to evaluate the performance of six elite turmeric varieties namely, Pragati, Rajendra Sonia, Pratibha, Lakadong, Megha and Salem for growth and yield parameters at two locations representing northern dry zone (Bagalkot) and coastal zones (Ullal) of Karnataka. The experiment was laid out in randomized block design with four replications. ANOVA revealed significant variations among the varieties for growth and yield parameters at both the locations. Lakadong variety recorded highest fresh rhizome yield of 28.63 t/ha followed by Megha (21.75 t/ha) and Salem (21.56 t/ha) in Bagalkot district of northern dry zone. Whereas, Pragati (18.41 t/ha) and Rajendra Sonia (15.50 t/ha) emerged as high yielders in Ullal location of coastal zone. Pratibha variety found to be moderate in both the locations with mean rhizome yield of 14.56 t/ha and 11.64 t/ha, respectively. High yielding genotypes in Bagalkot namely Lakadong and Megha found to be very poor yielders in Ullal. Similarly, Salem variety that recorded high yields in Bagalkot found to be low yielder in Ullal with mean rhizome yield of 10.23 t/ha. The top two genotypes of North East Region of Meghalaya were identified as promising varieties based on yield and overall ranking indicating scope for adoption of these varieties in Northern Dry zone of Karnataka for better yields and returns. Pragati and Rajendra Sonia varieties that performed best in coastal zone could be the best candidates for large scale promotion of these varieties. These findings may induce a window for identification and introduction of new turmeric varieties that ultimately play a role in enhancing production and productivity.

Key words: *Curcuma longa*, Turmeric, varieties and yield**STABILITY ANALYSIS FOR YIELD TRAITS AND *ASPERGILLUS* INFECTION RESISTANCE IN GROUNDNUT (*ARACHIS HYPOGAEA* L.) USING AMMI AND GGE BIPLLOT MODELS****ARATI YADAWAD* AND BHAT R. S.****Department of Biotechnology, University of Agricultural Sciences Dharwad, Karnataka, India 580 005**

Multi-environment trials (METs) are essential components of plant breeding programs to evaluate genotypes for productivity and yield stability in diverse environments. In this study, genotype 9 environment interaction (GEI) was studied in 74 advanced groundnut lines developed from the cross between elite Spanish bunch groundnut genotype, GPBD 4 resistant to rust and LLS but highly susceptible to *Aspergillus* infection and ICGV 2266 tolerant to *Aspergillus* infection for yield, shelling percentage and *A. flavus* infection resistance for three consecutive years (2019, 2020 and 2021) at three locations (Dharwad, Bagalkot and Belagavi) in five different environments (E1, E2, E3, E4, and E5). This study found significant variability for yield, shelling% and *Aspergillus* infection% in the advanced lines of groundnut evaluated at different locations and seasons. A combined analysis of variance revealed that the genotype and GEI had a greater impact ($p < 0.001$) on the pod yield. The environment presented the most significant influence on shelling percentage and *Aspergillus* infection% followed by genotype and GEI. The GGE biplot analysis of the yield potentials indicated that G-19 was the ideal line, with a high yield potential at multilocations, followed by G-66 and G-43. Higher stability across the locations coupled with higher yield was observed for G-15 line. These promising lines can be used as parents to develop location high yielding and stable varieties with resistance to *Aspergillus flavus* infection.

Key words: stability, yield, ground nut, AMMI, GGE and *Aspergillus***FIRST REPORT OF EXSEROHILUM LEAF SPOT: A UNIQUE HALOPHILIC PATHOGEN IN CUCUMIS SATIVUS IN THE SOUTH BENGAL AREA OF INDIA****ARATRIK BANERJEE, VIKRAM DHARA, ARUP KUMAR MITRA****Department of Microbiology, St Xavier's College (Autonomous), Kolkata, India.**

Cucumber (*Cucumis sativus* L.) is a domesticated nutritious vegetable that belongs to Cucurbitaceae family. India is the 30th leading producer of Cucumber in the world having a total annual input of 1,61,000 metric tons. An investigation carried out on different kinds of leaf spot disease was observed on 2 months old cucumber leaves samples from cucumber fields in Baruipur, West Bengal, India (Latitude: N 22 22.262, Longitude: E 88° 24.5086'). The spots appeared were large, greyish brown in colour surrounded by a yellow to brownish halo, measuring 21 cm in average. These lesions gradually expanded from circular to angular spots ultimately resulting in necrosis and defoliation. The fungus isolated from the leaves showed mycelial growth ranging from greyish black to dark olive. Microscopic characterization revealed straight to slightly curved conidia and distoseptate with a distinctly protruding basal hilum. Through microscopic observation and 16S rRNA sequencing the organism was identified to be *Exserohilum rostratum*. *E. rostratum* was previously known for causing blight disease in maize as well as human immune system diseases. *E. rostratum*, *E. longirostratum* and *E. meginnisii* are identified as human pathogens. Koch's postulates were carried out and distinct symptoms were observed in cucumber. Since there are no such previous records, it can be said that this is the first time the host pathogen combination is separated in India.

Keywords: Unique pathogen, *Exserohilum rostratum*, *Cucumis sativus*, Cucurbitaceae, Leaf spot disease.

ISOLATION AND CHARACTERIZATION OF CELLULOSE FROM PEA PODS: TOWARDS SUSTAINABLE BIOMATERIALS

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Horticultural byproducts such as peels, pomace, and seeds typically make up 35-40% of the dry weight of the produce. Despite containing significant amounts of biopolymers e.g. cellulose, hemicellulose, proteins, phytochemicals, these are often discarded as waste, causing environmental pollution. Extraction of cellulose and other compounds from these biomass resources can transform them into valuable raw material, while addressing waste management and generating additional income. Further, horticultural byproducts have low and high hemicellulose content, thus requiring less energy and chemicals than wood based cellulose extraction. In the present study, green pea pods, produced as byproducts of peas processing industries was used for isolating cellulose and characterized. Firstly, pea pods were purified chemically through multistage hydrolysis using hot water, acid and alkali, followed by bleaching and freeze drying. The changes in microstructure, functional, thermal, and crystalline properties of resulting powders were analyzed after each treatment through scanning electron microscopy, FTIR, thermo-gravimetric analyzer, and X-ray diffraction respectively. The scanning electron microscope images of cellulose showed the presence of fibers isolated from pea pods. Cellulose microfibrils of comparable thickness were present in the form of bundle along with macrofibrils. The particular peaks at 1733, and 1558 cm^{-1} observed in FTIR spectra of acid treated fiber, attributed mainly due to the presence of hemicellulose, and lignin were found disappeared completely in the spectra of alkali treated, and cellulose in later treatments. The peaks at 1192 cm^{-1} in isolated cellulose from pea pods indicate an increase in the cellulose components after removal of lignin, and hemicelluloses by chemical treatments. These peaks confirmed the removal of hemicellulose, and lignin from pea pods; resulting in chemically purified cellulose. The XRD of cellulose microfiber exhibited crystalline peaks at 15.7°, 22.7° and 34.8 °, that attributed to the typical structure of cellulose I and the small intensity peak at 18° correspond to the amorphous phase. The Segal crystallinity index of cellulose was found to be 49.95%. The TGA curve indicated that majority of weight loss of the raw, acid, alkali treated pea pod powder and cellulose occurred in the temperature range of 200-400° C. The residual weight of raw powder, acid treated, and alkali treated powder on the TG curve was found to be about 0.08%, 4.4%, and 8.7%, respectively, which further proved that the raw pea pod contained hemicellulose, lignin, and cellulose which decomposed at different temperatures.

Keywords: Cellulose, hydrolysis, peas pod, FTIR, Crystallinity

NUTRITIONAL STATUS AMONG MALE AND FEMALES DIABETIC PATIENTS

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People are greater risk of diabetes due to improper dietary practice, unhealthy life style, lack of physical exercise. The present study was conducted to assess the nutritional status among diabetic males and females. Multistage stratified random sampling technique was used for selecting 100 samples in both male and females and an interviewed schedule was developed to collect information regarding socioeconomic profile, dietary pattern etc. Dietary intake between males and females diabetic were highly significant but age, BMI, etc. between males and females diabetic were insignificant.

SURVIVABILITY OF MICROBES IN TEA PLANTATION SOIL IS INFLUENCED BY PESTICIDES, HEAVY METALS AND SHADE TREE LITTER

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Soil is one of the most important factors for quality tea production. The soil microflora of any plantation helps in plant growth by improving soil fertility, and tea plantations are no exception. In tea plantations, shade trees are also planted to provide shade to tea bushes. Besides providing shade, and being deciduous these leguminous shade trees shed huge amounts of leaf litter. In plantations, soil microbes are always facing threats from pesticides, heavy metals, leaf litter from shade trees etc., which might ultimately lead to a decrease in microbial population. So, to find out their antagonistic influence against soil microbes, nine rhizospheric consortia from cover areas of different shade trees like *Derris robusta*, *Albizia chinensis*, *Dalbergia sissoo*, *Acacia lenticularis*, *Albizia odoratissima* etc were isolated. Results depict that leaf extracts of shade trees suppress the growth of the consortium whereas much higher tolerance was found against pesticides like phorate, flubendiamide, thiamethoxam etc., and heavy metals like arsenic trioxide (As_2O_3), cupric chloride (CdCl_2), lead nitrate ($\text{Pb}(\text{NO}_3)_2$) etc. these may be due to continuous and overuse of pesticides. GC-MS of different shade leaf extracts were done, where antimicrobial compounds like eicosane, heneicosane, phytol, squalene etc, were detected in the leaf of *Leucaena leucocephala*, where leaf extracts showed maximum inhibition on microbial growth. To find out the PGP activity of these tolerable consortia, *in vitro* PGP activity and growth study of moong and beans plants in pot were conducted. PGP study showed that all the consortia have good PGP activity, where the highest PGP activity was shown by consortia belonging to non-shaded area, followed by the consortia of *Derris robusta*, *Albizia chinensis*, *Acacia lenticularis*, *Dalbergia sissoo*. So, the results disclosed the acceptability of each and every shade tree used in this region and these consortia can be further explored as possible biostimulants.

MANGANESE WITH SALICYLIC ACID OPTIMIZE THE GROWTH DYNAMICS AND QUALITY POTENTIAL IN INDIAN MUSTARD (*BRASSICA JUNCEA* L.)**ARITRA GUIN¹, SANTOSH KORAV¹**¹Department of Agronomy, School of Agriculture, Lovely Professional University (Phagwara), Jalandhar, Punjab, India

As an oilseed crop, mustard—a plant in the family *Brassicaceae*—is essential in India and worldwide. Crucial to plant metabolism are manganese and salicylic acid. We performed a field experiment to determine how they affected Indian mustard (*Brassica juncea*). Using a Randomized Block Design with three replications, the experiment included ten treatment combinations. These included control groups, different doses of sole salicylic acid (75, 150, 300 ppm), sole manganese (0.25, 0.5, 0.75 mM MnSO₄), and combinations of the two. According to the experimental results, increasing dosages of both manganese and salicylic acid reversed the effects of sole foliar application by increasing the mustard growth and biochemical properties. It is worth mentioning that the addition of 0.5 mM manganese and 150 ppm salicylic acid externally increased stem dry weight by 1.24-fold, total chlorophyll content by 2.35-fold, relative water content by 1.25-fold, grain protein content by 1.11-fold, and oil content by 1.19-fold. To top it all off, the leaf membrane injury index went down by 36.2% to 53.2% after the combined application. The combination of salicylic acid and manganese yielded superior outcomes in optimizing growth dynamics and quality potential compared to individual applications of either compound.

Keywords: Total chlorophyll content, Membrane stability index, Relative water content, Stem dry weight, Grain protein content**JEVAMRIT: A SUSTAINABLE ALTERNATIVE TO CHEMICAL FERTILIZERS FOR ENHANCED PRODUCTION*****ARJUN B. DALSANIYA¹, HARSH A. KAMANI², V. S. RANPARIYA² AND RAGHAV J. JANI¹, ¹UNDER GRAD****Scholar¹ and Assistant Professor², Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat, India**

The current reliance on chemical fertilizers underscores the urgent need for embracing natural farming methods to restore the production of organic food. Jeevamrit, a natural liquid fertilizer, serves as an excellent source of organic carbon and biomass, containing essential macro and micronutrients crucial for crop growth. Formulated from desi cow dung, desi cow urine, pulse flour, jaggery, and a handful of bund/forest soil, Jeevamrit harnesses the inoculating properties of these ingredients to promote beneficial microbial growth. Unlike conventional fertilizers, Jeevamrit has demonstrated superior efficacy and compatibility with other organic amendments. Its beneficial microorganisms aid in soil nutrient mineralization, enhancing nutrient availability for plants upon application. Additionally, foliar application of Jeevamrit influences the microclimate of the plant's leaf surface. Cost-effective and environmentally friendly, bio-inoculants like Jeevamrit hold significant promise for sustainable agricultural production by mitigating overreliance on chemical fertilizers, which can degrade soil fertility. It serves as a potent source of nitrogen-fixing and phosphorus-solubilizing microorganisms, while also enriching the soil with carbon, nitrogen, phosphorus, potassium, and various micronutrients. Furthermore, Jeevamrit's application can adjust soil pH levels, fostering optimal conditions for crop growth. By increasing crop yields and reducing reliance on chemical fertilizers, Jeevamrit contributes to overall soil health improvement and cost reduction in agricultural practices.

Keywords: Natural farming, Jeevamrit**GROWTH PARAMETERS AND YIELDS ASSESSMENT OF DIFFERENT BAJRA NAPIER HYBRIDS IN THE TRANSITIONAL PLAIN OF LUNI BASIN****ARJUN LAL BIJARNIA*, RATAN LAL SHARMA*, DEELIP KUMAR, A. S. GODARA, SARESH, N. V., D. M. MEENA AND SOHAN LAL BOORI****Agricultural Research Station (Agriculture University, Jodhpur) Keshwana, Jalore**

A field experiment was conducted at Agricultural Research Station, Keshwana, Jalore under arid climate conditions during 2019 and 2020 to growth, yield attributes and yields of four varieties of Bajra Napier Hybrids. The data indicated that the variety Co-4 recorded maximum growth attributes like plant height, plant shoots, CGR at different intervals and yields during both years. Variety Co-4 also produced the maximum gross (Rs132405) and B: C ratio (2.66).

Keywords: Growth parameters, yields, Bajra Napier Hybrids.**STUDIES ON GENETIC VARIABILITY OF INDIAN BEAN (*LABLAB PURPUREUS* L.) GENOTYPES IN AGRO-CLIMATIC CONDITIONS OF BUNDELKHAND REGION****ARJUN SINGH¹, AK PANDEY¹, GOURAV SHARMA¹, ARJUN OLA¹, VINAY KUMAR², SIDDESH S¹, RUTUJA NALE¹**¹Department of vegetable science, RLBCAU Jhansi, UP, India¹Department of fruit science, RLBCAU, Jhansi, UP, India²Department of vegetable science, GBPUAT Pant Nagar, UK, India

The experiment conducted during the kharif season of 2020-21 at the Vegetable Research Farm, RLBCAU, Jhansi, demonstrated significant genetic variability among Indian bean genotypes in the Bundelkhand region. A total of 21 genotypes of Indian bean were collected from various districts of Uttar Pradesh. Traits related to pod yield and its components differed significantly among genotypes, with consistent values across measures indicating minimal environmental influence. These findings emphasize the importance of genetic diversity for breeding programs targeting improved pod yield in the region. PCV values were slightly greater than GCV, revealing very little influence of environment for their expression. High estimates of genotypic and phenotypic coefficient of variation were observed for the characters

inflorescence length (cm), number of flowers per inflorescence, number of pods per inflorescence, pod length (cm), vitamin C content (%), pod yield per plot (kg) and 10 pod weight (g). High heritability coupled with high genetic advance as per cent of mean was observed for all the growth, flower attributes, earliness attributes and pod attributes except days to first pod harvest, pod width (cm), width of leaves (cm), days to 50% flowering, number of pod per inflorescence, pod length (cm) and chlorophyll content (mg) (duration of picking, and protein content indicated in the case of GA as % mean) These characters were least influenced by environmental effects and these characters were governed by additive genes and selection will be rewarding for improvement of such traits.

Key word: Indian bean genotypes, Analysis of variance, Genetic variability, Heritability and Genetic advance

INFLUENCE OF GREEN SYNTHESISED IRON AND ZINC NANO-PARTICLES IN ENHANCING YIELD AND NUTRIENT CONTENT OF RABI SORGHUM (*Sorghum bicolor* L. Moench) THROUGH SEED PRIMING AND FOLIAR APPLICATION ARPITHA H C¹ AND DR. T. SUDHA²

1. PhD scholar, Department of Agronomy, University of Agricultural Sciences, Dharwad, Karnataka

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A field study conducted in MARS, Dharwad, Karnataka, during the *Rabi* season of 2023-24 aimed to assess the efficacy of green-synthesized iron (Fe) and zinc (Zn) nanoparticles (NPs) compared to conventional fertilizers. The standard concentrations for seed priming (SP) and foliar spray (FS), determined in lab and controlled conditions were applied in the field. The standardized SP and FS concentration for Fe, Zn and (Fe+Zn) under lab and controlled conditions were (200, 500 and 400ppm) and (400, 500 and 400ppm), respectively. Foliar spraying occurred at the panicle initiation and flowering stages. The experiment was laid out in RCBD with three replications comprising fourteen treatments viz., T₁-SP with Fe NPs@200ppm, T₂-SP with Zn NPs@500ppm, T₃-SP with (Fe+Zn) NPs@400ppm, T₄-FS of Fe NPs@400ppm, T₅-FS of Zn NPs@500ppm, T₆-FS of (Fe+Zn) NPs@400ppm, T₇-SP with Fe NPs@200ppm+FS of Fe NPs@400ppm, T₈-SP with Zn NPs@500ppm+FS of Zn NPs@500ppm, T₉-SP with (Fe+Zn) NPs@400ppm+FS of (Fe+Zn) NPs@400ppm, T₁₀-FS of FeSO₄@0.5%, T₁₁-FS of ZnSO₄@0.5%, T₁₂-FS of (FeSO₄+ZnSO₄@0.5%), T₁₃- RPP (RDF+15 kg ZnSO₄ ha⁻¹ and seed treatment with *Azospirillum*@500 g ha⁻¹) and T₁₄- Control (RDF-50:25 kg N and P₂O₅ ha⁻¹). RDF was applied to all the treatments. Results revealed that, SP with (Fe+Zn) NPs@400ppm+FS with (Fe+Zn) NPs@400ppm(T₉) recorded significantly higher grain yield, stover yield, grain and stover Fe content (44.75 q ha⁻¹, 7.73 t ha⁻¹, 39.95 and 43.42 mg kg⁻¹) grain and stover Zn content (29.06 and 29.54 mg kg⁻¹) compared to control(T₁₄)(36.17 q ha⁻¹, 6.26 t ha⁻¹, 34.36 and 36.18 mg kg⁻¹, 25.41 and 25.76 mg kg⁻¹, respectively). Overall, the study emphasises the potential of employing (Fe+Zn) NPs at the specified concentrations for both SP and FS to enhance crop productivity and nutrient content compared to conventional fertilizers.

Keywords: Nanoparticles, green-synthesis, seed priming and foliar spray.

THE BIO-EFFICACY OF NOVEL AND BIO-RATIONAL INSECTICIDES AGAINST LEAFHOPPER, *AMRASCA BIGUTTULA* *BIGUTTULA* OF OKRA, *ABELMOSCHUS ESCULENTUS*

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The investigations on ‘The bio-efficacy of novel and bio-rational insecticides against Leafhopper, *Amrasca biguttula biguttula* of Okra, *Abelmoschus esculentus*’ under semi-arid conditions were conducted at Horticulture farm S.K.N. College of Agriculture, Jobner (Rajasthan) during *Kharif*, 2022. The experiment comprised of thirteen treatments including untreated control was laid out in the simple randomized block design with three replications. Two sprays of different insecticides were carried out on okra crop to evaluate their bio-efficacy against leafhopper. The population of these pests were recorded on okra before spray and 1, 3, 7 and 14 days after spray application. The efficacy of twelve insecticides evaluated against leafhopper revealed that the treatment of Tolfenpyrad 15% EC followed by Flupyradifurone 17.09% SL and Diafenthiuron 50% WP these were at par to each other and proved superior over rest of the treatments. The moderately effective treatments were Pyriproxyfen 5% + Fenpropathrin 15% EC, Fenpropathrin 30% EC, Malathion 50% EC, Spiromesifen 22.90% SC, Spinosad 45% SC, Emamectin benzoate 5% SG these were non-significant difference and significantly superior over least effective treatments i.e., Pyridalyl 10% EC, Novaluron 10% EC and Lufenuron 5.40% EC. The ascending order of efficacy of pesticides was Pyridalyl 10% EC< Novaluron 10% EC< Lufenuron 5.40% EC< Emamectin benzoate 5% SG< Spinosad 45% SC< Spiromesifen 22.90% SC< Malathion 50% EC< Fenpropathrin 30% EC< Pyriproxyfen 5% + Fenpropathrin 15% EC< Diafenthiuron 50% WP< Flupyradifurone 17.09% SL< Tolfenpyrad 15% EC.

Key words: Leafhopper, okra, treatments, bio-efficacy

PHYSICO-CHEMICAL AND BIOLOGICAL ANALYSIS OF RIVER RAMGANGA AT BIJNOR, UTTAR PRADESH**ARUN KUMAR SINGH AND SHAKEEBA****Department of Applied Science, Bhagwant Global University, Kotdwar, Pauri Garhwal, Uttarakhand, India**

The systematic study was carried out to determine the physico-chemical parameters of water samples of Ramganga River in Bijnor district. The rivers are an essential water resource and used for several purposes. The water quality of all fresh water ecosystems is assessed by the physico-chemical. Water is a unique natural liquid which is quite essential for all kinds of life. Rivers are the best examples of fresh water. River Ramganga is a major tributary of Ganga River that flows to the south-west from Kumaun Himalayan. Domestic water, solid wastes, industrial and agricultural effluent from various areas is dumped into the river Ramganga through different drains. River water samples were collected from five different sites of Bijnor district stretch during the summer and winter season of the year 2023-24. Water samples from five different sites of river Ramganga were collected and analyzed for physicochemical and biological parameters such as Temperature, transparency, pH, Total Solids, Total Dissolved Solids, Dissolved Oxygen, BOD, COD, Electrical Conductivity, turbidity, alkalinity, calcium, nitrate, and total biomass during the rainy season, to assess the quality of the river. The study revealed that as per physicochemical and biological parameters which exceed the permissible limits render the water of the river Ramganga to be unfit for drinking purposes and it is unhealthy for the aquatic life too.

Keywords: Ramganga River, Physico- chemical parameters, Biological parameters, Natural liquid and Water samples.

WATER BIRD DIVERSITY OF PATNA BIRD SANCTUARY, ETAH DISTRICT, UTTAR PRADESH**ARUN KUMAR SINGH****Department of Zoology, Jaipur National University, Jaipur, Rajasthan, India**

The inland wetlands support vast diversity of flora and fauna by providing them with suitable habitats. Patna Bird Sanctuary is a natural lake and dotted by several islets. Patna Bird Sanctuary harbours excellent population of waterfowl and supports a variety of other resident bird species and also attracts several migrants' varieties. Birds help in the pollinization of plants and also good seed dispersal. A study was performed in Patna Bird Sanctuary during January 2022 to March 2023. Patna Bird Sanctuary covers an area of 1.09 km² (0.42 sq mi). With a lake area of only 1 km² (0.39 sq mi), it is the smallest bird sanctuary in Uttar Pradesh, and provides breeding grounds to multiple populations of flora and fauna. It is a typical rainfed wetland of the Gangetic plains, being a natural, freshwater, shallow depression. The shallow parts of the Sanctuary dry up during summer, leaving some puddles in the deeper zones. Surveys were carried out seasonally and observations were made along line transects with the aid of 10x50 binoculars and Canon EOS 1000 D SLR camera. The documentation of biodiversity in any ecosystem is a requirement for better management and conservation. In the present study water birds diversity of Patna Bird Sanctuary, Etah District of Uttar Pradesh has been documented. About 200,000 birds of 300 different bird species frequent the sanctuary. More than 106 species of migratory and resident birds are known to have their resting habitats around the lake. This notable water birds diversity needs to be protected for nourishing the socioeconomic and ecosystem services provided by Patna Bird Sanctuary.

Keywords: Water birds, Wetlands, Avifauna, Patna Bird Sanctuary.

BALANCED FERTILIZATION IMPROVE GROWTH OF MAIZE PLANT**ARUN PRATAP SINGH****Department of Agronomy, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan) India**

Maize (*Zea mays* L.) is one of the most important staple food crops and its production and consumption have grown widely across regions. Yet cropping systems, management practices, soil type, fertility status, climatic conditions and other factors governing growth response to nutrients vary considerably in space and time Kihara *et al.* (2016). Therefore, future gains in food grain production will be more difficult and expensive considering the increasing problem of multi-nutrient deficiencies unless immediate action is taken. An experiment was carried out at Gorakhpur (Uttar Pradesh, India) with the objective - determine the yield response of maize through the nutrient combination. Results found that the lowest value of growth parameters like plant height, dry matter accumulation and crop growth rate of maize recorded from control while the maximum from the application of (NPKSZn). The reason for an increase in growth parameters might be due to the development of more expanded leaves produced in response to the balanced application of nutrients that enhanced vegetative growth. This showed that the balanced application of mineral nutrients on maize increased leaf size (to maximize light interception) and maximize the overall plant economy of the crop. Fertilization of balanced nutrients to crops up to optimum level helps efficient utilization of nutrients that leads to high photosynthetic productivity and accumulation of high dry matter. This ultimately increases plant growth and development, which may result in improved yield attributes like leaf length and leaf size, thereby increasing production as supported by (Mikos-Szymańska, 2018). The result was in line with the finding of Getinet *et al.* (2022).

Key words: Balanced fertilization, Maize, Growth

APPLICATIONS OF AI AND IOT IN POST-HARVEST DISEASE MANAGEMENT**ARUN, A. T.¹, PRAMOD, R.¹, RADHAKRISHNAN, N. V.¹, SUSHA, S. THARA¹, REJI RANI, O. P.², ANURADHA, T.³**¹Department of Plant Pathology, College of Agriculture, Vellayani, Kerala Agricultural University, Thrissur. (Kerala), India²Department of Entomology, College of Agriculture, Vellayani, Kerala Agricultural University, Thrissur. (Kerala), India³Department of Plant Biotechnology College of Agriculture, Vellayani, Kerala Agricultural University, Thrissur. (Kerala), India

In recent years, the post harvest industry has witnessed a paradigm shift propelled by advancements in technology. Among the most revolutionary developments are Artificial Intelligence (AI) and the Internet of Things (IoT), which has emerged as powerful tools reshaping traditional post harvest practices. Combining AI and IoT technologies in post-harvest disease management offers several promising applications to improve efficiency, reduce losses and ensure food safety. It includes early disease detection, predictive analytics, smart pest management, quality monitoring, prescriptive recommendations, supply chain management etc. By leveraging advanced analytics and real-time monitoring, AI and IoT powered solutions empower farmers to make informed decisions and take proactive measures to protect their crops and ensure food safety and security. Overall, the integration of AI and IoT in post-harvest disease management holds great potential to revolutionize the way to monitor, prevent, and respond to disease outbreaks in stored crops, ultimately improving food safety, reducing waste, and ensuring a more sustainable agricultural system.

Keywords: AI, IoT, Post -Harvest, Disease management, Advanced technology**EFFECT OF CROP COVER AND STAGE OF CROP GROWTH ON SOIL ENZYME ACID AND ALKALINE PHOSPHATASE IN VERTISOL****ARUNA KUMARI J.¹ AND K. SHAILAJA²**¹Department of Biochemistry, ²Department of Soil Science and Agricultural chemistry, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana

A pot culture experiment was conducted to study the effect of Crop cover and stage of crop growth on soil enzymes acid phosphatase and alkaline phosphatase activities. For the experimental study three cereals – rice sorghum and maize, two oil seeds – ground nut and sesame, two pulses – green gram and black gram, and two vegetables – bhendi and brinjal. The experiment was conducted in Completely Randomized Block design with 10 treatments and three replications. The enzyme activity increased from 0 days and reached peak level 45 days for acid and alkaline phosphatases. The activity of acid phosphatase was expressed as μg of 4-nitrophenol g^{-1} soil h^{-1} . The increase ranged with the age of the plant and is as follows 16.34 to 58.76 in groundnut for vertisol I, 16.34 to 57.65 in blackgram, 16.33 to 56.46 in greengram, 16.32 to 55.74 in sesame, 16.32 to 54.67 in rice, 16.32 to 46.76 in maize, 16.32 to 45.86 in sorghum, 16.30 to 44.65 in bhendi and 16.30 to 43.44 in brinjal. In the uncropped control it ranged from 16.29 to 18.17. The activity of acid and alkaline phosphatase under different crop coverages followed the decreasing order groundnut > blackgram > greengram > sesame > rice > maize > sorghum > brinjal > bhendi.

SCREENING OF PIGEONPEA GENOTYPES GROWN IN THE STATE OF TELANGANA FOR NUTRITIONAL QUALITY AND ANTIOXIDANT POTENTIAL**ARUNA KUMARI J.¹ AND RAMESH M²**¹Department of Biochemistry, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana²Department of Seed Science and Technology (SRTC) PJTSAU, Rajendranagar Hyderabad-Telangana

Pigeonpea *Cajanus cajan* is popularly called as Red Gram. It is cultivated in 2.75 lakh hectares across Telangana state. It is the major crop for Mahbubnagar, Adilabad, Ranga Reddy, Medak, Nalgonda, Warangal and Khammam districts. 57 genotypes were collected from the districts where the crop is grown regularly and the nutritional quality and antioxidant potentials were estimated. The range of total carbohydrates varied from 41.04 to 66.12g/100g total soluble proteins was found to be range from 28.4g/100g to 14.05 g/100g and lipids 1.98 to 0.98 g/10g, fibre content ranged from 18.4 to 13.4 g/100g and total phenol content ranged from 1.98 mg/10g to 0.45mg/10g respectively. Antioxidant potential in terms of free radical scavenging activity (DPPH) is ranged from 20.28 to 33.76%, ferric reducing antioxidant power (FRAP) ranged from 3.11 mg/g to 5.86 mg/g, reducing power, Flavonol content in the range between 5.32 mg/100 g and 16.02 mg/100 g Saponin content varied from 5.73 mg/g to 16.98 mg/g. Phytic acid content varied from 1.37 to 5.54 mg/g

DOPPLER ULTRASONOGRAPHIC EVALUATION OF FETAL CIRCULATION DURING PREGNANCY IN GOATSARUNA .V*, CHAUDHARI R. J^A., GAIKWAD S.M^A., SAWANT M. N^B., PAWALKAR D. A^C., PALAMPALLE H.Y^D., AND JAWALE R. S^E.^aDepartment of Animal Reproduction, Gynaecology and Obstetrics; Mumbai Veterinary College, Parel, Maharashtra Animal and Fishery Sciences University, Nagpur-01^bDepartment of Veterinary & Animal Husbandry Extension; Mumbai Veterinary College, Parel, Maharashtra Animal and Fishery Sciences University, Nagpur-01^cDepartment of Veterinary Epidemiology and Preventive Medicine; Mumbai Veterinary College, Parel, Maharashtra Animal and Fishery Sciences University, Nagpur-01^dDepartment of Veterinary Parasitology ; Mumbai Veterinary College, Parel, Maharashtra Animal and Fishery Sciences University, Nagpur-01^eDepartment of Zoology, Veer Wajekar ASC, College, Phunde, Raigad

Trans-abdominal ultrasound was performed on sixteen Osmanabadi-crossbred does, comprising of two groups i.e. known group : with history of mating dates (group-I, n=8), and unknown group : with no history of mating dates (group –II, n=8). B-mode and Doppler ultrasonography was performed every 15 days from 45-135 days of gestation. Doppler indices and parameters of the umbilical artery i.e Pulsatility Index (PI), Resistance Index (RI), Peak Systolic Velocity (Vp), End Diastolic Velocity (Ve), Mean Velocity (Vm) and Systolic/Diastolic ratio (S/D) were recorded with the aim of assessing umbilical cord Doppler parameters during gestation that might be used for assessment of foetal development. The Vp showed non-significant rise ($P < 0.05$) at 120-135 days. The Ve was zero from 45-75 day and non-significantly increased till end gestation. The Vm increased non-significantly till end gestation with a drop at 90-120 days. The PI non-significantly ($P < 0.05$) increased between 60-75 days while in other period, declined non-significantly. The RI was 1.00 from 45 to 75 days, dropped non-significantly ($P < 0.05$) between 75-90 till 120-135 days. The S/D ratio showed a non-significant decrease from 75-135 days. The changes in the Doppler indices indicate the alterations in the resistance of the umbilical artery and the blood perfusion to the fetus. All the does parturated uneventfully. No abortions were recorded during the study. The result of the present study indicates that Doppler indices of umbilical artery can be evaluated for assessing the normal fetal growth and development in goats.

EXPLORING THE INFLUENCE OF VARIOUS SUBSTRATE COMBINATIONS ON FLORAL CHARACTERISTICS OF WINTER ANNUALSARVIND MALIK¹, D. S. DAHIYA¹, A. K. GODARA¹, VIKAS KUMAR SHARMA² AND RAVEENA¹¹Department of Horticulture, CCS Haryana Agricultural University, Hisar, Haryana, India²Department of Horticulture, Galgotias University, Greater Noida (UP) India

This study was carried out to explore the effect of substrates on flowering of different winter annuals (Larkspur, Antirrhinum, California poppy and Dahlia). The research was conducted at Centre for Quality Plant Material, CCS Haryana Agricultural University, Hisar, during 2015-16 to 2017-18. This research was arranged in a factorial randomized block design with seven substrate combinations and five replications. The results showed that the combination of cocopeat: vermiculite: perlite (3:1:1) gave maximum average spike length (28.2 cm) and number of spike per plant (18.9) in larkspur and antirrhinum. However, mean of largest flower diameter (6.0 cm) and number of flower per plant (71.6) was reported from California poppy and Dahlia. In case of different winter annuals the highest parameters of spike length and number of spike per plant (28.7 cm and 16.3 cm) was reported from antirrhinum, while highest maximum flower diameter (6.1 cm) was measured from dahalia.

Keywords: Substrates, Flowering Parameters, Cocopeat, Perlite, Vermiculite**ENHANCING BROCCOLI'S NUTRITION & ANTIOXIDANTS WITH VACUUM IMPREGNATION**ASEEYA WAHID*^A, SAROJ KUMAR GIRI^B^a Shri Venkateshwara University, Gajraula, Uttar Pradesh, India^b ICAR-National Institute of Secondary Agriculture, Ranchi, Jharkhand, India

In this study, we address the challenge of preserving the nutritional and sensory quality of broccoli, a highly perishable vegetable. We investigate the impact of vacuum impregnation on the bioactive compounds and quality attributes of broccoli florets. Florets were treated with a solution containing ascorbic acid and calcium chloride under varying vacuum pressures (20, 40, and 60 kPa). We measured total phenolic content (TPC), total flavonoid content (TFC), total ascorbic acid content (AAC), total soluble solids (TSS), water activity (aw), total chlorophyll content (TCC), carotenoid content (CC), and antioxidant activity (AA) of both treated and untreated samples. Our results show a significant increase ($p \leq 0.05$) in TPC, TFC, AAC, TCC, CC, and AA in vacuum-impregnated broccoli florets. Particularly, at 0.6 bar vacuum impregnation, we observed a significant rise in biochemical compounds. This increase could be attributed to the stress induced by vacuum pressure and impregnation solution, which may have stimulated the phenylpropanoid pathways involved in biosynthesis. Additionally, the osmotic effect of the impregnation solution could explain the elevation in TSS and water activity.

Keywords: Vacuum impregnation, calcium chloride, ascorbic acid, biochemical

MOLECULAR STUDIES ON SOME SPECIES OF SUBFAMILY POLYOMMATINAE (LYCAENIDAE: LEPIDOPTERA) FROM NORTHWEST INDIA**ASHA DEVI*, GURINDER KAUR WALIA & AVTAR KAUR SIDHU****Department of Zoology and Environmental Sciences, Punjabi University Patiala, Punjab, India**

Butterflies are among the most well-known insect groups, with nearly 19,000 described species. They show fascinating wing colour patterns, mimicry and migration. Their sensitivity to minor changes in the forest structure and environment makes them useful bio indicators. Members of family Lycaenidae which comes under superfamily Papilionoidea are commonly known as 'Gossamer-winged butterflies'. They are generally smaller in size and extremely delicate. Family Lycaenidae constitutes around 5200 species under 416 genera worldwide, while 380 species are available in India. This family is further divided into 8 subfamilies: Curetinae, Lipteninae, Poritinae, Liphyrinae, Miletinae, Lycaeninae, Theclinae and Polyommatainae. Subfamily Polyommatainae further divided into tribes and subtribes.). The members of this subfamily are found in all main bio-geographical regions of the world, while maximum diversity of species is reported from the Europe, North America and Asia. The butterflies representing this subfamily are usually known as "Blues" due to the presence of blue scales on their wings. This subfamily is one of the most difficult groups of butterflies for identification as it contains many sibling complexes as well as exhibits polymorphism. In the field of molecular systematics, mitochondrial genes have proved to be significantly dominated because of their limited recombination, maternal inheritance and rapid evolution. These characteristics make them best markers for species delimitation (Dinca *et al.*, 2011). The mitochondrial DNA of class insecta is a small circular molecule, ranging from 14-20 kb in size. It encodes for 37 genes, out of these, 13 are protein coding genes (Wolstenholme, 1992). Protein coding gene COI is the most informative and useful gene for species identification (Hebert *et al.*, 2003). Different localities of Northwest India have been surveyed for the collection of members of subfamily Polyommatainae. 25 butterfly species have been collected from these regions. These species further proceeded for DNA Barcoding. Sequences of 7 species have been submitted to NCBI GenBank.

BIODIVERSITY CONSERVATION IN SACRED GROVES OF MANIPUR**ASHA GUPTA****Centre of Advanced Study, Department of Life Sciences, Manipur University, Canchipur, Imphal, India**

Biodiversity is the basis of human survival and life support system. Traditional nature worship is common in various societies of the world. Protected for reasons of traditional beliefs and customs, sacred groves are natural habitats and ecosystems which present in-situ conservation of the whole range of genes, species and ecosystems in the region. The sacred groves of Manipur (Latitude 23°50'N – 25°42'N, Longitude 92°58'E – 94°45'E) falling within Indo-Myanmar hot spot of biodiversity are the prominent feature in the cultural landscape and located all over Manipur. The paper reports the valuable biodiversity from the four valley sacred groves of Manipur, the vegetational analysis, regeneration trends, litter production and decomposition and reports the nutrient conservation mechanism by investigating the hydrological budget. The study concludes that cultural aspect of management of sacred groves is to be linked with the scientific aspects of preserving biodiversity to prevent the germplasm erosion of present and future.

Key Words: Biodiversity Hotspot, Conservation, Vegetational analysis, Hydrological Budget**INVESTIGATIONAL ANALYSIS OF VARIOUS SEEDS FOR STEREOSELECTIVE HYDROXYNITRILE LYASE ACTIVITY AND ITS CHARACTERIZATION****ASHA KUMARI* AND MONICA SHARMA[#]****Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India**

The adaptable class of enzymes known as hydroxynitrile lyases is important for protecting plant systems from microbial invasion. Using the reversible enzymatic reaction, hydroxynitrile lyase is a significant industrial biocatalyst for the manufacture of chiral cyanohydrins in the chemical industries. Biologically active substances called cyanohydrins are needed to synthesise hydroxy ketones and amino alcohols and hydroxy acids, which are significant as agrochemicals, medicines, and fine chemicals. A hydroxynitrile lyase activity assay was conducted after screening seeds from 12 families for cyanogenic activity. The crude extract of the seeds found to degrade racemic mandelonitrile into benzaldehyde that was monitored at 280 nm using UV-Vis spectrophotometer. Three of the 12 seeds were determined to be cyanogenic and to have particular hydroxynitrile lyase; *Lpomea quamoclit* (0.0731/U), *Pinus roxburghii* (0.136/U) and *Pyrus communis* (5.663/U). This is the first time these seeds were reported. Hydroxynitrile lyase from *Pyrus communis* was further characterised for reaction conditions- buffers system, pH, temperature, incubation time and substrate concentration. Hence it showed maximum enzyme activity in sodium citrate buffer pH 5 at 30 °C in 30 minutes with substrate concentration of 10 mM. Further this enzyme can be purified and can be used for production of various cyanohydrins that are used in industries.

Keywords: hydroxynitrile lyase, cyanohydrins, hydroxy ketones, hydroxyacids, mandelonitrile, *Lpomea quamoclit*, *Pinus roxburghii*, *Pyrus communis*.

INVESTIONAL ANALYSIS OF VARIOUS SEEDS FOR STEREOSELECTIVE HYDROXYNITRILE LYASE ACTIVITY AND ITS CHARACTERIZATION**ASHA KUMARI* AND MONICA SHARMA[#]****Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India**

The adaptable class of enzymes known as hydroxynitrile lyases is important for protecting plant systems from microbial invasion. Using the reversible enzymatic reaction, hydroxynitrile lyase is a significant industrial biocatalyst for the manufacture of chiral cyanohydrins in the chemical industries. Biologically active substances called cyanohydrins are needed to synthesise hydroxy ketones and amino alcohols and hydroxy acids, which are significant as agrochemicals, medicines, and fine chemicals. A hydroxynitrile lyase activity assay was conducted after screening seeds from 12 families for cyanogenic activity. The crude extract of the seeds found to degrade racemic mandelonitrile into benzaldehyde that was monitored at 280 nm using UV-Vis spectrophotometer. Three of the 12 seeds were determined to be cyanogenic and to have particular hydroxynitrile lyase; *Lpomea quamoclit* (0.0731/U), *Pinus roxburghii* (0.136/U) and *Pyrus communis* (5.663/U). This is the first time these seeds were reported. Hydroxynitrile lyase from *Pyrus communis* was further characterised for reaction conditions- buffers system, pH, temperature, incubation time and substrate concentration. Hence it showed maximum enzyme activity in sodium citrate buffer pH 5 at 30 °C in 30 minutes with substrate concentration of 10 mM. Further this enzyme can be purified and can be used for production of various cyanohydrins that are used in industries.

Keywords: hydroxynitrile lyase, cyanohydrins, hydroxy ketones, hydroxyacids, mandelonitrile, *Lpomea quamoclit*, *Pinus roxburghii*, *Pyrus communis*.

ANALYZING THE DYNAMICS OF WILDLIFE TRADE: A MULTI-SOURCE EXAMINATION OF CITES, SEIZURE REPORTS, AND NATIONAL CRIME CONTROL BUREAU DATA OVER SIX YEARS**ASHA POONIA^{1*}, SHRADA KALRA¹, KAPISH SAMOTA¹****¹Department of Zoology, Faculty of Life Sciences, Chaudhary Bansi Lal University, Bhiwani**

Wildlife trafficking poses a significant threat to biodiversity and ecosystem stability worldwide. This study presents a comprehensive analysis of wildlife trade dynamics over a six-year period, integrating data from the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), seizure reports, and the National Crime Control Bureau (NCCB). Through a multidisciplinary approach, temporal, spatial, and species-specific patterns of trafficking are examined, shedding light on the intricate networks and routes used by traffickers. Additionally, the study evaluates the effectiveness of enforcement efforts and explores the underlying drivers of trade, including demand for exotic pets, traditional medicine, and luxury goods. The implications of wildlife trafficking on conservation efforts are discussed, highlighting the urgent need for robust policy interventions and international cooperation. By uncovering trends and informing conservation strategies, this research contributes to the global effort to combat illegal wildlife trade and safeguard endangered species.

Keywords: Wildlife trafficking, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), Seizure reports, National Crime Control Bureau (NCCB), Illegal wildlife trade, Conservation, Biodiversity, Species-specific analysis, Enforcement effectiveness, Trafficking routes, Spatial patterns, Temporal trends, Drivers of trade, Policy interventions, International cooperation, Wildlife crime networks, Endangered species, Conservation implications, Predictive modeling, Multidisciplinary approach

EFFECT OF POPLAR AND EUCALYPTUS BASED AGROFORESTRY SYSTEM ON SOIL BIOCHEMISTRY**ASHA SHARMA, RAJNESH PANDEY, DEBIDUTTA BARMAN****Department of Forestry, Horticulture faculty, Uttar Banga Krishi Viswavidyalaya, Pundibari- 736 165, Cooch Behar, West Bengal, India**

Eucalyptus and poplar are among the most rewarding tree species when concerning the agroforestry systems of India. Intercropping with short rotation higher density tree species like eucalyptus is taken to fulfill the demand for food and industrial raw matter for the same specified piece of land. Whereas, poplar is an incredible timber producing tree in northern India. The field experiment was conducted during the winter season of 2016-17 at the experimental site of the Agroforestry Research Centre, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. Poplar and eucalyptus were intercropped with different wheat varieties (UP-2526, UP-2565, UP-2628, and DPW-621-50). After harvesting the wheat crop, soil sampling was performed to determine the soil parameters like electrical conductivity (EC), organic carbon and minerals content. Nitrogen, phosphorus and potassium content and other biochemical constituents were higher in the agroforestry system as compared to the open farming system. A high soil pH (7.53) was found in an open farming system and lower pH in an agroforestry system. Soil EC in the agroforestry system was slightly higher than the open farming system. Organic carbon was maximum (1.33%) under the poplar agroforestry system compared to the eucalyptus based agroforestry system. Overall, this study determines the effect of poplar and eucalyptus based agroforestry systems on soil biochemistry.

Keywords: Electric conductivity, Eucalyptus, Organic carbon, pH

SOLID CATALYST FOR BIOFUEL PRODUCTION**ASHISH KUMAR^A AND MAMTA BELWAL^B**^aDepartment of Chemistry, Hemwati Nandan Bahuguna Government Post Graduate College, Khatima, Udham Singh Nagar, Uttarakhand, India^bDepartment of Chemistry, Radhey Hari Government Post Graduate College, Kashipur, Udham Singh Nagar, Uttarakhand, India

Sodium doped zirconia impregnated SBA-15 has been prepared without using hydrothermal treatment trailing the wet impregnation route. The prepared catalyst has been characterized by employing various techniques viz., BET for surface area analysis, SEM for morphological study, XPS for element oxidation state determination. It was found that catalyst seized both acidic and basic sites therefore, successfully employed for one-pot or concurrent esterification and transesterification of virgin cottonseed oil and high FFA containing vegetable oils. Under optimum reaction conditions of catalyst concentration of 10 wt% with respect to weight of oil, MeOH/oil molar ratio of 30:1 and at 65 °C reaction temperature, the catalyst could confer > 98 % fatty acid methyl ester yield within 3 h of reaction duration. Regeneration study advocated that the catalyst may well be recycled for 5 successive cycles without any significant trouncing of activity and even yielded 86% fatty acid methyl esters during 6th cycle.

Keywords: Heterogeneous catalysts, mesoporous, basicity, acidity, transesterification, thermodynamic parameters**ORGANIC MANURES IMPROVE HEALTH OF SOIL AFTER WHEAT HARVEST****ASHISH RAJA JANGID****Department of Agronomy, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan) India**

Wheat (*Triticum aestivum* L.) is a most important cereal crop in the world, originated from South West Asia. It is second most staple crop in India after rice. Increase the population of world the need of crop demand increases. Nowadays practice modern agriculture that included high yielding varieties require more nutrients and used the chemical fertilizers like Urea, DAP, SSP and MOP that are not much suitable for soil health and sustainable crop production. Most of the chemical fertilizers influence the soil health and change the soil fertility parameter and also influence the microbial properties of soil ecosystem. Chemical fertilizer produced higher nutrients and beside change soil ecosystem. Different organic manures like FYM, vermicompost and neem cake increase production and also maintain soil fertility long term basis (Arbad *et al.*, 2014) organic manures are good sources of plant available nutrients. The organic manures increase the microbial activity, enzymatic activity and also increases the mineralization process (Saiyad *et al.*, 2014). Thus judicious use of organic and inorganic nutrient sources helps in sustain production of wheat. Thus, a field experiment was conducted at Udaipur and found that application of 100% RDN through compost, vermicompost and neem cake each in equal proportion significantly increased soil health as well as microbial population after crop harvest as compared to control.

Key words: Soil health, Sustainability, Organic manure**ESTABLISHING AND DEMONSTRATING ENVIRONMENTAL DNA (EDNA) BASED DETECTION METHOD FOR FRESHWATER FISHES****ASHISH SAHU^{1, 2}, MAHENDER SINGH^{1*}, UTTAM KUMAR SARKAR¹**¹ICAR-National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh, India²Faculty of Fisheries, Kerala University of Fisheries and Ocean Studies, Panangad, Cochin, Kerala, India

Environmental DNA (eDNA) is a complex mixture of genomic DNA of different organisms that are shredded through faecal matter, urine, mucus, gametes, skin, and corpses that can be collected from water, soil, and organic sediments. The eDNA is an emerging molecular tool for predicting the presence or absence of species such as rare, endangered, invasive, and migratory species that are occasionally coming to a particular ecosystem. In recent years, eDNA has seen a massive increase in application in freshwater systems with a concurrent growth in protocol developments for eDNA sampling and analysis like metabarcoding. To standardize the protocol for the eDNA extraction, we experimented under control conditions for establishing and demonstrating the eDNA protocol. The water samples were collected from the aquarium, and two individuals of *Puntius chola* and *Hetropneustes fossilis*, and were maintained in two separate aquaria in the laboratory for 24 and 48 hours. One fish per aquarium was kept, so the in-house Sanger sequencing can be used to authenticate the protocol of eDNA. 2L water was filtered and extract the DNA from the filtrate material. Single primer sets targeting Cytochrome c oxidase I (COI) regions were used to capture fish from aquarium tanks. PCR amplification and Sanger's sequencing of the COI gene were carried out. DNA sequences of fin clips of fishes and those generated from eDNA gave the same results. Protocol standardized for eDNA samples collected after 48 hours gave better results than 24 hours in terms of DNA quantity and PCR products. This study demonstrated the eDNA protocol and described procedures for collecting and filtering water for eDNA-based molecular characterization of freshwater fish taxa. This study will be helpful to future eDNA studies for the detection of freshwater fishes.

Keywords: Environmental DNA, Protocol, Sanger sequencing, Fish, Barcoding, Freshwater.

OKRA OR OKRO, *ABELMOSCHUS ESCULENTUS*, IS AN HERBACEOUS HAIRY ANNUAL FLOWERING PLANT**ASHMITA CHAKRABORTY****Department of Microbiology, St. Xavier's College (Autonomous) Kolkata, West Bengal**

Okra or Okro, *Abelmoschus esculentus*, is an herbaceous hairy annual flowering plant in the mallow family that is cultivated for its mucilaginous green pods used especially in soups or stews. In general, the growth of okra plant was observed for roughly 2 months. For each week, observations were noted. In this experiment, Eight treatments were given to observe the growth of plant in each of the treatment given. The treatments included – 1) Garden soil as a control - 2) Garden soil and Chemical fertilizer 3) Garden soil and Biofertilizer 4) Garden soil, Chemical fertilizer and Biofertilizer 5) Garden soil and Biosap 6) Garden soil , Biosap and Chemical fertilizer 7) Garden soil , Biosap and Bio fertilizer 8) Garden soil , Biosap, Chemical fertilizer and Biofertilizer. The results were noted for each of these treatments to check the best growth and a comparative analysis was done.

QUALITY EVALUATION OF VALUE ADDED GREEN PEAS UNDER FLUIDIZED BED DRYING DURING STORAGE**ASHOK K SENAPATI* M. SINGH, A K VARSHNEY, AND D. RAJ****Centre of Excellence on Post Harvest Technology, ASPEE College of Horticulture, Navsari Agricultural University, Navsari (Gujarat), India**

Pisum sativum (commonly known as peas) is one of the major vegetable crop contributes approximately 2.5% (3.86 million MT) share of the total vegetable production and 4.6% of the total vegetable producing area in India (NHB, 2014). Due to its high moisture content, it cannot be stored for a long period of time and must be subjected to some method of preservation such as, freezing, canning, cold storage or drying in order to make it available for later consumption. To make value addition, of green peas, different drying methods employed and in this paper we evaluate the fluidized bed drying method for green peas drying. The investigation of fluidized bed drying of green peas was conducted in which included two pre treatments (un-blanching and blanching). Matured fresh green peas were procured and deshelled manually to prepare samples and were blanched at 85°C for 1 min and cooled in running water and removed the surface moisture. Then green peas were put three level of bed heights (20,40 and 60 mm) and three level of fluidized bed drying air temperatures (45, 55 and 65°C).The result of the study revealed that the whole drying took place in falling rate period only. Overall drying rate varied from 0.0053 to 0.0158 (kg of water / kg of dry matter)/min in the study. The maximum overall drying rate i.e. 0.0158 (kg of water / kg of dry matter)/min was observed in treatment (blanched, 20 mm bed height and 65°C). Significantly maximum protein was found in individual effect of drying air temperature at 45°C i.e.17.87 g/100g which was at par at 55°C i.e.17.85 g/100g. Significantly higher average chlorophyll content was found in treatment (blanched, 40 mm bed height and 45°C) i.e.106.98 mg/100g which was at par with treatment (blanched, 40 mm bed height and 55°C) i.e.106.68 mg/100g). The rehydration ratio (blanched, 40 mm bed height and 55 °C) was found significantly higher at 3.53 which were at par with (blanched, 20 mm bed height and 45 °C) with 3.52. It can be concluded that green peas should be blanched at 85° C for 1 min before drying under fluidized bed drying at a bed height 40 mm and drying air temperature of 55°C to produce better quality of dried green peas upto 9 months of storage.

Keywords: Green peas, Fluidized bed drying, Quality parameters, Storage**ADVANCING VEGETABLE PRODUCTION: INTEGRATING TECHNOLOGY, GENETICS, AND SUSTAINABILITY FOR ENHANCED QUALITY AND YIELD****ASHOK KUMAR MEENA****Ph.D. Research Scholar, Department of Horticulture, CoA, SKRAU-Bikaner(Raj.)**

Advanced vegetable production encompasses a spectrum of innovative techniques and strategies aimed at enhancing the quality, yield, and sustainability of vegetable crops. This abstract provides an overview of key aspects of advanced vegetable production, including controlled environment agriculture (CEA), precision farming, genetic improvements, sustainable practices, and technological integration. Controlled environment agriculture (CEA) plays a pivotal role in advancing vegetable production by providing a controlled environment that optimizes crop growth throughout the year. Greenhouses, vertical farms, and hydroponic systems are examples of CEA methods that offer precise control over environmental factors such as temperature, humidity, light, and nutrient levels. This results in higher yields, superior crop quality, reduced resource usage, and protection against adverse weather conditions and pests. Precision farming techniques are integral to advanced vegetable production, utilizing technologies like GPS, sensors, drones, and data analytics to monitor and manage crop conditions with precision. This approach enables targeted application of water, nutrients, and crop protection products, optimizing resource use efficiency, reducing environmental impacts, and maximizing yields. Genetic improvements through breeding and biotechnology contribute significantly to advancing vegetable production. Developing vegetable varieties with enhanced traits such as disease resistance, drought tolerance, improved nutritional content, and extended shelf life is essential for meeting consumer demands and ensuring crop resilience in changing environmental conditions.

Keywords- Advanced vegetable production, Controlled environment agriculture (CEA), Precision farming, Genetic improvements, Sustainable practices, Technological integration

EFFECT OF PRE HARVEST APPLICATION OF HEXANAL AND SALICYLIC ACID AT DIFFERENT STORAGE TEMPERATURES ON FRUIT QUALITY AND SHELF LIFE OF STRAWBERRY (*Fragaria ananassa*) CV. WINTER DAWNASHOK SAH¹, M. MADHAVI², V. SIVAKUMAR³, P. SUBBARAMMAMMA⁴¹M.Sc. (Hort.), Department of Fruit Science, Dr. YSRHU, College of Horticulture, Venkataramannagudem, AP²Associate Dean, Dr. YSRHU, College of Horticulture, Venkataramannagudem, AP³Scientist (Hort.) and Head, Dr. YSRHU- Horticulture Research Station, Chintapalli, AP⁴Associate Professor, Department of Plant Physiology, Dr. YSRHU, College of Horticulture, Venkataramannagudem, AP

Strawberry is one of the most liked fruits in the world due to its pleasant color, shape, aroma and vital source of many health promoting nutritious compounds. In spite of having high demand from health aspect, it has shelf life only upto 4-5 days at normal room temperature and highly perishable and prone to postharvest losses. The investigation entitled effect of pre harvest application of Hexanal and Salicylic acid at different storage temperatures on fruit quality and shelf life of Strawberry (*Fragaria ananassa*) cv. Winter Dawn was carried out at Dr. YSRHU-College of Horticulture, Andhra Pradesh during the year 2023-24. The experiment was laid out in a factorial completely randomized design (FCRD) with three replications containing of ten treatment combinations which consists of two factors viz., pre harvest treatments at five levels (Control-Tap water, Hexanal 2mM, Hexanal 4 mM, Salicylic acid 2 mM, Salicylic acid 4 mM) sprayed two times i.e. 15 days and 7 days before harvesting and storage temperatures at two levels (3 °C and 6 °C temperatures). The results showed that fruits treated with Hexanal 4mM (EFF 0.04%) and stored at 6°C had prolonged storage life (20 days) as compared to control (12 days). Hexanal 4mM treated fruits stored at 6°C maintained various quality attributes of strawberry fruits such as physiological loss in weight (20.46%), decay incidence (62.50%), firmness (3.26 kg/cm²), TSS (6.98°Brix), titratable acidity (0.56%) total sugars (7.31%), ascorbic acid content (35.46 mg/100 g), total anthocyanins (22.21 mg/100 g), total phenolic content (295 mg GE/100 g) and antioxidant activity (26.29 %) at 20 days of storage. Hence from the above experiment it is concluded that pre harvest application of hexanal @4mM along with storage temperature of 6°C can be used as an effective alternative for enhancing fruit quality and shelf life of strawberry.

Keywords: Strawberry, Shelf Life, Hexanal, Salicylic Acid, Decay Incidence**STANDARDIZATION OF PLANTING METHOD AND NUTRIENT LEVELS IN TEFF- AN EMERGING MILLET IN THE INDIAN CONTEXT**ASHOKA P.^{1*}, MAHANTESH B. NAGANGOUDAR²¹Professor (Agronomy) and Head, Dept of Agronomy, College of Agriculture (UASD), Hanumanmatti, Haveri, Karnataka, India²Senior Research Fellow, DST-EESES Project, AICRP on Castor, ZARS, UAS, GKVK, Bengaluru

Aim: Teff is an Ethiopian intriguing grain packed with nutrition and emerging as a super millet in the Indian context. Since, it is an introduced millet, an experiment was carried out at ICAR-KVK, Haveri, Karnataka on *Alfisol* to standardize the production technologies. **Methodology:** The experiment was laid out in RCBD with Factorial concept, consisting Factor I: Planting methods (M₁: Line sowing and M₂: Transplanting) and Factor II: Nutrient management (N₁: Control, N₂: 100 % organics, N₃: 20:10:10 kg N:P₂O₅:K₂O ha⁻¹, N₄: 30:15:15kg N:P₂O₅:K₂O ha⁻¹ and N₅: 40:20:20 kg N:P₂O₅:K₂O ha⁻¹) replicated thrice during *Kharif*- 2019, 2021 and 2022. Results: The pooled analysis showed that, transplanting of teff recorded significantly higher grain yield (260 kg ha⁻¹), straw yield (447 kg ha⁻¹), and plant nutrient uptake (N-8.04, P-1.93, and K-5.27 kg ha⁻¹) over line sowing, contrastingly soil available nutrients (N- 171.22, P- 22.90 and K-113.67 kg ha⁻¹) were significantly higher under line sowing. Among the varied nutrient levels, application of 40:20:20 kg N: P₂O₅:K₂O ha⁻¹ resulted in significantly higher straw yield (474 kg ha⁻¹), lodging percent (81.60%), nutrient uptake by the plant (N-8.67, P-2.26 and K-5.81 kg ha⁻¹), soil available nutrients (N-196.87, P-29.00 and K- 124.29 kg ha⁻¹) and nutritional quality (Protein-13.51%, Moisture-12.35%, Fat-2.84% and Ash-3.19%) over rest of the nutrient levels and was found to be at par with the application of 30:15:15 kg N: P₂O₅:K₂O ha⁻¹. In contrast to the rest of the parameters, significantly higher grain yield (297 kg ha⁻¹) was noticed with the application of 20:10:10 kg N: P₂O₅:K₂O ha⁻¹ over other nutrient levels. Among the interaction effects, the line sowing method supplied with 40:20:20 N: kg P₂O₅:K₂O ha⁻¹ outperformed over rest of the interactions in all parameters except grain yield. **Conclusion:** Transplanting young seedlings over direct drilling the seeds and application of 20:10:10 kg NPK ha⁻¹ over other nutrient levels are recommended for attaining higher grain yield of teff crop in red sandy loam soils of North Karnataka.

Keywords: Teff, transplanting, line sowing, nutrient levels

TO EVALUATE THE IMPACT OF DIFFERENT AGRONOMIC PRACTICES AND ENVIRONMENTAL CONDITIONS ON THE GROWTH PARAMETERS, YIELD, AND OVERALL PERFORMANCE OF VARIOUS GREEN GRAM (*VIGNA RADIATA* L.)

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Pulses, such as green gram (mung bean), have been an important part of the human diet in India for thousands of years. They are a key source of protein, especially for people who do not eat meat. Pulses are the second most important group of crops after cereals. In 2016–17, pulses were grown on 23.856 million hectares in India, producing 18.25 million metric tons with a productivity of 765 kg per hectare. India is the largest producer and consumer of pulses, contributing to 25% of the world's production and 15% of its consumption. Pulses are vital to India's food crops and are a central part of farming systems across the country. They are mainly grown in rain-fed conditions on low-fertility soils, as they are drought-tolerant and can grow in various soil and climate conditions. Green gram is the main pulse crop in Odisha, covering 836,000 hectares with an average yield of 434 kg per hectare, making up about 40% of the state's total pulse area. Along the coastal belt, green gram and black gram are the primary pulses. Agriculture is the main occupation in this region, and the fertile soils of the Mahanadi River make it ideal for growing different crops. Paddy (rice) is the main crop, grown on 81,540 hectares. Pulses like green gram and black gram are grown widely, utilizing residual soil moisture. Including mung bean in the rice cropping system has diversified and strengthened agriculture, improved soil productivity, increased paddy yields, and boosted farmers' incomes. However, many farmers do not use fertilizers or biofertilizers, and Yellow Mosaic Virus (YMV) is a major problem, leading to low yields. Additionally, green gram often faces water stress due to its reliance on residual soil moisture. One major issue is the lack of high-yielding green gram varieties to replace traditional ones.

Keywords: Green gram, Rain-fed, Drought-tolerant, Yellow Mosaic Virus

DOUBLING FISH FARMERS' INCOME: THE PROMISE OF ADVANCED AQUACULTURE TECHNOLOGIES IN INDIA

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Farming of fish, shellfish, and aquatic plants is one of the fastest-growing food sectors in the world. It's seen as a promising avenue for doubling farmers' income in India. Advanced aquaculture technologies are playing a pivotal role in this transformation. This article delves into the potential of aquaculture, the advanced technologies revolutionising the sector, and the government initiatives supporting this growth. In India, where aquaculture has deep-rooted traditions, the prospect of enhancing farmers' income through innovative technologies is gaining traction. With the integration of advanced methods, such as Recirculating Aquaculture Systems (RAS), Aquaponics, Biofloc, Mono Sex Culture, Integrated Fish Farming (IFF), Integrated Multi-Trophic Aquaculture (IMTA), and Smart Aquaculture and Aquariculture (tanks and accessories, fish keeping, breeding, etc.), the potential for doubling income in the fisheries sector is within reach. The expansion of aquaculture is not only a testament to India's diverse climatic conditions and abundant water resources but also a response to the pressing need to boost food production sustainably. These advanced technologies offer solutions to the challenges faced by small-scale farmers, including water scarcity and low yields, thereby paving the way for a more prosperous future. Government initiatives like the Pradhan Mantri Matsya Sampada Yojana (PMMSY), Fisheries and Aquaculture Infrastructure Development Fund (FIDF), Kisan Credit Cards (KCC) for Fishers and Fish Farmers, and Biofloc Fish Farming Subsidy are providing crucial financial and infrastructural support to drive the adoption of these technologies. Despite the promising outlook, there are hurdles to overcome, such as initial investment costs and the need for training. Continuous research and development efforts are essential to refine these technologies and ensure their sustainability in the long run. Collaboration among stakeholders – including farmers, researchers, policymakers, and technology developers – is crucial for achieving the goal of doubling farmers' income and securing a prosperous future for the fisheries sector in India.

Keywords: Doubling Income, Aquaculture, RAS, IMTA, IFF, Smart Aquaculture, Aquariculture.

PHENOTYPIC VARIATION AND GENETIC DIVERSITY ANALYSIS OF TOMATO GERMPLASM: IMPLICATIONS FOR BREEDING STRATEGIES AND HYBRID DEVELOPMENT***ASHUTOSH SINGH¹, SHARWAN KUMAR SHUKLA², AVANTIKA IYENGAR³, RAJESH KUMAR SINGH⁴**¹Assistant Professor, Department of Biotechnology and Crop Improvement, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India²Assistant Professor, Department of Biochemistry, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India³PG Scholar, Department of Biotechnology and Crop Improvement, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India⁴Professor, Department of Vegetable Science, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India

Tomato (*Solanum lycopersicum* L.) is a versatile vegetable crop extensively cultivated worldwide. Assessing genetic diversity among different tomato germplasm can inform breeding strategies, identify promising combinations, and facilitate future hybrid development. In this study, we assessed phenotypic variation among the 48 tomato germplasm using nine agronomic traits to elucidate diversity. Initially, the germplasm lines were categorized into four groups based on plant height: dwarf, semi-dwarf, tall, and very tall. Subsequently, genotypes within each group were further classified based on days to flower initiation into early, medium, late, and very late categories, and evaluated for yield and yield components. Phenotypic diversity was analyzed based on yield-related traits such as number of flowers per cluster, number of fruits per cluster, pre-ripening single fruit weight, post-ripening single fruit weight, days to fruit maturity, fruit length, fruit width, fruit locules, and TSS. Cluster analysis using NTSYS-PC Ver. 2.02f grouped the 48 genotypes into four major clusters with eight sub-clusters. This phenotypic diversity-based grouping of tomato germplasm could facilitate the design of breeding programs aimed at harnessing heterosis and developing promising tomato cultivars/hybrids.

Keywords: Tomato, germplasm, yield and yield attributing traits, grouping, phenotypic traits, diversity, heterosis, agronomic traits.**STUDIES ON OPTIMIZATION, PRODUCTION, AND CHARACTERIZATION OF ECOFRIENDLY LIQUID ORGANIC SOLUTION (ELOS) FROM FRUIT COVERINGS****ASHWANI KUMAR*, ADESH KUMAR¹, MANJUL MUNGALI, SUPRIYA TOMAR, AKHILESH KUMAR DWIVEDI NIKHIL CHAND, SHAIBA PARVEEN**

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Long-term usage of chemicals kills the beneficial bacteria in the soil, making plants more susceptible to disease. These problems can be resolved with organic methods. Plants can be grown using ELOS as a natural fertilizer. It stimulates plant growth in this way. For the generated ELOS, physical attributes like as pH, total dissolved solids (TDS), color, and smell were examined. The phytochemical test was carried out to determine whether they contained secondary metabolites such as tannins, quinones, alkaloids, flavonoids, and cardenolides. Iron, zinc, manganese, and copper are the micronutrients found in ELOS, whereas potassium (in large amounts), magnesium, calcium, sodium, and phosphorus are the macronutrients. In addition to these minerals, ELOS also includes vitamins, vital amino acids, and plant development hormones, all of which nourish the soil properly and promote plant growth. By utilizing ELOS, we may lessen the use of dangerous, poisonous chemical pesticides, enhance the health of the soil, and increase the availability of nutrients in crops for human consumption.

Key Words: Ecofriendly Liquid Organic Solution (ELOS), Home-gardening, Organic Vegetables, Fruit coverings, Soil health, Sustainable environment.**ARTIFICIAL INTELLIGENCE IN SUSTAINABLE AGRICULTURE****DR. ASHWINI P. DANGORE¹, ABASAHEB V. DESAI², ANKITA D. CHAKRANARAYAN**¹Ph.D. Scholar, Department of Extension Education, Dr. BSKKV, Dapoli (M.S.) India²Ph.D. Scholar, Department of Extension Education, Dr. BSKKV, Dapoli (M.S.) India³Ph.D. Scholar, Department of Agril. Economics, Dr. BSKKV, Dapoli (M.S.) India

Agriculture has always played a crucial role in human civilization, providing food and resources necessary for survival. The global population is expected to reach 9.7 billion by 2050, and this rapid increase in population will put immense pressure on our already strained agricultural systems. To ensure food security for the growing population, there is a need for innovative and sustainable farming practices that can increase productivity while preserving the environment. One technology that is gaining traction in the agricultural industry for promoting sustainable farming practices is Artificial Intelligence (AI). AI is the creation of computer programs that can carry out tasks that normally require human intelligence. AI gives farmers timely and precise information about crops, weather, insects and other related topics. This knowledge can increase crop productivity, lower risk and increase farmers' revenue. The use of AI in sustainable farming offers numerous benefits ranging from minimizing resource usage to increasing yield potential. AI technology has protected crop yield from a variety of factors such as climate change, population growth, employment issues and food security problems. AI involves using advanced algorithms and data analysis techniques to optimize farm operations and make informed decisions. Also these AI technologies save the excess use of water, pesticides and herbicides. It maintains the fertility of the soil, which helps in the efficient use of manpower. As a result, farm produce is more productive and of higher quality.

Keywords: Artificial intelligence, Sustainable farming, Technology, Productivity

DEVELOPMENT OF GROUNDNUT YIELD PREDICTING MODEL IN RELATION TO WEATHER PARAMETERS IN DHARWAD DISTRICT, KARNATAKAASHWINI. C. B.^{1*}, ASHALATHA K. V.¹ AND MEGHA J¹¹Department of Agricultural Statistics, University of Agricultural Sciences, Dharwad, India

Groundnut (*Arachis hypogea* L.) is a high-yielding cash crop with multiple uses for each plant part, including direct consumption, cooking oil and a rich source of protein feed for livestock. Keeping that in view, six models were developed for two seasons of Dharwad districts of Karnataka to predicting the groundnut yield viz., Linear Regression, Ridge Regression, Least Absolute Shrinkage and Selection Operator (LASSO), Elastic Net (ELNET) regression, Support Vector Regression and K-Nearest Neighbor. In this study an attempt has been made to study the relationship for weather parameters on groundnut yield (*kharif* and *summer*) for more than four decades. The assessment of models was done by fixing 80% of the data for calibration and left 20 % data for validation. Specifically, the study highlighted the significantly positive impact of relative humidity and rainfall on kharif season yields, along with the significantly negative influence of temperature whereas in summer season significant negative impact on summer yield. Moreover, it identified LASSO regression as a promising model for predicting summer groundnut yields, showcasing its potential in optimizing crop management. Similarly, for kharif groundnut yield prediction K-NN turned to be the best model.

Keywords: Linear Regression, Ridge Regression, Least Absolute Shrinkage and Selection Operator (LASSO), Elastic Net (ELNET) regression, Support Vector Regression and K-Nearest Neighbor

EXPRESSION AND PURIFICATION OF RECOMBINANT PROTEIN-L-ISOASPARTATE-O-METHYL TRANSFERASE (RTPIMT) OF *CARICA PAPAYA*ASIT VIJAY PATHADE¹, SAUMYA¹, ANSHUMAN KUMAR², ARCHANA MAHAPATRA², DAYANIDHI JENA², PRASANTA KUMAR K. MISHRA^{*3}¹Plant Biotechnology, Department of Genetics and Plant Breeding, I.Ag.Sc., R.G.S.C., Banaras Hindu University, Barkachha, Uttar Pradesh, India-231001²Faculty of Veterinary and Animal Sciences, I.Ag.Sc., R.G.S.C., Banaras Hindu University, Barkachha, Uttar Pradesh, India-231001³Department of Veterinary Biochemistry, C.V.Sc.&A.H., Odisha University of Agriculture & Technology, Bhubaneswar

Protein damage is an impetuous process that can occur due to various biotic and abiotic factors, causing common phenomena like amidation, racemization, and isomerization in protein. This damage can be harmful to the plant's overall survival, making it vital to prevent such damages and preserve the native protein structure. PIMT is an enzyme present in all living organisms that repairs age-damaged aspartyl (Asp) and isoaspartyl (isoAsp) residues of the protein backbone by transferring a methyl group using S-adenosylmethionine as a methyl donor. The conversion takes place by forming a succinimide intermediate. Although it has been extensively studied in various prokaryotes and eukaryotes, its functions are relatively less understood in plants. Earlier research shows that PIMT plays a pivotal role in seed longevity and heat stress tolerance in plants. Papaya is a commercially grown crop plant in tropical regions worldwide, with India being one of the largest producers. It is grown mainly in areas like Maharashtra, Andhra Pradesh and Kerala. Papaya has adapted to tropical conditions and can survive harsh environments. It is also the first plant species to sequence its genome, making it an excellent model for studying evolutionary changes in plants. This current research project focused on the expression and purification of the recombinant PIMT gene of *Carica papaya* in *E. coli* cells. The transformed *E. coli* cells were confirmed using ampicillin as a selection marker, restriction digestion, and PCR amplification. The confirmed colonies were further subjected to protein induction by using IPTG and the recombinant protein was extracted by lysis of cells by denaturation agent i.e. urea. The cell lysate was then purified to homogeneity using affinity chromatography. Finally, the purified protein was subjected to protein dialysis to exchange protein into the desired buffer system. The molecular weight of recombinant Cp.PIMT protein was observed at 36 kDa on analysing the target protein by SDS-PAGE. The protein fraction was then processed through western blotting to further confirm the isolated protein fraction as recombinant PIMT.

Keywords: PIMT, *Carica papaya*, Protein expression, Affinity purification, Dialysis, Western Blot

ECONOMICS OF VARIOUS TREATMENTS OF VERMICOMPOST ON GROWTH AND YIELD ATTRIBUTES OF PEA (*PISUM SATIVUM* L.) BASED INTERCROPPING SYSTEMAsha Verma¹ and Dr. Kavita Aravindakshan²¹Ph.D Research scholar, Department of Horticulture, SKRAU, Bikaner, Rajasthan

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An experiment was conducted at the vegetable farm, Department of Vegetable Science, College of Horticulture and Forestry, Jhalrapatan City, Jhalawar during rabi season 2022-23. The experiment comprised of fifteen treatment combinations having three levels each of vermicompost (0, 2.5, and 5 ton/ha) and five levels of different intercropping system (Sole Pea, Sole Garlic, Pea + Garlic 1:1, 2:1, 2:2) in Factorial Randomized Block Design with three replications. Interaction effect of Vermicompost and Intercropping system significantly increased the economics attributes such as maximum gross return (361172 ₹ ha⁻¹), net profit (272244 ₹ ha⁻¹) and B:C ratio (4.06) was recorded under treatment V₂I₅ (Vermicompost @5ton/ha+ Pea+ Garlic 2:2) as compared to other treatment, respectively. The interaction effect of vermicompost and Intercropping system also significantly increased pea equivalent yield (166.040 q/ha), land equivalent ratio (1.25) under treatment V₂I₅ (Vermicompost@5ton/ha+ Pea+ Garlic 2:2), respectively.

Keywords: Economics, Equivalent yield, Intercropping, Gross return, Net return.

A STUDY ON THE DISTRIBUTION OF SOIL TESTATE AMOEBA (PROTOZOA: AMOEBOZOA; RHIZARIA) IN DIFFERENT ALTITUDINAL GRADIENTS OF THE EASTERN GHATS OF INDIA

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The testate amoeba is a type of free-living, polyphyletic, unicellular, eukaryotic organism that belongs to the kingdom Protista. These organisms are found in various habitats such as lakes, rivers, marshes, and soil, and their presence is influenced primarily by the moisture levels of the substrate. However, the distribution of testate amoeba across various elevation gradients remains poorly understood. In this study, we present our research findings on soil testate amoeba in the Eastern Ghats of India at altitudes ranging from 300 to 1600 meters above sea level. These altitudinal gradients provide a range of diverse terrain and ecosystems for examination. We identified a total of 31 species belonging to 11 genera in nine families across different soil biotopes of the Eastern Ghats of India. The majority of the species belonged to the phylum Tubulinea, with Cercozoa being the second most represented. The most dominant genus was *Diffugia* and *Centropyxis* with a total of eight and seven species respectively, followed by *Euglypha* and *Trinema* with three species each. The genera *Arcella* and *Galeripora* each contained two species, while *Hyalosphenia*, *Pyxidicula*, *Sphenoderia*, and *Tracheleuglypha* each had one species. In general, these discoveries suggest that the influence of elevation on the species composition of testate amoeba communities is heavily influenced by inhabitant biotopes, which holds promise for improving our understanding of the impact of different biotopes in different elevated environments. This observation has the potential to contribute valuable insights into the ecological dynamics and climate change at elevated altitudes.

Keywords: Protozoa Testate Amoeba Eastern Ghtas Diversity Soil

ECONOMIC TIDES OF AQUACULTURE: PIONEERING SUSTAINABLE WEALTH AND FOOD SECURITY IN INDIA

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As the tides of change sweep across global food systems, India emerges at the forefront, weaving its age-old maritime heritage with modern-day aquaculture innovations, charting a path towards a more food-secure world. Food security stands paramount in shaping a nation's socio-economic trajectory. Among the myriad solutions to this global challenge, aquatic produce, particularly shrimp, emerges as a nutrient-rich protein source, complementing staple human diets. Central to worldwide food systems, aquaculture stands as a formidable bulwark against poverty and malnutrition. Its transformative potential is evident, especially in burgeoning economies like India, offering not just an influx of essential nutrients and high-quality protein, but also avenues for employment and income generation. Presently, aquaculture is witnessing rapid expansion, and India, with its expansive 8,000+ km coastline, is strategically positioned as a pivotal player. This geographical advantage has catapulted India to the position of the second-largest aquaculture producer and the premier shrimp exporter globally. Shrimp, in particular, are laden with premium protein, vital micronutrients, and indispensable fatty acids, underlining their significance for holistic human health. The aquaculture realm enhances food security both directly, by supplementing dietary needs, and indirectly, by fuelling economic growth and livelihoods. Delving deeper into the specifics, shrimp farming encapsulates India's aquaculture dynamism, resonating with its historical seafood traditions. The strategic importance of shrimps transcends mere numbers; it mirrors India's concerted effort to address the challenges of undernutrition. Furthermore, the global demand for these aquatic delicacies emphasizes their culinary versatility and widespread appeal. The significance of India's burgeoning aquaculture sector is not merely in satiating local demands but in shaping global consumption patterns. As we propel into the future, the interplay between sustainability, technology, and market dynamics will be crucial. India's approach to melding tradition with innovation stands as a beacon for other nations, urging a collective stride towards a future where the oceans and freshwater reservoirs are not just seen as vast expanses of blue, but as the very crucible of our planet's food security. In essence, the story of shrimp in India is emblematic of a broader global narrative: the fusion of tradition, sustainability, and innovation in the quest for a food-secure future. The given study, based on authoritative data, investigates the dynamics between shrimp cultivation area and yield in India, underscoring their nutritional significance. Using advanced analytical models, the study highlights the industry's efficiency and pinpoints areas for sustainable growth interventions.

Keywords: Aquaculture, Food Security, India, Nutrition, Shrimp.

POLYANILINE/COLOCASIA ESCULENTA (TARO) LEAF POWDER COMPOSITES FOR PHOTOCATALYTIC DEGRADATION OF METHYLENE ORANGE DYE FROM WASTE WATER**ATUL DINKAR KAMBLE[@], VISHWAJEET LAGADE, SANTOSH MADHALE, SONAL WAGARE, PRANJALI KAMBLE, SANDIP GORSKETWAR, PRAKASH PAWAR****Shri Yashwantrao Patil Science College, Solankur, Tal- Radhanagari, Dist- Kolhapur. Maharashtra, India**

Novel polyaniline composites with plant leaf powder of Colocasia esculenta (PANI/TL) were synthesized for removal of Methylene orange (MO) dye from water. Polyaniline/TL powder composites were prepared by chemical oxidative polymerization of aniline monomer with leaf powder obtained from taro plant. The prepared PANI/TL powder composites were characterized by Fourier transform infrared spectroscopy, X-ray diffraction, scanning electron microscopy, UV-VIS spectroscopy. UV-Vis spectra of different PANI/TL composite were studied to investigate adsorption behaviour after PANI composites. FTIR spectra gives the information about the various bonds of different PANI composites. PANI composites were mixed in a solution of MO dye and used for adsorption process. Colour removal was studied using UV-Vis spectroscopy and the spectra were recorded for specific time interval. These results showed that PANI/TL composites enhancing its adsorption capacity than pure PANI. This is found to be novel and green method for removal of hazardous dyes from waste water.

Keywords: Polyaniline, Taro leaf, polymer composites, photocatalytic etc.**REVOLUTIONIZING AGRICULTURE: THE POTENTIAL OF HYDROPONICS****ATUL KUMAR RAWAT¹, SACHIN KUMAR SINGH¹, DHARMENDRA KUMAR¹, SHUBHAM YADAV¹ AND ANTRIKSH DESHWAL¹****¹Research Scholar, Department of Fruit Science, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (U.P.)**

Hydroponics, a method of growing plants without soil, is receiving increasing attention for its potential to transform agriculture and solve global problems such as food security, water scarcity and urban growth. This review provides a detailed summary of hydroponic systems, how they work, and their wide range of applications in various fields. First the basics of hydroponics are explained, emphasizing its principles, which focus on supplying plants with the nutrients they need in water, which improves growing conditions. Various hydroponic systems are being explored, such as deep-water cultivation, nutrient film technology and aeroponics, each offering specific advantages suitable for different plant species and environmental factors. The review explores the benefits of hydroponics, such as increased crop production, efficient water conservation, reduced land requirements and the ability to grow plants in urban areas and harsh weather conditions. In addition, hydroponics allows precise control of nutrient levels, pH and environmental conditions, which promotes ideal plant development and reduces resource waste. In addition, hydroponics is not limited to traditional agriculture, but also applies to vertical farming, greenhouse production and space exploration. The scalability and adaptability of hydroponic systems are critical to combating food insecurity, especially in congested urban areas and areas with little arable land. In addition to its use in agriculture, hydroponics has also been valuable in research, education and therapeutic horticulture, highlighting its many benefits. The article also discusses new developments, such as aquaponics, where fish farming is combined with hydroponic plant cultivation, creating self-sustaining closed-loop systems. Barriers to hydroponics such as high installation costs, technical complexity and nutrient management are being overcome through ongoing research to improve system efficiency. In short, hydroponics offers potential for sustainable agriculture and environmental protection by providing new ways to overcome the challenges of traditional agricultural methods. Continuous learning, technological advances and awareness are essential.

Keyword: Hydroponics, aeroponics, aquaponics, vertical farming, greenhouse,**FOOD, NUTRITION & LIVELIHOOD SECURITY****AUNDHKAR R. S.¹, HIWARALE A. S.² AND GOHADE G. R.³**

In today's rapidly changing world, achieving food, nutrition, and livelihood security remains a paramount challenge. This abstract explores the interlinkages between these critical aspects and presents strategies to enhance their resilience in the face of evolving global dynamics. Food security, the cornerstone of sustainable development, hinges not only on the availability of food but also on access, utilization, and stability. Addressing this multifaceted issue requires a holistic approach that integrates agricultural productivity, market access, infrastructure development, and social safety nets. Moreover, the growing threat of climate change exacerbates existing vulnerabilities, necessitating adaptive measures to ensure food production systems remain resilient. Nutrition security, often overlooked in discussions of food security, is equally imperative for human wellbeing. Malnutrition in all its forms—undernutrition, micronutrient deficiencies, and overweight and obesity—poses significant health and economic burdens worldwide. Therefore, interventions must prioritize not only food quantity but also quality, ensuring diverse and nutrient-rich diets for all. Furthermore, livelihood security, closely intertwined with food and nutrition security, encompasses the ability of individuals and communities to access resources, generate income, and build resilience against shocks. Sustainable livelihood strategies encompass diversified income sources, skills development, social protection mechanisms, and inclusive economic policies. This abstract critically evaluates existing strategies for enhancing food, nutrition, and livelihood security, emphasizing the need for interdisciplinary approaches and stakeholder engagement. It also highlights the challenges posed by globalization, urbanization, conflicts, and pandemics, which underscore the urgency of collective action and innovation. Ultimately, achieving food, nutrition, and livelihood security requires transformative policies and investments that prioritize the needs of the most vulnerable populations while safeguarding environmental sustainability. This abstract contributes to the discourse on sustainable development by offering insights and recommendations for policymakers, practitioners, and researchers striving to build a more equitable and resilient world.

Keyword: Food, Nutrition, Livelihood Security.

EFFECT OF DIFFERENT LEVELS OF DRIP IRRIGATION AND FERTIGATION ON GUAVA CV. ALLAHABAD SAFEDA IN LOWER SHIVALIK HILLS OF PUNJAB**AVANINDER PREET KALSI AND SWAPNIL PANDEY****Punjab Agricultural University, Ludhiana, Punjab, India**

Guava (*Psidium guajava* L.), commonly known as the 'Apple of Tropics' is an important fruit crop of the tropical and sub-tropical regions of the world. Sub-mountainous undulating terrain with high cultivation costs where there is no permanent water source was chosen for the study in order to maximize fertilizer usage efficiency, improved fruit yield and quality attributes, and conservation of water for future generations. Drip irrigation is the most efficient method of supplying water and nutrients to plants, saving both water and increased production in fruit crops. It results in less water consumption while, producing qualitative fruits. Keeping into view, the present research was conducted to investigate the effect of fertigation and drip irrigation on the morpho-physiological, vegetative growth and yield attributes of guava cv. Allahabad Safeda. The experimental trial was carried out at PAU- Regional Research Station, Ballawal Saunkhri with fifteen treatments replicated thrice. A factorial Randomised Block Design (Factorial RBD) was used in the study's setup. The drip irrigation and fertigation methods greatly enhanced the morpho-physiological, vegetative growth, yield attributes and quality parameters of guava cv. Allahabad Safeda. The morpho-physiological parameters recorded tremendous results in terms of net photosynthesis rate, leaf area, stomatal density, chlorophyll content, maximum fruit set, fruit retention, fruit weight and fruit yield. The fruit biochemical properties were enhanced, resulting in the highest Vitamin C content, pectin content, and minimum titratable acidity. Additionally, the study demonstrates that drip irrigation saves 25–30% on fertilizer and 20% on water. As a result, the findings above demonstrate that guava cv. Allahabad Safeda was highly responsive to fertigation and drip irrigation in lower Shivalik hills of Punjab.

Keywords: Drip irrigation, Fertigation, Water saving approach, Fertilizer use efficiency

HARNESSING THE POTENTIAL OF SPINE GOURD: A NUTRITIONAL AND MEDICINAL POWERHOUSE FOR RURAL COMMUNITIES***AVANTIKA IYENGAR¹, BENJAMIN CHUNGJAPAO HAOKIP¹, ASHUTOSH SINGH², SHARWAN KUMAR SHUKLA³**¹PG Scholar, Department of Biotechnology and Crop Improvement, RLBCAU, Jhansi, Uttar Pradesh, India²Assistant Professor, Department of Biotechnology and Crop Improvement, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India³Assistant Professor, Department of Biochemistry, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India

The Spine Gourd (*Momordica dioica* Roxb.) is a dioecious, perennial climbing creeper with tuberous roots belonging to the Cucurbitaceae family. It is a seasonal vegetable predominantly eaten by tribal communities residing in natural forests and cultivated by rural inhabitants for their own consumption. Recently, it has regained popularity due to its nutritional and medicinal properties, being utilized in folk medicine. The average nutritional value per 100g of edible fruit contains moisture (84.1%), protein (3.1g), carbohydrates (7.7g), fat (3.1g), fiber (3.0g) and minerals (1.1g) approximately. It serves as a rich source of antioxidants such as β -carotene, flavonoids, and phenols, ascorbic acid, pyridoxine, folic acid, and micronutrients like Ca and P. Its consumption aids in reducing oxidative stress, neutralizing harmful free radicals in the body and is used in the treatment of conditions such as diabetes, stomach pain and headache. Therefore, this cucurbitaceous crop holds significant potential to provide health benefits and meet the nutritional needs of the growing population.

Keywords: Spine Gourd, Nutritional properties, Antioxidants, Bioactive compounds, Health benefits, Ascorbic acid, folic acid, micronutrients.

ROLE OF BIO-PESTICIDE NEEM OIL INSTEAD OF SYNTHETIC PESTICIDES FOR SUSTAINING THE ENVIRONMENT**AYSHA PARVIN (Research Scholar) and Dr. UMESH SHUKLA (Assoc. Prof.)****Department of Zoology, Agra College, Dr. Bhimrao Ambedkar University, Agra. Uttar Pradesh, India**

Sustainable agriculture aims to complete the food needs of the increasing world population while ensuring less impact on the human and environment as well as productivity. Over the years, synthetic pesticides have been used to control different pests and disease carriers, insects and also improve crop yield. It also represents the main pillar of crop protection in the effort to assured food production, and also in food preservation. Synthetic pesticides not only kill pests but also other insects like bees which are essential in pollinating plant life. Many farms overuse these pesticides before they even have a pest problem. To reduce pesticide use we need to consider another resolution which can make it easy without any adverse effects on environment. As a promising alternative to synthetic pesticides, bio-pesticides which have emerged as potential eco-friendly inputs that are supplemented for proper growth of crops. Appropriate use of bio-inputs like bio-pesticides is a cost effective way to enhance crop yield, soil health along with manage balance environment. Bio-pesticides are an alternative of synthetic pesticides to improve soil fertility and control various insects, pests and disease in mostly all agricultural crops.

In conclusion, the bio-pesticides market is increasing rapidly, driven by enhancing health and environment concerns, technological advancements, and the rising popularity of agriculture. However, natural pesticides as bio-pesticides face challenges such as technological limitations and a strong preference for synthetic pesticides in some regions. Neem oil as a bio-pesticide contains at least 100 biologically active compounds. The neem oil is considered as a biodegradable, cheap, easily accessible, environment-friendly, and nontoxic bio-pesticide which regulates the target pests and other insects. Among them, the most important component of neem oil is azadirachtin, which appears to cause 90% of the effect on most pests. Neem oil acts as a natural pesticide by restricting the feeding, growth, and reproduction of harmful insects and pests.

Key words – Bio-pesticide neem oil, synthetic pesticide, agriculture, sustainability

EVALUATING CLADOCERAN EPHIPPIAL PRODUCTION: A SUSTAINABLE LIVE FEED ALTERNATIVE IN AQUACULTURE**AYUSHI BHARDWAJ*, NA I SABET DOHTDONG, ASHUTOSH DANVE, HARINI G., AND VIPUL SINGH BADGUJAR**
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Cladocerans, recognized for their superior nutritional and economic value over *Artemia nauplii*, present a sustainable and efficient live feed option for commercial aquaculture. Despite the identification of 620 Cladoceran species globally and about 130 in India, with a notable diversity in the Northeastern region, the knowledge surrounding the males and ephippial females of many taxa remains limited. The lack of accessible mass culture methodologies for ephippial production is a challenge, with information largely confined to obscure publications and foreign journals. Current study was undertaken where *Monia macrocopa* were subjected to a controlled feeding experiment using poultry extract (PE) in various concentrations, with a uniform density of 20 individuals per liter. The experimental setup included three replicates for each treatment group and a control group receiving 2ml of PE. Treatment groups T1, T2, and T3 were allocated 4ml, 8ml, and 16ml of PE respectively, administered daily for 10 days. The highest ephippial production was observed on the 15th day, with an average of 122 ± 10 ephippia. The hatching rate was also assessed under different photoperiods at 144 lux (0, 12, and 24 hours), water mediums (24-hour aerated tap water, RO water, and 24-hour aerated 24 μ m filtered tank water), and pH levels (5, 7, and 9), each with three replicates. The results indicated the highest hatching rate of 97% under a 24-hour photoperiod, 95% in RO water, and 93% at a pH of 7. The current scenario where Cladoceran ephippia are predominantly available through international markets with limited accessibility, it becomes crucial to foster a local market. Developing a domestic market for various species of Cladoceran ephippia would enable local fishermen, aquarists, and fish enthusiasts to acquire them at reasonable prices, thereby promoting self-sufficiency and sustainability in aquaculture practices. This approach is particularly pertinent in light of the COVID-19 pandemic, which has highlighted the importance of localizing resources to maintain aquaculture operations, reducing the dependency on costly imported *Artemia* cysts.

Keywords: Live feed, Cladocera, ephippia, *Artemia* cysts, local market, COVID-19**ORGANIC AND NATURAL ECO-FRIENDLY FARMING****AYUSHI JAIN****PhD Research scholar, Department of Horticulture, Rajasthan college of Agriculture, MPUAT, Udaipur**

Natural and organic farming is an integrated approach to agriculture that includes a variety of techniques designed to reduce environmental impact and promote sustainable food production. The avoidance of synthetic fertilizers, herbicides and pesticides instead of organic substitutes such as crop rotation, compost and integrated pest control. Organic farming improves soil structure, fertility and microbial diversity via an emphasis on soil health through practices like cover crops and limited tillage. This increases crop resilience and production. Moreover, natural and organic agricultural practices enhance biodiversity by providing residence for beneficial insects, birds and microorganisms which helps to natural pest management. It promotes fair employment practices, local food systems and community resilience by helping small-scale farmers and also supports food sovereignty. Furthermore, there is a growing consumer demand for food that is produced responsibly and organically, which presents chances for farmers to get access to exclusive markets and boost their earnings.

Keywords: Integrated approach, Crop resilience, Biodiversity, Sovereignty, Diversity etc**THE PROFOUND IMPACT OF THE ENVIRONMENT ON CHILD DEVELOPMENT****AYUSHI MISHRA, DR. MUKTA GARG, DR. SUMEDHA CHAUDHARY, DIVYA KAUSHIK, SHIVANI SINGH****Chandra Shekhar Azad University of Agriculture and Technology Kanpur U.P****Department of Human Development And Family Studies**

Childhood is a critical period of growth and development, characterized by rapid physical, cognitive, emotional, and social changes. While genetics play a significant role in shaping a child's development, the environment in which they grow and learn also exerts a profound influence. From the air they breathe to the relationships they form, every aspect of a child's surroundings can impact their overall well-being and future prospects. In this Research, we delve into the various ways in which the environment affects children's development and the implications for their long-term outcomes. The environmental influence of emotion Achieving beautiful and peaceful nature in any form provides us joy but natural disasters affect people's emotions to the extent that they experience depression and sorrow and sometimes PTSD (Post Traumatic Stress Disorder). Examples- smiling flower, flood tsunami, drought etc. Environment Influence of Occupation and Living Style The Natural environment determines the occupation of the people living there people from rural areas choose agriculture while people from cities choose industry. Agricultural people depend on collective efforts so they have an operative attitude they are more fatalistic and depend on nature like the monsoon while industry people have independent thinking and an attitude of competitiveness. The environment in which children grow and develop profoundly influences their physical, cognitive, emotional, and social well-being. From the quality of their surroundings to the relationships they form, every aspect of a child's environment shapes their experiences and future prospects. By prioritizing clean air, safe housing, quality education, supportive relationships, and cultural diversity, we can create environments that nurture the potential of every child and promote positive outcomes for future generations. Investing in the well-being of children is not only a moral imperative but also an investment in the future prosperity and sustainability of society as a whole. In conclusion, this research emphasized that A healthy environment provides the resources necessary for human life and well-being. It is the foundation upon which all economic and social development is built.

VOLARIZATION OF A SUSTAINABLE SOURCE (BUTTON MUSHROOM STALKS) OF VITAMIN D TO FORTIFY CEREAL AND MILLET FLOURS USING SURFACE FUNCTIONALIZATION

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The present study focuses on utilizing the byproduct (stalks) from the button mushroom (*Agaricus bisporus*) canning industry to extract vitamin D₂. The freeze-dried stalk powder was subjected to UV-B treatment (280- 315 nm) followed by the extraction of vitamin D₂ using conventional (saponification via reflux and saponification via open water bath), non-conventional techniques (ultrasonication) and combined (ultrasonication followed by saponification). The most effective method for extracting vitamin D₂ was identified as a combination of saponification and ultrasonication, resulting in the highest yield of the extract (25.8 mg/g) with optimal vitamin D₂ content (103.08 µg/g). The solvent (hexane) residue of the extracted vitamin D₂ was evaluated, and it revealed a low level (0.31 ppm) of hexane, which is far less than FDA-approved levels (290 ppm) and maximum residue limit (MRL) set by the European Union and FDA (1 mg/kg). This underscores the safety and compliance of the extraction method with regulatory standards. Vitamin D₂ enriched extract was then fortified in cereal and millet flours using surface functionalization, which improved the particle shape of the flours as the circularity increased by 26-38% and the aspect ratio decreased by 20-49%. The Carr's index, Hausner ratio, and angle of repose of the fortified flours also decreased after surface functionalization, indicating the improved flowability of the fortified flours. The findings thus emphasize the potential of utilizing mushroom stalks to address vitamin D deficiency and offer a safe and effective means of its fortification in both food and pharmaceutical applications.

Keywords: *Agaricus bisporus* stalks, Vitamin D₂, Ultrasonication, byproduct utilization, fortification, millets.

PRODUCTIVITY AND QUALITY OF ONION (*ALLIUM CEPA* L.) AS INFLUENCED BY SOURCES AND LEVEL OF SULPHUR NUTRITION, NDZ OF KARNATAKA, INDIA

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A field experiment was conducted at ICAR - KVK, Indi during *Kharif*, 2019-20, 2020-21 and 2021-22 under irrigated situation to assess the effect of three different sources and level of sulphur on onion. The treatments were T1:RPP (N:P₂O₅:K₂O + FYM : 125:50:125 +3000 kg ha⁻¹), T2 :RPP+ Gypsum 20 kg S ha⁻¹, T3 :RPP+ Gypsum 40 kg S ha⁻¹, T4 :RPP + Gypsum 60 kg S ha⁻¹, T5 :RPP+ Water dispersible granules of S' 20 kg S ha⁻¹, T6 :RPP + Water dispersible granules of S' 40 kg S ha⁻¹, T7: RPP+ Water dispersible granules of S' 60 kg S ha⁻¹, T8 :RPP + Bentonite S' 20 kg S ha⁻¹, T9: RPP + Bentonite S' 40 kg S ha⁻¹ and T10: RPP +Bentonite S' 60 kg S ha⁻¹. All the treatments were arranged in RBD with three replications. The results indicate that the mean bulb yield of onion was recorded significantly higher under T10 (17.6 t ha⁻¹) as compared to T1 (12.9 t ha⁻¹) followed by T9 (15.4 t ha⁻¹) and RPP + T7 (15.3 t ha⁻¹). The bulb yield obtained under T10 was enhanced up to 26.70% as compared to T1. Significantly higher net returns (Rs. 3,90,450/- per ha) and B: C ratio (7.66) was observed in T10 than T1 (Rs.2,72,989 per ha and 5.66, respectively). Application of bentonite sulphur @ 60 kg ha⁻¹ (T10) with RPP was recorded significantly higher pyruvic acid (7.26 µmol g⁻¹), ascorbic acid content (10.55 mg 100g⁻¹) and TSS (11.57 °Brix) as compared to T1 (6.09 µmol g⁻¹, 9.23 mg 100g⁻¹ and 10.0 °Brix). Application of bentonite sulphur @ 60 kg S ha⁻¹ may be recommended to the farmers' for onion cultivation to get better growth, yield and bulb quality under Northern dry zone of Karnataka, India.

Key words: Onion, bentonite sulphur, bulb yield, pyruvic acid and ascorbic acid

GENETIC INVESTIGATIONS IN PEARL MILLET (*Pennisetum glaucum* (L.) R. Br) FOR YIELD COMPONENTS, RUST AND BLAST DISEASES

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Three A₁ CMS sources (ICMB 94555, ICMB 98222 and ICMB 96666) were crossed with fifteen potential restorer lines in a line × tester fashion to develop forty five hybrids. All the eighteen parents were evaluated for genetic variability parameters for eleven different quantitative traits. Moderate value of GCV and high value of PCV were observed for the trait grain yield. High estimates of heritability coupled with high genetic advance as per cent of mean was detected for the traits like plant height, panicle length, panicle girth and grain yield, revealing that these traits might be governed by additive gene effects and simple selection would lead to fasten genetic enhancement of the genotypes under study. A total of forty five crosses along with their parents and checks (GHB 558, VPMH 7 and Kaveri Super Boss) were screened for rust and blast diseases to identify the resistance hybrids and parents, under field conditions in *kharif* 2021 at Regional Agricultural Research Station, Vijayapura. Only one hybrid ICMA 96666 × PRLN 133 was showed resistant for both rust and blast diseases.

Key words: Pearl millet, A₁ CMS source, GCV, PCV, line × tester analysis.

ENHANCING AGRICULTURAL DEVELOPMENT THROUGH NANO-MATERIALS: A COMPREHENSIVE REVIEW OF CURRENT TRENDS AND FUTURE PROSPECTS

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Nanotechnology's integration into agriculture offers a promising solution to address the challenges posed by a growing global population and declining natural resources. This review examines the diverse role of nano-materials in advancing agricultural development, spanning crop productivity, nutrient management, pest control, and environmental sustainability. Nano-materials possess unique properties stemming from their small size and high surface area-to-volume ratio, enabling precise manipulation and targeted delivery of active compounds. They have been instrumental in enhancing crop productivity by improving seed germination, root growth, and nutrient uptake efficiency. Nano-fertilizers, containing vital nutrients like nitrogen, phosphorus, and potassium, boast enhanced solubility and controlled release kinetics, optimizing nutrient availability while minimizing environmental impact. Moreover, nano-pesticides have emerged as a viable alternative to traditional chemical pesticides, offering heightened efficacy against pests and pathogens with reduced harm to non-target organisms and the environment. Nano-encapsulation of biopesticides and plant extracts bolsters their stability and effectiveness, promoting sustainable pest management practices. Nano-materials also play a pivotal role in addressing environmental stresses such as drought, salinity, and heavy metal contamination. Nano-sensors enable real-time monitoring of soil moisture, nutrient levels, and pollutant concentrations, facilitating precise irrigation and nutrient management. Additionally, nano-remediation technologies aid in efficiently removing toxic contaminants from soil and water, thereby restoring ecosystem health and fostering sustainable agricultural practices. However, the widespread adoption of nano-materials in agriculture necessitates addressing challenges surrounding safety, regulatory frameworks, and socio-economic considerations. Ethical and environmental concerns regarding the unintended consequences of nano-materials must be thoroughly evaluated to ensure their responsible deployment and long-term sustainability. Continued research efforts are essential to harness the full potential of nano-technologies in agriculture and realize their transformative impact on global food security and sustainability.

AN IN-DEPTH ANALYSIS OF SOIL QUALITY AND CONTAMINATION OF HEAVY METALS IN VICINITY OF NORTH COASTAL ANDHRA OF MSW DUMPSITE

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This Work conducts a comprehensive analysis of soil quality and heavy metal contamination in the vicinity of the North coastal andhra MSW Dumpsite, with a focus on the Gajuwaka municipality. The research addresses the escalating global concerns arising from improper waste disposal practices and their environmental repercussions. The Gajuwaka dumpsite, receiving diverse waste types, poses significant threats due to the leaching of heavy metals into the soil, impacting environmental components and human health. This analysis employs a robust experimental methodology involving soil sampling, metal extraction, and Atomic Absorption Spectroscopy for elemental analysis. Waste characterization reveals the predominant presence of organic fractions and inert materials in the dumpsite. Seasonal physicochemical analysis of soil samples indicates variations in pH, moisture content, soil texture, organic matter, and nutrient availability. Metal content generally decreases during the post-monsoon period. Phytotoxicity analysis of selected plant species demonstrates their capacity to accumulate heavy metals, particularly lead. This analysis emphasizes the urgent need for effective waste management practices, continuous soil monitoring, and community engagement to mitigate environmental and health risks associated with waste dumping sites. In conclusion, the findings underscore the critical importance of SWM and environmental health. Finally, this approach contributes valuable insights into the complex challenges posed by improper waste disposal practices and provides a foundation for the development of comprehensive strategies aimed at addressing environmental concerns.

Keywords: soil quality, heavy metal contamination, waste disposal, environmental health,

YIELD STABILITY BY AMMI MODEL IN NIGER (*Guizotia abyssinica* L.)

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The present investigation was carried out with forty Niger genotypes at multi-environments for assessment of high yielding and stable genotypes of Niger crop. Forty Niger genotypes were tested across five multi-environments in a randomized block design with replication thrice during *Kharif*, 2018 and *Kharif*, 2019. Combined analysis of variance and AMMI analysis of pooled data showed that genotype, environment and GEI effect were highly significant ($p < 0.01$) for seed yield. As per AMMI GGE biplots, two different mega-environments (METs) were identified, the first MET consists E1, E3 and E4 which are potential and excellent sites for discrimination of superior genotypes and second MET includes E2 and E5 were stable places. The genotypes, G28, G33, G8, G17, and G3 (seed yield plant⁻¹), and G6, G33, G8, G17 and G3 (seed yield plot⁻¹) were suitable for favorable environments while G4 and G7 (seed yield plant⁻¹), and G27, G20, G1, G37 and G25 (seed yield plot⁻¹) were suitable for unfavorable environments. Considering all the stability parameters and AMMI GGE biplots, genotypes, G36, G32, G24 and G10 had high mean seed yield and stable across the environments. These superior genotypes about grain yield and GEI impact, and can be recommended for future investigations.

Keywords: Niger, Genotype x Environment Interaction, stability, yield, GGE biplot

GLOBAL MILLET (SHREE ANNA): VALUE CHAIN ANALYSIS OF MILLET PRODUCTION AND PROCESSING**DR. BABITA BARDHAN****Assistant Professor, Jai Prakash University, Chapra, Bihar, India**

Millets are ancient grains that have gained renewed attention due to their nutritional benefit environmental sustainability, and resilience to climate change. This paper provides an in-depth analysis of the global millets value chain, focusing on production and processing, with a special emphasis on the Shree Anna variety. Though a comprehensive review of literature and data, this research aims to elucidate the key actors, activities, challenges, opportunities in the millet value chain. The findings underscore the importance of enhancing millet production efficiency, improving processing technologies, and strengthening market linkages to promote the sustainable growth of millet-based agriculture.

REVOLUTIONIZING AGRICULTURE: A COMPREHENSIVE OVERVIEW OF DIGITAL AGRICULTURE TECHNOLOGIES**BABITA BHARTI^{1*}, VISHAL BHARTI², BHARTI GAUTAM³, NEHA NEGI⁴, JAG MOHAN⁵****^{1,3,4,5}Assistant Professor, Department of Agriculture, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala. Haryana****²Professor, Department of Computer Science & Engineering, MMEC, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala. Haryana**

Digital agriculture technologies have emerged as transformative tools for revolutionizing conventional farming practices, optimizing resource utilization, and bolstering productivity while mitigating environmental impact. In this rapidly growing field, agricultural productivity and resource management are enhanced through the use of data analytics, advanced technologies, and applications under precision agriculture. This paper provides an overview of digital agriculture technologies, focusing on their core components, advantages, challenges, and future outlook. At the heart of digital agriculture lies precision farming, leveraging advanced sensors, drones, and GPS technology to monitor and manage crops with unparalleled accuracy. Remote sensing techniques, including satellite imagery and drones, provide valuable insights into crop health and environmental conditions, facilitating timely interventions. The integration of Internet of Things (IoT) devices enables real-time monitoring and control of agricultural operations, from automated irrigation systems to smart livestock management. Artificial intelligence (AI) and big data analytics empower farmers to analyze vast datasets, predict crop yields, and optimize farming strategies. However, widespread adoption of digital agriculture technologies faces challenges such as high initial costs, limited rural infrastructure, and data privacy concerns. Farmers and other stakeholders may contribute to the widespread adoption of precision agriculture and enhance crop yield, resource management, and environmental sustainability by recognizing and resolving these issues. In a nutshell, this paper analyzes and highlights digital agriculture technologies which offer unrivalled opportunities to enhance productivity, sustainability, and resilience in Agriculture.

Keywords: Digital Agriculture, technologies, Sustainability, Precision agriculture, Remote sensing, Data Analytics**STUDY ON DISTRIBUTION AND DIVERSITY OF BUTTERFLIES (LEPIDOPTERA: RHOPALOCERA) IN ARCHAEOLOGICAL SITE OF HULAS KHERA, LUCKNOW, UTTAR PRADESH, INDIA****BABITA SHARMA*, SUSHMITA PRAKASH AND ASHOK KUMAR****Department of Zoology, B.S.N.V.P.G. College, (University of Lucknow), Lucknow, Uttar Pradesh, India**

The Archaeological site of Hulas Khera is located near Mohanlalganj tehsil, Lucknow. This historical archaeological site is famous for its excavations sites and the wetland Karela Jheel. Butterflies play a prime role and act as an indicator of the salutary ecosystem. The authors conducted a study on butterflies in the archaeological site of Hulas Khera to record the distribution and diversity of butterflies from July 2021 to July 2022. A total of 46 species of butterfly related of five families, Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperidae were recorded from the Hulas Khera Archeological site. The highest numbers of species were observed in the family Nymphalidae and the lowest was observed in the family Hesperidae. Among all the observed species, three species of butterflies holds a protected status under the Wildlife Protection Act, of 1972. In this paper, the authors focused on the distribution and diversity of butterflies and apart from this, focused on how the archeological site is helpful for future conservation perspectives for biodiversity.

Keywords: Archeological site, Wetland, Butterfly diversity, Conservation, Biodiversity.

STABILITY POTENTIAL OF ANTHOCYANIN PIGMENTS EXTRACTED FROM ROSE PETALS**BABITA SINGH, KEERTHANA SANAPALA, RITU JAIN, MARKANDEY SINGH, AJAI TIWARI, ALKA JOSHI AND RUCHI BANSAL****ICAR-Indian Agricultural Research Institute**

Nature has given us all necessary molecules for sustainable development, especially in the form of secondary metabolites from plant kingdom. Natural pigments, one of the secondary metabolites, are alternative for chemical dyes. Natural dyes are environment friendly and have many advantages over synthetic dyes. Natural dyes are suitable for skin and are biodegradable. Anthocyanin is one of the pigments that can be used as a natural dye. Anthocyanin pigment can be very well used as dye material giving primarily different shades of blue purple to red. The large-scale production of textile dyed with anthocyanin is a new concept for the textile industry. They are the largest group of water-soluble natural pigments. They are present in flower, fruit, stem, leaves and root of plants. They are soluble in water and generally occur in the aqueous cell sap. They are found in fruits and vegetables such as red cabbage, strawberries, grape skin, blueberries, and raspberries. An experiment was conducted to check the stability of anthocyanin extracted from rose petals at different Temperature, pH, and Light conditions. The colour of Anthocyanin was found stable at lower temperatures than at higher temperatures. It becomes brighter in lower pH range and becomes blue at higher pH levels. The colour of Anthocyanin present in Dark conditions is more stable when compared to Continuous Light and Natural conditions.

Key words: Rose, Natural Dye, Anthocyanin, Stability, Temperature, pH, Light Conditions.**BIO-EFFICACY OF DIFFERENT BIO-PESTICIDES IN THE MANAGEMENT ON DIAMONDBACK MOTH (*PLUTELLA XYLOSTELLA* L.)****BABLU SHARMA* AND NANU RAM SHARMA*******Department of Entomology, RARI, Durgapura, Jaipur-302018, Rajasthan, India******Department of Entomology, Swami Keshwanand Rajasthan Agricultural University, Bikaner - 334 006, Rajasthan, India**

The bio-efficacy of bio-pesticides against diamondback moth, *Plutella xylostella* (L.) on cabbage was determined. Among different treatments, the reduction of mean larval population over untreated check was highest in T₄ Spinosad 45sc @ 200 ml/ha followed by T₃ *Bacillus thuringiensis* var. *kurstaki* 5% WP @ 2.0 kg/ha and T₆ *Beauveria bassiana* 5% WP @ 2.0 kg/ha. The lowest larval population reduction was found in the plots treated with T₅ Karanj oil 5% and T₂ Garlic bulb extract 5%. Among different treatments highest marketable yield was recorded in T₄ Spinosad 45 SC (58.10 t/ha) and the lowest marketable yield was observed in T₂ Garlic bulb extract 5% (42.30 t/ha) and T₇ Caster oil 3% (44.80 t/ha). The cost benefit ratio was maximum (1:1.95) in T₄ Spinosad followed by T₃ *Bacillus thuringiensis* (1:1.93) and T₆ *Beauveria bassiana* (1:1.83). The lowest cost benefit ratio was found with T₂ Garlic bulb extract (1:1.45).

Key words: Bt, cabbage, *plutella xylostella*, Spinosad and yield.**EXPLORING THE COMPREHENSIVE IMPACT OF MACRO AND MICRO NUTRIENTS ON SOIL IN RAJASTHAN****BABU LAL RAIGAR^{1*}, SUCHHANDA MONDAL², RANJAN LAIK¹, JAWED AKHTAR², DIBYAJYOTI NATH¹, PERAM NAGASESHI REDDY¹ AND PRIYANKA CHOUDHARY¹****¹Department of Soil Science, Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar****²Department of Soil Science & Agricultural Chemistry, PSB, Institute of Agriculture, Visva-Bharati, Sriniketan, West Bengal**

The interplay between macro and micronutrients is pivotal in shaping soil ecosystem vitality and productivity. Grasping their influence on soil health stands as a cornerstone for fostering sustainable agriculture and environmental preservation. This research endeavors to comprehensively assess the impact of both macro and micronutrients on soil quality and fertility. To achieve this, a systematic methodology was adopted. One hundred soil samples were procured from five blocks covering five villages each: Sambhar, Phagi, Amber, Chomu, and Mauzamabad in the Jaipur district of Rajasthan. These samples underwent thorough analysis for various soil fertility parameters, including particle size distribution, pH, electrical conductivity, organic carbon, available nitrogen, phosphorus, potassium, iron, copper, manganese, and zinc, employing standard procedures. The soils in this region ranged from loamy sand to sandy loam in texture, showcasing moderately alkaline characteristics. The overall soluble salt content was found to be within safe thresholds. Nevertheless, organic carbon and available nitrogen content were notably low. Phosphorus levels spanned from low to medium, while potassium levels were categorized as medium. Micronutrient scrutiny unveiled adequate copper and manganese levels but revealed deficiencies in iron and zinc across all soil samples. In essence, this study underscores the significance of delving into both macro and micronutrients for assessing and ameliorating soil health. The findings furnish valuable insights for precision agriculture methodologies, underscoring the necessity for tailored nutrient management approaches. This holistic approach contributes to the overarching objective of advancing sustainable agriculture practices and environmental conservation efforts.

Key-words: Macronutrients, Micronutrients, Soil Fertility, Soil Health and Soil Quality

CROP REGULATION IN FRUIT CROPS**BABU LAL YADAV^{*1}, SUNIL KHANDOLIYA²**¹M.Sc. Scholar, Department of Horticulture (Fruit Science), KNK, COH, Mandsaure (MP)²Ph.D. Scholar, Department of Horticulture, RVSKVV, Gwalior (MP)

Crop regulation plays a crucial role in fruit crop management, influencing harvest consistency and quality. It involves various practices to optimize productivity and fruit quality, including manual thinning, chemical treatments, selective harvesting, and training. This article discusses the principles, objectives, and methods of crop regulation in fruit crops, with a focus on enhancing yield and quality, particularly in crops with multiple flowering seasons. Key practices such as deblossoming, withholding irrigation, root exposure, shoot pruning, chemical applications, nutrient management, and shoot bending are elaborated upon. Research findings underscore the significance of manipulating flowering to maximize fruit output, quality, and profitability, emphasizing the superiority of winter crops in terms of size, quality, and market value. The adoption of diverse cultural and chemical strategies is recommended for regulating flowering and optimizing fruit yield, facilitating higher returns for growers and affordable prices for consumers.

Keywords:- Enhancing, Dblossoming, Irrigation**TOWARDS A SUSTAINABLE FUTURE: EXPLORING ECO-FRIENDLY ENERGY RESOURCES FOR GLOBAL PROGRESS
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In the face of rising environmental concerns and the pressing need for sustainable development, the exploration of eco-friendly energy resources emerges as a paramount imperative for global progress. This paper delves into the pivotal role of renewable energy sources in mitigating climate change, fostering economic growth and ensuring energy security. Through a comprehensive analysis of various renewable energy options including solar, wind, hydro, geothermal and biomass, this study examines their potential contributions to a sustainable future. The transition towards eco-friendly energy resources is not merely a matter of technological advancement but also encompasses socio-political, economic, and cultural dimensions. As such, this paper explores the intricate interplay between policy frameworks, market dynamics, public awareness, and technological innovation in driving the adoption of renewable energy solutions on a global scale. Furthermore, the paper discusses the challenges and opportunities associated with the widespread deployment of renewable energy technologies. These range from intermittency issues and grid integration complexities to investment barriers and socio-economic disparities. By addressing these challenges through collaborative efforts among governments, businesses, academia, and civil society, we can unlock the full potential of renewable energy resources and accelerate the transition towards a low-carbon, sustainable energy future. Ultimately, this paper advocates for a holistic approach to energy planning and policymaking that prioritizes environmental sustainability, social equity, and economic viability. By harnessing the power of eco-friendly energy resources, we can pave the way for a more resilient, prosperous, and equitable global society.

Keywords: sustainable future, eco-friendly energy resources, renewable energy, environmental sustainability, energy transition, policy frameworks, global progress.**STANDARDIZATION OF DRYING TECHNIQUES AND DEVELOPMENT OF INCENSE STICKS (AGARABATTI) FROM WASTE FLOWERS****DR. BALAJI S. KULKARNI, MS. SINCHANA A.H, DR. DEEPA TERDAL,****College of Horticulture, Bagalkot, University of Horticultural Sciences, Bagalkot, Karnataka, India**

A study was conducted to standardize the drying techniques for drying of waste flowers in turn to develop value added incense sticks (*Aagarabatti*). The investigation was carried out during 2022-23 at the Department of Floriculture and Landscape Architecture, College of Horticulture, University of Horticultural Sciences, Bagalkot, Karnataka, India. Two separate experiments were laid out in completely Randomized Design (CRD). Five different drying methods viz., shade drying, sun drying, solar tunnel dryer, Fruit and vegetable dryer (CAZRI, Jodhapur) and Try dryer (EZIDRI®) were adopted as treatments for drying of waste flowers collected from temples. Among the different drying methods, the solar tunnel dryer was found best w.r.t. physical parameters viz., lowest moisture content (8.10%), highest weight loss (25.53%), lesser time taken for drying (10.87h) and also resulted in obtaining appreciable color values L*, a*, b* suitable for development of value added incense sticks production. Six different treatment combinations of saw dust: waste flower proportions viz., 1 : 1, 1 : 2, 1 : 3, 1 : 4, only waste flowers and only saw dust were tried to develop incense sticks. The incense sticks prepared with only waste flowers had lowest ash content (2.92%), highest sensory score for color (9.24), texture (8.49), fragrance (8.29), uniformity (8.41) and overall acceptability (9.34). There was no significant difference among the different treatment for burning time of incense sticks. However maximum (95.75 min) in the treatment combination of Saw dust: waste flower proportion of 1 : 2.

GLOBAL CLIMATE CHANGE & GLOBAL WARMING: POLICY, PLANNING & MANAGEMENT**BANGAR R.U.¹ AND LAD A.S.²****College of Agriculture, Parbhani (VNMKV, Parbhani)**

Climate change refers to the significant alteration in the expected weather trends over an extended period, resulting from atypical fluctuations in the Earth's temperature. It includes both warming and its aftereffects, such as melting glaciers, stronger rainstorms, or more frequent droughts. Global warming, on the other hand, refers to the Earth's surface temperature rising. The Indian government introduced the National Action Plan on Climate Change (NAPCC) in 2008, which includes eight national missions addressing climate change. These missions include the National Solar Mission, Enhanced Energy Efficiency, Sustainable Habitat, Water Mission, Preserving the Himalayan Ecosystem, Green India, Sustainable Agriculture, and Water. The NMSKCC aims to build human and institutional S&T capacities in climate change and develop strategy knowledge in key areas. The NMSHE assesses the Himalayan region's vulnerability to climate change and the ecosystem's health status. The revised Nationally Determined Contribution (NDC) was approved in 2022 to meet India's net zero emissions target by 2070. Global climate change planning involves strategies to mitigate its impacts and adapt to its effects. These include reducing greenhouse gas emissions through renewable energy and carbon pricing, implementing adaptation plans like resilient infrastructure and water management, risk assessment, policy development, community engagement, research and innovation, and monitoring and evaluation. Effective planning requires collaboration across sectors like government agencies, businesses, communities, and international organizations to ensure sustainable development and reduce emissions. Global climate change management involves a multifaceted approach, including mitigation strategies like transitioning to renewable energy and improving energy efficiency. Adaptation involves addressing climate impacts like rising sea levels and extreme weather events through resilient infrastructure and early warning systems. International cooperation, policy frameworks, technological innovation, and individual actions are crucial.

Key words: Climate change. Global, policy, management, national mission**IPR CURRENT ISSUE AND CHALLENGES****BANGAR R.U.¹ AND LAD A.S.². DAWNE V. T.³****Department of Agricultural Extension Education, VNMKV, Parbhani**

Intellectual property rights (IPR) are the creations of the mind, inventions, literary and artistic works, symbols, names, images, and designs used in commerce. They fall into two main categories: copyright, which safeguards the rights of writers of literary and creative works for at least 50 years after the author's death, and industrial property, which can be divided into patents and trademarks. India is a signatory to the World Trade Organization and a member of the World Intellectual Property Organization (WIPO). The National Intellectual Property Policy (NIP) is a vision plan that aims to establish synergies between relevant legislation and agencies, all types of IP, and one another. Key points of the policy include financial organizations offering IP-friendly loans, the Department of Industrial Policy & Promotion overseeing IPR implementation and growth, revising certain IP laws, requesting financial assistance to develop IP assets through connections with financial institutions, and taking action against attempts to treat generic drugs as spurious or counterfeit. The policy will be revised every five years to ensure it remains current with industry advancements. The Indian Intellectual Property (IPR) strategy is crucial due to US-led multinational pharmaceutical firms advocating for changes to India's laws, promoting research and development, strengthening Make in India initiatives, and addressing trade agreements. Concerns include forced licenses for pharmaceutical companies and reinterpreting patents. Advantages include balancing rights holders' interests with public good, simplifying laws, improving healthcare access, and reducing trademark registration window to one month by 2017.

Key words: India, IPR, Patent, policy, WIPO, WTO**CATTLE, SHEEP AND GOAT FARMING: BEST PRACTICES IN ANIMAL HUSBANDRY, HEALTH MANAGEMENT AND GENETIC IMPROVEMENT****BANGAR R.U.¹ AND LAD A. S.²****College of Agriculture, Parbhani (VNMKV, Parbhani)**

Cattle, sheep, and goat farming are integral components of global agriculture, contributing significantly to food security, livelihoods, and economic development. As demand for high-quality animal products continues to rise, ensuring the sustainable and efficient management of these livestock species becomes paramount. A study conducted in Marathwada region of Maharashtra state in 2021-22 aimed to study the training needs of farm women in dairy farming. The results showed that (60.34%) of respondents considered the care of pregnant animals as the most critical training necessity, followed by the care of newborn calves. The majority of respondents (67.50%) emphasized the importance of disease prevention and animal health, with (67.50%) identifying foot and mouth disease control as the second most critical training need. Vaccination was ranked as the third most essential training need. In terms of animal breeding, (50.84%) ranked artificial insemination and its benefits as the most important training need, while (40.84%) ranked information about milch animal selection as the second most important. The third most crucial training requirement was methods to shorten animals' dry seasons. The study concluded that optimizing cattle, sheep, and goat farming practices is crucial for sustainable agriculture, as it can enhance productivity, mitigate disease risks, and promote genetic diversity within herds.

Key words: Animal Husbandry, livestock, animal health, dairy farming

ORGANIC AND ECO-FRIENDLY FARMING PRACTICES AMONG THE SANTALS OF MAYURBHANJ, ODISHA**MS. BANGI SOREN****PhD Scholar in History Kalinga Institute of Social Sciences (KISS) Deemed to be University Bhubaneswar, Odisha (India)**

The paper focuses on natural agriculture practices of the Santal tribe in the Mayurbhanj district of Odisha, highlighting their sustainability, efficacy, and cultural significance. The Santal community, renowned for their deep-rooted connection to the land, has developed agricultural techniques over generations that prioritize harmony with nature and resilience to environmental challenges. Through a combination of field research, interviews with local farmers, and analysis of farming methods, this research explores Santal agricultural practices in promoting soil fertility, biodiversity conservation, and community well-being. The study investigates key aspects of Santal agriculture, including traditional crop varieties, soil management techniques, water conservation methods, and indigenous knowledge systems related to farming. Additionally, it explores the socio-cultural dimensions of agriculture within the Santal community, considering factors such as land tenure systems, gender roles, and cultural practices associated with farming. By documenting Santal agricultural practices, this research aims to contribute to a deeper understanding of indigenous farming knowledge, inform sustainable agricultural development strategies, and promote the preservation of traditional ecological wisdom in contemporary agricultural practices.

Keywords: Sustainability, biodiversity conservation, land tenure system, cultural practices associated with farming, indigenous farming knowledge, tradition.

MEGHALAYA'S FIRST PRIVATE RAINBOW TROUT FARM LEADS IN LIVELIHOOD ENHANCEMENT AND EMPLOYMENT GENERATION IN NORTHEAST INDIA'S HILLY TEMPERATE REGION**BANLAM J. MARBANIANG¹ AND VENERABILITY DHAR²**¹**Iatreilang Farmer Producer Company Ltd., East Khasi Hills – 793121, Meghalaya**²**College of Fisheries, Central Agricultural University. W. Tripura – 799210, Tripura**

Rainbow trout farming presents a promising opportunity in India's aquaculture sector, particularly in Himalayan regions with hilly terrains and temperate climates. States like Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Jammu-Kashmir and Ladakh have emerged as leaders in rainbow trout production, leveraging their freshwater resources and favorable environmental conditions. In Meghalaya, despite its abundant water resources, the contribution to national fish production remains minimal. With vast riverine lengths and conducive environmental conditions, particularly for temperate species like trout, Meghalaya holds significant untapped potential. The initiative taken by young entrepreneurs in establishing Meghalaya's first private trout farm at Wahlyngkien Village, East Khasi Hills District marks a significant milestone in the region's aquaculture landscape. Commenced on June 6th, 2023, with the procurement of one-inch (0.5 g) rainbow trout fry from Shergaon, Arunachal Pradesh, and their stocking at the farm, this endeavor witnessed a culture period of 222 days, culminating in the first harvest on January 15th, 2024. Water was sourced from Lawkyntang into the culture raceways sized at 8.5 m x 3 m x 1.2 m (30.6 m³), maintaining a stocking density of 16/m³, and achieving a commendable survival rate of 72.2%. High-quality Nutril-Growel feed, with CP ranging from 45-48%, facilitated remarkable growth, with a final average weight of 0.38 kg and SGR of 22.11 g day⁻¹. Efficiency indicators such as a FCR (0.96), FER (1.044), and PER (2.695) underscore the operational effectiveness of the venture. Financially, the capital investment for one unit of the specified raceway dimension amounted to ₹61,650, with operational costs totalling ₹38,300. Gross revenue generated stood at Rs. 1,00,240, yielding an impressive BCR (2.62) and revenue per unit volume (₹3275.81). This successful venture demonstrates the lucrative potential of rainbow trout farming in Meghalaya's hilly terrain, offering a promising avenue for enhancing rural livelihoods and contributing to the economic development of the region.

Keywords: Aquaculture, Employment, Livelihood, Meghalaya, North-east India, Rainbow trout.

ASSESSMENT OF IMPROVED TECHNOLOGIES FOR INCREASING GROUNDNUT PRODUCTION IN YADGIR DISTRICT OF KALYAN KARNATAKA, INDIA**BAKIKARA UMESH, JAIPRAKASH NARAYANA R P., S.B. GOUDAPPA, M.R. KURUBAR, AMARESH Y S., D. K. HADIMANI AND HANUMANTHAPPA NAYAK H****University of Agricultural Sciences, Raichur**

Yadgir is the major producer of groundnut in Karnataka and average yield of rainfed groundnut is 7 to 8 q/acre which is comparatively less as compared to country average of 8 to 10 q/acre. The problems for this low groundnut yield was due to lack of knowledge on new technologies, high yielding groundnut varieties, poor soil fertility, scattering rainfall, high incidence of pest & disease and high labor cost during production. To address these problems, introduced high yielding groundnut variety Kadri lepakshi, bio controlling agents (*pseudomonas*, *trichoderma*, *beauveria bassiana* and *metarizhium* etc) for seed treatment and soil born disease management, soil health cards based nutrient management, sprinkler irrigation, tractor operated digger cum elevator. The average groundnut yield of 15 selected farmers under technologies demonstrated field was 12.66 q/acre and 12.89 q/acre as compared to 7.82 q/acre and 7.90 q/acre under farmer's practices during *kharif* and *rabi* season of 2022-2023 respectively. The improved technologies positively increased groundnut yield of 61.90 per cent and 64.92 per cent during *kharif* and *rabi* season respectively as compared to farmer's practices. The average cost of expenditure of groundnut production under technologies demonstrated field was 16052.00 (₹/acre) as compared to 21842.00 (₹/acre) under farmers practices with 26.51 per cent reduction due to use of improved technologies. It was observed that, net returns under technologies demonstrated field was 60628.00 (₹/acre) with 75.93 per cent increase as compared to 34462.00 (₹/acre) under farmers practices. The BC ratio of technologies demonstrated field was 3.77 as compared to 1.58 under farmer's field. Demonstrated technologies like soil health based nutrient application, use of bio fertilizers for disease management; integrated pest management and sprinkler irrigation during dry spell helped to minimize the cost of groundnut production and increases the groundnut yield by 4 to 5 q/acre.

Key words: Soil health, groundnut digger, bio controlling agents and sprinkler irrigation.

EXPLORING THE NATIVE BIOCONTROL AGENTS FROM PULSE RHIZOSPHERE FOR THE MANAGEMENT OF CHICKPEA WILT BASAMMA KUMBAR¹, SUSHMA S. TAKKALAKI², PREMA G.U.² AND S. B. PATIL³

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Aim: The present study was undertaken to explore the native biocontrol agents from pulse rhizosphere for the management of chickpea wilt.

Methodology: The 19 isolates of bio-agents were isolated from rhizosphere of pulse crops viz., chickpea, pigeonpea, cowpea and green gram in northern Karnataka through serial dilution technique. The fungal isolates of bio-agents were studied and identified based on morphological characters as colony characters, size and colour of conidia. The bacterial isolates of bio-agents were studied for biochemical tests viz., gelatin liquefaction, starch hydrolysis test, and Gram's staining technique. Molecular characterization of the bio-agents through PCR amplification of the COI gene followed by Sanger sequencing and comparison of obtained sequences with the NCBI database. The efficacy of antagonists against the *Fusarium oxysporum* f. sp. *ciceri* were evaluated by dual culture technique on PDA media (Dennis and Webster, 1971). The efficacy of selected bio-agents and organic amendments against the chickpea wilt was tested in sick pots. **Results:** Molecular characterization of the bio-agents confirmed the presense of one *Trichoderma asperellum*, four *Trichoderma harzianum*, one *Bacillus cereus*, two *Bacillus subtilis*, one *Paenibacillus lautus* and one *Stutzerimonas stutzeri* species. *In vitro* evaluation of fungal and bacterial bio-agents against Foc, revealed that, maximum growth inhibition by *T. asperellum* (Tr-4) (82.59%) and *B. subtilis* (Ba-9) (77.77%) isolates, respectively. Seed treatment with *T. asperellum* 10 g/kg+ soil application of farm yard manure (FYM) 6 g/kg recorded minimum wilt incidence of 6.83 per cent followed by seed treatment with *B. subtilis* 10 g/kg+ soil application of FYM 6 g/kg with 7.14 per cent incidence in sick pot condition. **Interpretation:** Thus, in the management of chickpea wilt, seed treatment with *Trichoderma asperellum* (Tr-4) 10 g/kg+ soil application of farm yard manure 6 g/kg had minimum wilt incidence of 6.83 per cent with 86.61 per cent disease reduction compared to control.

Key words: Chickpea Wilt, *Fusarium oxysporum* fsp. *Ciceri*, Bioagents, Antoginist

EFFECTS OF DIETARY SUPPLEMENTATION OF LEMONGRASS (*CYMBOPOGON CITRATUS*) ON GROWTH AND HAEMATO-BIOCHEMICAL PARAMETER OF *LABEO ROHITA* (HAMILTON, 1822) FINGERLINGS

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The present study was conducted to assess the effect of lemongrass (*Cymbopogon citratus*) leaf powder on the growth and haemato-biochemical parameters of *Labeo rohita* fingerlings. One hundred and eighty numbers of *Labeo rohita* fingerlings, with an average body weight of 10.48 ± 0.16 g and body length of 9.6 ± 0.11 , were divided into four experimental groups with three replicates each, following a completely randomized design. The experimental diet included different levels of lemongrass powder: C (@0.0g) T1 (@0.5 g), T2 (@1 g), and T3 (@1.5 g) per basal diet. After the 60-day experiment, haemato-biochemical and growth parameters were analysed. The results showed increased white blood cell count, red blood cell count, haemoglobin, packed cell volume, and other blood indices. The T3 group exhibited higher Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin Concentration (MCHC), lymphocytes, and monocytes. The fish fed with a diet containing $1.5 \text{ g}/100\text{g}^{-1}$ *Cymbopogon citratus* leaf extract powder showed the highest specific growth rate ($2.54 \pm 0.04\%$) and the best food conversion ratio ($1.50 \pm 0.07\%$). No mortality was observed in any of the experimental groups. And it has been concluded that the dietary inclusion of *C. citratus* leaf extract powder enhances body growth and significantly improves haemato-biological parameters in *Labeo rohita*.

Keywords: Aquaculture, lemongrass, growth performance, haematological parameters, fish feed, immunostimulatory

COMPUTATIONAL DESIGN APPROACH FOR A MULTI-EPITOPE VACCINE TARGETING NIPAH VIRUS: AN IMMUNOINFORMATICS PERSPECTIVE

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The emergence of the Nipah virus as a highly morbid zoonotic pathogen poses a threat to public health. It is categorized under biosafety level 4. The route of transmission in humans by bats is mainly saliva and urine. The Nipah virus genome size is 18kbp. The Nipah virus causes severe encephalitis and acute respiratory distress syndrome with high mortality rates, with the fatality rate of the disease ranging from 40% - 75%. The first emergence of viral disease was found in Malaysia during 1998-1999 and latterly several countries in South and Southeast Asia. Annually outbreak in Bangladesh since 2001 and occasionally in India. Currently, there are no specific vaccines or antiviral drugs available. This study was conducted by using various immunoinformatics platforms to prepare a multi- Epitope-based vaccine candidate with adjuvants and linkers to improve the immune response. The final 16 epitopes were selected for vaccine construction after using immunoinformatics approach to envisage the epitope of B-cells epitope and MHC-I and MHC-II which predicted from all the 7 proteins out of 8 proteins selected for study retrieved from uniprot database. The antigenic and physiological properties prediction of retrieved protein was analyzed by online servers, VaxiJen v 2.0 and ProtParam. The final vaccine candidate had a total combined coverage range of 80.53%

.The tertiary structure of constructed vaccine was optimized and confirmed with help of simulation that its stability assessed. The molecular docking performed with TLR-3, 5 and 8 to check the binding affinity and binding energy of constructed vaccine candidate. The vaccine constructed within the Escherichia coli K12 strain, codon optimization was performed to eliminate the danger of codon bias. However, it is important to note that these findings require further validation through additional in vivo experiments to assess their effectiveness and safety.

THE SYNERGISTIC ANTIMICROBIAL SPECTRUM OF TURMERIC AND TAMARIND: A POTENTIAL NATURAL FISH PRESERVATIVE

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To increase the shelf life of perishable Croaker fish, the present study is aiming at determining the microbiological and sensory profile of Croaker fish fillets treated with both tamarind and turmeric together to justify the hurdle concept and to get the synergistic effect so that microorganism need more energy to break all the barriers. the proximate composition of Croaker was found to be Protein ($16.20 \pm 0.18\%$), Fat ($2.77 \pm 0.04\%$), Moisture $79.23 \pm 0.17\%$ and Ash ($1.66 \pm 0.01\%$). The TPC value, gradually decreased from Control ($5.524 \pm 0.006 \log \text{cfu/g}$) with increased concentration of turmeric and tamarind respectively to get the synergistic effect and finally the T_8 treatment recorded lowest TPC score ($4.92 \pm 0.01 \log \text{cfu/g}$) which may be due to synergistic antimicrobial effect of highest concentrations of turmeric (6%) and tamarind (4%). TPC values decreased inverse proportionately to the added tamarind concentration at the rate of 0%, 2% and 4% respectively. *Bacillus* count followed exactly similar trend to TPC and finally T_8 recorded lowest count. The lowest *Staphylococcus* count observed in T_5 ($3.91 \pm 0.01 \log \text{CFU/g}$). All the treatments including control are within safe limit of acceptability of *Staphylococcus* for human consumption. With increase in tamarind concentration, *E. coli* count decreases and finally the lowest *E. coli* count ($3.55 \pm 0.02 \log \text{CFU/g}$) was observed in T_8 . *Vibrio sp.* count was seen least in T_8 treatment ($3.55 \pm 0.05 \log \text{cfu/g}$) due to synergistic effect of turmeric and tamarind in 6:4 ratio. *Salmonella sp.* count was nil; all the treated samples including control recorded nil or negligible ($<1 \log \text{cfu/g}$) fungal count, which may be due to the presence of turmeric and tamarind and good quality raw material. pH decreased inverse proportionately to the added tamarind concentration at the rate of 0%, 2% and 4% respectively. From the microbiological and pH assessment, both T_5 and T_8 exhibited best result in terms of preservation effect. Thus, the synergistic antimicrobial activity of turmeric and tamarind making a potential natural fish preservation practice.

Key words: Turmeric, Tamarind, Microbial count, Croaker, Seafood borne pathogen

KING'S GRASS: A VERSATILE ASSET FOR GREEN FODDER AND BIOENERGY PRODUCTION

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The Bajra-Napier hybrid, commonly known as king's grass, contributes significantly to the sector of green fodder production. This manmade grass is a perennial species highly valuable by dairy farmers and consider as potential source of bioenergy due to its substantial biomass output. By blending the distinct traits of both Bajra (*Cenchrus americanus*) and Napier (*Cenchrus purpureus*) species, it possesses an exceptional ability to thrive in harsh environments while maintaining superior quality. However, it is widely recognized for its productivity in generating biomass, making important resource for both forage and bioenergy in tropical and subtropical regions. Bajra is widely cultivated species in its genus and shares genetic similarities with Napier grass. The Bajra-Napier hybrid, known by various names such as BN Hybrids, PNM Hybrid, King's grass, Elephant millet, or Cumbu-Napier Hybrids, is a tall-growing (200-300 cm), upright, robust, deep-rooted, perennial grass. Its vigorous growth, high nutritional content, succulence, palatability and positive response to nitrogen-rich fertilizers, the BN Hybrid emerges as promising cultivars of the bioenergy crop. The rapid growth and abundant biomass production of Napier grass coupled with ease of propagation and harvest, as well as superior biomass quality make it an attractive option for green fodder as well as a bioenergy source.

Keywords: Bajra-Napier hybrid, king's grass, bioenergy, perennial grass, high nutritional content, biomass production.

PROTEIN CONTENT AND PROTEIN QUALITY OF READY-TO-EAT BUCKWHEAT (*FAGOPYRUM ESCULENTUM* MOENCH) BASED *KHAKHRA*BHAGYAJYOTHI C KOTIBAGAR¹, UMA N KULKARNI², SAROJANI KARAKANNAVAR, U K HULIHALLI, ASHWINI M.¹PhD Scholar, Dept. of Food and Nutrition, College of Community Science, UAS Dharwad, Karnataka, India²Professor and Head, Depts. of Food and Nutrition & Food Safety and Quality Assurance, College of Community Science, UAS Dharwad, Karnataka, India

Buckwheat is neither a nut nor a cereal but is included in a separate group called “pseudocereals”. Protein content of buckwheat flour is much more than rice, wheat, millet, sorghum, and maize flour. Buckwheat proteins have a significant biological value due to their well-balanced amino acid composition. *Khakhra* is a thin, crispy, crunchy and healthy snack that is typically eaten as a breakfast dish in Gujarat and Rajasthan. The main objective of the study was to compare protein content and protein quality of developed ready-to-eat buckwheat *Khakhra* with traditional wheat *Khakhra*. The study was undertaken in the department of Food Science and Nutrition, UAS, Dharwad. Buckwheat *Khakhra* was developed by replacing wheat flour with buckwheat flour in traditional *Khakhra* recipe. The results depicted that buckwheat *Khakhra* (21.60%) contained significantly ($p \leq 0.01$) high protein content than wheat *Khakhra* (8.47%). Lysine is one of the essential amino acids which is lacking in wheat *Khakhra* (1.98 g/100 g) but the amount of lysine is significantly high in buckwheat *Khakhra* (6.70 g/100 g). Present study revealed that most of the indispensable amino acids scored above 100 per cent for buckwheat *Khakhra* compared to wheat *Khakhra* except sulphur containing amino acids (methionine and cysteine), depicting the most limiting amino acids (83.91%). Other protein quality indicators like Net Protein value (NPV) and PDCAAS of buckwheat *Khakhra* (18.12 and 60.66% respectively), higher than wheat *Khakhra*. This indicates that buckwheat products protein will be utilized to the fullest. So, there is a tremendous opportunity in buckwheat products to use as an alternative plant-based protein for a wide variety of food and health.

Key words: Buckwheat, *Khakhra*, indispensable amino acids**INTEGRATED PEST MANAGEMENT ON MAJOR INSECT PESTS OF CAULIFLOWER (*BRASSICA OLERACEA* VAR. *BOTRYTIS* LINN.) IN DISTRICT GURUGRAM, HARYANA**BHARAT SINGH¹, NEETU SINGH², GAURAV PAPNAI³, ARCHANA U SINGH⁴ AND ANAMIKA SHARMA⁵ACBPDM, Amity Institute of Organic Agriculture, Amity University, Sector-125, Noida, India^{1 & 2}Krishi Vigyan Kendra (ICAR-Indian Agricultural Research Institute) Gurugram, Haryana^{1, 3 & 5}Division of Nematology, ICAR-IARI, New Delhi⁴

The present investigations on “Integrated pest management on major insect pests of Cauliflower in district Gurugram (Haryana)” was carried out during two Rabi crop seasons to determine hot spots of major insect pests on Cauliflower, to monitor the population in relation to climatic factors and to implement IPM modules and also compare the economics of farmer practices. Hence, a roving survey of District Gurugram was carried out in the infested area covering four different blocks i.e., Pataudi, Farukhnagar, Sohna and Gurugram during 2017-2019. It was found that Cauliflower crop was damaged by many insects such as Tobacco caterpillar (*Spodoptera litura*), Diamondback moth (*Plutella xylostella*), Stem borer, Cauliflower aphid, Mustard aphid, Leaf webber and Painted bug. However, efforts have also been made to arrange the insect pests with their common and scientific names, stages of pest infestation, systematic position, economic status, nature of damage and appearance as well. Data revealed that diamondback moth population appeared in second week of October and gradually reached up to maximum level of 8.33-8.67 diamondback moth larvae/05 plants during second- third week of December in both years. However, Tobacco caterpillar population appeared in fourth week of October and gradually reached to maximum level of 2.90 - 3.42 tobacco caterpillar larvae / 05 plants during third week of December in both years. Six integrated pest management (IPM) modules against diamondback moth and tobacco caterpillar involving the ecofriendly components i.e. bio-pesticides and/or botanical pesticides was taken in experiments besides control. Pooled data of diamondback moth and Tobacco caterpillar larvae revealed that on 3rd, 5th and 7th days after second application all the IPM modules were found significantly superior over control and there was substantial increase in Cauliflower yield from 1.45 to 4.70 t/ha in different IPM modules. In conclusion we can say that Diamondback moth and Tobacco caterpillar are two major pests of Cauliflower in four different blocks of Gurugram and responsible for major yield losses in the production of Cauliflower. Thus, IPM Module-4 comprising spray of Spinosad 45% SC @ 500ml/ha followed by second spray of NSKE 5% @ 5 ml/l 10 days after first spray and again repeated after 5 days could be applied for getting highest pooled net profit Rs. 38,325/ha increase in yield over control.

Keywords: Cauliflower, Diamondback moth, IPM Module, Tobacco caterpillar, eco-friendly**Trends in the Use of Hydroponics in Horticultural Crops**

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Soil based cultivation is now facing difficulties due to different man made reasons such as industrialization and urbanization. Also, sudden natural disasters, climate change and unrestricted utilization of chemicals for agricultural purposes cause the depletion of soil fertility and quality. That is why, scientists have developed a new alternative approach for cultivation system namely soil-less cultivation or hydroponics. The practice of hydroponic farming is widely used in modern agriculture where crop cultivation takes place without the use of soil and instead makes use of nutrient solutions. There are many forms of hydroponics such as nutrient film technique (NFT), drip system, aeroponics, Ebb Flow, water culture, wick system and the list continues as different designs emerge and are renamed. Through hydroponics a large number of plant crop can be grown. The quality of yield, taste and nutritive value of end products produced hydroponically is generally higher than the natural soil based cultivation. This cultivation is cost effective, disease free, eco-friendly and is gaining popularity all over the world including both the developed and the developing countries.

Keywords: Hydroponics, horticultural crops, drip System, nutrient film technique, aeroponics, wick system and Ebb flow

DEVELOPING GREEN NANOSENSORS FOR RAPID IN-SITU SOIL HEALTH TESTING**BHARTI KUMARI*A, INDU SHARMA*B*****a(Corresponding & Presenting Author) Assistant Professor, Department of Chemical Petroleum and Hydrogen Technology, Nims Institute of Engineering and Technology (NIET), NIMS University Rajasthan, Jaipur, Rajasthan, India*****bAssistant Professor, Department of microbiology, Nims Institute of Allied Medical Science and Technology(NIMT), NIMS University, Jaipur, Rajasthan**

Soil health testing using nanoparticles is an innovative approach that leverages the unique properties of nanoparticles to detect and assess various soil parameters such as nutrient levels, pH, moisture content, and presence of contaminants. Nanoparticles can be engineered to interact with specific soil components or substances of interest, allowing for precise and sensitive measurements. This technology has the potential to revolutionize soil testing by providing rapid, accurate, and cost-effective analysis, leading to better agricultural practices and environmental management. Nanoparticles can be utilized for soil health testing: Nutrient Detection: Nanoparticles can be functionalized with receptors that bind to specific nutrients, such as nitrogen, phosphorus, and potassium. By introducing these nanoparticles into soil samples, researchers can measure the concentration of nutrients based on changes in the nanoparticles' properties, such as fluorescence or conductivity. pH Sensing: pH-sensitive nanoparticles can change their optical or electrical properties in response to variations in soil pH. By incorporating these nanoparticles into soil probes or sensors, farmers can quickly and accurately assess soil pH levels, which is crucial for determining soil acidity or alkalinity and optimizing nutrient availability for plants. Contaminant Monitoring: Nanoparticles can be engineered to selectively bind to pollutants or contaminants in the soil, such as heavy metals or pesticides. When exposed to soil samples, these nanoparticles can indicate the presence and concentration of contaminants through color changes, fluorescence, or other detectable signals, enabling early detection and remediation of soil pollution. Moisture Detection: Nanoparticles with hydrophilic or hydrophobic properties can be used to monitor soil moisture content. By embedding these nanoparticles in soil probes or sensors, farmers can continuously monitor soil moisture levels, helping to optimize irrigation practices and prevent overwatering or drought stress in crops. These examples demonstrate the versatility and potential applications of nanoparticles in soil health testing, offering rapid and accurate assessments of various soil parameters critical for sustainable agriculture and environmental stewardship.

Keywords: Nanoparticles, Green synthesized, Soil health detection, moisture, nutrient**KNOWLEDGE, ATTITUDES AND PRACTICES OF HOMEMAKERS TOWARDS DEVELOPMENT OF A SUSTAINABLE KITCHEN GARDEN****DR. BHARTI PANDEY¹ AND DR. SHIKHA VERMA²****¹Assistant Professor, Department of Home Science, A.N.D.N.N.M. Mahavidyalaya, Kanpur, India****²Assistant Professor, Department of Home Science, A.N.D.N.N.M. Mahavidyalaya, Kanpur, India**

Kitchen gardens, also known as vegetable gardens or potage gardens, have gained significant popularity in recent years due to their numerous benefits, including providing fresh produce, reducing food miles and promoting a connection with nature. However, ensuring the sustainability of these gardens is crucial to maximize their environmental, social and economic benefits. The sustainable development of kitchen gardens requires a holistic approach that integrates ecological principles, efficient resource management and community engagement. By implementing strategies such as promoting biodiversity, managing soil health, conserving water, reducing waste, optimizing energy usage and fostering community involvement, Kitchen gardens can serve as models of sustainable food production that contribute to environmental stewardship, social well-being and food security for current and future generations. Education and outreach program for homemakers can contribute in cultivating sustainability. This study was conducted among homemakers living in urban areas of Lucknow city, Uttar Pradesh, to assess their knowledge, attitude and practices towards development of a sustainable kitchen garden. The results of the study found that although the housewives have sufficient knowledge regarding the techniques of kitchen garden and the use of resources was also environment friendly but most of the homemakers do not use it for social and economic benefits. The highest percentage was found of those homemakers who adopt kitchen garden as their hobby. Need of environmental education and training to develop knowledge about environmental protection and sustainability was strongly felt.

Keywords: sustainability, kitchen garden, homemakers, environmental education and training**ADVANCING HORTICULTURE: INNOVATIONS FOR SUSTAINABLE CROP PRODUCTION****BHAVANA DHAKER****Ph.D. Research Scholar, Department of Horticulture, CoA, SKRAU-Bikaner(Raj.)**

Advanced horticulture encompasses a range of sophisticated techniques and practices aimed at optimizing plant growth, productivity, and quality. This abstract provides an overview of key aspects of advanced horticulture, including precision farming, controlled environment agriculture, genetic engineering, and sustainable production methods. Precision farming in advanced horticulture utilizes technology such as GPS, sensors, and data analytics to monitor and manage crop conditions with precision. This approach allows for targeted application of water, nutrients, and pest control measures, leading to improved resource use efficiency and yield optimization. Controlled environment agriculture (CEA) involves growing crops in controlled environments such as greenhouses, vertical farms, and hydroponic systems. CEA enables year-round production, protection from adverse weather conditions, and optimal control over environmental factors like temperature, humidity, and light. It also reduces water usage and minimizes pesticide use, contributing to sustainable horticultural practices. Genetic engineering plays a crucial role in advancing horticulture by developing crop varieties with enhanced traits such as disease resistance, stress

tolerance, and improved nutritional content. Techniques like gene editing allow for precise modifications in plant genomes, accelerating the breeding of desirable traits and reducing reliance on chemical inputs. Sustainable production methods are integral to advanced horticulture, focusing on minimizing environmental impacts, conserving natural resources, and promoting biodiversity. Practices such as integrated pest management (IPM), organic farming, and agro ecology prioritize ecological balance, soil health, and ecosystem resilience while ensuring economic viability for growers.

Keywords- Advanced horticulture, Precision farming, controlled environment agriculture (CEA), Genetic engineering, Sustainable production methods

COMBINING ABILITY ANALYSIS IN CHILLI (*CAPSICUM ANNUUM* L.) FOR FRUIT YIELD AND YIELD CONTRIBUTING CHARACTERS

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Chilli (*Capsicum annum* L.) is an important commercial crop of India and grown for its green fruits as vegetable and dried ripe fruits as spice throughout the world because of its pungency and pleasant flavours. Heterosis breeding has been advantageous for higher yield and production in chilli. For effective transfer of suitable genes controlling quantitative characters in the hybrids it is necessary to identify better combining genotypes. This investigation was planned to identify good combiners and heterotic cross combinations for yield and its component traits in chilli. In this study, seven lines, three testers and their 21 hybrids were analysed in a Line x tester design for days to 50% flowering, yield (t/ha), fruit weight, fruit length and fruit breadth during 2021-23. ANOVA for combining ability for Line x Tester was significant for all the characters except for yield (t/ha) which showed significance for Lines. Dominance variance was significant for days to 50% flowering and average fruit weight whereas additive variance was reported for yield (t/ha), fruit length and fruit breadth. L1 x T2 (Haldi pada x Swarna Arohi), L4 x T1 (Aparna x Swarna Praphulya), L5 x T2 (Pusa Sadabahar x Swarna Arohi), L6 x T2 (Swarna Apoorva x Swarna Arohi) and L6 x T3 (Swarna Apoorva x Ujwala) were the best performing crosses for most of the yield characters. Promising hybrids identified from this study can be successfully incorporated in the chilli improvement programme.

Key Words: L x T Analysis, Combining Ability, Chilli Fruit Yield, Variance

GENETIC VARIANT OF *TERT* LEADS TO INCREASED SUSCEPTIBILITY TOWARDS MALE INFERTILITY IN THE NORTH INDIAN POPULATION OF JAMMU AND KASHMIR

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The failure to conceive, following at least a year of consistent and unprotected intercourse is known as infertility, and it is a concerning worldwide health concern. More significantly, because it affects a couple rather than a single person, it is a distinct medical illness. About half of the cases of infertility are thought to be caused by male factor, and up to 40 percent of those cases are classified as idiopathic. It is most important to access a further putative sperm quality parameter in light of the steadily rising use of ART and the rising drop in semen parameters. Infertility among men is undoubtedly influenced by genetic factors, however diagnostically significant genes are notably lacking which being the reason for categorization of most of the cases as idiopathic. In addition, deteriorating semen quality over the last fifty years points to the impact of altered lifestyle and exposure to hazardous substances in the environment, although the particular mechanisms underlying these changes are still unclear. At the ends of chromosomes are repeating DNA sequences called telomeres, which are essential for preserving the stability and integrity of chromosomes. Another tier of complexity arises from the role telomeres play in the aetiology of male infertility. In its first of a kind study in North Indian region, by examining the *TERT* gene variant rs10069690 and as well as *TERF2* variant rs251796, in male infertility patients and controls from the Jammu and Kashmir ethnic population in India, this study aims to explore the genetic factors linked to male infertility. This comprehensive investigation is essential to comprehending the genetic factors influencing reproductive health. These genes are important for spermatogenesis because *TERT* maintains telomere length and *TERF2* aids in chromosomal integrity and cell division. By looking at variations in the *TERT* and *TERF2* genes, the goal is to find potential genetic markers impacting male infertility. Additionally, the potential of telomere length as a diagnostic and predictive indicator in male infertility diagnosis and treatment options is being explored.

PLANT GROWTH PROMOTING MICROBES AS MICROBIAL INOCULANTS/BIOFERTILIZERS FOR SUSTAINING CROP PRODUCTIVITY AND SOIL FERTILITY

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Plant-microbe interactions play pivotal roles in sustaining crop productivity and soil fertility, offering promising avenues for sustainable agricultural practices. This paper explores the multifaceted interactions between plants and various microorganisms, highlighting their significance in enhancing crop productivity, combating pathogens, and promoting soil health. Understanding these interactions is crucial for harnessing their potential in agricultural systems to address challenges such as food security and environmental sustainability. Therefore, the introduction of beneficial microbes into agricultural ecosystems by bio-augmentation reduces the negative effects of intensive, non-sustainable agriculture on the environment, society, and economy. We delve into the mechanisms underlying the application of PGPM as microbial inoculants/ biofertilizers; their interactions, the factors influencing their dynamics, and the implications for agricultural practices. Furthermore, we discuss emerging technologies and strategies that leverage plant-microbe interactions for improving crop yields, soil fertility, and overall agricultural sustainability.

Keywords: Plant-microbiome interaction, PGPM, microbial inoculants, biofertilizers, productivity, soil health, sustainable agriculture

AN EFFORT TOWARD CONSERVATION OF *PICRORHIZA KURROA* ROYLE EX. BENTH : AN IMPORTANT HIMALAYAN RESOURCE**BHAWNA PANDEY* AND A. K. GAUR****Molecular Biology and Genetic Engineering, Bioprospecting and Metabolomics facility, College of Basic Sciences and Humanities , Govind Ballabh Pant University of Agriculture and Technology, Pantnagar -263145, Udham Singh Nagar, Uttarakhand, India**

Picrorhiza kurroa Royle ex. Benth. (Vernacular name: Kutki, Family: Plantaginaceae) since, this is a vulnerable at Himalayan range (2400-3000m) from mean sea level (msl). Therefore, special attention was required over the period of its sustenance by an adoption through certain tribes of Himalaya. Significance in traditional medicine system and thus an excessive extraction from natural habitat had been threatened by virtue of overexploitation. Subsequently, it had led under inclusion in Appendix II of the Convention on International Trade in Endangered Species (CITES) of Wild Flora. At present, Kutki is facing numerous pressures for its survival, primarily driven by unsustainable harvesting practices due to large international market, habitat degradation due to population pressure, and climate change due to industrialization and other related reasons like Greenhouse effect. Collaborative efforts of local tribal and other grower communities, Government(s) agencies including environment protection and conservation organizations are promoting/encouraging scientific efforts for sustainable conservation. In view of bioactive principles are being regularly derived from chemical skeleton extracts from *P. kurroa*. Various chemical lead compounds had been showing atleast hepatocaring function, which had been shown primarily attributed through anti-lipid peroxidative nature and free radical scavenging properties documented from active principles by an establishment of reversal of normal liver function from an abnormal liver function. Our laboratory work data based on observations of *in vitro* establishment, growth and development parameters from explants isolated from intact greenhouse maintained plants, *in vitro* developed direct/ indirect regenerated plants as well as plants of grower field situations. We optimized *in vitro* indirect regeneration protocols using excised leaves of various sizes as an explants which were inoculated in various orientations in Murashige and Skoog (MS) basal media supplemented with different combinations of phytohormones including Thidiazuron (TDZ) in lieu of cytokinin based on literature. Highest callus induction frequency was observed with 2.27µM TDZ without auxins. Upon subculturing of callus mass after fragmentation into pieces in MS basal media supplemented with 4.92µM Indole-3-butyric acid (IBA) as an auxin and 13.94 µM Kinetin (Kn) as a cytokinin proved sufficiently good number of shoots and leaves proliferation. Further subculturing of proliferated shoot tips on basal MS media with supplementation of 10.72 µM Naphthalene-1-acetic acid (NAA) and 11.41 µM Indole-3-acetic acid (IAA) as an auxins , showed good hairy roots too in addition to normal roots in indirectly regenerated plants from callus biomass. While leaves explants alone from indirectly regenerated plantlet, upon inoculation in basal MS media supplemented with 2.14 µM Naphthalene-1-acetic acid (NAA) and 1.96 µM Indole-3-butyric acid (IBA) as an auxins showed highest hairy root development. Thus, we are concluding that indirectly regenerated plantlets *in vitro* found sound for hairy roots development which are under extraction and analysis of desirable metabolites. Since hairy roots found to be good for possessing desired metabolites. We also hope for similar metabolite patterns from thus developed hairy roots which shall pave the way for availability of sufficient desirable metabolites through suspension culture of hairy root by further improvement of hairy root production under suspension culture conditions by managing phenolics exudates in culture medium which might hamper proliferation of hairy roots during suspension cultures. This way sustainable conservation strategy of *P. kurroa* is also be provided as strength for avoiding its further destructions from the habitat by maintaining its better use efficiency in such described manner as a part of strategic management.

Keywords: Conservation; Endangered; Phytohormones; *Picrorhiza kurroa*; Sustainable; Vulnerable**ATTITUDE OF VEGETABLE GROWERS TOWARDS ORGANIC FARMING****BHENDARKAR N.C.1 AND PAGARE Y.D.2****College of Agriculture, Latur (VNMKV Parbhani, MH)**

The present study entitled “Attitude of Vegetable Growers towards Organic Farming” was conducted in Ambajogai, Beed and Kaij tehsils which were randomly selected from Beed district of Marathwada region of Maharashtra State. A sample of 120 vegetable growers was drawn randomly from 12 villages. From each selected village ten vegetable growers were chosen. Ex post facto research design was followed in the present investigation. Data were collected with the help of pre- tested structured schedules consisting the information about selected characteristics of vegetable grower’s viz. farming experience, education, family size, land holding, annual income, social participation, extension contact, scientific orientation, risk orientation, innovativeness, knowledge and their attitude towards organic farming. Finding revealed that, majority of the vegetable growers i.e., 59.17 per cent were having medium farming experience, 30.00 per cent of the were having middle level education, 74.14 per cent of the vegetable growers were having middle family size while, 37.50 per cent of the vegetable growers possessing small size land holding. Further it can be concluded that majority of the vegetable growers i.e., 75.83 were having medium level annual income and 63.33 per cent were having medium social participation. Further, it could be concluded that more than half i.e., 54.17 per cent vegetable growers were having medium level of extension contact. Most of vegetable growers were having medium scientific orientation (61.17%) and medium risk orientation (53.33 %). Majority of the vegetable growers i.e., 60.00 per cent and 65.83 per cent were having medium level of innovativeness and knowledge respectively. And majority of vegetable growers i.e., 67.50 per cent had medium level attitude towards organic farming followed by, 20.83 per cent and 11.67 per cent had low level and high-level attitude towards organic farming. It was observed that the organic farmers had medium level knowledge and medium level of attitude towards organic practices. The possession of complete knowledge about technology is essential, as it helps in taking the right decision regarding organic farming. This implies that the extension system in the region will have to strengthen its educational efforts.

Keywords- Organic Farming, Vegetable growers

STUDY THE EFFECT OF PROCESS PARAMETERS FOR EXTRACTION OF PHENOLIC COMPOUNDS FROM CARICA PAPAYA L. LEAVES USING THERMOSONIFICATION EXTRACTION

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Growing fruit and vegetable processing industries generate a huge amount of by-products in the form of seed, skin, leaves, pomace, and rind containing a substantial quantity of bioactive compounds such as polysaccharides, polyphenols, carotenoids, and dietary fiber. Conventional extraction has certain limitations in terms of time, energy, and solvent requirements. Ultrasound assisted extraction (UAE) can extract bioactive components in very less time, at low temperatures, with lesser energy and solvent requirement. UAE as a non-thermal extraction technique is better equipped to retain the functionality of the bioactive compounds. This study provides a review of mechanism, concepts, factors affecting extraction of bioactive compounds with particular focus on fruit and vegetable by-products. Thermosonification extraction (TSE) was investigated for the extraction of total phenolic compounds (TPC expressed as gallic acid equivalents, GAE) from the leaves of Carica papaya L. using response surface methodology (RSM) coupled with a Box–Behnken design. The optimal TSE processing parameters were power 200W, temperature 60°C, extraction time 30 min, and liquid/solid ratio 50:1, with an extraction yield of 47.46 ± 3.61 mgGAE/gdw. It was found that TSE yield was higher as compared to thermal extraction & it can be concluded it is a more reliable method of extraction as compared to conventional heating method.

MUSHROOMS PRODUCTION: ADVANTAGES, DIFFICULTIES AND OPPORTUNITIES

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Mushroom farming as a supplementary source of income offers abundant prospects for supporting rural livelihoods. One advantage of cultivating mushrooms lies in their ability to potentially enhance sustainability and promote environmentally friendly agricultural practices. Cultivation of mushroom using an agricultural waste material as a growing medium, and the subsequent use of spent substrate has high value for agricultural activity such as, organic fertilizer; and potential utilization for animal feeding. Mushrooms have a short growth cycle, enabling fast harvests and frequent cropping, with high yields in small spaces, making them resource-efficient for farmers. Mushrooms are rich in essential nutrients such as vitamins, minerals and proteins and low in calories, carb, fat and sodium also, they are cholesterol-free making them a valuable addition to a balanced diet. Certain mushroom species possess medicinal properties and are used in traditional and modern medicine for their potential health benefits. Mushrooms are known to possess various nutraceutical properties, including their potential in preventing or treating conditions like Parkinson's disease, Alzheimer's disease, hypertension, and the elevated risk of stroke. Additionally, their antitumoral attributes are utilized in efforts to reduce the likelihood of cancer invasion and metastasis. Challenges in mushroom production include their high perishability, limited marketing infrastructure, issues with infected spawn, insufficient technical expertise, low risk tolerance, inadequate technical support, limited information flow, delays in spawn availability, difficulty in sourcing quality straw, and inadequate government involvement.

Keywords: Mushroom farming, agricultural waste, resource-efficient, nutraceutical

EVALUATING MUSTARD (BRASSICA JUNCEA) QUALITY AND YIELD IN RESPONSE TO DIVERSE NUTRIENT COMBINATIONS GROWN IN NORTH INDIAN PLAINS OF UTTARAKHAND

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An investigation was carried out in rabi season of 2021-2022 at the Rampur agricultural farm, Doon (P.G) College of Agriculture Science and Technology, Dehradun, Uttarakhand to evaluate the quality and yield of mustard (Brassica juncea L.) at different nutrient combinations and their effects on soil nutrient levels. The experiment comprised of nine treatments of organic and inorganic nutrient management including one common control in mustard. The experiment was laid out in randomized block design with three replications. The food and pharmaceutical sectors have taken notice of the unusual physical, functional, and nutritional qualities of edible oil. In recent years, the price of edible oil has increased dramatically. This research paper focuses on optimizing the chemical fertilizer use instant use of organic fertilizer. The results of experiment revealed that application of integrated nutrient management viz. T9, where 75% R.D.F (60:45:30 kg/ha) along with F.Y.M (1.5 t/ha) + Vermicompost (1 t/ha) + Green Manure (1 t/ha) + Gypsum (10 kg/ha) increased yield attributes and seed, stover yield, nutrient content and uptake followed by T8, 75% R.D.F (60:45:30 kg/ha) + Vermicompost (1.5t/ha) + Green Manure (1.5 t/ha), 50% R.D.F (40:30:20 kg/ha) + F.Y.M (5t/ha) + Green Manure (2.5 t/ha) + Gypsum (10 kg/ha) T5, and lowest data is recorded in Control (T1). From the investigation it can farmers can be recommended to use both organic and inorganic fertilizers when applying fertilizer to the soil because doing so greatly increased crop response.

Keywords: Interaction, Growth parameters, Integrated approach, Oil seeds, Siliqua

BOTANICALS: COMPREHENSIVE STRATEGIES FOR STORAGE PEST MANAGEMENT**BIPLOVE BALA****Department of Entomology, School of Agricultural Sciences, Nagaland University, Medziphema-Nagaland, India**

Managing stored pests presents challenges due to environmental and health concerns associated with synthetic pesticides. Botanicals offer eco-friendly alternatives. They contain bioactive compounds like alkaloids and phenolics, exerting pesticidal effects through various mechanisms. Common botanicals include plant extracts and essential oils. Botanicals exhibit a diverse array of pesticidal properties, including repellency, toxicity, growth inhibition and interference with pest development and reproduction. Therefore, a laboratory experiment was carried out, to evaluate the toxicant effect of some indigenous plant materials against *Callosobruchus chinensis* L. The plant materials were leaves of *Jatropha curcas* L., seeds of *Litsea citrata* and *Piper nigrum*. The insect mortality was recorded at 24, 48 and 72 hours after exposure. The highest mortality was observed in *Litsea citrata* @ 100 mg/ml (83.33%) followed by *Piper nigrum* (76.67%) and *Jatropha curcas* L. (73.33%). The finding showed the strong insecticidal effect of *Litsea citrata* extract against pulse beetle. Despite their potential benefits, challenges remain in the widespread adoption of botanicals for stored pest management. These include standardization of botanical extracts, variability in efficacy due to factors such as plant genotype and environmental conditions, regulatory considerations and acceptance by stakeholders. Botanicals represent a promising avenue for the management of stored pests, offering effective, sustainable and environmentally friendly alternatives to synthetic pesticides.

Keywords: Botanicals, Stored pests, Pesticides and Pest management.**LAND RESOURCE INVENTORY AND GIS TECHNIQUES FOR CROP SUITABILITY ASSESSMENT IN WATERSHED AREA OF NORTHERN DRY ZONE OF KARNATAKA****BIRADAR, I. B., SREENATHA, A., S. R. MULLA, TUPPAD, G. B., RUXANABI NARAGUND AND MAHESWARAPPA H.P.****Division of Natural Resource Management, College of Horticulture, Bagalkot, Karnataka-587104**

Inadequate land use practices lead to land degradation and a subsequent decline in agricultural productivity. To address this issue, land evaluation becomes crucial as it assesses the suitability of land for various purposes, particularly agriculture. This evaluation involves analyzing soil characteristics, land features and environmental factors like climate. Utilizing Geographic Information System (GIS) techniques, cropland suitability analysis aids in maximizing agricultural output by identifying the most suitable crops for specific areas. In this study, we conducted an assessment of land suitability and developed a crop suitability map based on soil attributes and climatic conditions in the Hulagbal micro watershed, situated in the Muddebihal taluka of Vijayapura district, Karnataka, India. Detailed land resource inventory and soil surveys were conducted to gather comprehensive data on land resources in the area. The predominant crops grown in this watershed included were chickpea, red gram, jowar and safflower. Through GIS analysis, 21 distinct land mapping units were identified, each was assessed for the suitability of 23 major crops, including agricultural staples such as sorghum, wheat, maize etc and horticultural crops like banana, grapes and mango etc. Results revealed that approximately 10% of the area was unsuitable due to hilly terrain and other causes. However, the remaining land showed varying degrees of suitability, ranging from not suitable (N) to highly suitable (S1) for both field and horticultural crops, depending on land and soil mapping units. This study provides valuable insights into the potential for cultivating a diverse range of crops within specific land units, offering opportunities for optimized land use and enhanced agricultural productivity. By leveraging data on crop-land suitability, farmers and decision-makers can devise tailored crop management strategies to maximize yields and promote sustainable land utilization.

Key words: Crop-land suitability, Mapping Unit, GIS technique, Watershed**GENETIC DIVERSITY AND POPULATION STRUCTURE ANALYSIS OF TARO GENOTYPES USING DNA MARKERS*****BIRUDUKOTA MONIKA¹, VIVEKANANDA BEHRA¹, SUBIR DUTTA¹, AVIJIT KUNDU¹ SUVENDU KUMAR ROY¹ AND RUPSANATAN MANDAL^{1,2}****¹Department of Genetics and Plant Breeding, Uttar Banga Krishi Viswavidyalaya, India****²RRTSZ, Directorate of Research, Uttar Banga Krishi Viswavidyalaya, India**

This study investigates the genetic diversity and population structure of 29 taro genotypes using 16 DNA primers. All primers exhibited 100% polymorphism, generating 1624 bands and 56 alleles. Analysis of marker efficiency parameters such as polymorphic information content (PIC), diversity index (DI), marker index (MI), and resolving power (RP) revealed informative markers. Population study revealed higher polymorphism in eddoo type compared to dasheen type, with dasheen type exhibiting greater genetic diversity. Analysis of molecular variance (AMOVA) showed high genetic variability within populations. Principal coordinate analysis (PCoA) indicated genetic diversity within populations but no diversity between populations. Dendrogram analysis revealed moderate to high genetic diversity within the population. Population structure analysis divided genotypes into four genetic groups, with some admixture genotypes. These findings contribute to understanding the genetic diversity and structure of taro populations, essential for conservation and breeding programs.

DANCE AMONG KOYA COMMUNITY**MS. BISHAKA OROW, PHD SCHOLAR IN HISTORY****Kalinga Institute of Social Sciences (KISS) Deemed to be University Bhubaneswar, Odisha (India)**

Dance holds a profound significance within the cultural world of the Koya community, an indigenous group inhabiting the forested regions of Chhatisgarh and Odisha. The paper explores the intricate significance of dance within Koya society, drawing upon both ethnographic research and cultural analysis. At the heart of Koya dance lies a profound connection to the community's history, mythology, and spiritual beliefs. Passed down through generations, these dances embody the collective identity and values of the Koya people, serving as a repository of their cultural heritage. Koya dance encompasses a wide range of forms, from ritualistic performances to joyous celebrations. Rooted within various communal events such as agricultural festivals and weddings, dance attends as a means of invoking ancestral blessings, promoting social organization, and reaffirming cultural continuity. Furthermore, Koya dance reflects on the harmonious relationship between humans and the natural world. Despite the resilience of Koya dance traditions, they face challenges in the wake of modernization and external influences. Rapid socio-economic changes and cultural transformations pose threats to the preservation and authenticity of Koya dance forms. The paper underscores the adaptive resilience of Koya dance, highlighting its capacity to evolve while retaining its cultural essence. By understanding and honoring Koya dance, we recognize its significance as a form of artistic expression, social cohesion, and cultural preservation within the broader context of indigenous communities worldwide.

Keywords:-Dance, Koya Community, Ritualistic Performance, Cultural Heritage, Social organization.**IMPACT OF PHYTOHORMONE ON YIELD, SOIL MOISTURE AND WATER PRODUCTIVITY OF DRIP IRRIGATED WHEAT****BISWAJYOTI BANIK¹, SANTOSH KORAV¹****Department of Agronomy, School of Agriculture, Lovely professional University (Phagwara), Jalandhar (Punjab), India**

A field experiment was conducted during Rabi 2022 and 2023 to study the performance of wheat (*Triticum aestivum* L.) under foliar application of phytohormones at different drip irrigation regimes at Lovely Professional University, Punjab. The experiment was laid out in a split-plot design with three replications. Treatments in the main plot were three irrigation levels (drip irrigation at 1.0 ETc, 0.8 ETc, and 0.6 ETc) and 3 phytohormones levels (SA, GA, ABA, and control) in the subplot. The result indicated that drip irrigation at 1.0 ETc recorded significantly higher growth, yield, and soil moisture attributes, soil moisture content percentage (29.2% in 2022 and 30.2% in 2023), and grain yield (60.2 q in 2022 and 60.9 q in 2023). Drip irrigation at 0.6 ETc consumed 28.5% in 2022 and 31.3% in 2023 less water but recorded significantly higher water productivity compared to drip irrigation at 1.0 ETc. Among phytohormones, SA was found superior over other phytohormones. The combination of SA with drip irrigation at 1.0 ETc recorded significantly higher growth and yield attributes, grain yield, and also delved positive impact under DI at 0.8 and 0.6 ETc. However, this superior treatment combination remained statistically non-significant in the case of soil moisture attributes. It was recommended for farmers to adopt drip irrigation at 0.8 ETc with foliar spray of salicylic acid which could increase water productivity by 4-5% and save water by 11-13%. It provides valuable insights for developing sustainable agricultural practices that balance water use efficiency with crop productivity.

Keywords: Crop evapotranspiration, salicylic acid, water productivity, soil moisture content, LAI**METAGENOMICS- UNVEILING THE CARBON-NITROGEN DYNAMICS IN RICE SOILS****BITOPAN DAS¹ AND BINOY KR. MEDHI²****¹M.Sc.Scholar, Department of Soil Science, Assam Agricultural University, Jorhat-13****²Professor, Department of Soil Science, Assam Agricultural University, Jorhat-13**

Soil, as a habitat, is a rich tapestry of microbial community, boasting a diversity that surpasses that of any other environment on Earth. In recent times, soil metagenomics has emerged as a crucial instrument, propelling our ability to delve into and exploit these intricate ecosystems without the constraints of traditional microbial cultivation methods. Through the extraction of soil DNA and the assembly of clone libraries followed by screening based on clone activities or gene sequence similarities, metagenomics unveils a comprehensive perspective of soil microbial communities, embracing bacteria, archaea, fungi, and viruses, collectively termed the soil microbiome. Unlike conventional microbiological techniques that barely scratch the surface, examining a mere 1% of the microbial populace, metagenomics delves deep into uncharted diversity, illuminating the vital roles microorganisms play in pivotal processes such as carbon and nitrogen cycling - essential for preserving soil fertility, especially in environments like rice soils. Studies leveraging metagenomics have identified essential microbial actors in rice soil ecosystems, such as *Bacillus* sp., *Pseudomonas* sp., and an array of fungal genera, driving nutrient cycling dynamics. Long-term applications of manure like farmyard manure (FYM) have been observed to heighten bacterial diversity, ultimately amplifying nutrient cycling efficiency. Moreover, metagenomic inquiries into agricultural strategies such as Bt rice cultivation have highlighted alterations in microbial diversity and metabolic pathways, influencing carbon and nitrogen dynamics in rice soils. Significantly, nitrogen-fixing cyanobacteria have been acknowledged for augmenting organic carbon and total nitrogen content in soil systems, augmenting microbial diversity. Gene-targeted metagenomics harbors the potential to decode the functional regulatory mechanisms shaping carbon and nitrogen dynamics in soil-plant-environment systems. By embracing the prowess of metagenomics, researchers stand poised to deepen comprehension of the intricate dynamics within soil microbial communities and their paramount role in safeguarding soil health and bolstering agricultural sustainability.

Keywords: Soil Metagenomics, Microbial Diversity, Carbon cycling, Nitrogen cycling

EXPLORING FARMERS ATTITUDE TOWARDS CLIMATE RESILIENT AGRICULTURAL TECHNOLOGIES IN TELANGANA STATE OF INDIA**BODA MAHESH NAIK^{1*}, A.K. SINGH², SAIKAT MAJI³, P. VENKATESAN⁴****Senior Research Fellow^{1*}, Principal Scientist⁴, ICAR-National Academy of Agricultural Research Management, Hyderabad
Professor², Assistant Professor³, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi**

Since the start of this century, significant attention has been directed towards climate change, primarily due to its profound impact on ecosystems and agriculture, notably affecting farmers in vulnerable regions. In a descriptive research work, the focus was on exploring farmers' attitudes towards Climate Resilient Agricultural (CRA) technologies within villages involved in the National Innovations on Climate Resilient Agriculture (NICRA) project [flagship project of Indian Council of Agricultural Research (ICAR)] in Suryapet and Khammam districts of Telangana state, India. A sample of 200 respondents from these districts was randomly selected to measure their attitudes towards these technologies and to assess the influence of various independent variables on their attitude. The study employed an *ex-post facto* research design. The findings unveiled that a significant majority of farmers in both Suryapet and Khammam (62.67% and 72.00% respectively) exhibited highly favorable attitudes towards CRA technologies. This was followed by those with moderately favorable attitudes (35.33% and 28.00% respectively), with a minimal proportion showing less favorable attitudes (2.00% in Suryapet and none in Khammam). Overall, nearly two-thirds (65.00%) of respondents displayed highly favorable attitudes towards CRA technologies which is considered as a precursor for adoption of these technologies by the farming community. Whereas, various profile characteristics such as access to water resources, economic motivation, willingness to take risks, educational background, exposure to both individual and mass media, and landholding size were found to have a positive and significant impact on farmers' attitudes towards CRA technologies. Moreover, upon employing the Z-test, a noticeable difference emerged in the attitudes of farmers between the Suryapet and Khammam districts, with farmers in Khammam exhibiting slightly more favorable attitudes compared to those in Suryapet. Therefore, the outcomes of this research study could assist extension organizations in effectively training and implementing climate-resilient technologies under the National Innovations on Climate Resilient Agriculture (NICRA) initiative.

Keywords: Agriculture, Attitude, Climate change, Resilient, Technologies**A STUDY ON STUDENTS AWARENESS TOWARDS ENVIRONMENTAL POLLUTION****BOJJAGANI BABITHA¹, GEETA CHITTAGUBBI², B JHANSI², PREMA PATIL³****¹Ph.D. Scholar, Dept. of Human Development and Family Studies, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, ² Professor and Head, Dept. of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India.****²Ph.D. Scholar, Dept. of Extension and Communication Management, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India****³Professor and Head, Dept. of Human Development and Family Studies, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India.**

Environmental behavior is critical for addressing global environmental challenges and achieving sustainability. It often involves a combination of individual actions, collective efforts, and policy changes to create a more sustainable and environmentally friendly world. Hence in this context to study the environmental behavior among degree students the present study adopted the exploratory research design. The participants were 61 students aged between 19- 29 years. Students were selected randomly from different colleges of the University of Agricultural Sciences, Dharwad, Karnataka. Data was collected by using the environment behavior scale developed by Archanaainghal, Urmila Verma and Pradeep K. Singhal. Data was analyzed through frequency, percentages, mean, index and chi-square. Results from the study indicated that, with respect to air pollution overall index score was 88.52 followed by 85.90 index score for water pollution. Regarding noise pollution index score was 75.73 and 60.00 for land pollution. With respect to water conservation, the index score was 88.19 and 80.00 for forest conservation. The biodiversity index was 74.09 and 86.88 for health management. Energy conservation and management index was 74.59 and environmental conservation & management Index was 82.13.

Keywords: agricultural students, environmental behavior, pollution, awareness, sustainable agriculture**A COMPARATIVE ANALYSIS OF QUALITY OF LIFE AMONG WOMEN MEMBERS AND NON-MEMBERS IN FARMER PRODUCER ORGANIZATIONS (FPOS)****BOJJAGANI JHANSI¹ AND ANNAPURNA N KALAL² GEETA CHITTAGUBBI³****¹Ph.D. Scholar, ² Rtd. Professor, Dept. of Extension and Communication Management, ³ Professor and Head, Dept. Resource Management and Consumer Science, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka.**

FPOs play a crucial role in empowering women by providing them with a platform to voice their concerns. FPO members demonstrated higher levels of self-confidence, autonomy, and a sense of belonging within their communities. Conversely, non-members face various challenges, including limited access to market opportunities, resources, and social networks. These disparities highlight the importance of FPOs in bridging gender-based inequalities in agricultural sector and foster sustainable development. In order to enhance the quality of life for all women in agriculture, policymakers, NGOs, and other stakeholders should recognize and support the role of FPOs. In this context a study on "Quality of Life of Women Members of Farmer Producer Organizations (FPOs) and Non-Members" was undertaken in the year 2022-2023 in Karnataka and Andhra Pradesh states of south India with a sample of 180 women members from FPO and 180 non-members

near to FPO. Thus, a total of 360 women members formed the sample. Data was collected through personal interview method and analysed through descriptive statistics, Correlation, Linear regression, Stepwise regression, Z test and ANOVA. Overall quality of life index of Karnataka FPO women members it was 62.87, whereas 61.05 was for Andhra Pradesh FPO women members. With regard to overall quality of life index of Karnataka FPO non-members it was 46.36 and 49.94 for Andhra Pradesh non-members. Correlation between the socio-personal characteristics with quality of life of FPO women members indicated that, experience in FPO (0.478**), achievement motivation (0.401**), extension Contact (0.434**) and innovativeness (0.376**) were found to be highly and positively correlated with quality of life at 1.00 per cent level. Regression analysis indicated that, R^2 value for FPO women members was 0.391 and F value was 7.581. Results from the study indicated that, highly significant difference of mean values was found (F- value 15.25**) at 1.00 per cent level.

Keywords: Farmer Producer Organizations (FPOs), Quality of Life, FPOs women members, non members.

DIVERSITY OF FINFISHES AND SHELLFISHES IN THE MULA RESERVOIR, MAHARASHTRA WITH A NOTE ON EXPLOITED FISHERIES

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A study on fishery and diversity of finfishes and shellfishes was carried out in the Mula reservoir of Maharashtra. Bimonthly sampling along ten stations was done for a period of eight months. A total of 40 species belonging to 25 genera under 14 families and 8 order were recorded during the study. Order Cypriniformes dominated in the composition (57%) of the species followed by Siluriformes (17%), Anabantiformes and Synbranchiformes (7% each) and Cichliformes, Gobiiformes, Osteoglosiformes and Perciformes (3 % each). Shellfishes represented by 8 species of which 6 were molluscs and 2 were crustaceans. Maximum diversity was observed in Site V and the minimum at Site IV. Maximum richness was found in Site VII and minimum was found in Site IV. The highest evenness was recorded at Site V and lowest was seen in Site I. Maximum dominance was seen in Site IV and minimum was seen in Site V. Out of the total 40 species 14 species were commercially important, they are *Oreochromis niloticus*, *Hypselobarbus kolus*, *Ompok bimaculatus*, *Salmostoma bacaila*, *Mystus cavasius*, *Mystus malabaricus*, *Labeo rohita*, *Mastacembelus armatus*, *Pangasius pangasius*, *Tor tor*, *Macrognathus pancalus*, *Channa marulius*, *Labeo catla*, and *Cyprinus carpio*. In eight months, the total production of the reservoir was calculated as 2,98,460 kg. And around 70,000-75,000 kg. production from culture, from the species *Pangasius pangasius*.

Keywords: Diversity, Freshwater, Reservoir, Finfish, Shellfish, Fisheries

SOIL HEALTH MANAGEMENT: THE KEY FOR HIGHER PRODUCTIVITY & PROFITABILITY

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Today, India is on verge to improve the agriculture productivity by improving soil quality and crop quality in a sustainable way. Hitherto, fertilizer recommendations for different crops were made on the basis of agronomic practices not on the soil test base. Injudicious & haphazard use of chemical fertilizer leads to greater mining of the soil nutrients to the extent of about 10 million tons every year and depleting the soil fertility. In the past two decades the fertility status of soils has decreased drastically i.e the soil nutrient response ratio has decreased from 14.06 in 1990-91 to 8.59 in 2010-11. Soil testing is the key for management decisions about fertilizer requirement and judicious use. To attain higher productivity and profitability, farmers need to realize that fertility levels must be measured as these measurements can be used to manage soil fertility. To avoid deterioration of soil in long run and visualizing the importance of balance nutrient in crop production, Government of India has started Soil Health Management Programmes like National Mission for sustainable Agriculture, Soil Health Card scheme, Paramparagat Krishi Vikas Yojana (PKVY), National Biogas and Manure Management Program, Nutrient Based Subsidy (NBS), Integrated watershed Management Programme, Coating urea with Neem (*Azadirachta indica*) oil. Moving forward, continued research and investment in soil management will be essential for addressing emerging challenges and opportunities in agriculture. From harnessing digital technologies for precision soil management to exploring regenerative agriculture practices that enhance soil health and carbon sequestration, there is immense potential for innovation and collaboration in this field. In conclusion, soil management is not merely a means to an end but a fundamental pillar of sustainable agriculture and environmental stewardship. By safeguarding soil health today, we can cultivate a resilient and prosperous agricultural future for generations to come.

Keywords: Soil health, sustainable agriculture

INCREASE THE SHELF-LIFE OF MORINGA CHHANA SPREAD USING SOME ANTIMICROBIAL AGENTS**¹BRAJAPAL SINGH, 2ANJALI YADAV, 3M. P. S. YADAV****1Guest faculty, 2Ph.D. Scholar, 3Professor****1,3Department of Animal Husbandry & Dairying, 2Department of Food Science & Nutrition, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, UP**

The Moringa Chhana Spread was prepared by using the cow milk with 0, 6, 12, 18 & 24% Moringa leaves extract, Coagulation temperature 70 & 750C and 1.5% Lactic acid was used as a coagulant, four levels of preservatives (0.1%) Potassium Metabisulfite, (0.1%) Calcium Propionate, (0.1%) Sodium benzoate and (0.1%) Sorbic acid. The prepared samples were stored at refrigerated temperature (50C) for 0, 15, 30, 45 and 60 days. The fresh and stored samples were analyzed for their cost of production, sensory, chemical and microbiological qualities. The cost of production was also determined. The min. cost of production obtained in case of Moringa Chhana Spread prepared from coagulation temperature at 750c with Lactic acid coagulant. The superior sensory quality of Moringa Chhana Spread obtained when samples prepared with 6 % Moringa leaves extract, best suitable coagulation temperature 750C, 1.5% Common salt, 1.5% Lactic acid as a coagulant and (0.1%) Sorbic acid preservative, which can be stored up to 45 days at refrigerated temperature at 50 C.

Key words: Moringa Chhana Spread, Antimicrobial agents, Cow Milk.**ELECTRON MICROSCOPY FOR STUDYING VIRAL PARTICLE MORPHOLOGY****BRIJESH, PINKI SHARMA, KIRAN KUMAWAT AND SUSHILA YADAV****Department of Plant Pathology, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture & Technology**

Electron microscopy is widely used in virology because viruses are generally too small for a direct inspection by light microscopy. Analysis of virus morphology is necessary in many circumstances, e.g., for the diagnosis of a virus in particular clinical situations or the analysis of virus entry and assembly. Moreover, quality control of virus particle integrity is required if a virus is propagated in cell culture, particularly if the virus genome has changed. In most cases already the basic methodology for transmission electron microscopy, i.e., negative staining and ultrathin sectioning, is sufficient to give relevant information on virus ultrastructure. The term “virosphere” describes both the space where viruses are found and the space they influence, and can extend to their impact on the environment, highlighting the complexity of the interactions involved. Studying the biology of viruses and the etiology of virus disease is crucial to the prevention of viral disease, efficient and reliable virus diagnosis, and virus control. Electron microscopy (EM) is an essential tool in the detection and analysis of virus replication. New EM methods and ongoing technical improvements offer a broad spectrum of applications, allowing in-depth investigation of viral impact on not only the host but also the environment. Indeed, using the most up-to-date electron cry microscopy methods, such investigations are now close to atomic resolution. In combination with bioinformatics, the transition from 2D imaging to 3D remodeling allows structural and functional analyses that extend and augment our knowledge of the astonishing diversity in virus structure and lifestyle. In combination with confocal laser scanning microscopy, EM enables live imaging of cells and tissues with high-resolution analysis.

Keywords: Cesium sulphate, Electron microscopy, Negative staining, Etiology, Virosphere**INTEGRATED MANAGEMENT OF NUTRIENT, WEED, DISORDER, PEST- DISEASES & PLANT PROTECTION****BRIJESH PATEL^{1*}, ABHISHEK SONKAR¹, AMAN KUMAR MAURYA², NIHARIKA SINGH³****1Research Scholar, Department of Fruit Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya****2Research Scholar, Department of Fruit Science, Rani Lakshmi Bai Central Agricultural University, Jhansi (U.P.)****3Research Scholar, Department of Vegetable Science, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya**

This comprehensive overview of the key components involved in the surveillance and mitigation of pests through an integrated pest management (IPM) approach. Pests pose significant threats to agriculture, livestock, and human health, necessitating effective strategies for monitoring, prevention, and control. The framework of IPM emphasizes a holistic and sustainable approach, integrating various methods to achieve optimal results. Surveillance is a critical aspect, involving regular monitoring systems, data collection on pest biology, and the implementation of advanced technologies. Prevention strategies encompass cultural practices, quarantine measures, and hygiene/sanitation protocols. Biological control methods, such as the introduction of natural enemies and microbial agents, play a pivotal role in reducing pest populations. Chemical control, when necessary, is approached judiciously within the IPM framework, with emphasis on selecting least harmful pesticides and minimizing environmental impact. Integrated Pest Management involves a collaborative effort, integrating decision support systems and leveraging technology for informed decision-making. Public awareness and education initiatives are crucial, involving farmers and local communities in sustainable agricultural practices. Legislative measures, including monitoring, enforcement, and research and development efforts, contribute to effective pest management. Early detection and rapid response mechanisms are established to prevent the establishment and spread of invasive species. This emphasizes the significance of adopting a comprehensive, balanced, and environmentally friendly approach to pest management, ensuring food security while minimizing the ecological impact of control measures. Integrated Pest Management emerges as a dynamic and adaptable strategy for addressing the complex challenges posed by pests in agricultural and ecological systems.

Keywords: Surveillance and Mitigation, Integrated Pest Management (IPM), Natural enemies

OPTIMIZATION OF GRAFTING TECHNOLOGY TO PRODUCE INTERSPECIFIC GRAFTED SEEDLINGS OF TOMATO (*SOLANUM LYCOPERSICUM* L.) AND BRINJAL (*SOLANUM MELONGENA* L.) AT FARMER LEVEL**BRIKSHA G. C., RACHANA MAGAR, KHUSBU RAUT, BITISHA SUBEDI, ASHMA TULADHAR, KUMAR LAMA****Department of Life Sciences, School of Science, Kathmandu University, Panchkhal, Kavre, Nepal**

Grafting involves joining of two different parts of one or more plants in such a way that both parts unite and continue their growth as a single plant. In this study, splice grafting was performed in tomato cv. Srijana and brinjal cv. F1 hybrid seedlings and healed at modified low cost healing and growing chambers at room temperature to evaluate the success rate of interspecific grafting with aims to transfer optimized protocol to the farmers. Brinjal seedling of age 35 days having 0.7 mm stem diameter size and tomato seedling of age 20 days having 0.6 mm diameter size were selected for grafting as a rootstock and scion respectively. A modified low cost healing chamber was developed and humidity was maintained manually to boost the success rate of grafting. Grafted plants were kept in modified healing chamber for 9 days and 3 days at growing chamber before removing grafting clip. Particularly, 88.46% of total interspecific grafted plants were observed successfully joined between the scion and rootstock with proper graft union. Thus, interspecific grafting of tomato and brinjal seedlings by the use of low cost healing and growing chambers was achieved and it can be directly implemented by vegetable nursery growers and farmers. Further investigation is suggested to evaluate resistant or tolerant effect of interspecific grafted plants with root-knot nematode and bacterial wilt disease.

Keyword: Brinjal, Healing chamber, Inter-specific grafting, Tomato**IMPACT OF PYRIMIDINE DERIVATIVE ON ANTIOXIDANT ENZYMES IN THE BRAIN OF *HETEROPNEUSTES FOSSILIS*****BULBUL ALI, NEELAM SHARMA, ROHIT KUMAR, ABHA MISHRA*****Department of Zoology, Babasaheb Bhimrao Ambedkar University, Raebareli Road, Lucknow, UP**

This study investigated the influence of pyrimidine, a fundamental heterocyclic compound crucial for DNA and RNA, on the antioxidant enzyme profile within the brain of *Heteropneustes fossilis*, a highly valued freshwater catfish widely sought in the Indian fish market. Various doses of pyrimidine, ranging from 10 fg/mL to 1 mg/mL, were administered to observe their effects on brain histology and blood parameters. The experimental design involved treating the fish with a low concentration of pyrimidine (10 pg/mL) for different durations (1, 5, and 21 days), after 21 days the fishes were left for recovery about one week alongside a control group was concurrently maintained to facilitate comparative analysis. The assessment focused on oxidative parameters indicative of *H. fossilis* brain health. Results showed that pyrimidine significantly maintained levels of key antioxidant enzymes (such as catalase, superoxide dismutase, and peroxidase), reduced lipid peroxidation content, compared to the control group. These parameters served as vital indicators of cellular oxidative stress and overall brain health in the fish. In conclusion, this study underscores the potential therapeutic efficacy of pyrimidine in bolstering brain health in *H. fossilis*. The findings suggest that pyrimidine treatment, administered in a duration-dependent manner, could serve as a promising avenue for enhancing antioxidant defence mechanisms and mitigating oxidative stress in this species. Such insights not only contribute to our understanding of pyrimidine's physiological impact but also hold implications for the broader field of aquatic organism health and welfare.

Key words: Antioxidant enzymes, *Heteropneustes fossilis*, Pyrimidine**GENETIC ENHANCEMENT OF CANE AND JAGGERY PRODUCTIVITY IN SUGARCANE (*SACCHARUM OFFICINARUM* L.) UNDER ORGANIC CULTIVATION****C. DEVARAJU¹, SANJAY B. PATIL², P. K. MALLIKARJUN^{3*} AND N. G. HANAMARATTI⁴**¹M.Sc, Department of Genetics and Plant Breeding, UAS, Dharwad, Karnataka, India^{2,4}Professor, Department of Plant Breeding and Genetics, UAS, Dharwad, Karnataka, India³Ph.D. Scholar, Department of Genetics and Plant Breeding, UAS, Dharwad, Karnataka, India

Aim: To assess the exploitable variability in the first clonal population of sugarcane for cane, sugar and jaggery productivity and quality parameters. **Methodology:** The pre-selected population comprising 226 progenies advanced from the sexual generation obtained from open pollinated standard jaggery varieties were evaluated in an augmented design under organic cultivation practices during 2013-14 cropping season at ARS, Sankeshwar. **Results:** The preselected population of 226 progenies derived from open pollination of commercial jaggery varieties study showed varied genetic variation for key traits. For cane, sugar and jaggery yield and quality parameters, top 15 genotypes showing superiority over popular best jaggery standard Co 92005, among them six genotypes viz., SNK 10131, SNK 10159, SNK 10184, SNK 10260, SNK 10162 and SNK 10229 were promising as they recorded most acceptable features particularly jaggery productivity and quality parameters under organic cultivation. **Interpretation:** Most promising genotypes Identified for jaggery productivity and quality under organic cultivation, hold potential for commercial cultivation and/or as parents, after confirming their productivity potential through advanced yield trials, small and big mill tests. Directed parental selection of jaggery varieties holds promise for realising genetic enhancement under organic cultivation.

Keywords: Sugarcane, Jaggery Yield, Organic Cultivation, Cane Yield

ISOLATION, SCREENING AND FUNCTIONAL CHARACTERIZATION OF RHIZOBIUM FROM GREEN GRAM (VIGNA RADIATA L.)**C. MRUDHULA, DR. SHUBHA. S* AND DR. SANTHOSH G. P.****Department and Institution: Department of Microbiology, University of Agricultural Sciences Dharwad (UASD)**

Rhizobium forms symbiotic associations with legumes, facilitating nitrogen fixation and thus contributing significantly to sustainable agriculture. The study was conducted in Department of Microbiology at College of Agriculture, Dharwad with an aim to isolate Rhizobium strains which can nodulate green gram as a part of Master research. Rhizobia were isolated from green gram growing fields of Dharwad district. The standard isolation methodology was followed by using Yeast Extract Mannitol Agar (YEMA) medium. A total of 10 efficient isolates were selected based on extra-cellular polysaccharides production on YEMA and all isolates were screened and characterized further. Screening for in vitro N₂ fixation using Leonard jar assembly showed that shoot nitrogen percentage of green gram isolates ranged from 2.35%-3.10%. Morphological characterization of 10 rhizobial isolates revealed circular, translucent colonies with colony size of 2-4 mm and milky pink to creamy white coloration, indicating typical Rhizobium traits. Biochemical tests including gram staining, citrate utilization and growth on specific media confirmed the tentative identification of the isolates as Rhizobium spp. Additionally, functional assays demonstrated their ability to produce indole-3-acetic acid (IAA) and siderophores, vital for plant growth promotion and iron chelation, respectively. All isolates were positive for IAA production with a range of 35.853-5.905 µg/ml production and 7 isolates among 10 isolates were positive for siderophore production. These findings contribute to understanding the diversity and functionality of Rhizobium strains, crucial for optimizing their utilization in sustainable agricultural practices

Keywords: Characterization, Green gram, In vitro nitrogen fixation and Rhizobium**ISOLATION AND CHARACTERIZATION OF PESTICIDE DEGRADING NITROGEN FIXING BACTERIA FROM WHEAT SOIL SYSTEM****CHAHAT SHARMA¹, POOJA SHARMA²****¹Ph D scholar, Department of Bio-Sciences and Technology, MMEC, Maharishi Markandeshwar (Deemed to be) University, Mullana, (Ambala)****²Department of Bio-Sciences and Technology, MMEC, Maharishi Markandeshwar (Deemed to be) University, Mullana, (Ambala)**

Due to toxicity and persistently accumulation of cypermethrin in soil, it is urgent to detoxify this pesticide and its metabolites from the environment using indigenous microbial bioremediation. In the present study, we have isolated nitrogen fixing bacteria from wheat soil system. On the basis of biochemical and morphological parameters, we have selected 6 bacterial isolates (Y-18, Y-13, Y-11, A-10, KU-40, KA-23) for further cypermethrin degradation. It was confirmed that all the six nitrogen fixing bacteria showing similarity to *B. subtilis* using 16S rRNA primers. Pesticide tolerant pure colonies of nitrogen fixing bacteria has been isolated by growing them in Burk-agar plates enriched with cypermethrin at different concentration (25 ppm, 50 ppm, 75 ppm, 100 ppm). Furthermore, pesticide degradation from six isolates is confirmed by monitoring the bacterial growth curve in carbon and nitrogen deficient media (MSM) at various concentration of cypermethrin using UV-Spectrophotometer. Linear graph of each bacterial growth in cypermethrin enriched medium at 50 ppm and 100 ppm showed that these bacteria are tolerant to cypermethrin. Each bacterial growth was gradually increases from 2nd day to 10th day. Y-13 showed maximum tolerant against cypermethrin at 600 nm on 10th day. The percentage of degradation of cypermethrin was calculated by analysing its residue in MSM at 280 nm using UV spectrophotometer. At 50 ppm, 3 isolates Y-13, KU-40 and Y-11 showed complete degradation (99.9%) and Y-18, A-10 and KA-23 showed more than 90% of degradation after 10 days. It was observed that half of the cypermethrin was degraded within 6th day of incubation by all the bacterial isolates (Y-18, Y-13, Y-11, A-10, KU-40, KA-23) at 100 ppm. The goal of this study is to isolate novel cypermethrin-degrading nitrogen fixing bacteria from wheat soil system for crop improvement and agricultural sustainability.

Key words: Pesticide, cypermethrin, nitrogen, bacteria, minimal salt media, diazotrophs**STANDARDIZATION OF DIFFERENT PRE-SOWING SEED TREATMENTS PHOSPHATE SOLUBILIZING BACTERIA, RHIZOBIUM, AZOSPIRILLUM AND TRICHODERMA ON GROWTH, YIELD AND YIELD ATTRIBUTING TRAITS OF FRENCHBEAN (PHASEOLUS VULGARIS L.) VARIETY ELLORA NO-11****CHANDAKA DHANA* AND PRASHANT KUMAR RAI******M. Sc scholar*, Department of Seed Science and Technology, NAI, SHUATS, Prayagraj, Uttar Pradesh****Assistant Professor**, Department of Genetic and Plant Breeding, NAI, SHUATS, Prayagraj, Uttar Pradesh**

The Present investigation entitled 'Standardization of Different Pre-Sowing Seed Treatments Phosphate Solubilizing Bacteria, Rhizobium, Azospirillum and Trichoderma on growth, yield and yield attributing traits of Frenchbean (*Phaseolus vulgaris* L.) variety Ellora No-11'. Application of various chemical fertilizers and other inorganic inputs are used to enhance the production of the crops. The over usage of these inorganic inputs may affect the production of food which are produced by these methods with toxins which are dangerous for human consumption. The study was designed to check the response of various treatments with different concentration and time duration on linseed to find out the effect of organic seed treatment on different growth and yield parameters such as Field emergence, plant height @30DAS, 60DAS, Number of primary branches, Days to 50% flowering, Number of pods/plant, Number seeds/ pod, seed yield/ plot, Seed index, Biological yield and Harvest index and seedling parameters germination(%), Root length(cm), Shoot length(cm), Seedling length(cm), Seedling fresh weight(g), Seedling dry weight(g), Vigor index-I, Vigor index-II, Seed density(gcm⁻³), Electrical conductivity(dsm⁻¹) of

French bean as a step towards chemical less farming. The variety of French bean was collected from the department of Genetics and Plant Breeding and were treated by using an PSB @ 12%, 10%, 8% for 6hrs, *Rhizobium* @ 12%, 10%, 8% for 6hrs, *Azospirillum* @ 12%, 10%, 8% for 6hrs and *Trichoderma* @ 12%, 10%, 8% for 6hrs. It is found that all treatments showed improved performance than untreated seeds, but it was observed that seed treated with *Rhizobium* (12% for 6hrs) performed better in comparison to other treatments. This study can be helpful to reach new horizons of research in the field of seed technology to overcome the germination problem, improving crop stand and yield ultimately.

Keywords: (Frenchbean, *Azospirillum*, PSB, *Rhizobium*, *Trichoderma* and morphological parameters)

QUALITATIVE AND QUANTITATIVE PHYTOCHEMICAL ANALYSIS OF LEAF EXTRACTS OF *MIRABILIS VISCOSA*

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Plants have long been utilized for both culinary and therapeutic purposes. Commercially, phytochemical study of the plant is quite important, and there is a lot of interest in it for potential medicines. The aim of the current study was to explore the important bioactive components of leaf extracts from *Mirabilis viscosa* in both qualitative and quantitative analysis using polar solvents such as water, methanol, ethanol, acetone, and ethyl acetate. The non-polar solvents are hexane and chloroform. Standard techniques were employed to determine the phytochemical components' qualitative and quantitative analysis. A qualitative study of *M. viscosa* revealed the presence of secondary metabolites, including alkaloids, protein and amino acids, carbohydrates, reducing sugar, and saponin. Phytosterols, Glycosides, Tannins, Glycosides, Phenols, Coumarins, Triterpenoids. Through quantitative analysis, the highest concentration of total flavonoids in ethyl acetate was found. Quercetin was used as a standard, and total alkaloids in ethanol were found to be equivalent to atropine sulphate. Total phenol in methanol was found to be equivalent to gallic acid. Additional study on the plant will be helpful in identifying and analysing its secondary metabolites, which will be very helpful in treating a variety of illnesses and in the pharmaceutical industry in the production of new medications. Further bioactive components from the plant will be isolated, and these might eventually be applied to medicine.

Keywords: Qualitative and Quantitative, Secondary metabolites and *Mirabilis viscosa*.

IMPACT OF VARYING ZINC LEVELS WITH RDF APPLICATION ON THE GROWTH AND YIELD PERFORMANCE OF WHEAT (*TRITICUM AESTIVUM* L.)

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The current study titled "Impact of varying Zinc levels with RDF application on the growth and yield performance of Wheat (*Triticum aestivum* L.)" was conducted at the Agricultural Research Farm of Uttaranchal (P.G.) College of Bio-Medical Sciences & Hospital, Dehradun and partially at PLANTICA- Indian Academy of Rural Development, Dehradun, Uttarakhand. The experiment followed a RBD design with 5 NPK levels: Control Plot, 100%RDF, 100% RDF + 5 KG Zinc, 75% RDF + 10 KG Zinc, 50% RDF + 15 KG Zinc, 100% RDF + 10 tonne/ Hac. The system of sowing involved a spacing of 22.5 cm Row to Row and was replicated thrice. Urea, single super phosphate, and muriate of potash were used as nitrogen, phosphorus, and potassium sources respectively, with a portion applied at sowing and the remainder split into two doses. Observations on growth parameters such as plant height were taken at 30, 60, and 90 DAS and at harvest, while yield-related traits like effective tillers m⁻², spike length, grains per spike, and 1000-grain weight were recorded at maturity. Significant variations in growth parameters were noted among the different NPK levels tested. The treatment T5 (50% RDF + 15 KG Zinc) displayed the highest plant height and dry matter accumulation, as well as the maximum grain, straw, and biological yield. Moreover, the treatment T5 (50% RDF + 15 KG Zinc) exhibited the highest B:C ratio.

Keyword : Murate of potash, Single super phosphate, dry matter.

DETERMINING THE BASELINE SENSITIVITY AND FUNGICIDE RESISTANCE IN PATHOGENIC AND BENEFICIAL FUNGI AGAINST CARBENDAZIM

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Fungicide resistance poses a significant challenge in agriculture and plant pathology, threatening crop health and yield. This phenomenon occurs when fungi develop mechanisms rendering fungicides ineffective, driven by factors such as overuse, genetic mutations, and selective pressure. This study investigates baseline sensitivity and resistance dynamics in various fungal pathogens of agricultural importance, focusing on their response to carbendazim through *in vitro* experiments. Key findings reveal varying sensitivity levels among *Colletotrichum capsici*, *Fusarium oxysporum*, *Macrophomina phaseolina*, *Pleurotus sajor-caju*, *Trichoderma viride*, *Rhizoctonia solani*, and *Sclerotium rolfsii*, with notable resistance emergence in *Colletotrichum capsici* and *Pleurotus sajor-caju*. While the EC₅₀ value couldn't be determined in *C. capsici*, other fungi exhibited varying levels of resistance, with resistance observed at concentrations ranging from 2.5 to 2080.150 µg ml⁻¹ upon subculturing at the same concentrations to assess the stability of the resistant strains. In conclusion, this study provides a comprehensive understanding of baseline sensitivity and resistance dynamics pathogens exposed to carbendazim. These insights are crucial for developing effective strategies for fungal disease management in agriculture and horticulture, contributing to sustainable practices and disease control efforts. Understanding fungicide resistance mechanisms is essential for ensuring the long-term viability of agricultural systems.

Key words: Fungicide resistance, Carbendazim

FLIGHT OF HEALING: INTEGRATING BIRDS AND THEIR BY-PRODUCTS IN TRADITIONAL MEDICINE**CHANDER SHEKHAR, RAKESH KUMAR, AND AMIT KUMAR SHARMA****1Department of Animal Sciences, Central University of Himachal Pradesh**

Birds have long been integral to traditional healthcare systems across various cultures globally. The present study provides a comprehensive overview of the diverse uses of birds and their by-products in traditional human healthcare practices. The utilization of bird-based remedies encompasses a wide array of ailments, ranging from physical maladies to psychological conditions. Feathers, renowned for their symbolic significance and perceived healing properties, are often employed in rituals, ceremonies, and therapeutic interventions. Moreover, avian eggs are valued for their nutritional content and have been historically utilized to address specific health concerns, such as fertility issues and malnutrition. These practices often draw on the perceived associations between certain bird characteristics and desired health outcomes, reflecting the intricate interplay between cultural beliefs and therapeutic practices. Furthermore, the use of bird calls and songs in healing rituals underscores the significance of auditory stimuli in traditional healthcare systems. Bird vocalizations are believed to possess restorative qualities, influencing emotional well-being and fostering a sense of connection with nature. Despite the enduring popularity of avian-based therapies in traditional healthcare, their efficacy and safety remain subjects of debate and scientific inquiry. Integrating indigenous knowledge with contemporary research methodologies offers valuable insights into the potential therapeutic benefits of bird-derived remedies while respecting cultural traditions and ecological sustainability. In conclusion, the multifaceted uses of birds and their by-products in traditional human healthcare systems underscore the rich tapestry of cultural diversity and ecological interconnectedness. Understanding and preserving these practices not only contribute to the preservation of cultural heritage but also hold promise for informing modern healthcare practices and fostering holistic approaches to well-being.

Keywords: Avian, indigenous knowledge, By-Products, Traditional Medicine.**SIGNIFICANCE OF MUSHROOMS IN DAILY LIFE-AN INSIGHT****PROF. (DR.) CHANDRA KANT SHARMA, B.SC., M.SC., M.TECH., PH.D., FWRA****Professor and Head-Horticulture, School of Agriculture (ICAR Accredited) ITM University, Gwalior****Former Dean, Principal and Head of Institute (HoI)**

Mushrooms, often overlooked, play a significant role in routine life due to their nutritional, medicinal, and ecological importance. This paper explores the multifaceted significance of mushrooms in daily life, emphasizing their diverse applications and benefits. From culinary delights to medicinal marvels, mushrooms offer a plethora of opportunities for enhancing human health and well-being. This article highlights the importance of incorporating mushrooms into daily diets and leveraging their medicinal properties for improved health outcomes. Mushrooms hold a prominent place in various cultures worldwide, not just for their distinct taste and texture but also for their nutritional richness. They are low in calories and fat, yet high in essential nutrients like vitamins, minerals, and antioxidants. Incorporating mushrooms into daily meals can enhance nutritional intake, promoting overall health and vitality. Beyond their culinary appeal, mushrooms boast remarkable medicinal properties. Certain species have been used in traditional medicine for centuries to treat various ailments ranging from infections to immune disorders. Modern research continues to unveil the therapeutic potential of mushrooms, with compounds like beta-glucans and polysaccharides showing promise in boosting immune function and combating diseases such as cancer and cardiovascular conditions. Moreover, mushrooms play a crucial ecological role as decomposers, breaking down organic matter and recycling nutrients in forest ecosystems. They contribute to soil health and biodiversity, making them indispensable for maintaining ecological balance. In daily life, mushrooms offer versatile options for culinary creativity, from savoury dishes to umami-rich broths and sauces. Their unique flavours and textures make them a favourite among chefs and home cooks alike. Additionally, the growing availability of mushroom-based products, such as supplements and extracts, underscores their rising popularity in health-conscious communities. Mushrooms wield immense significance in daily life, enriching diets, promoting health, and contributing to ecological sustainability. Recognizing and embracing the diverse benefits of mushrooms can lead to a more balanced and fulfilling lifestyle.

Keywords: Mushrooms, Nutrition, Culinary, Medicinal, Health, Ecological, Significance, Daily Life**A REVIEW ON CHANGING THE SCENARIO OF CLIMATE CHANGE: WHICH INFLUENCES THE DYNAMICS OF SOIL ORGANIC MATTER****CHANDRAKANT CHAUBEY^{1*}, SATENDRA KUMAR², ANAND KUMAR CHAUBEY³ AND VAISHALI SINGH⁴**^{1,2&4}**Department of Soil Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut**³**Department of Soil Science, Banda University of Agriculture and Technology, Banda**

Soil organic matter is essential to maintain soil health. Due to constant climate change, the dynamics of the Soil organic matter, its fractions induced in several components are strongly influenced by climate change trends. It includes the change in temperature, air, moisture etc. various soil organic elements which remains as dead plants, animals, microbes and their by-products and ultimately add on soil organic matter. The rise in temperature associated with climate change accelerates its degradation and reduces its content in soil with the release of various green house gases. Decomposition rate and microbial activity are affected by soil moisture. Prolonged periods of drought can hamper decomposition due to lack of microbial activity, while increased humidity during the wet season can accelerate it. Significant amounts of carbon dioxide (CO₂) and methane (CH₄) could escape from the permafrost and accelerate climate change. High CO₂ concentration in the atmosphere leads to accelerate plant growth in some areas. This increases organic stock in the soil. In addition to this, climate change impacts may vary depending on regional factors, crop species and land management techniques. Understanding and predicting these dynamics is critical to mitigating climate change, maintaining soil health, and ensuring ecosystem functioning.

Keywords: Carbon Stock, Climate, GHG etc.

Characterization of morphological diversity of little millet by principal component analysis¹CHANDRIKA PAUL, ²HEMLATA KOTKAR, ¹SANJAY G. AUTI¹Post-Graduate Department of Botany and Research Centre, H.P.T. Arts and R.Y.K. Science College, Nashik, Maharashtra, India²Department of Botany, Savitribai Phule Pune University, Pune, Maharashtra, India

Little millet (*Panicum sumatrense* Roth) is one of the nutritious minor millets grown in wide environmental conditions, characterized by high temperature, low fertile soil with no inputs of fertilizers. In the present study, 84 landraces were collected from Northern part of Maharashtra state (India) and were given accession number from C1 to C84. All the accessions were evaluated for their genetic diversity by employing principal component analysis (PCA) based on quantitative traits viz., plant height, flag leaf blade length, flag leaf sheath length, inflorescence length, panicle length, inflorescence secondary branch number, panicle weight, 1000 seed weight, yield per panicle etc. Results revealed variations in morphological traits, that the first 3 components show 70% variability, while PC1, PC2 and PC3 contributes 39.7%, 20.1% and 11.1% respectively. Dendrogram based on cluster analysis grouped accessions into 5 main clusters on the basis of similarity and dissimilarity existed in morphological traits. Plant height, panicle length, 1000 seed weight and yield/panicle were emerges as most significant traits. Obtained results can be used to understand genetic diversity existed in landraces and to find out economical traits which can be used for improvement of crop.

Keywords: Little millet, genetic diversity, morphological traits, principal component analysis**ADVANCEMENTS OF ARTIFICIAL INTELLIGENCE AND ROBOTICS IN HORTICULTURE: IMPACTS, INNOVATIONS, AND APPLICATIONS****CHARU GUPTA****Amity Institute for Herbal Research & Studies, Amity University UP, Sector-125, NOIDA-201313, G.B. Nagar (UP, India)****Corresponding Author Email: cgupta@amity.edu**

India's diverse soil and climate conditions offer the potential to grow various horticultural crops, including fruits, vegetables, medicinal, aromatic, and ornamental plants, which are essential for health, medicine, and aesthetics. Vegetables and fruits contribute to 90% of the total horticultural production in India, ranking the country next to China in global fruit and vegetable production. Horticulture plays a significant role in improving rural incomes and creating employment opportunities for the youth. Intelligent systems and artificial intelligence (AI) have enhanced the cultivation and management of horticultural crops, despite the sector being subjected to various stresses affecting yield and quality. AI applications in horticulture range from disease diagnosis and produce-maturity identification to field management and automation systems in irrigation. AI in horticulture aids in disease diagnosis, nutrient deficiency recognition, and real-time pest identification, reducing pesticide use and soil contamination. It also helps automate irrigation, enhance produce maturity identification, and optimize field management for resource efficiency. Drones facilitate effective crop monitoring and can predict production inefficiencies, leading to better management practices. Drones enhance crop monitoring and are valuable in crop spraying, while robotics assist in harvesting, sorting, and grading of horticultural produce. Robots are being used for tasks such as setting pots in greenhouses, fruit harvesting, and the Quad Duster system for enhancing pollination. Horticulture faces challenges such as labour availability and biotic/abiotic stresses, which technology, AI, and robotics aim to address for more efficient production. Thus, the present topic discusses the role and applications of Artificial Intelligence and their impact on Horticulture.

Keywords: Horticulture, Artificial Intelligence, Drones, Robots, Sustainability, Agriculture**ISOLATION AND CHARACTERIZATION OF PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) TRAITS FROM THE RHIZOSPHERE OF HIPPOPHAE RHAMNOIDES (SEABUCKTHORN)****CHAUHAN S¹, DEVI S^{1#}.**¹Research Scholar, Department of Microbiology, HP University, Summer Hill, Shimla, India^{1#} Associate Professor, Department of Microbiology, HP University, Summer Hill, Shimla, India

Seabuckthorn (*Hippophae rhamnoides*) is esteemed for its resilience in harsh environments, owing in part to symbiotic relationships with Plant Growth-Promoting Rhizobacteria (PGPR) in its rhizosphere. This study aimed to isolate, characterize, and identify PGPR traits in microbial communities from seabuckthorn rhizospheric soil. Rhizospheric soil samples were collected from various regions of Himachal Pradesh, with bacterial strains isolated and purified using selective media. Characterization involved morphological and biochemical techniques to identify strains. PGPR traits were assessed through in vitro assays, including phosphorus solubilization, nitrogen fixation, synthesis of Indole Acetic Acid (IAA), production of Ammonia and formation of biocontrol agent such as HCN and Siderophores. Promising isolates exhibiting multiple PGPR traits were identified, shedding light on their mechanisms and potential applications in sustainable agriculture and environmental management. This research enhances understanding of plant-microbe interactions and offers insights into harnessing PGPR for agricultural sustainability in marginal lands.

Keywords: Seabuckthorn, Plant Growth-Promoting Rhizobacteria (PGPR), IAA, HCN production, phosphorus solubilization, nitrogen fixation, sustainable agriculture.

BIOMETHANATION OF VARIOUS BIOWASTE AVAILABLE IN KONKAN REGION OF MAHARASHTRA STATE**CHAVAN P.P.^{1*}, SHRIRAME H.Y.², PATIL M.B.³, KHANDETOD Y.P.⁴, MOHOD A.G.⁵, DHANDE K.G.⁶, BODAKE P.S.⁷****^{1&3}Assistant Professor, ²Senior Research Assistant, ⁴Ex-Director of Research, ⁵Professor & Head, ⁶Associate Professor, ⁷Director of Instruction, *Department of Renewable Energy Sources, College of Agricultural Engineering and Technology, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.). Email- chavan_poonam21@rediffmail.com**

Biowaste, also known as biodegradable waste, is a waste that mainly consists of organic materials. The biowaste comprises of agro residue, domestic wastes, municipal solid waste, garden waste, paper, waste from poultry farms, cattle farm, slaughter houses, waste from dairy, sugar mill, distillery, paper mill, oil extraction plants, food processing, starch processing and leather industries etc. Biowaste have a large unexploited energy potential that could be harnessed by the production of methane (CH₄)-rich biogas through 'Anaerobic Digestion' (AD). The various cellulolytic crop residues like straw of wheat, rice and sorghum, maize stalk can be a good feedstock for anaerobic digestion with a suitable pretreatment. The composition of biomass is largely diverse and dependent upon its origin and species plant type, climatic conditions etc. The viability and feasibility of bio-energy generation from agricultural biomass depends upon the characteristics of biomass available. Characteristics of biomass feedstock vary greatly which impacts the quality of the fuels derived thereof. Elemental composition of biomass is an important property, which defines the energy content and determines the clean and efficient use of the biomass materials. The selected biowaste available from crop residues along with weeds available in konkan region of Maharashtra were considered for study. Laboratory experiment for biomethanation of various biowaste was carried out in the lab scale models of 5.0 liter capacity polythene containers. From *Kharif* season, 10 bio wastes were combined with 04 dung proportions, thus 40 combinations were finalized and one control treatment. For *Rabi* season biowaste, 07 crop and weed wastes were combined with 04 dung proportions, thus 28 combinations were finalized and one control treatment. During laboratory experiment, for *Kharif* season biowaste initial slurry pH ranged from 4.56 to 6.91 while outlet slurry pH ranged from 5.64 to 8.47 which indicated that the pH of outlet slurry was more than the pH of slurry feed. The temperature of digester ranged between 26.08 to 42.15 °C, which was suitable for biogas production. The cumulative biogas production was highest for treatment KFW6 (75 % rice straw + 25% dung) followed by the treatment KFW16 (25 % bhamburda+ 75 % dung), KFW40 (25 % dry grass + 75 % dung), KFW11 (50 % lajaloo + 50 % dung). During the laboratory test of *Kharif* season biowaste R² value varies 0.947 to 0.999, which indicated there was good relationship between the independent variables and dependent variable. It showed all the combinations including control treatment have gas production with various proportions. During laboratory experiment, for *Rabi* season biowaste initial slurry pH ranged from 4.96 to 6.15 while outlet slurry pH ranged from 6.55 to 8.49. The temperature of digester ranged between 21.78 to 42.08 °C during the study period, which was suitable for biogas production. The cumulative biogas production was highest for treatment RFW14 (75 % cow pea waste+ 25 % dung) followed by the treatment RFW13 (100 % cow pea waste), RFW15 (50 % cow pea waste+ 50 % Dung), RFW9 (100 % dry grass). During the laboratory test of *Rabi* season bio wastes R² value varies 0.702 to 0.991, which indicated there was good relationship between the independent variables and dependent variable. It showed all the combinations including control treatment have gas production with various proportions.

Keywords: Biowaste, biomethanation, laboratory studis**AGRI-SILVI-HORTI SYSTEMS FOR CLIMATE RESILIENCE, BIOMASS AND CARBON SEQUESTRATION IN NORTHERN TRANSITIONAL ZONE OF KARNATAKA, INDIA****CHAVAN RAJU L., RATHOD R.S., VENKTESH L. INAMATI S.S. HANUMANTHA M. HUNDEKAR S.T. AND SHAPURMATH G.****Dept. of Environmental Science and Agroforestry, University of Agricultural Sciences, Dharwad**

Implementation of Silvi-Horti Systems for climate resilience, biomass management, litterfall regulation, soil nutrition enhancement and carbon sequestration in Northern Transitional Zone. Study endeavours to assess correlation between tree volume, biomass and carbon sequestration, to quantify litterfall and its subsequent impact on soil physical and chemical properties under 42-year-old Silvi-Horti system established on deep black clay soils at Forest Research Station, Prabhunagar, Dharwad, Karnataka, India. Observations were initiated from 2019 to 2022. Short-rotation species such as *Eucalyptus tereticornis* and *Acacia auriculiformis* exhibit commendable performance, boasting biomass rates of 81.05 and 78.80 ton/ha, respectively, accompanied by corresponding carbon sequestration rates of 38.09 and 37.03 ton/ha, respectively, due to attributed to their rapid growth rate, adaptability to a range of agroclimatic zones, and ability to rapidly produce biomass for energy, thus contributing to reduced greenhouse gas emissions. *T. grandis*, characterized by moderate growth, achieves biomass and carbon sequestration rates of 58.71 and 27.59 ton/ha, respectively, while slow-growing long-rotation species such as *D. latifolia* yield biomass and carbon sequestration rates of 12.38 and 5.92 ton/ha, respectively. Integration of Sapota plants with *L.lanceolata* and *D.latifolia* within plantation results in substantial increase in total tree biomass and carbon sequestration. In Silvi-Horti system, production of fruit exhibits significant increase from 88.12 ton/ha (*E. tereticornis* + Sapota) to 128.25 ton/ha (Sapota sole) per annum, with highest fruit yield (92.50 ton/ha) being recorded in plantations of *D. latifolia* + Sapota. Introduction of different trees in plantations leads to a reduction in soil bulk density and pH levels, while enhancing soil aggregation, organic matter content, nitrogen, phosphorus, potassium, magnesium and exchangeable calcium levels. Notably, nutrient status of soils and return of nutrients through litterfall rank highest under *T. grandis*, followed by *A. auriculiformis* and *D. latifolia* among tree species.

Key words: Carbon sequestration, biomass, Silv-horti system, climate change, nutrient.

INTEGRATED WEED MANAGEMENT IN MUSTARD**CHETANA SHARMA*, DR. AMIT KUMAWAT*******PhD Research Scholar, Agronomy, SKRAU, Bikaner (Raj.)******Assistant Professor, SKRAU, Bikaner (Raj.)**

Integrated Weed Management (IWM) in mustard cultivation represents a multifaceted approach to weed control that integrates various techniques to optimize crop yield and quality while minimizing the adverse effects of weeds. This abstract provides insights into the principles, strategies, and benefits of IWM in mustard production. Mustard is a vital oilseed crop globally, facing significant challenges from weed competition, which can reduce yield and quality if left unmanaged. Integrated Weed Management (IWM) offers a comprehensive solution by combining cultural, mechanical, biological, and chemical control methods to mitigate weed pressure effectively. Cultural practices, such as crop rotation and intercropping with legumes, disrupt weed life cycles and enhance resource competition, thereby reducing weed establishment and growth. Mechanical control methods, including hand-weeding, hoeing, and mulching, provide targeted weed suppression while minimizing reliance on herbicides. Biological control agents, such as bioherbicides and allelopathic crops, offer additional tools for weed management, exploiting natural enemies or allelochemicals to suppress weed growth. Strategic herbicide application, utilizing diverse modes of action and herbicide-resistant mustard varieties, minimizes the risk of herbicide resistance development in weed populations while ensuring effective weed control. By combining these approaches, IWM in mustard cultivation promotes sustainable weed management practices that enhance crop resilience, improve soil health, and optimize resource use efficiency. Overall, Integrated Weed Management in mustard cultivation represents a proactive and holistic approach to weed control, integrating diverse techniques to achieve effective and sustainable management of weeds while safeguarding crop productivity and environmental health.

Keywords: Biological, cultural, mechanical, competition, strategic**COMPOSITE FISH CULTURE AS AN ALTERNATE LIVELIHOOD USING WATERLOGGED LANDS OF TUNGABHADRA COMMAND AREA IN KARNATAKA****CHETHAN N*, ADARSH K., RAJANNA K. B., HARSHA NAYAK AND MANJAPPA N.****Fisheries Research and Information Centre, Bengaluru, KVAFSU, Bidar*****Corresponding author: FRIC, 10th cross, Mayura Street, Paapanna layout, Hebbal Outer Ring Road, Bengaluru, Karnataka**

Waterlogged area is a condition of land where the soil remains saturated with water. These lands are less productive to the anaerobic condition created for the plant roots. The effective utilization of such lands for fish culture yields better result with employment and income generation. The present study was focused on demonstration of composite fish culture in waterlogged areas of Tungabhadra command area of Karnataka. Indian major carps and exotic carps were used for the demonstration at 5 different locations under the command area. Exotic carps namely Grass carp, Silver carp, Amur carp and common carp exemplary growth and proved its suitability for composite fish culture with 1.54+ 0.20, 1.41+ 0.25, 1.40+ 0.36 and 1.01+ 0.05 kgs respectively. While the growth of Indian major carps namely Catla, Rohu and Mrigal was less than 1 Kg at the time of harvest. The total mean production of the demonstration was below par the standard fish production with 3.46 ton/acre with gross revenue of Rs. 3.81 lakhs. The present demonstration is evident on utilization of waterlogged areas for composite fish culture leading to generation of employment and income to the farming community.

Keywords: Waterlogged, Tungabhadra command area, Carps, Production.**INCOME GENERATION THROUGH COMPOSITE FISH CULTURE IN ALKALINE AND WATERLOGGED LANDS OF KRISHNA COMMAND AREA IN KARNATAKA****CHETHAN N*, RAJANNA K B, ADARSH K, HARSHA NAYAK, MANJAPPA N AND PRABHUDEVA K N****Fisheries Research and Information Centre, Bengaluru, KVAFSU, Bidar*****Corresponding author: FRIC, 10th cross, Mayura Street, Paapanna layout, Hebbal Outer Ring Road, Bengaluru, Karnataka**

The unutilized and unproductive lands in alkaline and waterlogged areas can be used for income and employment generation through fisheries activities. Apart from the income generation, the reclamation of the land is also possible if the scientific practices are followed. Karnataka is bestowed with vast variety of water resources for fisheries activities, saline, alkaline and waterlogged areas are also present in large extent in the state where the land is unused in majority of the affected areas. In this study, Krishna command area was selected for demonstration of composite fish culture using alkaline and waterlogged lands. Four beneficiaries were identified and empowered on using of these affected areas for fish culture. They were provided with quality carp seed and 2 tons of supplementary feed to each and scientific fish culture practices were demonstrated. Meanwhile, the water quality, fish survival, health and growth were monitored throughout the demonstration period. The pH of the water gradually decreased from 8.9 to 7.5, majorly due to addition of organic load to the pond. Other water quality parameters were scientifically monitored and they exhibited a decreasing trend with optimal limits favoring to fish culture. Catla, silver carp, grass carp, common carp and amur carp showed a better growth rate with others being in moderate condition. The total mean fish production was found to be 3.8 t/acre from the demonstration sites and with the mean gross revenue of 4.25 lakhs.

Keywords: Alkaline, Waterlogged, Krishna command area, Amur carp.

UTILIZATION OF COLD PLASMA TECHNOLOGY TO ENHANCE THE FLOUR FUNCTIONALITY OF JACKFRUIT SEED FLOUR**CHETNA^{1*}, AASHITA BHARDWAJ¹, TANYA LUVA SWER^{1**}, RACHNA SEHRAWAT²**¹Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana, India²Department of Food Process Engineering, National Institute of Technology, Rourkela, Odisha, India

Jackfruit seed is an underutilised crop that is nutritionally rich with macro and micronutrients. Seeds contain a higher percentage of moisture, eventually reducing their shelf life, and to enhance it, seeds can be dried, ground, and stored as jackfruit seed flour (JSF). Multipin atmospheric cold plasma (ACP) technology is a non-thermal, low-temperature plasma generation method that operates at atmospheric pressure or low vacuum. The JSF was subjected to a multipin ACP reactor with varying voltage (10-30kV) and time (5-25 minutes). The objective of the present study was to investigate the effect of ACP treatments on the physicochemical and functional properties of untreated and treated JSF. The Moisture content (9.26 ± 0.32 - 3.90 ± 0.16 %) and pH (6.55-5.84) of the treated flour were reduced significantly compared with untreated JSF. The study's findings suggest that cold plasma treatment can the functional properties of jackfruit seed flour namely water/oil absorption capacity (WAC/OAC), foaming and emulsifying properties, swelling power and solubility. To illustrate, the results of WAC (1.59 ± 0.02 - 2.02 ± 0.19 g/g), OAC (1.03 ± 0.03 - 1.11 ± 0.04 g/g), foaming capacity (46 ± 0.00 - 52.67 ± 1.15 %), foaming stability (20 ± 1.22 - 14.67 ± 0.58 %), emulsifying activity (42.50 ± 2.50 - 14.31 ± 0.68 %), emulsifying stability (29.17 ± 1.44 - 9.83 ± 1.26 %), swelling power (9.58 ± 0.11 - 11.36 ± 0.47 %) and solubility (2.10 ± 0.03 - 3.22 ± 0.11 %). In conclusion, ACP treatment can alter the functionality of the JSF which will pave the way for its application as a potential substitute to wheat and rice flour for production of low glycemic and gluten free products.

Keywords: Cold plasma treatment, Jackfruit seed flour, functional properties, gluten-free.**VERMICOMPOST: AN ADDITIONAL SOURCE OF INCOME FOR REMOTE VILLAGES****CHHAYA SINGH*, NEHA CHAUHAN, ANJU RANI*****Assistant Professor Government PG College Thalain, Pauri Garhwal**

Kitchen scraps and other green trash are turned into rich, dark soil through the process of vermicomposting. It keeps the soil healthy since microbes are present. Vermicomposting is a sustainable method that turns organic waste into compost and releases important nutrients. The source of the raw materials and the type of earthworms employed for composting determine the amount of plant nutrients in vermicompost. Magnesium (N), phosphorus (P), potassium (K), and other secondary and micronutrients are abundant in a fine vermicompost. Within a month of application, nutrients in vermicompost are liberated and are present in an easily accessible form. An increasing number of people and organisations are becoming interested in using earthworm activity to produce vermicompost. It is relatively profitable to sell the compost for Rs. 10/kg because the average annual operating cost of producing vermicompost is about Rs. 4.2/kg. An average vermicompost business with 20 beds will cost you around 2,00,000 Indian Rupees to launch. It is not feasible to launch a vermicompost business with fewer than 20 beds. Less than 20 beds will result in higher unit setup and vermicompost output costs. Thirty kilogrammes of earthworms are needed for one bed of vermicompost. The cost of one kilogramme of earthworms for vermicompost is one hundred Indian rupees. Vermicompost has a virtually zero opportunity cost and offers a wonderful chance for the farm to generate additional revenue because it can be generated in any unprofitable location with high humidity, low temperatures, and shade. Unused structures or abandoned livestock or poultry sheds can be put to good use. It can also be manufactured outdoors with an inexpensive thatched canopy to shield the machinery from rain and intense sunshine.

Keywords: Vermicomposting, revenue, business, sustainable**Study of Plant Extract as Photosensitizer in Photogalvanic Cell for Solar Energy Conversion and Storage****CHIRAG GANDHI AND PRABHA SHARMA****Department of Chemistry, Janki Devi Bajaj Government Girls College Kota, 324001, Rajasthan, India**

Renewable energy sources are becoming imperative due to the high population, high demand for energy, and depletion of fossil fuels. The Photogalvanic cells play an important role in this regard. The Photogalvanic cell is a solar cell that converts solar energy into electrical energy and is also capable to storage the energy. In a Photogalvanic cell that contained Natural pigment (Plant extract) as a photosensitizer, surfactant, and Reductant, counter electrode components, and working electrode components the Photogalvanic effect was investigated. Dyes and surfactants are the main constituents that facilitate the absorption of solar radiation, its conversion into electrical energy, and its subsequent storage. The efficiency of working cells depends on the type of substance used as dye and surfactant. The nature of the natural pigment photosensitizer is the main constituent influencing the electrical output of the PG cell. In the present study, as observed the greater photo-stability of the aqueous plant extract pigment sensitizer and strong absorption of the light throughout the range 400 to 700 nm may be one of the reasons for optimal performance of the cell. The Photopotential, photocurrent, Conversion efficiency, fill factor, current-voltage characteristics of the cell have also been studied. The effect of different parameters like P^H , light intensity, diffusion length, and concentration of Reductant, surfactant, and dye on the electrical output of the cell was investigated and a mechanism for the generation of photocurrent in this Photogalvanic cell has also been proposed.

Keywords: Photopotential, photocurrent, conversion efficiency, storage capacity.

PRACTICES FOR RESPONSIBLE FISH FARMING AND ANIMAL HEALTH MANAGEMENT**¹CHITRA BHATT, ²PROF. H. C. S BISHT****¹Research Scholar, D.S.B Campus, Department of Zoology, Nainital, Uttarakhand, India****²Supervisor, H.O.D, D.S.B Campus, Department of Zoology, Nainital, Uttarakhand, India**

Responsible fish farming and animal health management practices are paramount in ensuring sustainable aquaculture and livestock production while safeguarding environmental integrity and public health. This abstract provides an overview of the key principles, methods, and challenges associated with implementing such practices. Firstly, the abstract discusses the importance of disease prevention and control in aquaculture and livestock farming. It emphasizes the significance of biosecurity measures, including quarantine protocols, sanitation, and regular health monitoring, to mitigate the spread of pathogens and minimize the need for antibiotics and other pharmaceutical interventions. Secondly, the abstract explores the role of nutrition in promoting animal health and welfare. It highlights the importance of formulating balanced diets using sustainable and locally sourced ingredients, as well as the utilization of alternative protein sources to reduce reliance on fishmeal and soy-based feeds, which can contribute to overfishing and deforestation. Thirdly, the abstract addresses environmental stewardship in aquaculture and livestock production. It discusses the implementation of responsible water management practices, such as recirculating aquaculture systems and integrated multi-trophic aquaculture, to minimize water usage, nutrient pollution, and habitat degradation. Furthermore, the abstract examines the ethical considerations associated with animal farming, including the promotion of humane treatment, proper handling, and transport practices, as well as the adoption of certification schemes, such as organic and welfare assurance programs, to ensure transparency and accountability throughout the supply chain. Lastly, the abstract evaluates the economic viability and social implications of adopting responsible fish farming and animal health management practices.

FARMERS AND STRESS MANAGEMENT DURING COVID-19 THROUGH YOGA**D.A. NITHYA SHREE^{1*} PRABHU ILIGER² AND VAISHNAVI P³****¹Professor (Agricultural Extension), Department of Extension and Communication Management, University of Agricultural Sciences, Dharwad, Karnataka****²Farm Manager, ICAR-KVK, Chamarajnagar.****³Assistant Professor, Department of Agricultural Extension, School of Agricultural Sciences, Dhanalakshmi Srinivasan University, Trichy**

Majority of the farmers in India are marginal and small farmers and their agriculture is mainly dependent on rainfall. Apart from this they are also facing many problems like lack of marketing and storage facilities, low mechanization, non-availability of labour, soil fertility depletion, climate change which leads to anxiety, stress and depression among them. Due to these factors we are witnessing many farmers' committing suicide in India in the last three decades. The corona virus crisis has led to a situation where farmers faced additional stress due to unavailability and non-movement of labour, inter-state transport bottlenecks, shortage of raw materials due to closure of mandis, unavailability of transport and markets. This had induced more stress and anxiety to the farmers and farm women than the usual conditions leading to suicides. Hence, a need was felt to help farmers to cope up with the situation by overcoming their stress. Yoga is considered to be the most ancient Indian tradition for the management of stress. Keeping this in view the present study was conducted with the objective of assessing and developing strategies to overcome stress, anxiety and depression by farmers during COVID19. The study was conducted in Karnataka state using survey and pre-post test experimental design with a sample of 150 farmers and 150 farm women. Yogic and meditative strategies was developed to manage the stress level and tested for its effectiveness by experimenting on selected farmers and farm women. The results of the study indicated positive impact of the developed strategies on reducing stress among farmers and farm women. Thus, yogic practices (pranayama, asanas and meditation) can be an effective strategy for managing stress levels of farmers and farm women.

Keywords: Anxiety, Stress, COVID-19, Health, Benefits, Yoga and Meditative strategies**GENOMIC SELECTION AND GENOMIC ENABLED PREDICTION IN PLANT BREEDING****D. KEERTHANA^{1*}, RUTH HEPSI SINDHURA², UTKARSH TIWARI³ AND, HIMA BINDU⁴****¹Ph.D. Scholar, Department of Genetics and Plant Breeding, Rani Lakshmi Bai Central Agricultural University, Jhansi, India****²Ph.D. Scholar, Department of Genetics and Plant Breeding, Acharya N.G Ranga Agricultural University, Guntur, India,****³Ph.D. Scholar, Department of Genetics and Plant Breeding, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, India****⁴Ph.D. Scholar, Department of Genetics and Plant Breeding, Orissa University of Agriculture and Technology, Bhubaneswar, India**

In the last 20 years, marker-assisted selection has been widely used in plant breeding where a few markers significantly associated with the phenotypic trait are employed to predict the genetic value of the candidates for selection. The recent concept of Genomic Selection (GS) incorporates all available markers information simultaneously into a model to predict the genetic value of the candidates for selection. A computer simulation study using the whole set of markers of genotyping has the better prediction accuracy of breeding values than using only subsets of markers significantly associated with QTL (i.e., MAS). The central process of GS is the calculation of Genomic Estimated Breeding Values (GEBVs) for individuals having only genotypic data using a model that was "trained" from individuals having both phenotypic and genotypic data. The population of individuals with both phenotypic and genotypic data is known as the "training population" as it is used to estimate model parameters that will subsequently be used to calculate GEBVs of selection candidates (e.g., breeding lines) having only genotypic data. These GEBVs are then used to select the individuals for advancement in the breeding cycle. Therefore, selection

of an individual without phenotypic data can be performed by using a model to predict the individual's breeding value. In GS, the training population must be representative of selection candidates in the breeding program to maximize GEBV accuracy. The success of a GS breeding approach is determined by its ability to increase the rate of gain per unit of time, while maintaining affordable costs. The most cost-effective way to ensure the success of GS is to implement accurate selection in early generations. It has been predicted for more than two decades that molecular marker technology would reshape breeding programs and facilitate rapid gains from selection. Genomic selection looks to fulfil it by using genome wide marker coverage to accurately estimate breeding values, accelerate the breeding cycle and introduce greater flexibility in the relationship between phenotypic evaluation and selection.

Keywords: GEBV, Genomic Selection, Genetic gain, Prediction Models

PLANT ESSENTIAL OILS: FEATURING INSECTICIDAL PROPERTIES AGAINST SUCKING INSECT PESTS

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Aim: The main aim of the present investigation was to study the pesticidal properties of different combinations of plant essential oils viz., mint oil, lemon grass oil, mustard oil, clove oil, thyme oil and cinnamon oil against the major sucking insect pests under laboratory condition. **Methodology:** The study was conducted under laboratory conditions during 2020 and 2021 at the Department of Agricultural Entomology, University of Agricultural Sciences, Dharwad-Karnataka-India. Tender leaves were selected from groundnut, cabbage, safflower, cotton and capsicum seedlings, and were immersed in the essential oil solution (1, 2, 3, 5 and 7 ml/l) for 10 seconds and then air-dried naturally. Twenty nymphs /adults of the sucking insects were selected and released onto their respective essential oil treated leaves. Each treatment was replicated three times. The tested sucking insect pests includes second instar nymphs of cabbage aphid (*Brevicoryne brassicae*), cowpea aphid (*Aphis craccivora*) and safflower aphid (*Uroleucon carthami*); adults of cotton whitefly (*Bemisia tabaci*), spiralling whitefly (*Aleurodicus dispersus*) and red spider mite (*Tetranychus urticae*). The mortality of insects in each treatment was recorded at 24 and 48 hours after treatment and the LC₅₀ values were computed following standard procedure. **Results:** The findings revealed that the essential oil combination like mint oil + lemon grass oil + mustard oil and mint oil + clove oil + mustard oil recorded lowest LC₅₀ values of 2.41 & 2.52 ml/l at 24 hours after treatment (HAT) and 1.53 & 1.69 ml/l at 48 HAT against cabbage aphid; LC₅₀ values 2.00 & 3.22 ml/l at 24 HAT and 2.83 & 2.14 ml/l at 48 HAT against cowpea aphid and LC₅₀ values of 2.44 & 3.04 ml/l at 24 HAT and 1.93 & 2.14 ml/l at 48 HAT against safflower aphid. The same essential oil combination also performed better pesticidal activity against the adults of both the species of whiteflies and red spider mite by recorded lowest LC₅₀ values at 24 and 48 HAT under laboratory condition. **Interpretation:** Since each plant essential oil is having different components responsible for toxicity, mixed formulations of these plant essential oils with different mode of action can be well fit into integrated pest management of sucking insect pests.

Keywords: Plant essential oils, sucking insect, LC₅₀ values, Laboratory condition

PATHOLOGICAL AND IMMUNOHISTOCHEMICAL INVESTIGATION OF PPR VIRUS IN GOATS FROM BALLIA DISTRICT OF EASTERN PLAIN ZONE OF UTTAR PRADESH INDIA

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Peste des petits ruminants (PPR) is an acute, highly contagious and transboundary viral disease of sheep and goats, causing high morbidity and mortality. A total of 250 goats were examined in Ghazipur district, Uttar Pradesh during the study period (September, 2021 to August, 2022) and 40 serum samples were randomly collected from goats exhibiting clinical signs of PPR like anorexia, depression, fever (106±1°F), ocular-nasal discharge, diarrhoea with soiled hind quarter, shrunken eyes, coughing, and respiratory distress. Out of these, 25 goats were dead and necropsy was conducted. Gross lesions like stomatitis, consolidated pneumonic lungs, generalised lymphadenopathy with necrosis and congestion of lymph node, atrophied spleen, and hemorrhagic gastroenteritis were noticed. Histopathological analysis showed congestion and edema in lungs, network of fibrin was infiltrated with neutrophils, syncytia, and giant cells along with eosinophilic intracytoplasmic inclusion bodies. The alveoli, bronchioles, alveolar wall, and interstitium of the lungs showed neutrophils and mononuclear cells infiltration. Lymphoid organs showed necrosis and lymphoid cells loss. Immunohistochemical labelling showed localization of PPR virus antigen in the lung alveolar epithelial cells and macrophages. The seroprevalence of PPR was 92.5% using c-ELISA. PCR analysis was done to detect PPR virus on tissue samples and eight of 25 samples tested positive for the PPR virus with a prevalence of 32% by PCR.

Keywords: Competitive ELISA, Goats, Immunohistochemistry, PPR, Pathology, Ghazipur

EFFECT OF BIOSTIMULANTS AND BIOFERTILIZERS ON SOIL AND PLANT NUTRIENT CONTENT OF FLORIBUNDA ROSES**D. PARINITHA^{1*}, G. K. SEETHARAMU¹, MANJUNATH RAMANNA AND AMREEN TAJ²**¹Department of Floriculture and Landscape Architecture, College of Horticulture, Bengaluru²University of Horticultural Sciences, Bagalkot

The present study on “Effect of biostimulants and biofertilizers on growth and flowering of Floribunda roses was undertaken during the year 2020-21 at College of Horticulture, Bengaluru. The experiment was laid out in Factorial Randomized Block Design with three replications. The biostimulants were sprayed at bimonthly interval on cvs. Mirabel and Charishma. The soil was collected and analysed before and after the treatment. Among different levels of biostimulants and biofertilizers, available primary nutrients viz., nitrogen, phosphorus, potash (316.85, 35.69 and 185.84 kg/ha, respectively) and secondary nutrients calcium, magnesium and sulphur content of soil (3.93, 2.93 and 27.26 ppm, respectively) was highest in T₅-75% RDF + *Azospirillum* + PSB + KSB each @ 4 ml/plant and it was minimum (301.80, 29.88 and 174.27 kg/ha, respectively) in T₁. Available micronutrients viz., copper, zinc, manganese and iron content of soil was highest (23.95, 34.26, 5.08 and 1.97 ppm respectively) in T₄-100% RDF + Ecohume @ 3 ml/l followed by T₅-75% RDF + *Azospirillum* + PSB + KSB each @ 4 ml/plant (22.99, 33.35, 4.88 and 1.91 ppm, respectively) while it was lowest (21.07, 30.59, 4.69 and 1.43 ppm, respectively) in control (T₁). Among different levels of biostimulants and biofertilizers, plants applied with 100% RDF + Ecohume @ 3 ml/l (T₄) recorded highest plant nutrients viz., nitrogen, phosphorus and potassium (2.72, 0.27 and 1.76 per cent, respectively) which is on par with T₅ (2.64, 0.26 and 1.68 per cent, respectively) and T₇ (2.64, 0.26 and 1.66 per cent, respectively) while it was lowest (2.08, 0.19 and 1.15 per cent, respectively) in control (T₁). The micronutrient viz., copper, iron, zinc, manganese and boron content of leaf was maximum (0.194, 2.467, 6.535, 3.978 and 1.946 ppm, respectively) in plants applied with 100% RDF + Ecohume @ 3 ml/l (T₄) and it was minimum (0.177, 2.222, 6.177, 3.352 and 1.464 ppm, respectively) in plants applied with only 100% RDF (T₁). This study indicated that foliar application of Ecohume at 3 ml/l at bimonthly interval and soil application of *Azospirillum* + PSB + KSB each @ 4 ml/plant exhibited superior soil and plant nutrient content of Floribunda roses.

Keywords: Floribunda roses, biostimulants, biofertilizers, Mirabel, Charishma.**STUDIES ON MORPHOLOGICAL, CULTURAL AND MOLECULAR VARIABILITY IN RHIZOCTONIA SOLANI CAUSING SHEATH BLIGHT OF RICE****D.M. PAWAR*, POKHAR RAWAL AND SHAIK MUNNYSHA**¹Department of Plant Pathology, Maharana Pratap University of Agriculture and Technology, Udaipur-313001 (Raj.), India

Sheath blight is a worldwide destructive disease that causes a substantial reduction of yield loss and quality. This disease of rice caused by the fungus *R. solani* Kuhn (Asexual stage) and perfect stage *Thanatephorus cucumeris* (Frank) Donk belong to phylum Basidiomycota. Naturally infected samples which showed typical sheath blight symptoms were collected and applying employing sclerotium insertion in between stem and leaf sheath technique at tillering stage plants, ten isolates of *R. solani* were obtained on Potato dextrose agar (PDA) medium. Pathogenicity test was attempted on susceptible rice cv. Ratnagiri 7 under screen house conditions by employing sclerotium insertion in between stem and leaf sheath inoculation technique which revealed that all ten isolates of *R. solani* were pathogenic to rice. After identification of the pathogen as *R. solani* these ten isolates were accessed as these ten isolates were accessed as Rs1, Rs2, Rs3, Rs4, Rs5, Rs6, Rs7, Rs8, Rs9 and Rs10. Ten isolates were screened and there were morphological, cultural and molecular variations based on radial growth, number of sclerotia and sclerotial size. All ten isolates of *R. solani* exhibited a wide range of cultural variability. Among the ten different isolates, a single most virulent isolate Rs1 was selected for further studies. Ten isolates of *R. solani* were tested to evaluate genetic variability through ISSR marker by using 10 ISSR primers. The percent polymorphism generated by RAPD primers was 74.42 percent. Dendrogram generated by UPGMA cluster analysis based on Jaccard's similarity coefficient obtained from RAPD markers through NTSys pc software revealed two major clusters. The genetic similarity coefficient value ranged from 63 to 87 percent across 10 isolates of *R. solani* indicating high degree of variation. Molecular analysis using RAPD primers demonstrated polymorphism rates of 74.42% across all ten isolates.

Keywords: Sheath blight, *R. solani*, polymorphism, molecular analysis**EVALUATION OF TOMATO (*SOLANUM LYCOPERSICON* L.) GENOTYPES FOR TOLCV RESISTANCE AND ANALYSIS ON THE BIOCHEMICAL BASIS OF RESISTANCE****D. O. KAVYA*, RAVEENDRA S JAWADGI, NAMITA RAUT, NOORULLA HAVERI, MALLIKARJUN AWATI AND FAKRUDIN B**

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Tomato leaf curl virus (ToLCV) is one of the most serious plant viral pathogens of tomatoes grown in tropical and subtropical regions of the world. The virus is a monopartite and bipartite Geminivirus, transmitted by the tobacco whitefly, *Bemisia tabaci* (Gennadius). Tomato cultivation, especially in autumn in north India is adversely affected due to the high incidence of tomato leaf curl virus disease and losses often exceed 90 percent. To identify the resistance source/s against this disease, 53 tomato genotypes which included *Solanum pimpinellifolium* accessions, selected hybrids, and their parents along with the released varieties were evaluated under natural field conditions by adapting randomized block design with two replications. The observations on disease incidence and percent disease index were

recorded at different intervals and based on the disease incidence genotypes were categorized into different disease reaction groups according to which LP 9 was the only accession observed to be highly resistant. The genotypes were also tested for the biochemical basis of resistance according to which total phenols chlorophyll and SOD activity showed a positive association with ToLCV resistance whereas peroxidase and catalase showed a negative association with ToLCV and ToLCV-linked molecular markers were validated in selected genotypes

Keywords- ToLCV, percent disease index (PDI), Disease incidence

EVALUATION OF *Lactobacillus* spp. ISOLATED FROM DAHI (CURD) SAMPLES AND ITS PROBIOTICS PROPERTIES FOR DAIRY APPLICATION

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The research project attempted to examine the probiotic properties of *Lactobacillus* spp. strains derived from Dahi (Curd) samples collected from five neighbourhood markets in Satna district Madhya Pradesh, India, name as SH011, PA012, CL013, BS014 and KI015. The majority of Indians consume Dahi, which is a fermented milk product. Randomly selected specimens were analysed to determine their physicochemical properties. The results showed variations in pH (3.49– 4.24), titratable acidity (0.89–1.15%), fat (0.70-4.55%), protein (1.67-3.94%), lactose (3.82- 5.33%), and liquid Dahi percentage (44.50–68.50%). The five different strains of bacteria were isolated and subsequently described by following a streaking process on MRS agar plates. The *Lactobacillus* species were identified through their morphological assessments as gram staining, biochemical testing, and carbohydrate fermentation patterns. Based on the results, *Lactobacillus fermentum*, *Lactobacillus casei*, and *Weisella* or *Leuconostoc* were suggested as the isolate *Lactobacillus* species. The survivability of isolated *Lactobacillus* species was evaluated under acidic conditions and in the presence of phenol. Most of the isolates exhibited persistence to pH 3 for three hours, despite PA012 demonstrating substantial fluctuation. For a 24-hour period, CL013 showed the greatest longevity at a 0.4% phenol content. The antibiotic resistance test was done by using Vancomycin, Gentamycin, Ampicillin, Streptomycin, and Tetracycline; showed that PA012 had strong resistance action. Thirty untrained panellists were evaluated the quality of Dahi produced by different five strains, and the Dahi made from the CL013 strain was found to be the most preferred sample. This study provides insightful information on the probiotic benefits of particular species of *Lactobacillus* that were isolated from Dahi but also emphasizes the beneficial effects of Dahi quality and their resistance to antibiotics.

Key words: Dahi, lactic acid bacteria, probiotics, *Lactobacillus* species, biochemical characterization

APPLICATIONS OF BAMBOO (*BAMBUSA VULGARIS*) FOR SUSTAINABLE DEVELOPMENT

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Bamboo belongs to the evergreen or *Poaceae* family of grasses. It's the world's fastest-growing woody plant. Bamboo is a sturdy, adaptable, environmentally beneficial, and renewable material. In China, bamboo is referred to as "friend of the people," in Vietnam as "brother," and in India as the "wood of the poor." Wide stretches of Africa, Asia, the Caribbean, and Latin America are home to the amazing plant known as bamboo. The livelihood of millions of people is reliant on this plant. It has been used for eating and cooking for a very long time. Bamboo offers a wide range of new applications outside of its conventional functions, such as replacing costly materials and quickly diminishing wood. In my native state of Tripura, bamboo is a common sight in daily life. Bamboo is used in almost every home for décor, furniture, tables, and even accessories like bottles and cooking. Indeed, as intriguing as this may sound, using bamboo and bamboo products on a daily basis is rather common among the inhabitants of Tripura and the northeast India. We have forgotten our old roots, when we used to use a lot of natural items like bamboo, in this day of chemicals and dangerous pollutants like plastic. Bamboo buildings are inexpensive, lightweight, and resistant to earthquakes. As an excellent substitute for doing water purification, a natural filter constructed of bamboo, pebbles, gravel, and other readily available natural adsorbents found locally is a good alternative for plastic filters. Minerals including potassium, calcium, magnesium, and others are abundant in bamboo charcoal. Bamboo filters, in contrast to contemporary charcoal filters, have the extra advantage of an internal microbial community that breaks down harmful compounds like trihalomethane and chlorine. Toxins are so naturally removed from water. This study is entirely devoted to the advantages and applications of bamboo in day-to-day survival of life, so we can say that "Go bamboo, go green".

Keywords: Bamboo, Water purification, Natural filter, Environmentally beneficial, Tripura.

CHARACTERIZATION OF RICE GERMPLASMS OF MANIPUR AND ASSAM FOR TRAITS ASSOCIATED WITH DROUGHT TOLERANCE**DAIZI DURBA SAHARIA¹, PRAMESH KHAYUMTHEM¹, AISWARYA BARUAH², MANOJ KUMAR SARMA², MRIDUSMITA KALITA², DISHARI BISWAS¹, TH. NEPOLIAN SINGH¹**¹College of Agriculture, Central Agricultural University, Imphal²Biswanath College of Agriculture, Assam Agricultural University, Assam

Drought stress poses a significant challenge to rice production in rainfed ecosystems, particularly in regions like Assam and Manipur. To address this issue, a study was conducted comparing some rice genotypes from these regions to identify those with the most adaptive traits under drought conditions. Drought stress was induced during the panicle initiation stage by withholding water for 20 days. The study included resistant (Sahabhazi and Mas-26) and susceptible (IR-64 and Sawarna) checks for comparison. After the stress period, various morpho-physiological and biochemical traits were measured. Results showed significant variation among the genotypes for these parameters. Traits like panicle characteristics (PC) and grain yield (GY) exhibited high levels of variation. Moderate to high heritability and genetic advance percentage of mean indicated the potential for selecting improved traits. Genotypes differed notably in root distribution, with the variety Gin excelling in root-related traits and filled grains per panicle. Variability in leaf rolling and drying responses among genotypes provided insights into drought tolerance mechanisms. Positive correlations were found between grain yield and traits such as flag leaf length, panicle length, and spikelet fertility. Path coefficient analysis revealed direct relationships between yield and traits like flag leaf breadth, chlorophyll content, and root volume, while traits such as relative leaf water and proline content showed negative correlations with yield. In summary, this study offers valuable insights into genetic variability and trait relationships in rice genotypes, aiding the selection of resilient varieties with improved root, shoot, and yield traits crucial for drought stress management.

Keywords: Characterization, Ricc, Drought, Yield.**COMPREHENSIVE STUDIES ON FISH DIVERSITY AND HABITAT ECOLOGY OF RIVER RAVI BASIN IN HIMACHAL PRADESH****DANISH MAHAJAN *, KUSHAL THAKUR, RAKESH KUMAR**

Department of Animal Science, School of Life Sciences, Central University of Himachal

Pradesh, District Kangra, Himachal Pradesh

India's Ravi River basin is well known for its abundant aquatic biodiversity, especially for its wide variety of fish species. But the integrity of this important ecosystem is under jeopardy from rapidly changing environmental conditions and human activity. The current study provides comprehensive research on fish diversity and habitat ecology to address this problem and implement effective conservation measures. Twelve fish species in all, including *Schizothorax richardsonii*, *Tor putitora*, *Cyprinus carpio*, and *Garra gotyla*, were identified along the study region. Assessments of habitat ecology were carried out in order to identify the main environmental factors affecting the dynamics and structure of fish communities. The analysis of many factors, including substrate composition, water quality, and hydrology, was done to identify the important habitats for various fish species. Dissolved oxygen content, turbidity, and substrate structure were found to be strongly correlated with fish diversity. In addition, the harmful consequences of invasive species introduction, overfishing, habitat degradation, and anthropogenic influences were assessed for their effects on fish populations and ecosystem health. In order to reduce risks and advance the sustainable management of the Ravi River basin, conservation tactics and management suggestions were put out in light of the findings. In summary, this extensive research offers insightful information about the habitat ecology and fish diversity of the Ravi River basin, which lays the groundwork for conservation initiatives meant to protect this critically important freshwater ecosystem in Himachal Pradesh.

Keywords: Fish Diversity, Ravi River, Water Quality, Hydrology, Conservation**ASSESSMENT OF ANTAGONISTIC POTENTIALS OF PLANT GROWTH PROMOTING RHIZOBACTERIA AGAINST VEGETABLE WILT PATHOGENS*****DANISH NIGAR, MOHAMMAD SAGHIR KHAN*****Department of Agricultural Microbiology, Aligarh Muslim University, Aligarh**

Diseases caused by phytopathogens, such *Fusarium oxysporum*, significantly reduce vegetable yields. In intensive cropping systems, the phytopathogens can be treated with expensive fungicides, although doing so increases the chances of emergence of resistance among phytopathogens. Plant growth promoting rhizobacteria (PGPR) in this regard have been found useful as biocontrol agents that support long-term crop protection strategies. The goal of this investigation was to identify, and reveal the antagonistic activity of bacteria that could be used to manage the *Fusarium* wilt disease caused by *F. oxysporum*. A total of 200 rhizobacteria were recovered from four distinct locales and were assessed for their capacity to inhibit fungal growth and consequently facilitating plant growth. Preliminary antifungal activity test of isolated PGPR strains showed 50% antagonistic effect against *F. oxysporum*. In dual culture technique, isolated strain ONKB03 showed maximum percent inhibition (86%) followed by PKB02 (86%), GCNA06 (83%), WHNA01 (82%) and WHNA07 (78%) against test pathogen. Furthermore, the bacterial antagonists were identified by 16S rRNA gene sequencing, the rhizobacteria belonged to *Pseudomonas* sp., *Bacillus* sp., *Prestia* sp. and *Kocuria* sp. The present findings suggest that the bacterial isolates expressing antagonistic effect against *Fusarium* wilt disease could be employed as potential bioagents vis-à-vis reducing yield losses.

STARTUP INDIA AND ITS RELEVANCE TO AGRICULTURE ENTERPRISES**DAWANE V. T., BANGAR R. U.****Department of Agricultural Extension Education, College of Agriculture, VNMKV, Parbhani, MH**

Agricultural startup is a very huge sector so we need to see what are the different growth drives, key performing indicators, what are driving startups. From last 2 to 3 years startups are growing into the agriculture sectors. There are significant 6 main stages: Ideation, concepting, committing, validating, scaling & establishing. Eligibility Criteria for Startup India should be up to a period of 10 years from the date of registration or up to 10 years in Biotechnology sector, incorporated as Private Limited Company, with an annual turnover not exceeding Rs.100 crores, entity should not be formed by splitting or reconstruction of business already in existence, working towards innovation and development. Startup funding includes major 6 stages like pre seed, seed, early stage, comprises series A & series B, Late stage - series C, mezzanine stage IPO (Initial Public Offer). There are some Government Initiatives & policies to promote startup ecosystem in India like Startup India, Atal Incubation Mission, New Gen IEDC, Make In India, BIRAC, Small Farmers Agribusiness Consortium (SFAC), Rashtriya Krushi Vikas Yojana (RKVY). Some Benefits of Registration under Startup Programme are Simplification & Handling, Startup India Hub, Legal support & Patent examination, Easy exit, Tax exemption, Self-certification. Agri-tech startups are redefining Agriculture with Technology solutions. Agri-tech is the idea of applying modern technologies to the agriculture sector with a view to enhance, produce efficiency & revenue. We can divide agriculture into 3 sectors such as pre harvesting, post harvesting & value addition. So, these are major components of whole agriculture. There are some Government Initiatives & Policies to promote agri-tech startup ecosystem in India such as AIM, New Gen IEDC, RKVY & ASPIRE. Institutional ecosystem for Agri startup (Incubators/ accelerators) are Agri-udaan, A-IDEA, t-hub, ICRISAT, Manage ACBC Incubation centre.

RESPONSE OF TRANSIENT SOIL WATERLOGGING ON ROOT ARCHITECTURE, BIOMASS AND SEEDLING GROWTH OF FINGER MILLET AND BARNYARD MILLET SEEDLINGS**DAYANJI SHERPA^{1*}, SHAILESH KUMAR¹, SWETA MISHRA² AND JYOTSNARANI PRADHAN¹****Department of Botany, Plant Physiology and Biochemistry, ²Department of Genetics and Plant Breeding, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India**

Millet is a vital crop in semi-arid and arid tropical regions, primarily grown in developing nations, serving as both human food and livestock feed due to their nutritional value. Finger millet and Barnyard millet are highlighted for their rich nutrient content, including minerals, protein, fibre, and phytochemicals, making them significant in addressing nutritional deficiencies. It is renowned for its ability to thrive in marginal soils and withstand environmental challenges like drought or flooding. Waterlogging inhibits aerobic respiration and impacts growth and development. Despite the nutritional and resilience benefits, research on the responses of millets to waterlogging stress is limited. So, we studied seedling growth pattern and root architecture of both millet at seedling stage to understand the immediate response of this millet under waterlogging stress. Pre-screened genotype of both the crop was retrieved and treated with different duration of submergence condition i.e. 48, 74 & 120 hours against control. It was observed waterlogging affected plant root architecture such as root length which significantly reduced up to 17% in finger millet and 20% in barnyard millet. Shoot growth pattern such as seedling length, dry weight and leaf area were also affected especially leaf area which significantly increased up to 31% in barnyard millet and 35.9% in finger millet with the duration of waterlogging stress and finally wilted at 120-hour submergence condition. Both the millet has shown adaptive root and shoot growth pattern to cope up with submergence condition, finger millet was found to be more tolerant as compared to barnyard millet with better tolerance index ratio and root shoot ratio at same seedling stage.

Key words: finger millet, barnyard millet, root architecture, leaf area, root shoot ratio**EVALUATION OF THE CARBON FOOTPRINT STEMMING FROM THE CAGE CULTURE FARMING OF ASIAN SEA BASS DEBJANI DAS*, SUPRATIM CHOWDHURY, SWARNADYUTI NATH, PRASANTA MURMU****Department of Fish Processing Technology, Faculty of Fishery Sciences, WBUAFS, Kolkata**

This study aimed to assess the environmental consequences of producing Asian sea bass fillets within a cage culture farming system, utilizing Life Cycle Analysis (LCA) data. The investigation focused on sea bass farming in Kalnagini Creek, Kakdwip, South 24 Parganas, West Bengal, with particular attention to two mariculture cages. The study involved computing the materials necessary for the cages and inputs, and identifying the carbon dioxide (CO₂) emissions linked with these materials over the entire 8-month cultivation period. This comparison was made between the total emissions from two distinct feeding approaches in cages C1 and C2. The total CO₂ emissions from all material inputs, excluding transportation, were determined to be 259.23 kg CO₂eq for C1 and 111.03 kg CO₂eq for C₂. In the instance of C1, fish feed constituted 57% of the CO₂ emissions from diverse inputs, excluding transportation. This explains the higher overall CO₂ emissions for C1 in comparison to C2. The study found that transportation-related CO₂ emissions were calculated as 58.07 kg CO₂eq for C1 and 56.19 kg CO₂eq for C2. It indicates the necessity of various measures to mitigate carbon emissions, including the use of renewable energy sources, reducing transportation distances, and improving feed efficiency.

Keywords: life-cycle assessment; Asian Sea Bass; mariculture cages; carbon footprint

TOXICITY OF HEXAVALENT CHROMIUM ON HISTOPATHOLOGY OF GILL, KIDNEY, AND LIVER OF THE FRESHWATER FISH, NILE TILAPIA (*OREOCHROMIS NILOTICUS*)**DEBKANTA GHOSH¹* AND SAMIR KUMAR SAHA¹**¹Department of Zoology, West Bengal State University, Barasat, West Bengal, India²Vidyasagar College for Women, Kolkata, West Bengal, India

Water pollution due to chromium has become one of the main issues in the present day pollution. We conducted tests to determine the effects of different hexavalent chromium concentrations can distress the kidneys, liver, and gills of the affected fish. Two groups of Nile tilapia (*Oreochromis niloticus*) were exposed to sublethal concentrations (10% and 20% of LC₅₀ of potassium dichromate) for 15 and 30 days. Alterations in histopathology of the kidney, liver, and gill were studied in *O. niloticus*, after exposure to hexavalent chromium. The 96-hour LC₅₀ of potassium dichromate was measured to be 93.49 mg/L. The affected fish showed erratic swimming and lethargy. The alterations in gills were marked by lamellar fusion, epithelial hyperplasia, clubbed tips in the secondary lamellae, epithelial lifting, epithelial necrosis and desquamation, aggregation of cells, aneurism as well as waving of secondary lamellae. The changes in the kidneys of exposed fish were characterized by atrophy of the renal tubules, Hypertrophy of epithelial cells of renal tubules, and contraction of glomeruli in the Bowman's capsules. The alterations in the liver were characterized by cytoplasmic vacuolization with the lateral nuclei arrangement of hepatocytes, hepatocytes atrophy, enlargement in sinusoidal space, and patchy degeneration. The result showed that hexavalent chromium toxicity severely affects the vital organs which may be deleterious for fish populations.

Keywords: Toxicity, Hexavalent Chromium, Histopathology, *Oreochromis niloticus*, Gill, Kidney, Liver**EFFECT OF PLANT GROWTH REGULATORS ON FRUIT SET, FRUIT RETENTION, YIELD ATTRIBUTES AND PHYSICAL FRUIT QUALITY OF SAPOTA (*MANILKARA ACHRAS* FORB.) CV. DHS-1 UNDER EASTERN TROPICAL REGION OF INDIA****DEEKSHA GAUTAM¹, G. C. ACHARYA², DEEPA SAMANT² AND CHARU SHEKHAWAT³**¹Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India²ICAR-IIHR, Central Horticultural Experiment Station, Bhubaneswar, Odisha, India³Agriculture University, Kota, Rajasthan, India

Sapota (*Manilkara achras* Forb.) is the sixth important fruit crop of India after mango, banana, citrus, apple and guava. It is also known as chico, chikoo, sapodilla. It belongs to the family Sapotaceae. It is originated in Tropical America. The fruits are super tasty and nutritious, and loved for their soft, sweet, crumbly flesh with a sandy texture and unique smell. Plant growth regulators have become an important aspect of the horticulture sector for improving the production of high-quality fruits. Applying Plant Growth Regulators (PGRs) at specific stages of flowering and fruit development is an appreciable way to address issues such as inconsistent flowering patterns and poor fruit formation. The problem of poor fruit set, fruit retention and yield in commercially grown sapota under tropics deserves attention and there is need to work in this direction. Therefore, the present study was carried out at Central Horticultural Experiment Station, (ICAR-IIHR), Bhubaneswar during 2021 and 2022 to evaluate the influence of foliar spray of Plant Growth Regulators on Fruit Set and yield of Sapota (*Manilkara achras* Forb.) cv. Dharwad Hybrid Sapota-1 (DHS-1). The experiment was laid out in a randomized block design with 9 treatments, comprising PGRs i.e. NAA @50 and 100 ppm, CPPU @5 and 7.5ppm, SA @150 and 300ppm and Homobrassinolide @10 and 15 ppm and water as control. Treatments were foliar sprayed on twenty Four years old uniformly grown DHS-1 sapota trees, planted at 5m x 5m spacing at flowering, fruit set and one month after fruit set. It was observed that foliar application of all PGRs resulted into significant enhancement in fruit set, fruit retention, yield attributes and physical fruit quality over control. Out of these four PGRs, NAA and CPPU at higher dose were found more effective. However, NAA @100 ppm resulted in highest fruit set, fruit retention percentage, yield attributes and physical fruit quality irrespective of both the years.

Keywords: Plant growth regulators, Foliar spray, crumbly flesh, Yield**OPHTHALMIC IMPLICATIONS OF TRICLOSAN ON *DANIO RERIO*****DEEPA AND RESHMA SINHA****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, India**

Triclosan (TCS, 5-chloro-2-(2,4-dichloro-phenoxy) phenol) is a versatile antibacterial and antimicrobial agent. It is commonly included as an ingredient in various personal care products like toothpaste, cosmetics, deodorants, antibacterial soaps, and antiseptic items. An everyday activity such as cleaning, washing, bathing, and showering has led to its prevalence in various environmental areas. Globally it has been reported in surface water, groundwater, seawater, and sediments with concentrations varying from nanograms per liter to micrograms per liter. The eye, being an important organ has the potential to serve as an indicator of both visual and neurological impairments. Also holds paramount importance as a sensory system, intricately linked to a range of behavioural activities like seeking food and escaping predators. Present study aims to investigate the histopathological alterations in ocular structure of zebrafish, *Danio rerio*. A 30-day chronic assay was conducted on adult zebrafish (size: 2.7±0.1cm, weight: 0.206± 0.007g) by exposing to sub-lethal concentration, 0.34 mg/L (1/5th of 96h LC₅₀) of TCS. The physicochemical properties of water such as pH 7.2 ± 0.1, dissolved oxygen 8.0 ± 0.3 mg/L, total hardness 18 ± 0.5 mg/L and temperature 25 ± 2°C was maintained throughout the experiment. The regular structure of zebrafish eye consists of cornea, lens, iris, optic nerve, and retina similar to typical vertebrate eye. The retina is composed of six layers that play crucial role in visual processing. These layers are retinal pigment epithelium, outer nuclear, outer plexiform, inner nuclear, inner nuclear plexiform and ganglion cell layer. On exposure to TCS, it caused retinal disorganization, reduction in ganglion cell layer density and photoreceptor damage. Thus, study concluded ocular pathological alterations in response to TCS mediated toxicity on *Danio rerio*.

Keywords: Eye; Fish; PCPs; TCS; Toxicity,

EFFECT OF PEROXIDE AND SOFTNESS MODIFICATION ON PROPERTIES OF RAMIE RIBBONS**DEEPA BHATT¹ AND MANISHA GAHLOT²**¹Ph.D. Research Scholar, Department of Textiles & Apparel Designing, College of Community Science, G.B.P.U.A. & T., Pantnagar, Uttarakhand, India²Professor cum Head, Department of Textiles & Apparel Designing, College of Community Science, G.B.P.U.A. & T., Pantnagar, Uttarakhand

Ramie (*Boehmeria Nivea*), a perennial herb is one of the premium and oldest textile vegetable (Bast) fibers that have undergone rapid development due to its good performance. "Queen of natural fibers," ramie boasts luster, high strength, and microbial resistance, making it exceptionally desirable in various textiles applications. It has been extensively used for fabric production for at least 6000 years. In India, it is named by different popular names such as Rhea, Popah, Khunkoor, Kurkunda etc. Ramie fibers, rich in cellulose, bind firmly due to pectin substances, hemicelluloses and little lignin in the gums. Degumming is crucial for ramie raw material, enhancing fiber qualities, separating them for textile use, and improve fiber spinning ability to meet textile requirements. Ramie fiber usage hindered by low degumming efficiency, causing high environmental pollution and inefficiency issues. Ramie degumming degrades pectin and hemicellulose, necessitating Chemical, Physical, Biological, or combined treatments for removal. In this study confirmed that hydrogen peroxide and sodium hydroxide can be used as very efficient agents for simultaneous removal of non-cellulosic substances and improvement of ramie fiber properties. Three experiments were conducted in which raw ramie ribbons was treated with NaOH in three different concentrations i.e. 1%, 2% and 3% with M: L ratio 1:10. Results showed that the degummed and bleached fiber shows a definite improvement of fiber characteristics (softness, elongation, and fineness), which can be used to blend with other fibers in different processing system. The factors influencing the properties of modified fiber with combined chemicals were investigated.

Keywords: Ramie, perennial, elongation, degumming, Bleaching, natural fiber**SORPTION-DESORPTION BEHAVIOUR OF ARSENIC ON CLAY-ORGANIC COMPLEX****DEEPAK¹, RUMA DAS², S.P. DATTA³, NAYAN AHMED⁴, DEBASIS GOLUI⁴**¹Department of Soil Science & Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University,²ICAR-National Bureau of Soil Survey and Land Use Planning, Kolkata³ICAR-Indian Institute of Soil Science, Bhopal⁴ICAR-Division of Soil Science & Agricultural Chemistry, Indian Agricultural Research Institute, New Delhi

The high concentration of arsenic (As) in soil may pose to potential risk for groundwater contamination and its entry in the food chain. Sorption-desorption of As on different soils especially on clay-sized fractions may affect its mobility, toxicity and bioavailability in soil. Therefore, knowledge about As sorption-desorption processes is of paramount importance. The interaction of As with soil minerals is greatly influenced by the contents of organic carbon and amorphous Al-Fe-oxides, type of clay minerals as well as soil pH and temperature. Therefore, a laboratory batch experiment was carried out to study the sorption-desorption behaviour of As on soil and clay-sized fractions of two different soil orders namely – Alfisol and Inceptisol at varying pH (5.5 and 7.0) and temperature (298 and 308 K). The Alfisol and Inceptisol was dominated with smectite and illite minerals respectively. The contents of organic C was lower and free and amorphous aluminium (Al) and iron (Fe) oxides was higher in Alfisol compared to the Inceptisol. The results showed that the adsorption capacity was higher for soil and clay-sized fractions in Alfisol compared to the Inceptisol. The adsorption of As on clay-organic complex was higher at lower pH (5.5) compared to the higher pH in both the soil orders. The adsorption isotherms for both soil orders fitted well to both Langmuir and Freundlich models. Among clay-sized fractions, high adsorption capacity was found for clay-oxides and clay-organic-complex of Alfisol and Inceptisol, respectively. The thermodynamic results revealed that the sorption reactions were exothermic and favourable at lower temperature (298 K). The desorption data showed that the cumulative desorption was higher in Alfisol but the percentage of As desorbed was higher in Inceptisol. The desorption Index (DI) was higher in Alfisol compared to Inceptisol.

Key words: Adsorption capacity; Al-Fe-oxides; Clay-sized fractions; Desorption Index**EXPLORING THE STATUS OF ANEMIA AND HAEMOGLOBINOPATHIES IN GARHWAL REGION, UTTARAKHAND, INDIA****DEEPAK CHANDRA MELKANI¹ NETRA PAL SHARMA¹ SEETA DEWALI^{1*} AND SATPAL SINGH BISHT²**¹Department of Zoology, Kumaun University, Nainital, Uttarakhand, India²Soban Singh Jeena University Almora, Uttarakhand, India

Anemia and hemoglobinopathies represent significant public health challenges worldwide, particularly in regions with limited access to healthcare resources and proper diagnostic facilities. This study aimed to evaluate the prevalence and distribution of anemia and hemoglobinopathies in the Garhwal Region of India. Through an extensive survey, data were collected from various sources including government hospitals, Primary Health Centers, certified pathology labs, and medical registries maintained by relevant government departments. Analysis of the collected data revealed a varying prevalence of anemia, thalassemia trait, SCβT, SCT, Sick cell anemia (SCA)/Sickle cell disease (SCD), and thalassemia major across different districts within the Garhwal Region. Notably, the district of Haridwar exhibited the highest number of cases, followed by Dehradun, while the mountain districts of Uttarkashi and Tehri Garhwal reported the lowest number of cases.

Keywords: hemoglobinopathies, Sick cell, Haemoglobinopathies, Uttarakhand, Garhwal Region

MANAGEMENT OF NATURAL POLLINATORS FOR SUSTAINING AGRICULTURE AND ACHIEVING FOOD SECURITY***PROF. (Dr.) DEEPAK KHOLIYA and ** DR. PREETI (JOSHI) KHOLIYA*****Professor, School of Agri. Graphic Era Hill University, Dehradun; Uttarakhand, INDIA******Ex-Women Scientist, Botany Deptt. Forest Research Institute (FRI) Dehradun; Uttarakhand**

The 17 Sustainable Development Goals (SDGs) that the UN has set forth aims to reconcile environmental preservation with human well-being by 2030. Although the Biosphere is the focus of all the SDGs, biodiversity conservation remains a global concern. Two billion small farmers worldwide are currently increasing their food output, thanks to bees and other beneficial insects that pollinate crops, which contributes to global food security. According to research, crop yields can rise by a noteworthy median of 24 percent on small, diversified farms provided that pollination is properly managed, while all other things being equal. Pollination is the process that gives us a great deal of food, mostly from horticulture crops. Fruits, vegetables, and seeds are among the foods highest in micronutrients, and their pollination is primarily dependent on insects. In actuality, pollinators like bees, beetles, birds, and bats contribute to 35 percent of global agricultural production, boosting the yields of 87 major food crops and numerous medications produced from plants (FAO). As such, it is essential to the human lifestyles and the production of food, and it establishes a direct link between agricultural production systems and wild ecosystems. Many interdependent species and environmental processes could cease to exist without this reciprocal assistance. Furthermore, we must expand the apiculture industry to include large-scale entrepreneurship, given the significant percentage of rural women who work in agriculture. As a result, more women are able to focus on earning money in the apiculture industry by giving them access to appropriate current technology training. In order to achieve global food security, biodiversity protection, environmental preservation, gender equality, and the empowerment of rural women, it may be the perfect entrepreneurship tool. How can we conserve pollinators and advance their role in environmental and agricultural operations is currently the biggest problem? Owing to the increased prevalence of modern chemical farming practices. Pollinators are under a lot of pressure from human activity because it is both increasing their need and destroying their habitats. Throughout the past few decades, horticulture has grown significantly, and intensive farming practices have resulted in a more homogeneous environment. The importance of insects as pollination and their management needs for this ecosystem service are now more understood. Resources, such as areas with pristine natural flowering plants available in all seasons, are necessary for effective pollination. Insect pollinators are becoming rare in areas where they are diminished or eliminated, and adaptive management techniques will be needed to maintain our food production. The significance of pollination services for agricultural and environmental advantages makes it imperative to take proactive measures to save insect pollinators. The primary topics covered in the study are the difficulties associated with both traditional and contemporary apiculture techniques, with regard to pollinator services and significant honey bee products and their value additions, in order to achieve food security.

Key words:- Apiculture, Sustainable Development, Biodiversity Conservation, Food Security etc.

DEEP LEARNING BASED SOIL TILLAGE QUALITY ASSESSMENT FOR SEEDBED PREPARATION**DEEPAK KUMAR¹, N.S. CHANDEL²****¹Ph.D Scholar, ICAR - Central Institute of Agricultural Engineering, Bhopal, M.P.****²Senior Scientist, ICAR- Central Institute of Agricultural Engineering, Bhopal, M.P.**

Soil aggregation plays a critical role in soil physical properties and processes, impacting factors like water infiltration, aeration, and root growth. Accurately characterizing soil aggregates is therefore essential for understanding and managing soil conditions, particularly in the seedbed during crop establishment. This review examines recent developments in techniques for measuring and analysing soil aggregates, including both direct physical methods and indirect imaging-based approaches. Key topics covered include: the use of stereo vision and semantic segmentation for automated roughness measurement and aggregate size classification; the application of laser diffraction to determine dry aggregate size distributions; and the leveraging of these advanced measurement capabilities to provide feedback for precision control of tillage implements. The review highlights how these novel techniques can provide more detailed, objective, and efficient assessment of aggregates compared to traditional manual sieving methods. Additionally, the integration of aggregate characterization with precision farming technologies is enabling new opportunities for optimizing seedbed preparation and improving crop establishment. Overall, the review synthesizes the current state-of-the-art in soil aggregate measurement, identifying both the strengths and limitations of emerging approaches to guide future research and practical implementation.

Keywords: Soil aggregate size distribution, deep learning, semantic segmentation, tillage quality assessment, soil aggregate size classification.

EFFECT OF INTEGRATED WEED MANAGEMENT PRACTICES ON FRENCH MARIGOLD GROWTH FLORAL PARAMETERS**DEEPAK KUMAR^{*1}, B.S. BENIWAL², SONU KUMARI³, V.S. HOODA⁴ AND ANITA KUMARI⁵**^{1,2 &3}**Department of Horticulture, ⁴Department of Agronomy and ⁵Department of Botany and Plant Physiology CCSHAU, Hisar**

Marigold is a free blooming ornamental crop and used as a loose flower that is gaining popularity on account of its easy culture, wide adaptability, and increasing demand on festival, wedding, and religious act. There is an immense scope in marigold cultivation to boost farmers income. To evaluate different weed control practices in French marigold present study was conducted at Experimental Orchard of the Department of Horticulture Chaudhary Charan Singh Haryana Agricultural University, Hisar during the rabi season of years 2021-2022 and 2022-2023. The experiment comprised of total sixteen treatments laid out in randomized block design and was replicated three times. All the growth parameters were recorded maximum in T6 (Local thatch grass mulch @ 5 ton/ha) viz., plant height (83.35 cm & 75.25 cm), plant spread (68.77 cm & 66.57 cm), number of primary branches per plant (22.53 & 21.60), fresh weight of plant (1,651.72 g & 1405.76 g), dry weight of plant (418.87 g & 349.47 g) followed by T7 (black polyethylene mulch of 100 µ). The flower parameters viz. minimum days taken for bud initiation (52.87 & 51.07 days), minimum days taken for flowering (62.40 & 64.67 days) recorded in T16 (glyphosate @ 2% at 30 and 60 DAT), while the maximum duration of flowering (68.94 & 62.60 days), maximum number of flowers per plant (154.27 & 134.93) flower weight per plant (827.82 & 510.06 g) and flower yield (362.17 & 239.09 q/ha) recorded in T7 (black polyethylene mulch of 100 µ). However, the maximum flower diameter (6.08 & 5.27 cm), maximum fresh weight of flower (5.48 & 3.82 g) recorded in T6.

Key words: - French marigold, integrated weed management, mulch,

STUDY ON THE PATH COEFFICIENT ANALYSIS OF CERTAIN MATRIC TRAITS IN BRINJAL (*SOLANUM MELONGENA*)**DEEPAK KUMAR****Research Scholar, Sunrise University, Alwar, Rajasthan**

The present investigation, entitled “Investigation on the genetic basis of certain metric traits in the brinjal (*Solanum melongena* L.) Summer crop under Alwar (Rajasthan) conditions,” was under way. In the present study, 74 genotypes (14 lines, 4 tests, and 56 F1's) with two checks were evaluated in RBD with three replications at the Vegetable Research Farm, Department of Vegetable Science, Sunrise University, Alwar, Rajasthan, India, under two summer seasons during 2022 and 2023. The observations were recorded for days to 50% flowering, days to first fruit harvest, plant height, number of primary branches per plant, length of pedicle (cm), number of fruits per cluster, average fruit weight (gm), number of fruits per plant, total phenol content (mg/100 gm), dry matter content (%), reducing sugar (%), non-reducing sugar (%), total sugars (%), TSS (Brix), ascorbic acid (mg/100 gm), total fruit yield per plant (kg), and yield Q/Ha. The observations were also recorded for some ancillary traits as well. The result revealed that, both year and pooled Phenotypic Path coefficient analysis revealed high positive and direct effect of Total fruits yield per plant (0.3723) followed by number of fruits per plant (0.2300), average fruit weight (0.2204), plant height (0.1734), number of fruits per cluster (0.0568), length of pedicle (0.0446), days to first fruit harvesting (0.0281), Total Phenol content (0.0159) and dry matter content (0.0081). Regarding indirect effects number of primary branches (0.2892 followed by reducing sugar (0.2536), days to 50 % flowering (0.1952), non-reducing sugar (0.0693) and TSS (0.0022). contributed number of fruits per cluster maximum positive and indirect effect. Although number of primary branches per plant gave maximum negative direct effect on plant height but high positive and indirect effect via total fruit yield per plant (0.591) and ultimately resulted in positive correlation with yield. In pooled Genotypic Path coefficient analysis revealed high positive and direct effect of Total fruits yield per plant (0.7791) followed by total sugar (0.3543), plant height (0.2132), average fruit weight (0.1956), Ascorbic acid (0.1216), number of fruit per cluster (0.0367), dry matter content (0.0260), Total Phenol content (0.0256) and TSS (0.0134). Regarding indirect effects reducing sugar (0.4582) followed by number of primary branches per plant (0.3155), non-reducing sugar (0.1718), days to first fruit harvesting (0.1336), number of fruits per plant (0.0428), days to 50 % flowering (0.0343) and number of fruits per cluster (0.0174). contributed plant height maximum negative and indirect effect.

TISSUE DISSOCIATION FRACTIONATION: A SIMPLE AND RAPID METHOD FOR ISOLATION, FRACTIONATION AND QUANTIFICATION OF NEURONAL AND NON-NEURONAL CELLS IN THE BRAIN OF FRESHWATER CATFISH *HETEROPNEUSTES FOSSILIS* (BLOCH, 1794)**DEEPAK KUMAR BEHERA, NEELAM SHARMA, BULBUL ALI, ROHIT KUMAR GAUTAM, ABHA MISHRA*****Department of zoology, school of life sciences, Babasaheb Bhimrao Ambedkar University, Lucknow, U.P.**

Understanding the cellular composition of the brain is fundamental to unravelling its intricate functions. Here, we present a modified, fast and inexpensive method, termed the tissue dissociation fractionation, designed for the efficient isolation, fractionation, and quantification of neuronal and non-neuronal cells in the brain of the freshwater catfish, *Heteropneustes fossilis*. This method integrates the tissue dissociation technique, which consists of transforming brain tissue into a homogenous suspension of single cell, using a combination of tissue dissociation techniques and density gradient centrifugation. The cells can be counted and identified by a haemocytometer. We successfully isolated distinct populations of neuronal and non-neuronal cells from the brain tissue, without the use of major enzymes such as collagenase, or proteinase. Characterization of these cell populations revealed differences in neuronal and non-neuronal morphology. Furthermore, we quantified the relative densities of neuronal and non-neuronal cells in different regions of the brain. Estimates of total cell, neuronal, and non-neuronal cell numbers can be obtained in 2 hours, which vary by <10% among animals. Our results demonstrate the utility and versatility of this method as a valuable tool for neurobiological research. Applying this method to the full brain of medium-sized fish,

average weight of 140mg, we show, for example, that it contains ~1.276 million cells out of which ~184,800 are neurons and almost >60% of these are located in the cerebellum (metencephalon) alone. Moreover, we show that non-neuron cells (glial cells) are in the majority.

Key words: neuron, glial cells, cerebellum, homogenous suspension, neuron morphology.

WITHANIA SOMNIFERA: REVIEW ON BIODIVERSITY, BIOCHEMICAL PROFILING, AND PHARMACO-COMMERCIAL APPLICATIONS

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Withania somnifera, commonly known as Ashwagandha, is a prominent herb in traditional medicine systems like Ayurveda, Unani, and Siddha. This review provides a comprehensive overview of the biodiversity, biochemical profiling, and pharmaco-commercial applications of *Withania somnifera*. The biodiversity of *Withania somnifera* is explored, encompassing its natural habitat, morphological characteristics, and genetic diversity. This section delves into the geographical distribution of the plant, its ecological requirements, and the factors influencing its growth. The biochemical profiling of *Withania somnifera* is examined, focusing on its phytochemical composition and therapeutic compounds. Key bioactive constituents such as withanolides, alkaloids, flavonoids, and sterols are discussed in detail, along with their pharmacological properties and potential health benefits. The pharmaco-commercial applications of *Withania somnifera* are elucidated, highlighting its diverse uses in healthcare, nutraceuticals, and cosmeceuticals industries. The herb's adaptogenic, anti-inflammatory, antioxidant, and immune modulatory properties make it a valuable ingredient in various formulations targeting stress management, cognitive health, immune support, and skin care. This poster review sheds light on the multifaceted nature of *Withania somnifera*, emphasizing its significance in both traditional medicine and modern pharmacology. Further research and development efforts are warranted to fully explore the therapeutic potential and commercial opportunities associated with this remarkable herb.

Key words- Ashwagandha, biodiversity, biochemical profiling, plant medicinal properties

COMPOSITION OF GRASSLAND VEGETATION IN THE KOYNA RANGE IN SAHYADRI TIGER RESERVE

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Grasslands are crucial for maintaining biodiversity, controlling water cycles, and preventing erosion. Their significance as a source of forage for wildlife has greatly increased their function in protected areas. The Koyna range of the Sahyadri Tiger Reserve has grasslands where the current research was carried out. The study aimed to assess diversity in the composition of grasslands. Total 15 grasslands were identified and sampled. Minimum 3 to maximum 5 transects of were laid across the slope depending on the size of the grassland. On these transects, 5 quadrats of 1 m² size were laid at least 10 m away from each other. Data on species and their abundance in each quadrat was recorded for grasses and other herbaceous vegetation. Total 46 species of plants were recorded out of which 17 were grasses. Other 14 herbs, 9 shrubs and 6 regenerative stage trees were observed. Among all the sampled grasslands in Koyna range, Kirsule murha grassland has highest Shannon diversity index ($H = 2.877$) and Gokul has lowest index value ($H = 2.27$) while Maldev grassland recorded highest ($D = 0.9384$) while Punavali recorded lowest ($D = 0.8862$) Simpson diversity index.

BIOEFFICACY OF SOME INSECTICIDES AND MIXED FORMULATIONS WAS DETERMINED AGAINST SPODOPTERA LITURA (FABRICIUS)

DEEPENDRA KUMAR SAINI* AND DR. R.P SRIVASTAVA

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The bioefficacy of some insecticides and mixed formulations was determined against *Spodoptera litura* (Fabricius). The contact toxicity of dichlorvos and carbosulfan was tested against 7d old larvae (mean initial weight = 0.183g/ larva) of *S. litura* by topical application method using Hamilton microapplicator dispenser under laboratory conditions. The LD₅₀ values of dichlorvos at 12 and 24 HAT were 3.9061 and 2.8419 µg/larva while the LD₅₀ of carbosulfan at 36, 48, 72 and 96 HAT were 4.9041, 4.0578, 4.0954 and 3.4784 µg/larva, respectively. The LT₃₀, LT₅₀ and LT₉₀ values of dichlorvos at 1.52 µg/larva were 16.47, 33.06 and 183.74h, respectively and for carbosulfan at 7.5µg/larva the respective values were 10.41, 21.20 and 121.99 h. In another experiment the LD₃₀, LD₅₀ and LD₉₀ value of profenofos + cypermethrin and deltamethrin + triazophos at 24HAT were 0.8483, 1.5829 and 7.3489 µg/larva and 1.0312, 2.2669 and 15.7568 µg/larva respectively against 8d old larvae (mean initial weight = 0.193g/ larva) of *S. litura* by topical application method using Hamilton microapplicator dispenser. Profenofos + cypermethrin was 1.24 (RT₃₀), 1.43 (RT₅₀) and 2.14 (RT₉₀) times more toxic than deltamethrin + triazophos at different RT levels. LT₅₀ values for profenofos + cypermethrin at 1.72, 1.32 and 0.88 µg/larva was 22.90, 27.83 and 37.34h respectively while the LT₅₀ values for deltamethrin + triazophos at 2.16 µg/larva was 29.17h.

Keyword: Bioefficacy, *S. litura*, Dichlorvos, Carbosulfan, Profenofos + Cypermethrin, Deltamethrin + Triazophos

IN VITRO PROPAGATION AND SECONDARY METABOLITES PRODUCTION OF ANGELICA GLAUCA EDGEW.: A THREATENED MEDICINAL AND AROMATIC HERB OF HIMALAYAS**DEEPIKA NEGI, MANISHA THAKUR*****Department of Biotechnology, Dr YS Parmar University of Horticulture & Forestry, Nauni, Solan (HP)**

The present study reports an optimized single step protocol for high frequency in vitro propagation through rhizome buds and secondary metabolite production in *Angelica glauca*. Maximum in vitro establishment of buds (94%) was achieved on medium supplemented with 0.3 mg/L BA and 0.1 mg/L GA₃. Highest multiplication rate (1:15) was achieved from rhizome buds on MS medium fortified with 1.0 mg/L BA and 0.2 mg/L NAA after 5th sub-culture. Shoots with swollen rhizomes and fibrous roots were transferred for hardening to pots containing soil:cocopeat (1:1) and showed 60% survival after 1 month inside the polyhouse. For secondary metabolite production, callus was induced from in vivo roots on MS medium supplemented with Kin (0.5 mg/L) + 2,4-D (2.0 mg/L), under dark incubation. The untreated root callus suspension culture showed the existence of 206 compounds. The GC-MS analysis results revealed that extracts predominantly contain compounds from different classes such as esters, ethers, and *N*-heterocyclic pyrrolo pyridazine, fatty acids and mono and sesquiterpenes with varying concentrations. The root callus cultures extract under methyl jasmonate application (0.5, 1.0 and 1.5 mM) have varying concentration of monoterpene such as D-limonene, *trans*-ligustilide and *cis*-ligustilide a marker compound of *A. glauca* essential oil, fatty acids and ethers. Sucrose at 1, 3 and 5% reveals the presence of various unsaturated fatty acids, hydrocarbon, ethers, sesquiterpenes β -Farnesene, α -copaene, and carotenoid rhodopin under varying concentration. The application of growth regulators (2,4-D & Kin) revealed the presence of furfural and its derivatives, benzoic acids and esters.

Keywords: *Angelica glauca*, In vitro propagation, Aromatic, Endangered, Metabolites, Callus, Suspension cultures

RESPONSE OF NANO- DAP (LIQUID) ON GROWTH AND YIELD OF WHEAT IN A VERTISOL OF CHHATTISGARH**DEEPIKA SAHU, RAKESH BANWASI, L.K. SHRIVASTAVA, GAURAV JATAV****Ph.D. Scholar, Department of Soil Science and Agricultural Chemistry College of Agriculture, IGKV, Raipur, Chhattisgarh, India****Senior Scientist, Department of Soil Science and Agricultural Chemistry College of Agriculture, IGKV, Raipur, Chhattisgarh, India****Scientist, Department of Soil Science and Agricultural Chemistry College of Agriculture, IGKV, Raipur, Chhattisgarh, India****Associate Professor, Department of Soil Science and Agricultural Chemistry, College of Agriculture**

To assess the response of Nano- DAP on growth parameters and yield attributes of wheat crop, an experiment was carried out during the kharif seasons of two consecutive years 2021-2022 and 2022-2023 at the research farm of College of Agriculture, IGKV, Raipur, Chhattisgarh, India. The experiment was laid out in a randomized block design with the twelve treatments of various applications of conventional DAP (granular) and Nano-DAP (liquid). Nano-DAP were applied in wheat as seed treatment and foliar spray. Results showed that application 75% NP + seed treatments @ 5ml/l + foliar spray of Nano-DAP @ 0.2 % at 25- 30 DAG resulted at par yield in comparison with 100 % NP through conventional DAP (RDF applied as NPK 120:60:40 kg/ha). Significant effect of nano-DAP was also observed in spike length, spike weight and test weight of wheat.

Keywords: wheat, Nano DAP, Foliar application

COMPARATIVE STUDY ON THE REARING PERFORMANCE OF MUGA SILKWORM (ANTHERAEA ASSAMENSIS) ON DIFFERENT HOST PLANT UNDER THE FIELD AND GREEN HOUSE CONDITION**DEEPSHIKHA BURAGOHAIN* AND ANIRUDHA GIRI****Department of Life science and Bioinformatics, Assam University, Silchar, Assam, India**

Rearing performance of various host plants of Muga silkworm *Antheraea assamensis* was studied in various crop cycles. The nutritional composition of muga silkworm (*Antheraea assamensis*) reared in different host plants like som, soalu and dighlati were investigated under different rearing conditions. Breeding performance of various edible plants such as som, suolu and dighlati were analyzed based on cocoon weight, shell weight, pupal weight, cocoon length and width. This study showed that greenhouse conditions and open environment for silkworm are better options for achieving qualitative and quantitative cocoon production of *Antheraea assamensis*. This study shows that the yield performance of Katia was better than that of other silk moth pupae during the harvest season. The results showed that the pupal powder moisture content ranged between 70.8% to 73%, protein 55.88% to 65.10%, carbohydrate 0.002 to 0.005% and ash 1.57 to 2.55% on a dry matter basis in different host plants. Better nutritional content in some plants as an edible crop with other plants than safe and spread.

Keywords: Rearing Performance, *Antheraea assamensis*, Food Plants, Growth Condition, Nutritional Value

BIOCHAR AND ITS EFFECT ON SOIL PROPERTIES**DEEPSHIKHA THAKUR¹ AND KSHITIJ PARMAR²****Amity Institute of Organic Agriculture, Amity University, Noida (U.P)**

Biochar is defined as a carbon-rich material produced during pyrolysis process that is a thermochemical decomposition of biomass with a temperature about $\leq 700^{\circ}\text{C}$ in the absence or limited supply of oxygen. Biochar addition to soils has a multitude of potential benefits such as improvement in the physico-chemical and biological properties of soil. The physico-chemical properties that are positively affected by biochar amendment are soil density, soil pore size distribution, soil colour, soil pH, nutrient retention and availability, cation exchange capacity (CEC), sorption capacity, soil moisture retention, soil aeration and soil pollution remediation. On the other hand, the biochar

addition is also known to impact biological properties of the soil such as habitat for soil microorganisms, microbial biomass, soil enzyme activity, microbial abundance and diversity. All these properties contribute to the amendment of soils, by addition of basic cations and micronutrients, improving water holding capacity, and a gradual release of nutrients to the growing plant. Over time, these additions continue to promote soil nutrient availability by giving rise to greater stabilization of organic matter and a subsequent reduction in the use and requirement of chemical fertilizers.

Keywords: Biochar, Soil, crop, nutrients

ETHNOBOTANICAL PLANTS USED BY THE TRIBAL COMMUNITIES OF DISTRICT KINNAUR, HIMACHAL PRADESH, INDIA DEEPTI GUPTA AND SURESH KUMAR

Department of Biosciences, Himachal Pradesh University, Shimla

The present paper deals in the diversity of plant resources and with the documentation of field observations on traditional use of medicinal and aromatic plants by the tribal people of Kinnaur district of Himachal Pradesh in the North-Western Himalaya. The Zanskar, Dhauladhar and Himalayan hill ranges in district Kinnaur are inhabited by different ethnic groups. A series of ethnobotanical surveys, participatory observations and field visits were planned to illicit information by conducting interviews and meetings with people of the tribal community to find out the medicinal properties and uses of the collected plant specimens on the basis of a semi-structured questionnaire. A large number of plants of local flora are used to cure various ailments of human, livestock and other plant species are beneficial to indigenous people in some or the other way. It was found that 70 plant species are commonly used by indigenous people for various purposes in day to day life.

UNVEILING EARTH'S SECRETS: REMOTE SENSING AT THE FOREFRONT OF SOIL SCIENCE ADVANCEMENTS DESH RAJ MEENA

Department of Soil Science and Agricultural Chemistry, College of Agriculture, SKRAU, Bikaner (334006), Rajasthan

Remote sensing technology has numerous applications in soil science, providing valuable insights into soil properties, health, and dynamics. Here are some key areas where remote sensing is used in soil science: **Soil Moisture Monitoring:** Remote sensing can estimate soil moisture content by measuring the reflected or emitted electromagnetic radiation from the soil surface. This information is crucial for agricultural management, irrigation scheduling, and drought monitoring. **Soil Erosion Assessment:** By analyzing satellite images or aerial photographs, remote sensing can help assess soil erosion patterns and identify vulnerable areas. This data aids in implementing erosion control measures and land management strategies. **Soil Fertility Mapping:** Remote sensing techniques, combined with spectral analysis, can map soil fertility levels by detecting variations in soil composition, organic matter content, and nutrient availability. This information guides precision agriculture practices such as variable rate fertilization. **Land Degradation Monitoring:** Remote sensing is instrumental in monitoring land degradation processes such as salinization, desertification, and soil compaction. It allows for early detection of degradation trends, supporting sustainable land use planning and restoration efforts. **Crop Health and Yield Prediction:** By analyzing multispectral or hyperspectral data, remote sensing can assess crop health indicators such as chlorophyll content, leaf area index, and stress levels. This data helps farmers optimize inputs, detect pest or disease outbreaks, and predict crop yields. **Soil Type and Texture Mapping:** Remote sensing can contribute to mapping soil types and textures based on spectral signatures and surface characteristics. These maps are valuable for soil classification, land suitability assessment, and precision agriculture applications. **Environmental Impact Assessment:** Remote sensing is utilized in assessing the impact of land use changes, mining activities, infrastructure development, and pollution on soil quality and ecosystems. It supports environmental monitoring and sustainable land management practices. Overall, remote sensing technology plays a crucial role in advancing our understanding of soil dynamics, enabling informed decision-making for sustainable agriculture, land management, and environmental conservation.

Key words- Remote Sensing, Soil Science, Earth Observation, Technology Advancements, Environmental Monitoring, Precision Agriculture, Soil Health Assessment.

IMPACT OF WEATHER FACTORS ON POPULATION DYNAMICS OF PINK BOLLWORM, *PECTINOPHORA GOSSYPIELLA* (SAUNDERS) INFESTING BT COTTON

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A field experiment was carried out to investigate the population dynamics of *P. gossypiella* in Bt cotton during the Kharif seasons of 2020 and 2021 at All India Coordinated Cotton Improvement Project, MPKV, Rahuri. The findings indicated that in Kharif 2020, the number of adult moths captured per week was ranged from 1.00 to 185.00, with the highest moths observed during the 50th MW (185 moths/week). In 2021, the trap catches showed a gradual increase, reaching its peak during the 49th (153 moths/week). Rosette flower incidence was varied from 2.27 to 32.84 per cent in 2020 and 2.38 to 41.67 per cent in 2021. The peaks of rosette flowers were detected during 37th MW during both the years. During 2020, the extent of green boll damage caused by *P. gossypiella* varied from 2.56 to 63.49 per cent, while in 2021, it was ranged from 4.35 to 63.49 per cent. The population of PBW larvae/20 green bolls was ranged from 0.45 to 38.55 in 2020 and from 1.30 to 32.50 in 2021, with peak occurrences observed in the 46th and 47th MW for both years. Locule damage was ranged from 1.25 to 52.70 per cent in 2020 and from 1.65 to 48.38 per cent in 2021.

Key words: Pink bollworm, *P. gossypiella*, Bt cotton, population dynamics, weather factors, correlation

UNVEILING EARTH'S SECRETS: REMOTE SENSING AT THE FOREFRONT OF SOIL SCIENCE ADVANCEMENTS DESHRAJ MEENA

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Remote sensing technology has numerous applications in soil science, providing valuable insights into soil properties, health, and dynamics. Here are some key areas where remote sensing is used in soil science: **Soil Moisture Monitoring:** Remote sensing can estimate soil moisture content by measuring the reflected or emitted electromagnetic radiation from the soil surface. This information is crucial for agricultural management, irrigation scheduling, and drought monitoring. **Soil Erosion Assessment:** By analyzing satellite images or aerial photographs, remote sensing can help assess soil erosion patterns and identify vulnerable areas. This data aids in implementing erosion control measures and land management strategies. **Soil Fertility Mapping:** Remote sensing techniques, combined with spectral analysis, can map soil fertility levels by detecting variations in soil composition, organic matter content, and nutrient availability. This information guides precision agriculture practices such as variable rate fertilization. **Land Degradation Monitoring:** Remote sensing is instrumental in monitoring land degradation processes such as salinization, desertification, and soil compaction. It allows for early detection of degradation trends, supporting sustainable land use planning and restoration efforts. **Crop Health and Yield Prediction:** By analyzing multispectral or hyperspectral data, remote sensing can assess crop health indicators such as chlorophyll content, leaf area index, and stress levels. This data helps farmers optimize inputs, detect pest or disease outbreaks, and predict crop yields. **Soil Type and Texture Mapping:** Remote sensing can contribute to mapping soil types and textures based on spectral signatures and surface characteristics. These maps are valuable for soil classification, land suitability assessment, and precision agriculture applications. **Environmental Impact Assessment:** Remote sensing is utilized in assessing the impact of land use changes, mining activities, infrastructure development, and pollution on soil quality and ecosystems. It supports environmental monitoring and sustainable land management practices. Overall, remote sensing technology plays a crucial role in advancing our understanding of soil dynamics, enabling informed decision-making for sustainable agriculture, land management, and environmental conservation.

Key words- Remote Sensing, Soil Science, Earth Observation, Technology Advancements, Environmental Monitoring, Precision Agriculture, Soil Health Assessment.

SIGNIFICANCE OF BITTER GOURD FOR THE HEALTHY LIFE OF HUMAN BEING

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Bitter gourd, scientifically known as *Momordica charantia* and commonly referred to as bitter melon, is a vegetable that plays a pivotal role in promoting human health and fostering a healthy lifestyle. Originating from tropical regions, particularly South Asia and Africa, bitter gourd has been an integral part of traditional medicinal practices for centuries due to its diverse array of health benefits. One of the remarkable aspects of bitter gourd is its rich nutritional profile. It is packed with essential vitamins and minerals, including vitamins A, C, and E, as well as potassium, calcium, and iron. Moreover, bitter gourd is low in calories and carbohydrates, making it an ideal choice for those seeking to manage their weight or control their blood sugar levels. In addition to its nutritional value, bitter gourd possesses potent medicinal properties. One of its most well-known benefits is its ability to regulate blood sugar levels. Compounds found in bitter gourd, such as charantin and polypeptide-p, mimic the action of insulin and help improve glucose utilization, making it beneficial for individuals with diabetes. Bitter gourd is renowned for its antioxidant and anti-inflammatory properties due to its rich content of phytochemicals like flavonoids, phenolic compounds, and alkaloids. These compounds combat oxidative stress and inflammation, potentially reducing the risk of chronic diseases such as heart disease, cancer, and neurodegenerative disorders. Bitter gourd's importance extends beyond its nutrition and medicine. It's revered in global traditional medicines like Ayurveda, Traditional Chinese Medicine, and African practices, treating diverse conditions from GI issues to respiratory infections. Modern research validates its traditional uses, integrating it into medical practices, and highlighting its natural health benefits.

Keywords: Bitter gourd, human health, traditional medicine, nutritional value, antioxidant, anti-inflammatory.

INSECT BIODIVERSITY IN THE INDIAN HIMALAYAS: ISSUES, CHALLENGES AND IMPACT OF CLIMATE CHANGE DEVANSHU GUPTA¹ AND RISHI RICHA²

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Mountains in nature are treasure troves of biodiversity and occupy 24% of the global land area and 12% of the world's population. Due to the extreme environmental differences, unique physiology, extreme elevation differences, different ecological conditions and diverse vegetation, they have a rich diversity of life, both flora and fauna. The Himalayas form the great mountain system of Asia with the highest mountains in the world and form the formidable barrier between the Tibetan Plateau in the north and the alluvial plains of the Indian subcontinent. The Himalayas stretch over 2,400 km across India, Nepal, Bhutan, China and Pakistan and are home to the highest peaks and mightiest glaciers on earth. The great Himalayan range in India extends from Jammu and Kashmir in the west to Arunachal Pradesh in the east and crosses six states, namely Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, West Bengal (Darjeeling and Kalimpong) and Arunachal Pradesh. The Indian Himalayas are home to over 30% of India's animal diversity and among them insects is the dominant group of animals. They serve as an important source of food for other organisms, help in the biological control of other organisms (predators, parasites), and maintain soil structure and fertility. They are now extremely useful as pollinators. As pests of agriculture and stored products and as carriers

of life-threatening diseases, they are often in direct competition with humans. Insects in the agroecosystem play a vital role in crop production as pests of crops, predators of other insects, and parasitoids. Except for the few pest species, little is known about the bionomics, host association, and habitat of a significant proportion of species. Despite their ecological importance, the conservation of insects in India has not yet received much attention. Therefore, in this work we try to investigate the biodiversity of insects in the Indian Himalayan region. The Indian Himalayan insect fauna comprises over 24,784 species, accounting for 38.1% of India's known diversity. Most of these are beetles, represented by over 10,533 species/subspecies, followed by Lepidoptera (5,356), Hymenoptera (3,054), Diptera (1,698) and Hemiptera (1,841). The Central Himalayas have the highest insect diversity with 12,053 species/subspecies, followed by the Western Himalayas (10,002), the Northwestern Himalayas (6,445), the Eastern Himalayas (3,819), the Ladakh Mountains (1,031) and the Trans-Himalayan Sikkim (833) and the Tibetan Plateau (811). The reason for the lower representation of fauna in the Tans Himalaya biogeographic zone and the Eastern Himalayan biotic province (Arunachal Pradesh) could be that there is less exploration and collection in the museums of national and international repute in these areas. Therefore, there is an urgent need for comprehensive surveys and field investigations using standardized data collection methods to thoroughly inventory the fauna of these regions. Habitat loss, deforestation and degradation, agriculture, forest encroachment, grazing, human-wildlife conflict, forest fires, illegal mining of forest products, commercial plantations, replacement of native species with exotic species and uncoordinated infrastructure development are among the major threats to biodiversity worldwide and in India. Like other animal groups, insects are also severely affected due to habitat loss, invasive alien organisms, pollution and biological control. Therefore, global warming and climate change are leading to changes in the diversity, geographical distribution, and abundance of insects. Long-term monitoring of insect populations is needed to identify the most affected regions and evidence of a biological response to climate change.

POPULATION DYNAMICS OF MAJOR SUCKING PESTS OF MANGO AND THEIR NATURAL ENEMIES

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Mango (*Mangifera indica* L.) is very important popular fruit of the world and choicest fruit of sub-continent and considered as king of all fruits. Mango originated in Indo-Burma region. Besides delicious taste, excellent flavour and attractive fragrance, it is rich in vitamin A&C. India contributes major share in production and export which accounts for about 50% and ranks first in the world. In India mango is cultivated in an area of 1.23 million ha with the production of 10.99 million tonnes. Production of mango is enormously handicapped by various insect pests and diseases from seedling to maturity stage. The mango crop is attacked by about 492 species of insects, 17 species of mites and 26 species of nematodes globally. Of these, 188 species have been reported from India. Among them sucking pests like leaf hopper and thrips are important sucking pests which cause considerable economic loss to mango production. Population dynamics of leaf hopper and thrips and their natural enemies were studied from three consecutive years of 2021, 2022 and 2023 at Chintamani, Karnataka (variety Mallika) in IPM (integrated pest management), FP (farmers practice) and untreated control. Pooled mean of three years data revealed that, maximum no. of hopper population was recorded in untreated plots (11.8/panicle) followed by FP (7.61/panicle) and lowest population was observed in IPM plots (3.12/panicle). Similarly, thrips population was also higher in untreated control (3.56/tap) followed by FP (2.19/tap) and IPM recorded lowest population (1.05/tap). Natural enemy populations viz., coccinellids, chrysopids, and spiders were in the order of untreated control > IPM > FP, highest natural enemies population with highest PD ratio (pest: defender ratio) was highest in untreated control followed by IPM and FP plots. This is due to no pesticide interventions in untreated plots and need based application in IPM plots and in case of FP farmers resort to cocktail of pesticides to manage the pests.

Key words: mango pests, IPM, hopper, thrips, natural enemies, spider

DOCUMENTING ECOLOGICAL VARIABILITY: SPECIES DISTRIBUTION AND FAMILY DOMINANCE IN THE WEST RAJABHATKHAWA RANGE OF BUXA TIGER RESERVE, WEST BENGAL

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The rich and varied plant communities across the globe contribute significantly to biodiversity, which is crucial for ecological stability, environmental health and human well-being. This study presents a comprehensive analysis of the diversity of trees, shrubs and herbs across four distinct sites within the West Rajabhatkhawa range, aiming to identify patterns of species distribution and dominant botanical families. Detailed surveys were conducted at four sites, designated as Site-I, Site-II, Site-III, and Site-IV. The plant species were classified into trees, shrubs and herbs, and were further analysed based on their genera, families and overall species distribution. Information was systematically tabulated and visualized through figures to illustrate the percentage of family distribution. The study documented a total of 210 species across the sites, comprising 109 trees, 43 shrubs and 58 herbs, spanning 154 genera and 44 families. Meliaceae emerged as the most dominant tree family across the sites, particularly prominent in Site-IV which exhibited the highest tree diversity. In the shrub category, Apocynaceae showed significant prevalence, especially in Site-I and Site-IV. The herb layer was dominated by Asteraceae, with Site-II displaying the most extensive herb species diversity. Each site presented unique patterns in species distribution and family dominance, reflecting the ecological variances and biodiversity significance of the West Rajabhatkhawa range. This comparative study underscores the

rich plant biodiversity within the West Rajabhatkhawa range and highlights the importance of preserving such diverse ecosystems. The variations in plant community structures across different sites provide critical information into the ecological dynamics and can guide conservation efforts. Further studies are recommended to explore the ecological interactions and conservation priorities within these habitats.

Keywords: Biodiversity, West Rajabhatkhawa Range, Species Distribution, Dominance

EFFECT OF ABIOTIC FACTORS ON THE SEASONAL INCIDENCE OF FRUIT BORER, *HELICOVERPA ARMIGERA* ON TOMATO IN PALAMPUR VALLEY OF HIMACHAL PRADESH

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Tomato fruit borer *Helicoverpa armigera* Hubner (Lepidoptera: Noctuidae) is one of the most important lepidopteran pests associated with tomato that acts as a limiting factor in harvesting high yields of healthy and quality fruits. The abiotic factors viz., temperature, relative humidity and rainfall are known to have profound influence on the occurrence, population build up and activity of the pest in tomato. Therefore, understanding such relations is critical for implementing effective management strategies against the pest. Thus, a study was conducted in 2022 at Palampur (H.P.), to observe the effect of varying climatic conditions on population buildup of *H. armigera*. Seasonal incidence studies revealed that the larvae started appearing during 4th week of May (SMW 22). The pest touched the peak with a mean of 4.25 larvae/ plant during 2nd week of June (SMW 24). Weather parameters showed non-significant effect on population buildup of *H. armigera*. The pest was negatively correlated with relative humidity and min. temperature with r values of -0.229 and -0.017, respectively. Max. Temperature and rainfall favoured the pest population, displaying a positive, insignificant correlation, with r values of 0.004 and 0.363, respectively.

Keywords: Tomato, *Helicoverpa armigera*, seasonal incidence, weather factors, larval population

UNCONVENTIONAL OIL SEEDS- CATALYSTS FOR FOOD SECURITY AND SUSTAINABILITY

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The uncontrolled growth of the population has resulted in the depletion of conventional food sources. The increase in consumers has caused a surge in demand that the existing resources are unable to keep up with. Consequently, nutritional value has decreased, leading to a depletion of essential nutrients. The major dominant vegetable oils- palm, soybean, canola, and sunflower are associated with several health risks. New, underutilized oils like rice bran, sal, pistachio, and jatropha have emerged, among others. These seeds offer a diversified approach to meeting the escalating demand for vegetable oils. These unconventional oilseeds, often taken from wild plants, have the potential to be domesticated and enhance their properties and production capacities. The search for novel oilseeds is driven by the fact that they can survive in adverse conditions such as poor soil conditions, benefiting developing nations by reducing the heavy dependence on oil imports. This will also strengthen the national economy. Investors, manufacturers, and consumers are also increasingly drawn to such unconventional edible oil sources for unique health benefits and functional characteristics. However, commercialization requires specific challenges with each oilseed. By exploring these unconventional oil sources, the path towards a diverse food system, addressing food security issues, malnutrition, and sustainable agriculture practices can be achieved.

EXPLORING ORGANIC FARMING PRACTICES IN VEGETABLE CULTIVATION

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Organic farming is a comprehensive production management system that promotes and improves agroecosystem health, which includes biodiversity, biological cycles, and soil biological activity. As a result, it is an effective and promising approach to sustainable agriculture in a circular and green economy. Organic vegetable consumption has increased in recent years due to its organoleptic qualities, better nutritional value, and lesser danger of toxic chemical residues. Recent scientific data on the usage of the primary aspects responsible for organic vegetable crop production includes plant material, soil management and crop nutrition, soil disinfection, crop management, and insect, disease, and weed control. The study focuses on these strategies. Some crucial features of organic systems include the development and carrying out of a "organic system plan" that describes the practices used in crop and livestock production, a detailed record keeping system that tracks all products from the field to the point of sale, and the maintenance of buffer zones to prevent inadvertent contamination by synthetic farm chemicals from adjacent conventional fields. Overall, the findings of this review show that industry, scientists, and farmers have made significant efforts to reduce the ecological effects of established and innovative horticultural practices while achieving consumer demands. To maximize the effectiveness of these horticultural approaches, research-specific investigations should be conducted in a variety of agricultural systems and pedoclimatic conditions.

Keywords: Organic farming, agroecosystem, nutritional value, soil disinfection and horticulture approaches.

PROMISING PROTEIOLYTIC ACTIVITY OF *EUDRILUS EUGENIAE***DHANSHREE CHAUDHARI*, MANOJKUMAR CHOPDA****Department of Zoology, Moolji Jaitha (Autonomous) College, Jalgaon, Maharashtra, India**

The proteolytic enzyme isolated from earthworm *Eudrilus eugeniae*. During isolation of proteolytic enzyme the output of protein purification steps namely, Crude extract-EEH (B), Supernatant- EES (C), Acetone precipitation- EEA (D), Filtrate- EEF (E), and isolated purified proteolytic enzyme- EEPF (F), was studied for their promising proteolytic activity namely, Dehairing and X- ray film hydrolysis activity. The goat skin and X- ray film were incubated in EEH (B), EES (C), EEA (D), EEF (E), and EEPF (F) at various time intervals. The dehairing activity showed the result which order as EEPF > EEF > EEA > EES > EEH. In the hydrolysis of X- ray film activity the EEPF showed highest result i.e., 98.67 ± 0.00 and 239.9 ± 1.08 % at 15 and 30 minutes. The purified proteolytic enzyme helps to remove hair effectively from goat skin and also had the potential to hydrolyze the silver layer from waste X- ray film. The hydrolyzed layer sludge can be used for recovery of silver.

Key word: Proteolytic enzyme, X- ray film hydrolysis, dehairing activity.**IMPACT OF BIO FERTILIZER LEVELS AND PHOSPHORUS NUTRIENT PERFORMANCE IN BLACK GRAM (*VIGNA MUNGO* L. HEPPER) UNDER SUSTAINABLE AGRICULTURE****DHARAM VEER^{1*} AND KHALID HABIB²**¹Ph.D. Scholar, Department of Agriculture, Integral Institute of Agricultural Science and Technology (IIAST), Lucknow (U.P.) India²Associate Professor, Department of Soil Science, Integral Institute of Agricultural Science and Technology (IIAST), Lucknow (U.P.) India

A field study was carried out at Agronomy Research Farm Integral Institute of Agricultural Science and Technology (IIAST), Integral University, Lucknow. during *kharif* season 2022-2023 and 2023-2024 to evaluate "Impact of bio fertilizer levels and phosphorus nutrient performance in black gram (*Vigna mungo* L. Hepper) under sustainable agriculture" Three replicates, sixteen treatments, and a factorial randomised design were used to set up the experiment. The effect of bio fertilizer levels and phosphorus levels on quality attributes, soil status (P^H , EC and OC) and available nutrients status in soil (N, P and K kg ha⁻¹). Application of 60 kg P₂O₅ ha⁻¹ Recorded maximum chlorophyll content (2.42 mg/g), protein content (22.84 %) and carbohydrate content (59.62 %) was recorded pooled data significantly at par different treatments both years. The soil status analysis at harvest stages soil P^H , EC and OC are combine application of T₁₆ (60 kg ha⁻¹ + *Rhizobium* with PSB inoculation) (7.66) (0.26 dSm⁻¹) and (0.39%) was recorded pooled data both years significantly at par different treatments. The observation of soil nutrients status at harvest stages T₁₆ (60 kg ha⁻¹ + *Rhizobium* with PSB inoculation) at the doses of 60 kg ha⁻¹ was recorded the average Nitrogen, Phosphorus and Potassium kg ha⁻¹ (124.86 N kg ha⁻¹) (19.13 kg P₂O₅ ha⁻¹) (285.76 kg K₂O ha⁻¹) was observed both years, pooled data result was significantly being different treatments. The result revealed that when we applied 60 kg P₂O₅ ha⁻¹ it gives higher yield and it is at par with 30 kg P₂O₅ ha⁻¹ and in bio fertilizer when PSB + *Rhizobium* is combinedly used gives higher yield over other. Among all the treatment combinations, T₁₆ treatment recorded maximum grain, straw, biological yield and harvest index and gave maximum values of gross return, net returns and benefit cost ratio which is closely followed by control.

PVA/ESSENTIAL OIL-BASED ACTIVE FOOD PACKAGING FILMS FUNCTIONALIZED WITH HALLOYSITE NANOTUBES AND CELLULOSE NANOCRYSTALS AS FILLER MATERIALS FOR THE SHELF-LIFE EXTENSION OF PAPAYA FRUITS**DHARINI V AND PERIYAR SELVAM S*****Department of Food Process Engineering, Postharvest Research Lab, School of Bioengineering, SRM Institute of Science and Technology, Potheri, Kattankulathur, Chengalpattu District, Tamilnadu, India**

This study investigates the development of PVA and essential oil-based biocomposite films incorporating halloysite nanotubes and cellulose nanocrystals as reinforcement materials for packaging papaya fruits to extend their postharvest shelf-life. The fabrication process involves the dispersion of filler materials within the PVA polymer matrix, followed by the casting of the films using the solvent-evaporation technique. The cellulose nanocrystals isolated from the papaya peel exhibited rod-like structures confirmed in the morphological studies. The films reinforced with halloysite nanotubes and cellulose nanocrystals (5 wt%) had enhanced mechanical properties and exhibited a tensile strength of ~64.40 MPa. The findings of the study demonstrate that the fruits packed with biocomposite materials containing halloysite nanotubes and cellulose nanocrystals as reinforcements and lemongrass essential oil as active material showed better performance when compared to the control. The edible quality and the storage life of the papaya fruits (TSS, firmness and weight loss %) under investigation were extended by 14 days, thus improving the postharvest shelf-life of harvested papayas. Therefore, PVA-based active packaging film prepared with lemongrass essential oil, halloysite nanotubes and cellulose nanocrystals has great potential for the preservation of papaya during postharvest storage.

Keywords: Nanoclay, Eco-friendly materials, Biodegradable, Antimicrobial Films and Postharvest Storage

ROLE IN AGRICULTURE ROBOTICS: A PERSPECTIVE OF DIGITAL FARMING**DHARMENDRA KUMAR¹, SHUBHAM YADAV¹, AMIT KUMAR SINGH² SACHIN KUMAR SINGH¹, ATUL KUMAR¹ AND ANTRIKSHA DESHWAL¹**¹Research Scholar, Department of Fruit Science, ²Research Scholar, Department of Floriculture and Landscape, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (U.P.)

Digital farming is the practice of replacing tedious operations with continuously automated processes through the application of modern technologies such as robotics, sensors, and data analysis. This work specifically reviews the latest advancements in field reconnaissance, autonomous weed management, and harvesting robotics. Among the difficulties faced by digital farming include object identification, task planning algorithms, digitization, and sensor optimization. Some of the gates to digital farming were highlighted, including the ideas of multi-robots, human-robot collaboration, and environment reconstruction using aerial photos and ground-based sensors enabling the production of virtual farms. Research in agricultural field robotics has indicated that one trend and area of interest is developing a network of small-scale robots and drones that work together to maximize farming inputs and uncover hidden or suppressed information. An autonomous framework with multiple inexpensive, simple-axis manipulators may be quicker and more effective in robotic harvesting applications than the expensive, professionally designed manipulators that are now in use. Robots (Aerial, Ground, and Underwater) can be quite useful in this situation. Common names for aerial robots include drones and unmanned aerial vehicles (UAVs). Because it can undertake site-specific farm management operations with more precision and concentrate on tiny crop fields at lower flight altitudes than other standard aerial vehicles, it could be beneficial for the management of agricultural production. Despite the fact that robots are becoming an essential component of contemporary farms, we have come to the conclusion that a fully automated farming system is not likely to occur anytime soon.

Keywords: Digital farming, Agriculture robotics and Drones**EXPLORING THE FUNCTIONAL AND NUTRACEUTICAL SIGNIFICANCE OF AONLA (*EMBLICA OFFICINALIS*)****DHARMENDRA KUMAR GAUTAM¹, NIRANJAN SINGH² AND HITESH KUMAR³**¹Research Scholar, Department of Fruit Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, (U.P.)²Assistant Professor, Department of Fruit Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, (U.P.)³Assistant Professor, Department of Post Harvest Management, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, (U.P.)

Indian gooseberry, or aonla (*Embllica officinalis*), is a multipurpose fruit with significant functional and nutraceutical value. Due mainly to its high vitamin C, polyphenol, and flavonoid content, aonla is well known for having a high antioxidant content. Strong free radical scavenging action is exhibited by these bioactive compounds, protecting against oxidative stress-related illnesses like cancer, cardiovascular disease, and aging-related conditions. In addition to being an excellent antioxidant, aonla has antimicrobial, immunomodulatory, and anti-inflammatory qualities. It is a useful tool in the treatment of inflammatory and immune-related illnesses because of its capacity to regulate immune responses and block inflammatory pathways. Aonla has an equally impressive nutritional profile, including important minerals (calcium, phosphorus, iron), vitamins (A, C, E, and K), and dietary fibers. By promoting bone health, digestive health, and immune function, these nutrients improve general health. Traditional medical systems like Ayurveda and traditional Chinese medicine (TCM) can benefit from the therapeutic applications of Aonla. It is frequently utilized in formulas to support longevity, improve digestion, and increase vitality. Moreover, the contemporary food and pharmaceutical industries are utilizing amla's nutraceutical potential. Juices, powders, supplements, and skincare formulas made with aonla are among the products that are becoming more and more popular because of their natural origin and health-promoting qualities. Its rich nutritional profile and anti-inflammatory, immune-modulating, and antioxidant qualities make it an invaluable supplement to diet plans and treatment plans that support overall health and disease prevention. Unlocking the full potential of aonla in disease management and health promotion may require more investigation and study of its bioactive constituents.

Keywords: Indian gooseberry, antioxidant, flavonoid content, polyphenol and bioactive compounds**SUSTAINABLE FOOD SECURITY IN FRUIT CROPS: A HOLISTIC APPROACH****DHARMENDRA KUMAR GAUTAM, RADHA,****Research Scholar, Department of Fruit Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, (U.P.)**

Fruit crops are crucial to completing the ambition of sustainable food security, which is a major global concern. It emphasizes crop varieties with resilience, farming methods that are considerate of the environment, and the socioeconomic impact on local communities. This entails using precision farming, integrated pest management, and organic farming practices to boost output and lessen environmental impact and agro-ecological methods that lessen environmental impact are prioritized in the production of sustainable fruit crops. Resource optimization is further enhanced by the integration of technology, such as data-driven decision making and precision irrigation. By encouraging a wide range of fruit varieties that are resistant to disease, crop resilience is highlighted. Fruit crops are guaranteed to be long-term adaptable to shifting environmental conditions through sustainable breeding techniques and genetic diversity conservation. Furthermore, incorporating agrobiodiversity into orchard management strengthens the resilience of the ecosystem and encourages organic pest control. In order to foster community resilience, the socioeconomic component of sustainable food security is critical. In order to support a robust and sustainable fruit

farming industry, fair trade practices, equitable distribution systems, and inclusive agricultural policies empower local farmers. In order to ensure the long-term food security of vulnerable populations, it is imperative that community engagement and education initiatives be prioritized. Fruit crop cultivation has the potential to be a catalyst for global sustainable food security if it embraces resilient crop varieties, adopts environmentally friendly practices, and places a high priority on community well-being, which incorporates socioeconomic, agricultural, and ecological science.

Keywords: food security, agrobiodiversity, genetic diversity, crop resilience, socioeconomic and ecological science.

FRUIT BIODIVERSITY CONSERVATION: A PREREQUISITE FOR SUSTAINABLE AGRICULTURE AND GLOBAL FOOD SECURITY

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Fruit biodiversity conservation is essential for maintaining the resilience of agroecosystems and ensuring global food security. Conservation of fruit biodiversity contributes to ecological sustainability by supporting countless plant and animal species. Fruits serve as an important component of biodiversity, providing habitat, food and sustenance for diverse organisms. Conservation of wild fruit species protects natural ecosystems, promoting biodiversity at both the genetic and species levels. Biodiversity in fruits is a storehouse of genetic resources that can be used to develop new crop varieties. Wild relatives of cultivated fruits may have traits such as disease resistance, drought tolerance, and adaptability to changing climates. Conservation efforts, including in-situ and ex-situ methods, ensure the availability of diverse genetic material for breeding programs, contributing to the development of resilient and sustainable fruit crops. The cultural and nutritional importance of diverse fruit species cannot be underestimated. The traditional knowledge associated with indigenous fruits and their uses is a rich cultural heritage. Conserving fruit biodiversity supports traditional agricultural practices, increases local food diversity and preserves cultural identity. Furthermore, the nutritional diversity provided by a wide range of fruits contributes to better diets and human health. Effective fruit biodiversity conservation requires a collaborative and interdisciplinary approach involving governments, researchers, local communities and international organizations. Policies promoting sustainable use of fruit resources, community-based conservation initiatives, and educational programs can help raise awareness and foster a sense of responsibility for the conservation of fruit biodiversity. Conservation of fruit biodiversity is an important foundation for sustainable agriculture, biodiversity conservation and global food security. Recognizing the intrinsic value of diverse fruit species and implementing measures to protect their genetic resources will contribute to resilient ecosystems, strong agricultural systems, and the well-being of current and future generations.

Keywords: biodiversity, conservation, in-situ, ex-situ, diverse fruit and diverse fruit

NATURAL AND ORGANIC MANUFACTURING SYSTEMS IN AGRICULTURAL CROP : A HOLISTIC APPROACH TO SUSTAINABLE FARMING

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Modern agricultural practices have increasingly recognized the importance of transitioning towards more sustainable and environmentally friendly methods to ensure long-term food security. The concept of natural and organic building systems in grain crop agriculture as a holistic approach to address the challenges faced by traditional farming methods. By integrating principles of biodiversity, soil health and ecological balance, this approach seeks to increase crop productivity while minimizing negative impacts on the environment. Natural and organic construction systems emphasize the use of organic inputs such as manure and compost to enrich soil fertility and promote microbial diversity. This approach encourages the adoption of agroecological practices that mimic natural ecosystems, promoting a balanced and resilient agroecosystem. Crop rotation, cover cropping and intercropping are key components of this system, which promote pest control, nutrient cycling and reduce dependence on synthetic inputs. Implementation of this approach also considers the conservation of natural habitats and the protection of biodiversity within and around agricultural landscapes. The reduction in chemical inputs contributes to a healthier environment for both flora and fauna, promoting a more sustainable and harmonious co-existence between agriculture and nature. Additionally, natural and organic building systems highlight the importance of water conservation and efficient resource management. Implementing technologies such as rainwater harvesting and precision irrigation ensure optimal use of water, thereby reducing the environmental impact of grain crop production. It aims to highlight the potential benefits and challenges associated with the adoption of natural and organic manufacturing systems in grain crop agriculture. By taking a holistic approach to farming, we can strive towards a more sustainable, resilient and environmentally conscious future for the global food system.

Keywords: Crop rotation, food security, agroecosystem, flora, fauna and intercropping.

ROLE OF CROP DIVERSIFICATION IN ENHANCING CLIMATE RESILIENCE OF AGRICULTURAL SYSTEMS**DHARMENDRA VIJAYVERGIYA¹, SHUBHAM AHIRWAR², SHIKHA ARYA³, ANJALI SHARMA⁴**^{1,2,3,4}**Ph.D. Research Scholar, Department of Horticulture, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)**

Crop diversification plays a crucial role in enhancing the climate resilience of agricultural systems by reducing vulnerability to climate variability and extreme weather events. This abstract explores the significance of crop diversification in building resilience against climate change impacts and highlights examples of successful implementation. Through a synthesis of literature and case studies, the abstract illustrates how diversifying cropping systems with a variety of crops, including traditional, drought-tolerant, and climate-resilient varieties, can mitigate risks associated with changing climatic conditions. For instance, intercropping or crop rotation practices can enhance soil health, reduce erosion, and improve water retention, thereby mitigating the impacts of droughts and floods. Additionally, incorporating agroforestry systems or integrating cover crops and legumes can enhance ecosystem services, such as carbon sequestration, biodiversity conservation, and pest regulation, contributing to overall resilience. Furthermore, the abstract discusses the importance of participatory approaches, knowledge sharing, and capacity building in promoting crop diversification among farmers, as well as the role of policy support and market incentives in incentivizing diversification efforts. By providing concrete examples and insights, this abstract aims to underscore the critical role of crop diversification in building climate-resilient agricultural systems and informing sustainable adaptation strategies in the face of climate change.

Keywords: Crop diversification, Climate resilience, Climate variability, Traditional crops, Drought-tolerant varieties, Climate-resilient varieties, Risk mitigation, Intercropping, Crop rotation, Soil health, Water retention, Drought mitigation, Flood mitigation, Cover crops.

ENVIRONMENTAL SUSTAINABILITY BY CREATING ENVIRONMENTAL PROTECTION**DHARMESH KUMAR,****RESEARCH SCHOLAR University Department of Zoology BRABU Muzaffarpur**

The goal of environmental sustainability is to conserve natural resources and to develop alternate sources of power while reducing pollution and harm to the environment. Sustainable development also focuses on finding better ways of doing things without affecting the quality of our life. There are three major components of sustainable development economic growth, environmental stewardship and social inclusion. This can take the form of installing solar panels or wind generators on factory sites, using geothermal heating techniques or even participating in cap-and-trade agreements. The biggest criticism of sustainable development is that it does not do enough to conserve the environment in the present and is based on the belief that the harm done in one area of the world can be counter balanced by creating environmental protections in other

Keywords- Environmental Sustainability, Natural Resource, Solar Panel, Wind Generator

FOOD PROCESSING AND VALUE ADDITION**DHARNA SINGH AND PAWAN KUMAR****SHUATS, Praygaraj**

A sufficient supply of fresh and processed foods that are healthy, cheap, and safe for everyone is necessary to address the significant global problem of food and nutrition security. Increasing food production will play a part in meeting the task of feeding 9 billion people a nutritious diet by 2050. Food processing has made it possible to reduce food losses at every stage of the food supply chain, from production to consumption, and to sustainably improve food safety, nutrient content, shelf life, and preservation. A balanced approach to food's energy and nutritional composition is crucial for a world with limited resources. In order to produce larger quantities of current foods and create novel, environmentally friendly foods that are long-lasting, easily transportable, and nutritionally appropriate for the promotion of health and well-being, both the agrifood production and food processing sectors will face challenges in using less resources. In a world where natural resources are running out, it is imperative to provide consumers with nutritious meals that live up to their expectations and is derived from robust and sustainable agrifood systems. To address global food and nutrition insecurity, a comprehensive multi-sectoral solution spanning the whole food supply chain is needed. Extensive study is required to determine how food wastes may be added value and used for human consumption, given the rising concerns about environmental conservation. The biggest winners from this are the customers, the industry, and the environment. Value addition, agriculture has gained a lot of attention lately and presented chances for employment expansion. It has the potential to strengthen rural communities, stabilize farm incomes, diversify the farm revenue base, rejuvenate main agricultural towns, and increase farmer financial support for the rural economy and agriculture. Value addition is the process of enhancing an existing product by creating specialized markets and adding value to a product firm. It gives agriculture and smaller farmer's stability and opportunities.

Keywords – Robust, Sustainable, Value addition and Diversify.

ESTIMATING THE EFFICACY OF BLUP AND INDIVIDUAL SELECTION IN A CLOSED BREEDING NUCLEUS OF CLARIAS MAGUR, HAMILTON, (1822)**DHRUTI P. KOTADIYA^{1*}, SHRINIVAS JAHAGEERDAR¹ AND JAYASHANKAR JAYARAMAN²**¹Department of Fish Genetics and Breeding¹ ICAR-CIFE, Mumbai, India²FRAEE Division, ICAR-CMFRI, Kochi, India

Indian catfish (*Clarias magur*) is a potential candidate for commercial aquaculture. ICAR-Central Institute of Fisheries Education, Mumbai, India, has been implementing a genetic selection program to improve body weight at one year of pond age in Magur since 2013. The present study evaluated the efficacy of BLUP and individual selection on the genetic gain of body weight at one-year pond age. The data were analysed for genetic and non-genetic factors employing LMM equations and the genetic gain. The non-genetic factors (generation, sex and pond) affected selected growth traits significantly. The heritability estimates for body weight in the base, first, second and third generation by the animal model were 0.67 ± 0.08 , 0.48 ± 0.10 , 0.30 ± 0.08 and 0.25 ± 0.08 , respectively. The genetic and phenotypic correlations between various growth traits were positive and high. The rank correlation between PBVs by individual selection and BLUP was moderate. The accuracy of BLUP PBVs was high in each generation. The response to selection was estimated by selecting the top 10, 20, 40 and 50 per cent ranked fish for BLUP and individual selection methods per generation. The estimated genetic gain for body weight was higher by the individual selection than the BLUP. The cumulative response to selection in the magur nucleus from three generations of selection was 25.8% for body weight. The result showed that body weight improves faster with the individual selection than BLUP. The efficacy of the BLUP is higher when the trait's heritability is low, and the information from different relatives is available. In the present study, the heritability of body weight was higher, and only information from full-sibs was available; hence, the response to selection from individual selection was higher. Hence, the selection method should be chosen based on the degree of heritability and the information available from additional relatives.

Keyword: Magur, heritability, BLUP, individual selection, response to selection**ELECTROSTATIC FIELD SEED TREATMENT: A NOVEL TECHNIQUE TO AUGMENT SEED QUALITY OF LOW VIGOUR ONION (*ALLIUM CEPA* L.) SEEDS****DHRUVA N. BHAGWATKAR AND DR. V. K. DESHPANDE****Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad, Karnataka, India**

Seed is the basic unit of agriculture and increasing productivity completely depends on the quality of seed. Due to ageing of seed over the time, seed losses its vigour and viability, which makes it unfit for sowing and certification. The cost effective, non-chemical and eco-friendly electrostatic field seed treatment, seems to be encouraging in modern agriculture. Hence, the experiment was conducted at department of Seed Science and Technology, University of Agricultural Sciences, Dharwad with the objective understand the effect of electrostatic field on seed quality of low vigour Onion seeds and to assess the bio chemical changes as induced by electrostatic field. Methodology consisted of subjecting the low vigour Onion seeds of variety Arka Kalyan to electrostatic field of different intensities (3 kV cm^{-1} , 4 kV cm^{-1} and 5 kV cm^{-1}) and time periods (60s, 90s and 120s) and were compared with untreated control. Data was analyzed using factorial CRD with four replications. Electrostatic field treatment with 3 kV cm^{-1} for 90 seconds was found to be the best treatment to enhance the seed quality attributes of marginal/poor seed lots of onion followed by 60 seconds exposure. All Biochemical parameters enhanced at 3 kV cm^{-1} for 90 seconds followed by 3 kV cm^{-1} for 60 seconds. Higher power intensity and higher duration have little effect when compared to untreated control. Thus the biophysical method, using the electrostatic field can be successfully used to improve the quality of low vigour Onion seeds and to save the seed lots which may fail in seed germination tests. This method can also be used in the organic production and processing of seeds without a doubt.

Keywords: Electrostatic field, Seed treatment, Onion seed treatment, Seed quality enhancement, Organic seed production.**FOOD ALLERGIES-TYPES, COMPLICATIONS PREVALENCE AND PREVENTION****¹MR. DIBYA JYOTI MOHANTY, ²MS. RASHMI MISRA**¹PhD. Research Scholar, RPCAU, Pusa, Bihar²Lecturer in Home Science, Kujang College, Jagatsinghpur, Odisha

When specific proteins in food trigger an immune system reaction, food allergies arise. Food allergies can cause moderate symptoms like hives, which are round, red welts on the skin that itch very badly and can sometimes grow dangerously, to severe symptoms like anaphylaxis, which can induce shock and potentially fatal breathing issues. IgE-mediated reactions to foods including eggs, milk, peanuts, tree nuts, sesame, wheat, soy, and fish (marine fish, dry fish, prawns, etc.) are examples of common immunological reactions. Food allergies can cause a number of symptoms, including colitis, diarrhoea, rashes on the skin, wheezing, fever, headaches, irritability, and restlessness. In extreme circumstances, it could even result in death. The prevalence is highest in young children, but new research suggests that it is also rising in emerging countries, teenagers, and young adults. The most concerning aspect is the seeming increase in frequency among older kids and teenagers, who have the highest risk of dying from food anaphylaxis. In the short to medium term, prevalence will rise even if we lower incidence through effective preventive measures because the danger of having a food allergy is merely decreased, not eliminated. The best chance of stability or a decline in prevalence is to find an efficient treatment.

Key Words: Food Allergies, IgE Mediated, Immunological reactions, Fatal, Effective Treatment.

REVOLUTIONIZING AGRICULTURE: A COMPREHENSIVE REVIEW OF DRONE TECHNOLOGY IN REAL-TIME SOIL MOISTURE MAPPING**DIBYAJYOTI NATH*, SHIVA NATH SUMAN, BABU LAL RAIGAR, PERAM NAGASESHI REDDY AND PRIYANKA CHOUDHARY****Department of Soil Science, RPCAU, Pusa, Samastipur, Bihar, India**

Drone technology has revolutionized the field of real-time soil moisture mapping, contributing to improvements in the accuracy and speed of various farming methods. This article looks into how unmanned aerial vehicles can be used in conjunction with state-of-the-art sensors and image technologies to quickly and precisely assess soil moisture across a wide range of areas. The technological developments that enable drones to capture high-resolution, multispectral photos and use them with analytical models to get a trustworthy measurement of soil moisture are discussed. The choice of the environmental elements to be taken into account is crucial. This article presents its story via an overview of developments in sensor technology, including thermal, near-infrared, and hyperspectral sensors. This is essential to the shooting of aerial photographs, which enable the measurement of moisture and the computation of the wetness content of the areas photographed. The sort of spectrum and the angular elements in the sensors are the performance that has to be assessed since these parameters have a direct influence on the accuracy of moisture detection. This paper also looks at the development of learning machines that organize the complex data obtained during drone flight and show the progress of real-time information that is crucial in ensuring timely agricultural management. Moreover, we look at comparative studies, which show that the drone-based approaches are more accurate, cost-efficient and time-saving compared to their conventional ground-based counterparts. In conclusion, the challenges include the necessity for specialized training for operators and the stringent regulatory oversight on drone usage, which may impose restrictions on researchers. Finally, regarding the possibilities in the future, the review identifies several exciting ones. These include the utilization of Internet of Things (IoT) devices and enable drones to operate autonomously. Furthermore, IoT could significantly improve soil moisture monitoring and facilitate the availability of data to farmers.

Keywords: Drone Technology, Internet of Things (IoT), Multispectral Imaging, Real-Time Data Analytics and Soil Moisture Mapping**SOIL CHARACTERIZATION OF WET TERRACE RICE SYSTEM FALLOW AND THEIR IMPLICATION ON CHICKPEA FARMING IN KOHIMA*****DIEZELHOUNUO KISO AND **SAMADANGLA AO****Department of Botany, Kohima Science College (Autonomous) Jotsoma, Kohima, Assam**

The study was conducted during the rabi season 2022-2023 to evaluate wet terrace rice cultivation fallow soil biophysical and chemical properties of Jotsoma village, Kohima district for suitability for chickpea farming and examine soil nutrient status during three crop phases @ Before planting, mid stage and after harvest. From the study site, composite soil samples were collected at a depth of 0-30 cm for analysis. Soil texture was sandy loam with a bulk density of 1.05 g cm^{-3} favouring chickpea growth and soil pH was acidic ranging from 5-6 suiting chickpea growth. Highest level of 6.79 % organic matter (OM) were obtained during the crop mid stage. An increase by 105% OM was found at after harvest as compared to before planting phase. Nitrogen was found to be 598 kg ha^{-1} before planting and during mid stage it increase by 74%. After harvest, soil nitrogen was $1525.18 \text{ kg ha}^{-1}$ indicating huge increase by 154 % as compared to before planting. Whereas, there was a decline in phosphorous level from before planting to after harvest. Highest level of Phosphorus was at before planting phase with 49.70 kg ha^{-1} and it reduce by 21 % during mid stage and 53% after harvest as compared to before planting. Decline in phosphorus level from mid-stage to after harvest as compared to before planting indicates chickpea requirement for relatively high amount of phosphorus for growth. High level of OM and nitrogen at all three phase indicates the study site suitability for chickpea feasibility and chickpea as environmentally friendly and nitrogen-fixing crop helping to maintain soil nutrient status.

Key words: Wet terrace rice cultivation, Chickpea, Soil nutrient**PHYLOGENETIC INVESTIGATIONS ON TAXA WITHIN THE SUBFAMILY LYCAENINAE (FAMILY LYCAENIDAE: ORDER LEPIDOPTERA) FROM THE NORTHWESTERN REGION OF INDIA****DIKSHA CHOPRA¹, GURINDER KAUR WALIA² AND AVTAR KAUR SIDHU³**¹Research Scholar, Department of Zoology and Environmental Sciences, Punjabi University Patiala²Professor and Head, Department of Zoology and Environmental Sciences, Punjabi University Patiala³Scientist-E & Officer-in-Charge, High Altitude Regional Centre, ZSI, Solan, Himachal Pradesh

Globally, the order Lepidoptera ranks as the third most extensive order within the class Insecta, encompassing a total of 1,57,424 species consisting of butterflies, moths and skippers. Butterflies represent a significant taxonomic group, with over 19,000 species documented globally. In India, the butterfly population includes approximately 1,393 species. The superfamily Papilionoidea is additionally subdivided into seven families, with true butterflies comprising Papilionidae, Riodinidae, Nymphalidae, Lycaenidae, and Pieridae. Moth butterflies and skippers are found in the families Hedylidae and Hesperidae, respectively. The members of the Lycaenidae family are referred to as "Gossamer-winged butterflies". This family can be further categorised into eight subfamilies, namely Curetinae, Lipteninae, Poritinae, Liphyrinae, Miletinae, Lycaeninae, Theclinae, and Polyommattinae. In India, the subfamily Lycaeninae Leach, 1815 is represented by three genera. Known colloquially as "The Coppers," members of the Lycaeninae subfamilies are distinguished by their wings' remarkable copper, gold, or violet hues. DNA barcoding serves as a pivotal tool for species identification and the characterization of biodiversity. This technique, central to genotypic taxonomy, leverages a short fragment of the COI gene (500-800 base pairs) from mitochondrial DNA for

accurate species-level identification. The COI sequence, notable for its high degree of conservation and minimal variability, is highly effective for species identification. To date, five species within the subfamily Lycaeninae have been documented from Northwest India, each subjected to DNA extraction, amplification, and sequencing procedures. Of these, sequences from four species have been successfully submitted to GenBank, and respective accession numbers have been acquired. The phylogenetic analysis for these species is being conducted to explore their evolutionary relationships.

A STUDY ON ADOPTION OF ORGANIC FARMING PRACTICES AMONG THE FARMERS IN GURSARAI BLOCK OF DISTRICT JHANSI (UTTAR PRADESH)

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Organic farming is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes. This is accomplished by using on farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs. The research work was done with the objective of to Extent of adoption of organic farming practices by farmers which were divided into three categories i.e., Low, Medium and Large. The study was carried out in Jhansi district of Uttar Pradesh. 10 villages from Gursarai blocks were also 10 respondents were selected randomly which means total 100 respondents were interviewed personally. Result founded that the adoption level was 97.00 % in case of in situ Incorporation of crop residues, 96.00 % in selection of good seed, 95.00 % in seed inoculation, 96.00 % application of FYM/ Nadeb compost, 79.00 % in raising green manure and incorporation, 90.00 % in application of Vermi-compost. 75.00 % in use of biogas slurry, 48.00 % in use of Amrit Pani, 45.00 % in use of Amrit Sanjivani, 56.00 % in Matka Khad, 63.00 % in use of litter, 89.00 % in use of Khali Khad, 64.00 % in use of Press mud, 53.00 % in use of Poultry manure, 53.00 % in use of Tank silt, 53.00 % in use of Seeng Khad, 45.00 % in use of Neem Khali, 96.00 % in use of summer ploughing, 79.00 % in hand weeding, 31.00 % in use of neem oil, 93 % in use of Neem leaf extract, 55.00 % in use of tobacco decoction, 29.00 % in use of light trap/ pheromone trap, 59.00 % in installation of bird perches before flowering. 52.00 % in use of cow urine. 45.00 % in use of rotated/ fermented curd milk, 59.00 % in use of Ipomya, 64.00 % in Trichoderma and 55.00 % in use of Chilli/ garlic. Thus, there was high percent of adoption amongst the farmers following organic farming practices mentioned above except three practices i.e. 29.00 % use of tobacco decoction, 31.00 % use of neem oil and 38.00 % in case of use of spray of Ha NPV/ Bt at early infestation stage. From the above observation its was concluded that, Among Small farmers Adoption practices Application of FYM/Nadeb compost is found Highest i.e., 82.61%, Among Medium Farmers, Application of Vermi Compost is highest i.e., 77.50 % and Among Large Farmers, practice of Seed inoculation is highest i.e., 71.43%.

Keywords: Organic farming, adoption, FYM, Press mud, compost and Nadeb etc.

ASSESSMENT OF GENETIC DIVERSITY AND VARIANCE ANALYSIS IN AROMATIC RICE (ORYZA SATIVA L.) SEEDS

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In a comprehensive study conducted during the 2022 kharif season Indian and the Philippians, 20 rice genotypes were meticulously analyzed to uncover the intricacies of genotype effectiveness and genetic variability, particularly focusing on aromatic rice varieties. Conducted at the Breeder Seed Production Farm in Dholi, Bihar, the study employed a Complete Randomized Block Design to provide a robust foundation for its scientific exploration. The findings of the study, unveiled through meticulous variance analysis, revealed a rich tapestry of diversity across 17 traits. Among the genotypes studied, Samba Mahsuri, Taraori Basmati, Jasmine, Sonasal, and Katarni stood out as exceptional performers, especially in terms of grain yield. Traits such as days to flowering, plant height, spikelet fertility, and grain dimensions exhibited significant variability, contributing to the overall complexity of the genetic landscape. Path coefficient analysis further explored the diversity, emphasizing the crucial influence of characteristics such as seedling root length, seedling shoot length, and germination rate on grain yield. Grain width emerged as a central orchestrator, directing an intricate ballet of traits such as seedling dry weight, vigour indices, and test weight. Seedling root length played a prominent role, exerting direct and indirect effects on yield through its interaction with other traits. Seedling shoot length also contributed gracefully, influencing yield directly and in partnership with other factors. Overall, the study provided a clear depiction of the genetic diversity and the scope for enhancing aromatic rice varieties. It stressed the significance of comprehending the intricate relationships among traits to boost grain yield and highlighted the potential for ongoing genetic advancements in agricultural methods.

Keywords: Variance analysis, Diversity, Path coefficient analysis, Genetic advancements.

STUDY OF POTENTIAL TOXIC HEAVY METALS IN THE GANGA RIVER BASIN AND ITS POSSIBLE ECOLOGICAL TOXICITY**DINESH KUMAR¹, AWADHESH KUMAR, SIPAHEE LAL PATEL, S. P. TIWARI, RAJESH SHARMA****¹Faculty of Science, Veer Bahadur Singh Purvanchal University, Jaunpur, India**

Ganga River receives industrial, municipal and agricultural wastes from the vicinity of Kanpur city, Uttar Pradesh, India. Water and sediment samples were collected from selected sampling sites along the river Ganga. Heavy metal analysis was done according to the procedure described in APHA. Water samples were digested with concentrated nitric acid at 120°C while sediment samples were digested with mixture of nitric acid and perchloric acid in 2:1 ratio at 120°C. Digested samples were filtered by Whatmann paper No.42 and diluted to make final volume 50 ml with 0.1 N nitric acid. Heavy metals such as Cu, Cr, Cd and Pb were analyzed on a particular wavelength of atomic absorption spectroscopy (AAS). The results show that these metals are found widespread throughout the study area. Level of heavy metal concentrations in sediment samples was higher than that of water. The highest concentration of heavy metals recorded in water and sediment samples at each sampling sites.

Keywords: Heavy metals, Ecological toxicity, Atomic Absorption Spectroscopy**INFLUENCE OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH AND YIELD OF RADISH (*RAPHANUS SATIVUS* L.) CV. JAPANESE WHITE****DINESH KUMAR MEENA*, SANJAY KUMAR, ANUSHRUTI, VIKASH KU. SONKAR AND NIRAJ KU. PRAJAPATI****Department of Horticulture, SAST, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, (U.P.)**

An investigation was conducted at Horticulture Research Farm-I, Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Lucknow (U.P.) during 2021-22 to assess the effect integrated nutrient management on growth and yield of radish cv. Japanese white. The experiment comprised of 9 treatments viz. T₁- NPK (RDF)-80:60:80 Kg/ha, T₂-Vermicompost @ 4 tons/ha, T₃-FYM @ 15 tons/ha, T₄-Poultry manure @ 3 tons/ha, T₅-NPK (50 %) + Vermicompost (50%), T₆-NPK (50%) + FYM (50%), T₇-NPK (50%) + Poultry manure (50%), T₈-Vermicompost (50%) + FYM (50%), T₉-Vermicompost (50%) + Poultry manure (50%) were evaluated in Randomized Block Design with three replications. The experimental findings revealed that the maximum plant height (17.08 cm, 26.45 cm, and 38.09 cm), number of leaves (5.96, 15.07 and 18.07), leaf length (8.33 cm, 18.45 cm, 19.07 cm) at 30, 45 and 60 days respectively was recorded from treatment T₅ [NPK (50 %) + Vermicompost (50%)]. The highest fresh weight of root (119.08 g), dry weight of root (21.09 g), longest root length (19.09 cm), maximum root diameter (4.54 cm), and highest yield (401.43 q/ha) were also recorded from treatment T₅ [NPK (50 %) + Vermicompost (50%)]. Overall results reveal that application of half dose of inorganic fertilizers with other organic fertilizers fulfilled 50 % requirement of chemical fertilizers which will also reduce the cost of cultivation at some extent.

Keywords: Integrated Nutrient Management, Radish, Mooli, Growth and Yield.**COMBINED APPROACH FOR CONTROLLING *FUSARIUM* WILT IN *GLADIOLUS*****DIPAKE SHITAL^{1*} AND ANJU SHUKLA¹****¹Department of Plant Pathology, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur**

The study "Combined Approach for Controlling *Fusarium* Wilt in *Gladiolus*" utilized a Factorial Randomised Block Design, incorporating three primary factors (neem cake, cotton cake, and vermicompost) and five sub-factors (*T. asperillum*, *T. harzanium*, *P. fluroscens*, *B. subtilis*, Carbendazim, and an uninoculated control) on the Psittaneceous Hybrid variety of gladiolus. Findings revealed that neem cake application resulted in the shortest emergence time (14.51 days), while the biocontrol agent *T. harzanium* notably decreased mortality by 5.53%, 14.16%, 43.26%, and 51.77% at 30, 60, 90, and 120 days post-sowing (DAS). Additionally, organic inputs and bioagents significantly influenced growth parameters including shoot length, flower count per plant, spike length, and corm weight per plant. Neem cake application increased spike and shoot length at various intervals, similarly to *T. harzanium* inoculation. Mortality observations were also documented at different intervals. The interaction between organic inputs and bioagents did not significantly impact growth parameters. Thus, the combined application of neem cake and *T. harzanium* emerges as an effective strategy for *Fusarium* wilt control in gladiolus.

Keywords: *Fusarium* wilt, *Gladiolus*, *Trichoderma*, *Bacillus*, *Pseudomonas*.**DIVERSITY OF MEALYBUGS IN THE PANTNAGAR REGION OF UDHAM SINGH NAGAR, INDIA****DIPTI JOSHI¹ AND POONAM SRIVASTAVA²****Govind Ballabh Pant University of Agriculture and Technology, Pantnagar**

Mealybugs are one of the major pest of many important crops, especially horticultural and ornamental crops. Mealybugs are sucking insects belonging to the family Pseudococcidae in the order Hemiptera. Many species are considered as pests, they feed on plant juices of greenhouse plants, house plants and subtropical trees and also act as a vector for several plant diseases. Mealy bugs are found on both tops and bottom of leaves, on the flower buds, on the stem or anywhere else on the plant. These bugs can spread from plant to plant and form a large uncontrolled colony. To eliminate a mealy bug invasion, a systemic pesticides and physical cleaning of the plant should be used. Like most pests, the best control for mealy bugs is defensive. Healthy, vigorous plants are less susceptible to infestation than weak, underpotted, and stressed plants. Plant protection products are of limited effectiveness against mealy bugs because of their habit of hiding in crevices and the presence of waxy covering of its body. For the promising management of these harmful pests it is very much important to identify and

categorise different species of mealybugs. The present survey was done in the Tarai region of Uttarakhand (India). Study implies the collection and identification of mealybugs on different hosts in the Pantnagar area. The most common mealybug was found to be Papaya mealy bug (*Paraccocus marginatus*) so it was selected for the further studies. The collection of mealybugs was done from the different research centres and localities of Pantnagar. The samples were preserved in 75% ethanol. All the collected specimens were identified with the help of standard keys prescribed by National Bureau of Agricultural Insect Resources and Indian Council of Agriculture Research. The mealy bugs were reported from the plant species belonging to different families like Hibiscus (Malvaceae), Papaya (Caricaceae), Marigold (Asteraceae), Chrysanthemum (Asteraceae), Mango (Anacardiaceae), Citrus (Rutaceae), Peepal (Moraceae), Coleus (Lamiaceae) and Sugarcane (Poaceae). Major horticultural and ornamental plants were found to be infested with the different species of mealybugs.

Keywords: *Paraccocus marginatus*, Diversity, Mealybug, Pseudococcidae, Identification

KNOWLEDGE AND ADOPTION OF SUGARCANE PRODUCTION TECHNOLOGY IN HARYANA

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This study was conducted to assess the extent of adoption of the recommended production technology for sugarcane among the sugarcane growers in Haryana. The present study was conducted in three districts of Haryana, namely Yamuna Nagar, Kaithal and Rohtak. One block from each district was selected; from each block, two villages were selected and from each village, 20 farmers were selected randomly. Thus, a total of 120 farmers were selected and interviewed with the help of a well-structured schedule. The independent variables included in this study were age, socio-economic status, family type, family size, mass media exposure, cropping pattern, economic motivation, innovativeness, risk orientation, extension contact and extension participation of the respondent. Knowledge and adoption were taken as dependent variables for the study. Majority of the respondents had medium level of knowledge about recommended cultivars, seed rate, planting distance, manures and fertilizers, time and method of fertilizer application, intercultural operations, insect-pest control, disease control and overall knowledge about sugarcane production technology, except for time of planting and irrigation, where the majority had full knowledge. In case of the adoption of sugarcane production technology, majority of the respondents exercised partial adoption of each aspect. Computation of correlation coefficients revealed that knowledge and adoption level of sugarcane were positively and significantly correlated with education, annual family income, social participation, land holding, material possession, cropping pattern, extension contact, mass media exposure, risk orientation, economic motivation, innovativeness, extension participation.

Keywords: Knowledge, Adoption, Sugarcane growers, Sugarcane Production Technology

EFFECT OF VARIOUS HERBICIDE COMBINATIONS ON WHEAT (*TRITICUM AESTIVUM* L.) YIELD

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A field experiment was conducted at Agronomy farm, RCA, Udaipur in the *rabi* season of 2022-23 which was replicated 3 times in randomized block design having 12 treatments of different herbicides and their combinations. Highest grain yield (5.56 t ha⁻¹) was recorded under the weed free plots as there was the lowest crop-weed competition observed. While, by the application of different herbicides the treatment W₇: EPOST tank mix application of Pyroxasulfone + metsulfuron @ 127.5 + 4 g a.i. ha⁻¹ recorded maximum yield (5.31 t ha⁻¹) and it was statistically at par with PE application of Pyroxasulfone 85% WG @ 127.5 g a.i. ha⁻¹ (W₃) and PE tank mix application of Pendimethalin + Pyroxasulfone @ 1250 + 127.5 g a.i. ha⁻¹ (W₄) treatments. The lowest grain yield was recorded under the weedy check plots due to the highest crop weed competition under this.

EVALUATION OF DIFFERENT JUICE VARIETIES OF GRAPE (*VITIS* SP.) FOR QUALITATIVE AND FUNCTIONAL CHARACTERISTICS

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Grape is the most important commercial fruit crop grown in the world. It is consumed both fresh as well as in the processed form. Grape juice contains nutrient elements, sugar and natural acids which are present in readily available forms. It is rich in bioactives such as phenols, ascorbic acid, anthocyanin etc. It is also rich in antioxidants which neutralize free radicals and reactive oxygen species (ROS) in the cell. These bioactives play important role in preventing many chronic diseases including cardiovascular diseases, aging, heart disease, anaemia, cancer and inflammation. So, the experiment has been undertaken to evaluate eight different juice varieties of Grape i.e. H-516, Arka Shyam, Black Cornechen, Concord, Gulabi X Bangalore Purple, Manjari Medika, Pusa Navrang and Bangalore Blue for their bunch and berry characteristics and to evaluate functional parameters of juice. Based on the results obtained, among the different juice varieties of grape,

Manjari Medika recorded maximum bunch length (22.37 cm), bunch weight (315.82 g), bunch volume (308.33 cm³), number of berries per bunch (136) and juice recovery (71.80 %). Maximum berry length (20.05 mm), berry diameter (17.59 mm) and 100 berry weight (307.38 g) were recorded in Gulabi X Bangalore Purple. In respect to functional compounds, maximum ascorbic acid (14.37 mg/100 ml), total anthocyanins (196.91 mg/L) and total antioxidant activity (338.31 percent inhibition) were recorded in Pusa Navrang. Total phenolic content was maximum in Manjari Medika (218.56 mg/100 g GAE). The results of the current study convey potential benefits of the grape juice varieties tested. Among the varieties studied, Pusa Navrang had good bioactive components and can be used by blending with other juice varieties due to its superior functional and bioactive composition. The overall quality and functional properties also were excellent in Manjari Medika which can be further recommended for processing and value addition.

Keywords: Grape, juice varieties, bioactives, antioxidant activity, phenols

GENOTYPING OF CHICKPEA GERmplasm USING GENE-SPECIFIC MARKERS FOR WILT TOLERANCE

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With the advent of modern strategies, developing molecular markers and resistant varieties has simplified and facilitated us to reduce the effect of diseases. The integration of genomic tools in the chickpea breeding program is very promising for crop improvement as compared to conventional methods. Chickpea (*Cicer arietinum* L.) is an important rainfed pulse crop grown in India. One of the major yield-limiting factors for chickpea among various biotic constraints is *Fusarium* wilt. Developing new sources of resistant cultivars or genotypes is the most economical and feasible option to overcome this problem. Breeding efforts have been contributed to reduce the effect of *Fusarium* wilt on this crop significantly. The main factors generally involved are genetic variation, selection within the variation for disease resistant plant types and evaluation of the selected lines for commercial production. An experiment was conducted in *rabi* 2021 to screen 50 germplasm lines against wilt with susceptible check JG 62 and resistant check JG 315. The selection of resistant lines was evaluated in the wilt sick plot which was further screened with PCR-based molecular markers. The Screening test revealed that 4 germplasm lines were found to be resistant to *Fusarium* wilt. These germplasm can be utilized for developing wilt-resistant varieties in chickpea breeding work. Also, multilocal trials can be conducted to test their stability and adaptability within different environments. Therefore, integrating genomic technologies for disease resistance into breeding programs is valuable to improve breeding efficiency.

Keywords: Chickpea, *Fusarium* wilt, Molecular markers, Screening, Resistant

HARNESSING SILVER NANOPARTICLES MEDIATED ELICITATION IN *ECLIPTA ALBA* FOR SECONDARY METABOLITE PRODUCTION

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Rising market demand for plant secondary metabolite products mandates the application of novel technologies to enhance biomass production in medicinally important plants. Biotechnological solutions are required to harvest more biomass and phytochemicals. In vitro culture techniques including callus cultures, cell suspension cultures and hairy root cultures is a promising method for enhancing phytochemical production. In vitro culture elicitation has been found to be one of the most effective methods for creating considerable quantities of important phytochemicals. Elicitation might help overcome some of the challenges involved with producing most economically significant bioactive secondary metabolites on a large scale from wild and cultivated plants, undifferentiated or differentiated cultures. The purpose of this study is to see how silver nanoparticles affect the therapeutic wedelolactone and demethylwedelolactone concentration in callus and hairy root cultures of *E. alba*, a plant that possesses multiple medicinal characteristics. Callus and induced hairy roots of *E. alba* will be elicited by silver nanoparticles, and the secondary metabolite content will be compared to non-elicited cultures.

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APPROACHING THE PROBLEM OF ENVIRONMENTAL POLLUTION THROUGH UTILIZATION AND MANAGEMENT OF INVASIVE PLANTS

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Nowadays, the environment is grappling with various issues such as pollution, climate change, and deforestation. Among all these issues, the uncontrolled growth of invasive plants is one of the most serious. Their rapid growth surpasses that of native biota in terms of habitat occupation and exploitation of water and nutritional resources. Plant invasions are an unavoidable process and have been recognized as an emerging global threat. The use of herbicides to control their growth is not advisable, as it introduces more harmful chemicals into the environment. The utilization of agricultural waste and non-useful plant biomass can address both economic and environmental issues. Invasive plant weeds, while non-edible and detrimental to native vegetation, are rich in lignocellulosic biomass. Therefore, they can be effectively managed for various value-added applications. Managing this biomass effectively requires low initial investments for biopolymer extraction. Lignocellulosic biomass is the most promising feedstock, providing a vast and unique natural resource for cost-effective bio-energy collection due to its inexpensive, non-toxic, renewable, biodegradable, and abundant nature. Although there have been limited research efforts in this area, literature studies indicate that these weeds contain a significant amount of cellulose. Cellulose is the most abundant, renewable, and non-toxic polymer, possessing a structural framework that can be modified into various useful products. The issue of invasive weed invasion can be effectively addressed by utilizing their biomass as a lignocellulosic substrate for the development of cellulose-based products.

DYNAMICS OF HUMAN DEVELOPMENT AND ENVIRONMENTAL EVOLUTION: A SYSTEMATIC REVIEW

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The intricate interplay between human development and environmental evolution has long captivated scholars across disciplines, with implications for sustainability and societal well-being. This systematic review synthesizes existing literature to elucidate key themes, patterns, and challenges in understanding the dynamics of human-environment interaction throughout evolutionary timeframes. The objective of this paper is to critically examine the reciprocal influences between human societies and the natural environment, drawing on interdisciplinary insights and methodological rigor. Utilizing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, the review comprehensively searches multiple academic databases, selects relevant studies based on predefined criteria, and synthesizes findings through thematic analysis and critical appraisal. Key findings highlight the coevolutionary dynamics between human societies and ecosystems, the impacts of human activities on environmental sustainability, and the complex feedback loops and resilience-building mechanisms inherent in human-environment interactions. The review identifies several key themes, including coevolutionary dynamics, thresholds and tipping points, equity and justice considerations, and adaptive governance. It underscores the importance of interdisciplinary collaboration, data-driven analyses, and transformative governance structures for addressing sustainability challenges and promoting resilient socio-ecological systems. Despite advancements in theoretical frameworks, methodological approaches, and empirical evidence, challenges and gaps persist in understanding the complex dynamics of human-environment interaction. The implications of this review for the field of sustainability studies are far-reaching, contributing to theoretical advancements, methodological innovations, and policy-relevant insights. By centering equity and justice considerations in research and policy agendas, sustainability scholars can develop more inclusive, equitable, and resilient approaches to environmental governance and development. Recommendations for future research emphasize the importance of interdisciplinary collaboration, data and methodological innovation, and adaptive governance for advancing sustainability agendas and addressing pressing challenges.

Keywords- Human-environment interaction, Sustainability, Evolutionary dynamics, Systematic review, Socio-ecological systems

EXPLORING SPIDER BIODIVERSITY IN AN APPLE ORCHARD OF MUKTESHWAR, NAINITAL DISTRICT, UTTARAKHAND, INDIA

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The intricate role of spiders in ecology stems from their predatory prowess, making them pivotal in regulating insect populations. Thriving in diverse terrestrial habitats, spiders are ubiquitous, inhabiting plants, trees, underground burrows, and crafting intricate webs. Often blending seamlessly with their surroundings, they epitomize stealth and adaptability. This study delves into the biodiversity of spiders within an Apple Orchard in the Mukteshwar area of the Kumaun region, Nainital district, Uttarakhand, India, spanning from October, 2023 to March, 2024. The spider specimens were collected using various methods as visual searching, handpicking, pitfall trapping. Identification of spiders to the family, genus, and species levels using established literature and taxonomic keys. A total of 15 spider species, representing 13 genera across 6 families were documented from the study site. Family Araneidae emerged as the dominant family, comprising 10 species from 6 genera.

The collected spiders were classified into six different ecological guilds based on their feeding behavior, including Orb-Weavers, Wandering-Active, Branch-Dwellers, Web-Matrix, Ground-Dwellers and Wandering-Ambush. The predominant spider guild type observed was identified as orb weavers. This preliminary exploration sheds light on the spider diversity within the uncharted Orchard system of the Kumaun region, providing foundational insights into this overlooked aspect of Uttarakhand's ecology.

Keywords: Spider, Apple Orchard, Guild structure, Orb Weavers

IMPROVEMENT IN BLACK PEPPER (*PIPER NIGRUM* L.) THROUGH INTER-VARIETAL HYBRIDIZATION

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Black pepper being christened 'King of Spices' and 'Black gold' is one of the major spices of the world. It is widely used as a culinary spice, table condiment and it has become an essential part of Eastern and Western cuisines. However, natural variability present in self-pollinated populations is exhausted quickly when they are subjected to selection. Therefore, for further improvement, inter-varietal hybridization in black pepper (*Piper nigrum* L.) was carried out using variety Panniyur-1 as female parent and four cultivars of black pepper Ademane pepper, Chomala, Keregadde Malligesara and Kurimale as pollen donors to get the hybrids with better quality characters like the tolerance / resistance to Phytophthora foot rot disease and anthracnose and also to get quality berries. The results of the study revealed that the cross combination of var. Panniyur-1 and cv. Keregadde Malligesara recorded better plant height (46.01 cm), more number of leaves (10.13), leaf length (9.98 cm), leaf breadth (8.30 cm), internodal length (4.92 cm) and number of branches (1.3). The morphological characters in hybrid plants also differed accordingly.

Key words: Black pepper, inter-varietal hybridization, Panniyur-1, Ademane pepper, Chomala, Keregadde Malligesara, Kurimale

ENHANCING CROP DIVERSIFICATION AND INSECT PEST MANAGEMENT THROUGH AGRICULTURAL BIODIVERSITY

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This study delves into the intricate relationship between agricultural biodiversity, crop diversification, and insect pest management. Agricultural biodiversity, encompassing genetic, species, and ecosystem diversity, is critical for sustainable agriculture and food security. Crop diversification, a strategic approach involving the cultivation of a variety of crops, enhances ecosystem resilience and reduces susceptibility to pests. This paper examines how diversified cropping systems impact insect pest management. By introducing multiple crop species, pest populations are disrupted due to decreased host availability and altered pest movement patterns. Furthermore, diverse agro ecosystems attract natural predators and beneficial organisms that act as biological control agents, suppressing pest outbreaks. Additionally, the genetic variety present in different crop cultivars enhances plant resistance to pests, reducing reliance on chemical interventions. The study underscores the significance of integrating agricultural biodiversity and crop diversification into pest management strategies, promoting sustainable and resilient agricultural practices. This approach not only diminishes reliance on synthetic pesticides but also fosters ecosystem well-being and ensures enduring agricultural viability.

Key word -: Pest, Ecosystem, Food, Diversification etc.

ENHANCING THE SHELF LIFE OF BUTTON MUSHROOMS THROUGH EDIBLE COATING WITH TRAGACANTH GUM/ GLUTATHIONE/ KOJIC ACID

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The button mushroom, which is the most commonly produced mushroom, has a shorter lifespan than other vegetables due to its intense metabolism and elevated moisture content, which led to microbial degradation and browning caused by enzymes. In this study, the impact of tragacanth gum coating combined with different concentrations of glutathione (0.16%, 0.32%) and kojic acid (0.2%, 0.5%) individually on the shelf life and postharvest quality of mushrooms were investigated. Weight loss, firmness, the browning index, the pH, the TPC, the DPPH scavenging activity, the PPO, the POD activity, and the sensory analysis were all evaluated throughout storage. In accordance with the research results, treating mushrooms with TG that includes glutathione (0.16%) reduced weight loss, POD activity, and PPO activity while increasing color retention, firmness, total phenolic content, and antioxidant activity. The results of the study indicated that tragacanth gum and glutathione may be a unique and easy method to increase the preservation time of button mushrooms.

Keywords: Edible coating, button mushroom, tragacanth gum, glutathione, kojic acid, shelf life

ROSELLE EXTRACT: A POTENTIAL NATURAL PRESERVATIVE**DIWAKAR KUMAR, S. NATH*, S. CHOWDHURY, P. MURMU, BEAUTY RAY****Department of Fish Processing Technology, West Bengal University of Animal and Fishery Sciences, Kolkata, West Bengal, India**

The perishability of fresh fish remains the biggest challenge for its preservation making shorter shelf-life. Due to consumers' preference for safe food preservation by natural means without posing any health risks, the traditional methods of preventing microbial spoilage and hazards in foods are thus being replaced with biological, natural, and organic antimicrobial compounds like Roselle calyces extract, a safe plant resource, either alone or in combination with mild physicochemical treatments and low concentrations of conventional harsh chemical preservatives, in order to balance consumer demands with the necessary safety standards. The present study was aiming at extension of the shelf life of croaker fillet by using roselle extract under refrigerated storage condition ($4\pm1^{\circ}\text{C}$); where, the pH values decreased upto 6th day followed by a sharp increase in all the treatments which might be attributed to the dissolution of CO_2 in the fish sample, and subsequent increase in volatile bases. Control sample exhibited higher TVBN as compared to the other treated samples which might be due to enzymes produced by bacterial activity during the production of volatile bases while breaking down the proteins. There was a sharp increase of TBA values 6th day of storage onwards which was probably due to the destruction of hydroperoxides into secondary oxidation products; however, T3 didn't cross the limit of acceptability till the end of storage period, which may be due to potential antioxidant activity of Roselle extract. T3 remain safe for human consumption ($5.92\pm0.05^{\text{i}}$ CFU/g) at the end of 15 days of storage under $4\pm1^{\circ}\text{C}$, which may be due to the antimicrobial activity RCE (3MBC). Thus, RCE can be a good option as a potential natural preservative due to its promising antimicrobial and antioxidant properties, without compromising the nutritional value of raw materials and food products; thereby effectively increases shelf life and food safety.

Keywords: Roselle, Preservatives, Antimicrobial, Antioxidant**ATMOSPHERIC CO_2 ELEVATION AND ITS POTENTIAL IMPACTS ON PLANT BIOLOGY AND FOOD QUALITY****DODDAGHATTA H. RAVITEJA^{1*}, RANJEETHA R², ANIL JADHAV³, YASMEEN BEGAUM⁴ AND AFSANA BANU³**¹**Department of Crop Physiology, JCDR, Agricultural College, Jutur, Tadipatri, Affiliated to Acharya N. G. Ranga Agricultural University, Guntur, Andra Pradesh.**²**Department of Horticulture, College of Sericulture, Chintamani, Karnataka**³**Department of Crop Physiology, College of Agriculture, UAS, Raichur, Karnataka**⁴**Centre for Vacuum Packaging Technology, College of Agriculture, UAS, Raichur, Karnataka**

Human activities are having a significant impact on our climate, which is affecting food production, productivity, and quality. A plant's growth is influenced by various factors, including water, light, and the concentration of carbon dioxide in the atmosphere. Over time, atmospheric CO_2 levels have increased from approximately 280 ppm during pre-industrial times to 420 ppm and this number is still rising. While this increase has led to higher rates of photosynthesis and plant growth, different plant species have responded differently, with C_3 plants typically benefiting more. This can result in faster growth rates, greater biomass accumulation, and increased yield. However, elevated CO_2 levels can also have negative effects on various quality parameters such as mineral composition, carbohydrates, proteins, fatty acids, vitamins, secondary metabolites and cooking quality. If we do not address these quality concerns, we may struggle to achieve nutritional security, which could lead to serious issues with undernutrition and malnutrition. Therefore, this review aims to address the significant impact of elevated CO_2 on crop growth, development and quality.

Keywords: Elevated [CO_2], Climate change, Food quality and Dilution effect**CARBON-BASED SLOW-RELEASE FERTILIZERS FOR EFFICIENT NUTRIENT MANAGEMENT****DOLLSHREE DENGRI****Ph. D scholar II year, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur (Raj.)**

In modern agriculture, fertilizers are essential for sustainable crop production, and chemical fertilizers have significantly increased crop production and quality. However, plants can only absorb a small portion of nutrients from applied fertilizers, leading to low fertilizer efficiency. Nutrient losses from leaching, volatilization, denitrification, fixation, erosion and runoff can cause environmental pollution and raise cost of fertilizer application. Researchers have proposed various to minimize these losses, including the use of slow-release fertilizers to extend nutrient availability throughout the crop growth period. The high cost of current slow-release fertilizers poses a challenge to their widespread use. Carbon materials like biochar and lignite have emerged as effective soil amendments with the ability to adsorb nutrients due to their porosity, surface area, and functional groups. These materials, which are cost-effective and abundantly available worldwide, can be utilized as nutrient carriers to create climate-smart and affordable slow-release fertilizers.

Key words: Biochar, Carbon-based fertilizers, Lignite, Nutrient-release and Slow-release fertilizers.

THE FUTURE OF HORTICULTURE: TRENDS AND INNOVATIONS**DOLLY SAINI*, HARSH SAINI AND TEJENDRA KUMAR****Department of Horticulture, R.S.M.(P.G.) College Dhampur, Bijnor (U.P)**

The future of horticulture is poised for transformative advancements driven by a confluence of technological innovation, environmental sustainability, and evolving consumer preferences. Integrating cutting-edge technologies such as precision agriculture, artificial intelligence, and biotechnology promises to revolutionize horticultural practices, enhancing productivity and efficiency. Precision agriculture enables targeted interventions, reducing resource usage and environmental impact. AI and machine learning offer predictive analytics for crop management, optimizing growth conditions and yield. Biotechnology advances, including genetic engineering and CRISPR, facilitate the development of resilient, high-yield crops with improved nutritional profiles. Sustainability is a central theme shaping the future of horticulture. Practices like vertical farming, hydroponics, and aquaponics are gaining traction, allowing for year-round production with minimal land and water usage. These methods contribute to urban agriculture, addressing food security challenges in densely populated areas. Additionally, the adoption of renewable energy sources and eco-friendly practices will mitigate horticulture's carbon footprint, aligning with global climate goals. Consumer demand for organic, locally-sourced, and diverse produce is reshaping the horticultural landscape. This trend is driving innovation in organic farming techniques and the cultivation of novel, exotic crops. The emphasis on food quality and safety is also promoting advancements in post-harvest technology, extending shelf life and reducing waste. Moreover, the integration of digital platforms for market access and supply chain management is enhancing the economic viability of horticultural enterprises. Farmers and producers are increasingly leveraging e-commerce and blockchain technology for transparent and efficient distribution. In conclusion, the future of horticulture is characterized by technological integration, sustainability, and consumer-centric approaches, promising a dynamic and resilient agricultural sector capable of meeting the challenges of the 21st century.

Keyword: Precision agriculture, Artificial intelligence, Vertical farming, Hydroponics and Aquaponics.

PHYTOPESTICIDES AND THE NANOTECHNOLOGY REVOLUTION**DR. LALIT MOHAN****Department of Zoology, Faculty of Science, Dayalbagh Educational Institute (Deemed to be University), Agra- (INDIA)**

Phytopesticides, derived from plants, offer a range of advantages over synthetic pesticides, making them a more sustainable and eco-friendly option for agriculture. The key benefits of phytopesticides are: **Environmental Safety:** Unlike synthetic pesticides, phytopesticides are generally less toxic to the environment. They often break down quickly into harmless compounds by natural processes, minimizing pollution risks. **Reduced Risk to Beneficial Insects:** Many synthetic pesticides have broad-spectrum effects, harming not just target pests but also beneficial insects like pollinators and predators that help control pest populations naturally. Phytopesticides can be more selective, targeting specific pests and minimizing harm to beneficial insects. **Novel Modes of Action:** Phytopesticides can have unique mechanisms that control pests. This variety can be helpful in combating the development of pesticide resistance in pest populations, a major challenge with synthetic pesticides. **Potential for Organic Farming:** Since they come from natural sources, phytopesticides are often allowed in organic farming practices. This allows organic farmers to control pests without compromising their certification. Phytopesticides, offer a promising eco-friendly alternative to synthetic pesticides. These natural products possess potent insecticidal, fungicidal, and herbicidal properties, promoting sustainable agricultural practices. However, limitations like selectivity, degradation, and delivery hinder their widespread adoption. Nanotechnology emerges as a game-changer, offering solutions to unlock the full potential of phytopesticides.

Nanotechnology presents a revolutionary approach to overcoming the limitations of phytopesticides and unlocking their full potential. The key advantages of nanotechnology in the development of phytopesticides are: **Enhanced Selectivity and Targeting:** Nanoparticles can be designed to encapsulate phytopesticides, allowing for targeted delivery to specific pests or plant parts. This minimizes harm to beneficial insects and reduces the overall amount of pesticide needed. **Improved Stability and Shelf Life:** Nanoparticles can act as carriers, protecting phytopesticides from degradation by sunlight, rain, and other environmental factors. This extends the shelf life and effectiveness of the pesticides, reducing the frequency of application. **Controlled Release:** Nanoparticles can be engineered for controlled release of phytopesticides within the plant or on its surface. This allows for a sustained effect over time, reducing the need for frequent applications and minimizing environmental impact. **Improved Delivery Methods:** Nanotechnology can facilitate the development of novel delivery methods for phytopesticides. For example, nanoparticles can be formulated for foliar sprays with better adherence to plant surfaces or for root uptake, enhancing the effectiveness of the treatment. **Potential for Synergistic Effects:** Nanoparticles themselves might possess some pesticidal properties, potentially working synergistically with the encapsulated phytopesticides for enhanced pest control. By addressing the limitations of phytopesticides, nanotechnology paves the way for a more targeted, sustainable, and effective approach to pest and vector management.

DETRIMENTAL IMPACTS OF NARINGENIN EXPOSURE ON A MODEL ORGANISM, DROSOPHILA MELANOGASTER**SIDDHARTHA GHANTY* AND PREM RAJAK****Toxicology Research Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, West Bengal, India**

Flavonoids are a class of polyphenolic secondary metabolites found in plants, and thus commonly consumed in the diets of humans. Flavonoids have been studied due to their numerous pharmacological activities, providing positive effects for the maintenance of health and the prevention of diseases like cardiovascular diseases and cancer. However, exposure to high doses might have detrimental effects on health. Of note, fewer studies have been performed to identify the negative effects caused by flavonoids. Naringenin is a pharmaceutically active compound that have health promoting applications like antitumor, antiviral, and cardioprotective effects. It is widely distributed in

several Citrus fruits. However less information is available regarding their toxicity at higher doses. Hence the present study was aimed to unravel the impacts of naringenin on physical activities and tissue damage in a model organism *Drosophila melanogaster*. Results have revealed that, naringenin at various concentrations modulate the physical activities like crawling and climbing activity. In addition, naringenin inflicted tissue damage in a dose dependent manner in the 3rd instar larvae of *D. melanogaster*. Therefore, the present study suggests that naringenin at high concentrations could function as pro-oxidant in *D. melanogaster*.

Keywords: Naringenin, Toxicity, Health hazards, antioxidants, *Drosophila melanogaster*.

ROLE OF COPPER NANOMATERIALS IN DETECTION APPLICATIONS

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The utilization of copper-based nanomaterials in various scientific and industrial applications has surged in recent years, driven by their unique properties and versatility. This abstract offers a succinct overview of the current state of research in copper nanomaterials detection. It highlights the growing significance of detecting copper nanomaterials due to their increasing use, as well as the environmental and health implications associated with their presence. This paper examines the latest advancements, challenges, and methodologies in the field of copper nonmaterial detection, encompassing various analytical techniques, including spectroscopy, microscopy, and electrochemical sensing. It also discusses the role of surface functionalization and the development of novel sensors in enhancing the sensitivity and selectivity of detection methods. Additionally, the abstract emphasizes the interdisciplinary nature of this research, as it impacts areas ranging from environmental science to biomedicine. The findings contribute to a safer and more efficient use of copper nonmaterial while minimizing their adverse effects

Keywords-Nanomaterial, Analytical techniques, Environmental Science Spectroscopy, Microscopy

TO ASSESS THE GROWTH AND INSTABILITY IN THE PRODUCTION ANDEXPORT OF BASMATI RICE IN INDIA

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Basmati is without a shadow of doubt the king of all rice's in the world, its long slender shape and an unmatched fragrance and aroma are reflective of the age- old civilization that cultivates it. Basmati is non glutinous and has a fine, smooth and silky texture. The rice has been favoured by emperors and praised by poets for hundreds of years. India is the largest producer and exporter of basmati rice in the world. Basmati rice is also stated to be the Pearl of Rice. India accounts for over 70% of the world's basmati rice production. So, the present study was undertaken with the aim to assess the growth and instability in the production and export of Basmati rice in India. For instability analysis the Coppock's instability index was worked out for two periods viz., period I (2000-01 to 2009-10), period II (2010-11 to 2019-20) and overall period (2000-01 to 2019-20) Coppock's instability index for production, export quantity and export value in period I was 73.92, 77.42 and 74.16, respectively. Coppock's instability index for production, export quantity and export value in period II was 91.50, 94.15 and 86.51, respectively. Coppock's instability index for production, export quantity and export value in overall period was 74.34, 74.02 and 114.1052, respectively. Table exists high positive correlation between the production, export quantity and value of export in overall period. Basmati rice is completely a unique species of rice originated from India. Across the World, India is the second-largest producer of rice (24 per cent) in the world after China (30 per cent). For the calculating of Compound Growth Rate (CGR) of production, export quantity and export value of basmati rice export in India data was collected from year 2000-01 to 2019-20. It is divided into two Periods, Period-I (2000-01 to 2009-10), Period -II (2010-11 to 2019-20) and overall Period (2000-01 to 2019-20). The exponential functional form was employed to compute the growth rate.

Key-Words: Marketing Channel, Compound Growth Rate, & Coppock's instability index.

NATURE'S PHARMACY: EXPLORING THE MEDICINAL WONDERS OF *CLITORIA TERNATEA*

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The plant *Clitoria ternatea* L., sometimes referred to as "blue pea," is underutilized in Sri Lanka. The ancient medical system of Sri Lanka uses the blue-colored blossom of this plant for medicinal purposes. Recent international research has also revealed various health advantages associated with this flower. Still, there aren't many globally available value-added blue pea flower products that have undergone scientific validation. Blue pea flower is rich source of biologically active compound and can potentially be utilized to produce different food materials and cosmetics also; the above-ground and underground parts of this plant are used to treat diabetes, high blood pressure, retinal damage, edema and indigestion. The antibacterial, antioxidant, anti-inflammatory, cytotoxic, and antidiabetic properties of *Clitoria ternatea* flower extract have been demonstrated to be advantageous to human health. *Clitoria ternatea* flowers have a wide range of medicinal qualities that make them safe and effective functional food choices. Butterfly pea flower has been shown to contain a number of primary and secondary plant metabolites, such as clitorin, aparagitin, triterpenoids, anthocyanins, steroidal glycosides, and flavonols. *Ternatea* Linn. The several pharmacological effects of *Clitoria ternatea* are reviewed in this article, including its hepatoprotective, cytotoxic, antiplatelet, anti-anxiety, anti-stress, antioxidant, anti-inflammatory, hyperlipidemic, and nootropic qualities. Butterfly pea has been shown to be active, which suggests that it could be a good source of therapeutic compounds for a variety of ailments. Anthocyanins, found in butterfly pea blossoms, are naturally occurring antioxidants that slow down aging. Butterfly pea flowers' blue color is frequently utilized as a natural coloring ingredient in the creation of numerous dinner wares. Antioxidants, diabetes inhibitors, inflammatory reducers, and anti-cancer compounds are just a few of the health advantages of flowers.

Keyword:- Antidiabetic, Triterpenoids, Anthocyanins

BIOINFORMATICS: A NOVEL APPROACH FOR PATHOGEN DETECTION AND DRUG DESIGN**ELINA JOSE VETOM*, ASHUTOSH DANVE, YASH KHALASI AND HARINI G.****ICAR – Central Institute of Fisheries Education, Versova, Andheri (W), Mumbai, Maharashtra, India**

Bioinformatics, an interdisciplinary field at the nexus of biology, computer science, and information technology, plays a pivotal role in revolutionizing biomedical research and healthcare. Within the realm of infectious diseases, two critical applications stand out: pathogen detection and drug design. Traditional methods for pathogen detection often suffer from limitations in sensitivity and speed, hindering effective disease management and outbreak control. Bioinformatics tools and techniques, however, offer a solution by enabling rapid, accurate identification of pathogens through genomic sequencing and data analysis. This capability proves indispensable in combating emerging infectious diseases and tackling drug-resistant strains, providing timely insights crucial for public health interventions. Furthermore, bioinformatics facilitates drug design through innovative approaches such as molecular modeling, virtual screening, and structure-based drug design. By elucidating the structural and functional characteristics of biological targets, bioinformatics empowers scientists to design molecules with enhanced specificity and efficacy against pathogens. This computational-driven drug discovery process accelerates the identification of promising drug candidates while minimizing the time and resources traditionally associated with drug development. The synergy between bioinformatics and biomedicine underscores the transformative potential of computational methods in advancing healthcare. By harnessing the power of big data and computational algorithms, bioinformatics not only enhances our understanding of pathogenic mechanisms but also accelerates the translation of this knowledge into tangible therapeutic solutions. Bioinformatics applications for pathogen detection and drug design represent a paradigm shift in infectious disease management, offering a potent arsenal of tools to combat current and emerging health threats.

Keywords: Bioinformatics, Pathogen detection, Drug design, Infectious diseases, Computational biology**ABSTRACT ON THE EFFECT OF POTASSIUM METABISULPHITE ON THE FUNCTIONAL AND NUTRITIONAL PROPERTIES OF KARIBALE RAW BANANA POWDER****ELIZABETH¹, DR. RAVI Y², VAIBHAV MALLYA³****¹Ph.D. Scholar in Food and Nutrition, College of community science, University of Agricultural sciences, Dharwad, Karnataka, India****²Senior Scientist (Food and Nutrition), AICRP-WIA, MARS, University of Agricultural sciences, Dharwad, Karnataka, India****³M.Sc.(Horticulture) in Genetics and Plant breeding, University of Horticultural sciences, Bagalkot, Karnataka, India**

Mature banana fruits are inherently delicate and soft, making them susceptible to damage during transportation. Furthermore, the release of ethylene gas during bulk storage accelerates their ripening, often resulting in premature spoilage before they reach their intended destination. Given their high perishability, there is a significant risk of substantial post-harvest losses in banana production. Additionally, during peak production periods, farmers may opt not to harvest their entire yield due to oversaturated markets, leading to additional losses. These post-harvest losses have a direct impact on both producers and suppliers of bananas, resulting in reduced financial gains. This, in turn, affects consumers who end up paying higher prices due to losses within the marketing chain. Therefore, mature raw bananas are converted into powder in order to avoid the market chain losses as well as increase the shelf life of the product. Highlighting the significance lies in stressing the alterations in both the nutritional and functional attributes of the product. Therefore, this study primarily centers on scrutinizing the functional and nutritional composition of *Karibale* raw banana powder, under the application of 0.1% potassium metabisulphite for durations of 10, 20, and 30 minutes. Results show that the raw banana powder was rich in potassium, phosphorus, iron, zinc etc and many other phytochemicals such as phenols, tannins, phytic acid, oxalic acid and trypsin inhibitor. The powder was also analysed for its functional properties such as swelling power, solubility, gelatinization temperature etc. the nutritional properties such as soluble dietary fibre and potassium showed significant difference in the raw banana powder on treatment with potassium metabisulphite.

Key words:- *Karibale*, raw banana powder, potassium metabisulphite, functional properties, nutritional properties.**THERAPEUTIC PROPERTIES OF MAJOR HERBS AND SPICES OF INDIA****ENA GUPTA¹ AND NEELESH KUMAR MAURYA²****¹Department of Family and Community Sciences, University of Allahabad, Prayagraj, Uttar Pradesh****²Assistant Professor, Department of Nutrition and Dietetics, School of Allied Health Science, Sharda University, U.P**

Indians have been using herbs and spices for thousands of years, and their culinary skills are known over the world. In addition to giving food a pleasing color, flavor, and aroma and making an Indian meal more appetizing, these ingredients serve a purpose beyond Indian cooking and culinary arts. Because of their physiological and pharmacological properties, they have been essential in the prevention of many diseases. Natural remedies become increasingly popular these days because they are inexpensive and have few negative effects. A number of herbs and spices, including *Aloe barbadensis miller* (Aloe vera), *Azadirachta indica* (Neem), *Curcuma longa* (Turmeric), *Syzygium aromaticum* (Clove), *Zingiber officinale* (Ginger), *Stevia rebaudiana* (Stevia) etc., have been shown to offer protection against chronic diseases, cancer, diabetes, liver disorders, and hypertension, antipyretic, antioxidant, antibacterial, antiviral, antifungal, antimalarial, antiprotozoal, diuretic, immune-modulatory, and immune-boosting properties have been identified in the majority of herbs. The list of herbs and spices that people may utilize to improve health and reduce their risk of chronic illness is summarized in this study.

Keywords: Herbs, hypertension, ingredients, essential, antioxidant.

CAN MICROBIAL FOOD ALTERNATIVES BE THE SOLUTION TO A SUSTAINABLE FUTURE?**ESHA GUHA ROY****Department of Microbiology, St. Xavier's College (Autonomous), Kolkata, West Bengal**

The demand and shortage of food has become a global crisis affecting millions of people around the world. The recent report by the World Food Programme (WFP) indicates that more than 250 million people are facing acute food insecurity and need urgent assistance. According to the World Bank, the inflation in domestic food prices keeps increasing and by 2030, around 600 million people are estimated to not be able to afford their daily meals. Microbe based food substitutes have the potential to become the best alternative for a sustainable future that can feed our ever-growing population that is supposed to hit a 9.7 billion by 2050 (UN) in the face of urbanisation, overpopulation and food shortage. Different microbes can be screened from inexpensive and readily available sources like agro-industrial waste and urban wastewater and modified with the help of synthetic biology tools to meet necessary requirements. The high protein content and nutritional profile of microorganisms like fungi and bacteria make it suitable for production of meat analogues. In addition, different flavour components can also be produced through genetic engineering of microbes to mimic the flavour profile of its traditional counterparts. By incorporating innovative fermentation process designs, the production process can be further optimised, complementing its low carbon footprint, land use and energy efficiency. Overcoming the hurdle of high RNA content in microbial food derivatives is one of the many challenges that need to be tackled for its success. However, with adequate research and substantial funding, microbial food alternatives have the potential to become market trendsetters and serve as the catalyst for a more sustainable future on a global scale.

Keywords: microbial food alternatives, microbial protein, mycoprotein, bacterial food substitutes, sustainable food.

MODERN MICROBIOLOGY IN SPACE AGRICULTURE: A CLOSER LOOK**ESHITA CHATTERJEE****Department of Microbiology, St Xavier's College (Autonomous)**

In the present era, there is no denying that the conditions on planet Earth are worsening by the day, and human intervention has played a significant role in this. However, we must not let this discourage us from exploring the possibility of finding another planet to inhabit. We have also come to understand the importance of microorganisms in our daily lives, and their behaviour in spaceflight conditions is a crucial factor to consider if we are to embark on long-term space missions or inhabit different planets. The introduction of microbes to outer space is inevitable as we continue to explore the void of space, and we must learn as much as possible about their behaviour in these conditions. The research conducted so far, including Rep-PCR DNA fingerprinting carried out at the ISS, has provided valuable insights into various contaminants and the behaviour of microbes in microgravity and radiation. Radiation and microgravity are critical factors that can significantly influence the behaviour of microorganisms, and we must take these observations into account when making choices on In-situ resource utilization methods. MELISSA provides life support in space through a loop of bioreactors, and In-situ resource utilization is the key to long-term expeditions outside of Earth, including the invasion of other planets. Therefore, we must discuss possible food grain cultivation methods in altered environmental conditions such as on other planets or onboard any space shuttle. The marvels of microorganisms are an inseparable part of our very existence, and it is our noble responsibility to unlock their incredible potential for the greater good of humanity. We have a treasure trove of experiences, achievements, and mistakes that we can learn from as we shape a brighter future. By examining the past, we can gain insights that guide our present decisions and lead us to a successful future.

Keywords: cultivation, MELISSA, in-situ resource utilisation, microorganisms, bioreactor, space

RECENT ADVANCES IN PATHOGENESIS OF EQUINE HERPESVIRUS**FAIZAN UL HAQUE NAGRAMI¹, PRIYAMBADA KUMARI¹, UDIT JAIN²**¹**College of Biotechnology, DUVASU, Mathura**²**Department of Veterinary Public Health, DUVASU, Mathura**

Equine Herpesvirus (EHV-1), also known as Equine Rhinopneumonitis, is a highly contagious Alpha herpesviridae present globally, particularly affecting horses. EHV-1 poses a significant risk, causing upper respiratory disease, neurological issues, abortions, or neonatal death in horses. Research on EHV-1 primarily focuses on in vitro models to understand its pathogenesis. The primary infection and pathogenesis involve intricate interactions with mucosal epithelium, mononuclear cells, and vascular endothelium. Various in vitro models have been developed to mimic the in vivo tissue complexity. These models fall into two categories: that mimicking epithelium-PBMC interaction (e.g., ex vivo mucosal explants, equine respiratory epithelial cells) and PBMC-endothelium mimicking models (e.g., flow chamber and contact assays). Microfluidic based 3D culture systems, like the horse-on-a-chip, are seen as potential advancements for future research. EHV-1 pathogenesis encompasses three main infection levels: initial infection in respiratory epithelium, migration of infected cells to lymphoid tissues causing cell-associated viremia, and the transfer of the virus to endothelial cells in different tissues. The dynamic process involves multiple steps, and understanding the precise orchestration is crucial. In vitro models employed for studying EHV-1 pathogenesis include Equine Respiratory Epithelial Cells (EREC) culture, contact assays, flow chamber systems, and organ-on-a-chip micro devices. These models provide insights into virus-host interactions, reduce the need for in vivo experiments, and contribute to understanding the intricate mechanisms at each infection level. The mention of microfluidic-based 3D culture systems indicate a potential avenue for more realistic in vitro modeling of EHV-1 pathogenesis. Further research is needed to fully comprehend the mechanisms involved at each level of infection.

Keywords: equine herpes virus, pathogenesis, *in vitro*, model, EREC, flow chamber, *ex vivo* explants

CHARACTERIZATION DIFFERENT ORGANIC MANURES AND ITS EFFECT ON YIELD AND QUALITY OF CAPSICUM (*CAPSICUM ANNUUM* L. VAR. *GROSSUM*) UNDER PROTECTED CULTIVATION IN NORTHERN TRANSITIONAL ZONE OF KARNATAKA

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An experiment was conducted to study the impact of different organic manures and liquid organic foliar sprays on yield and quality of capsicum (*Capsicum annum* L. var. *grossum*) under shade net. The study was laid out in factorial randomized complete block design with two factors viz., organic manures (factor 1) and liquid organic foliar sprays (factor 2) and one single control (RPP) with three replications. The result unveiled that, among organic manures significantly higher number of fruits plant⁻¹ (11.56), average fruit weight (58.18, 60.26, 70.52, 69.46 and 59.81 g at 70, 80, 90, 100 and 110 DAT (Days after transplanting), respectively), pericarp thickness (5.32 mm), total fruit yield plant⁻¹ (823.72 g), total fruit yield ha⁻¹ (27.18 t), shelf life (13.54 days) and vitamin C (138.81 mg 100 g⁻¹) were registered in 75% N equivalent through 50% FYM (Farm yard manure) + 25% vermicompost + biofertilizers (Azotobacter + PSB (Phosphorous solubilising bacteria) seedling dip). Among liquid organic foliar sprays, phyllosphere consortium @ 10% spray at vegetative and flowering stages + cow urine @ 10% spray at flowering stage and 15 DAF (Days after flowering) + panchagavya 5% foliar spray at 25, 50 and 75 DAT recorded significantly higher total number of fruits plant⁻¹ (12.96), average weight of fruit (60.88, 63.94, 75.63, 74.10 and 64.97 g at 70, 80, 90, 100 and 110 DAT, respectively), pericarp thickness (5.65 mm), total fruit yield plant⁻¹ (928.86 g), total yield ha⁻¹ (29.35 t ha⁻¹), shelf life (14.75 days), vitamin C (146.84 mg 100 g⁻¹) and capsaicin content (0.38%). Though RPP (Recommended package of practice) recorded significantly higher yield attributes it registered poor quality parameters compared to organic treatments.

Keywords: Capsicum, vermicompost, panchagavya and phyllosphere consortium.

STUDIES ON EFFECTS OF SOWING WINDOWS ON SEED QUALITY PARAMETERS, YIELD AND YIELD ATTRIBUTING TRAITS IN SAFFLOWER (*CARTHAMUS TINCTORIUS* L.)

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In the present investigation treatments consists of three sowing windows i.e., early sowing (D1) (1st October), timely sowing (D2) (15th October) and late sowing (D3) (30th October) and seven safflower genotypes A-1 PBNS-12, PKV-PINK, SSF- 708, PBNS-203, PBNS-204 and SSF-1704). Sowing windows were considered as a main plot treatment and safflower genotypes considered as sub plot treatment in split plot design with three replications. The seed quality, yield and yield attributing traits showed maximum value when safflower crop was sown on 15th October than 1st October and 30th October. For screening seven promising safflower genotypes were sown under early, timely, and late sowing condition and found that seed quality parameters i.e., Seedling dry weight, vigour index-II observed maximum and significant in late sowing condition i.e., (D3) 30th October. Germination percentage was found maximum and significant in early sowing (D1) (1st October). Yield and yield attributing traits viz., number of branches per plant, number of capsules per plant, number of seeds per capsules, seed yield per plant etc. was found highest and significant in timely sowing condition i.e., (D2) (15th October). Genotype A-1 (Annigeri-1) recorded higher seed quality parameters viz., germination percentage, root length, vigour index-1. Whereas genotype SSF-1704 showed maximum and significant value for shoot length, seedling dry weight. Vigour index-II was observed maximum in genotype PBNS-203, Genotype SSF-1704 recorded highest significant value for yield and yield contributing characters viz., number of branches per plant, number of capsules per plant, number of seeds per capsule, 100 seed weight, volume weight (g/100~ml) seed yield per plant, followed by genotype SSF-708. For all the traits interaction effects was found non-significant. Genotypes SSF-1704 and SSF-708 were found high yielding and showed maximum value for yield attributing and quality traits. Whereas sowing windows (D2) (15th October) timely sowing was found most suitable for yield, yield attributing and quality trait.

EFFECT OF LEAVES EXTRACT OF GARLIC (*ALLIUM SATIVUM*) ON CAM (CHORIOALLANTOIC MEMBRANE) OF CHICK *GALLUS GALLUS DOMESTICUS*

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Garlic (*Allium sativum*) has been widely used for its therapeutic use. Angiogenesis is a process in which creation of new blood vessels from pre-existing one, it is essential for normal growth and development. It also plays basic role in Ischemic disease, Cancer and other inflammatory disorders. Judah Folkman (1971) first proposed the essential role of angiogenesis in tumour growth. The present study aimed to investigate the angiogenic potential of leaves extract of *Allium sativum* on CAM of chick microscopically. The leaves were shed dried powdered and alcohol extract were prepared by Soxhlet method. Fertilized eggs of *Gallus gallus domesticus* incubated at 37°C and 72-75% relative humidity. 0.6 mg /ml dose of the leaves extract were injected by window method in incubated egg after 48 hrs, 72 hrs and 96 hrs of incubation and CAM were examined. And another set of three eggs were incubated up to 96 hrs of incubation, and Alcoholic extract were directly applied on vascular zone of the CAM. The CAM were compared with normal CAM and HBSS treated control CAM. In Present study inhibitory effects were observed on primary, secondary and tertiary vitelline blood vessels.

Keywords: *Allium sativum*, Leaves extract, CAM assay

EFFECT OF IN-SITU MOISTURE CONSERVATION PRACTICES IN CONJUNCTION WITH NUTRIENT LEVELS ON PRODUCTIVITY AND PROFITABILITY OF RAINFED BT. COTTON**G. S. YADAHALLI¹, G. Y. VIDYAVATHI², M. R. UMESH³, V. AMBIKA⁴ AND S. N. BHAT⁵**^{1&2}College of Agriculture, Vijayapura, University of Agricultural Sciences, Dharwad, Karnataka, India³⁻⁵All India Coordinated Research Project for Dryland Agriculture, UAS, Raichur.

A field experiment was conducted at AICRP for Dryland Agriculture, UAS, Raichur, during kharif 2016-17 to 2019-20 for yield maximization through in-situ moisture conservation practices and nutrient levels in Bt cotton under rainfed condition. The experiment was laid out in split-plot design with three main plots as in-situ moisture conservation practices (broad bed and furrows, ridges and furrows and flatbed) and four subplots as nutrient levels such as 60:30:30 NPK kg ha⁻¹, 90:45:45 NPK kg ha⁻¹, 60:30:30 NPK kg ha⁻¹ (50% N through organic) and 90:45:45 NPK kg ha⁻¹ (50% N through organic). In pooled data indicated, Adoption of ridges and furrows was recorded significantly higher seed cotton yield (2428 kg ha⁻¹) as compared to broad bed and furrows (2228 kg ha⁻¹) and flat bed (1812 kg ha⁻¹). Application of 90:45:45 NPK kg ha⁻¹ (50% N through organic) produced significantly higher seed cotton yield (2360 kg ha⁻¹) and it was on par with 90:45:45 NPK kg ha⁻¹ (2186 kg ha⁻¹) over 60:30:30 NPK kg ha⁻¹ (50% N through organic) and 60:30:30 NPK kg ha⁻¹. Among the treatment combinations adoption of ridges and furrows along with application of 90:45:45 NPK kg ha⁻¹ (50% N through organic) noticed significantly higher seed cotton yield (2758 kg ha⁻¹) over rest of the treatment combinations. Net returns (Rs. 104635 ha⁻¹), and benefit cost ratio (3.37) was recorded significantly higher with ridges and furrows with application of 90:45:45 NPK kg ha⁻¹ (50% N through organic) over the rest of treatments. Significantly higher soil moisture at varied depths and soil properties was noticed with adoption of land configurations along with 90:45:45 NPK kg ha⁻¹ (50% N through organic).

Key words: Economics, In-situ moisture conservation, INM, Nutrient uptake and soil fertility**VALIDATION OF PLANT GROWTH ENHANCER IMPAKT IN PROMOTING SOYBEAN PRODUCTIVITY****G. SOMANAGOUDA, R. CHANNAKESHAHA, G. K. NAIDU, SHALINI N. HUILGOL AND HARSHIY BANU****All India Co-ordinated Research Project on Soybean, University of Agriculture Sciences, Dharwad, Karnataka, India**

Soybean is a crop of global importance cultivated for oilseed and pulse crop with 40 % protein and 20 % oil content. Demand for soybean keeps increasing as its seeds provide essential proteins, oil, and nutraceuticals globally. It has been on the rise occupying a cherished position in area and production in oil front. In a quest to meet heightened demands for soybean, it has become essential to increase productivity. Plant growth enhancers are mainly exploited to achieve this, due to their crucial roles in plant growth and development. Increasing research suggests the influence of plant growth enhancers on soybean growth and development, yield, quality, and abiotic stress responses. An attempt to expatiate in field experiment was conducted at All India Co-ordinated Research Project on Soybean, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, Karnataka during kharif 2023 for the validation of Impakt bio stimulant for yield enhancement in soybean at five different doses along with control (RDF) and Commercial check at different growth stages of crop viz., vegetative, flowering and pod development stages. Results revealed that foliar application of RDF + Impakt at dose of 7.5 ml/L recorded significantly higher seed yield (2929 kg/ha), number of branches per plant (5.7), days to fifty percent flowering (39 days), number of pods per plant (56), seed index (14.1 g), seed yield (2929 kg/ha) with highest gross and net returns of 1,58,144 and 1,09,854 Rs/ha respectively followed by treatment RDF + Impakt at dose of 5.0 ml/L (2823 kg/ha) sprayed at vegetative, flowering and pod development stages. Significantly lower seed yield was recorded in control practice with recommended dose of fertilizer (2211 kg/ha). Notably, the foliar application of plant growth enhancer at 7.5 ml/L was appropriate concentration for increasing the yield and yield components of soybean.

Key words: Validation, Plant Growth Enhancer, Impakt, Yield**EFFECT OF HERBICIDES WITH PGPR ON SEED YIELD OF SOYBEAN****G. SOMANAGOUDA, R. CHANNAKESHAHA, SHALINI N. HUILGOL, G. K. NAIDU AND HARSHIY BANU****All India Co-ordinated Research Project on Soybean, University of Agriculture Sciences, Dharwad, Karnataka, India – 580 005**

Soybean has been called as “Golden bean” of twentieth century consisting 40-42% protein and 18-22% oil. Soybean ranks first both in area and production in India, occupying an area of 13.00 mha with production of 11.00 mt and productivity of 850 kg/ha. Soybean is mostly grown in Kharif season and suffers from severe weed crop competition due to continuous rain, which do not permit hand weeding operation timely resulting in yield loss to the tune of 30–80%. Weeds are major biotic factor responsible for poor soybean yield. Hence a study was conducted at All India Co-ordinated Research Project on Soybean, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, Karnataka during kharif 2023 in split plot design in three replications to know the compatibility of three different herbicides recommended for soybean along with weed free check with plant growth promoting *rhizobacteria* (PGPR) including three microbial strains so that the tolerant microbes could be used as a potential herbicide tolerant microbial culture to support the soybean crop nutritionally and on the growth performance of the soybean. In this study, the soybean crop was inoculated by cultures of *Bacillus daqingense*, *Bacillus aryabhataii*, consortia of *B. daqingense* and *Bacillus aryabhataii*. The results revealed that weed-free check by two hand weeding at 20 and 40 days after sowing exhibited higher seed yield (2838 kg/ha) followed by diclosulam @ 26 g/ha + one hand weeding at 40 days after sowing (2702 kg/ha). Whereas, under microbial strains, *B. daqingense* @ 10 g/kg seed recorded highest seed yield of 2670 kg/ha followed by *Bacillus aryabhataii* @ 10 g/kg seed (2545 kg/ha).

Key words: Assessing, PGPR, Herbicides, Microbial strains, Yield

EFFECT OF VARIOUS DOSES OF SULPHUR ON GROWTH, YIELD ATTRIBUTES AND YIELD OF INDIAN MUSTARD (*BRASSICA JUNCEA* L.)**MR G. ZION¹, DR. PUSHPA YADAV¹, MS SERTO SOPHIYA KOM², DR SHARAD PANDEY¹**¹Himgiri Zee University, Dehradun, Uttarakhand²School of Agricultural Sciences, Nagaland University, Medziphema, Nagaland

A field experiment was conducted during 2018-19 at the Agricultural Research Farm of Himgiri Zee University, Dehradun, Uttarakhand, to study the Effect of various doses of Sulphur on growth, yield attributes and yield of Indian mustard (*Brassica juncea* L.). The experiment has seven treatments viz., T₁- control, T₂- 10 kg S ha⁻¹, T₃- 20 kg S ha⁻¹, T₄- 30 kg S ha⁻¹, T₅- 40 kg S ha⁻¹, T₆- 50 kg S ha⁻¹, T₇- 60 kg S ha⁻¹, and the experiment was laid out in Randomized block design (RBD) with three replications. Results showed that applying Sulphur significantly impacts the soybean growth, yield attributes and yield. The plant growth characteristics such as plant height (153.87 cm), number of branches per plant (7.33), dry matters production per plant (111.66 g) and yield attributing characters like no. of siliqua plant⁻¹ (319.80), length of siliqua plant⁻¹ (4.81 cm), no. of seed siliqua⁻¹ (12.87), and 1000 seed weight (4.10 g) were found to be significantly higher in T₇ - 60 kg S ha⁻¹ compared to control and was at par with T₄- 30 kg S ha⁻¹, T₅- 40 kg S ha⁻¹. Seed yield (1524.00 kg ha⁻¹) and stover yield (4520.67 kg ha⁻¹) at 60 kg S ha⁻¹ was 27.49 % and 25.11 % higher over control and was at par with T₄- 30 kg S ha⁻¹, T₅- 40 kg S ha⁻¹.

Keywords: Indian Mustard, Sulphur, Siliqua**A TAXONOMICAL TREASURE: SUBFAMILY LYMANTRIINAE**^{1,*}GAGAN PREET KOUR BALI AND ²AMRITPAL SINGH KALEKA¹Department of Biosciences, UIBT, Chandigarh University, Mohali, Punjab^{1,2}Department of Zoology and Environmental Sciences, Punjabi University Patiala

Lepidoptera comprising of moths, butterflies and skippers is the second largest insect order and provides important model systems for studies on genetics, physiology, development, ecology and evolutionary biology (Mitter *et al.*, 2016). The moths constitute a significant part of biodiversity as they play an important role in ecosystem as herbivores, pollinators, bio-indicators etc. Being quite sensitive to even minute fluctuations in the environment, their diversity is directly correlated with ecosystem health hence they are considered as best suited models to monitor climate change and indicators of biodiversity loss etc. The subfamily Lymantriinae with 2500 known species is one of the most important families of order Lepidoptera (Holloway, 1999). This subfamily is composed of seven well defined and distinct tribes namely Lymantriini Hampson, Orgyiini Wallengren, Nygmiini Holloway, Leucomini Grote, Arctornithini Holloway, Daplasini Holloway & Wang and Locharinini Holloway & Wang (Wang *et al.*, 2015). The placement of many tussock moth species is still ambiguous in these tribes. The subfamily Lymantriinae accounts as a taxonomical treasure which needs urgent attention for its exploration and analysis.

AWARENESS OF FARMERS ABOUT SCHEMES FOR DOUBLING FARM INCOME**GAIKWAD S. R.¹, THORAT K. S.² AND SAMRIT V. B.³**¹PG student, College of Agriculture, Latur²Assistant Professor, Department of Extension Education, COA, Osmanabad³Ph.D. Scholar, Department of Extension Education, VNMKV, Parbhani.

Indian agriculture is essentially based on monsoon and market dependent and suffers frequent distresses posing threat to the welfare of farmers as well as interest in farming. Declining farm productivity and income have serious implications on rural prosperity and overall economy. Hence increasing the real farm income i.e. nominal (actual) income adjusted to inflation has become a priority for the state and policy planners. The Government of India in its budget 2016-17 proposed to double farmer's income by 2022 making the 75th year of independence. The present study was conducted in Latur and Osmanabad district of Marathwada region of Maharashtra state. In Latur district out of ten tehsils two tehsils were selected randomly namely Latur and Chakur and in Osmanabad district out of eight tehsils two tehsils were selected randomly namely Osmanabad and Kalamb. For the purpose of study 2 villages from each selected tehsils, (Total 2 X 4 = 8) were selected randomly for the selection of. Thus total 8 villages were selected for study. From each selected village, 15 farmers were respondents selected randomly. In this way, a total of 120 farmers (Total 8 X 15 = 120) were considered as respondent for the present study. These selections were done by using simple random sampling method for the purpose of the study. The result of Awareness showed that majority (65.00 %) of the respondents had medium level of awareness about schemes for doubling farm income followed by 20.00 and 15.00 per cent of the respondents had low and high awareness about the schemes for doubling farm income respectively.

Keywords: Doubling Farm Income, Awareness, Schemes of Doubling Farm Income

DOUBLING FARMER'S INCOME: STRATEGIES AND POLICIES**GAIKWAD S.R.¹, SAMRIT V.B.², AND SAKHARE P.A.³****Department of Agricultural Extension Education, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani**

Indian agriculture is essentially based on monsoon and market dependent also suffers frequent distresses posing threat to the welfare of farmers as well as interest in farming. Declining farm productivity and income have serious implications on rural prosperity and overall economy. Hence increasing the real farm income i.e. nominal (actual) income adjusted to inflation has become a priority for the state and policy planners. The Government of India in its budget 2016-17 proposed to double farmer's income by 2022 (Making the 75th year of independence.) by addressing the agrarian distress and crisis. The will of the present Indian government to double the income of farmer's by 2022 as announced by the Honorable finance minister during his budget speech on Feb 29, 2016. The XIIth 5-year plan (2012-17), the government constituted an Inter-ministerial Committee in April, 2016 to examine issues relating to "Doubling of Farmers Income" (DFI) and recommend strategies to achieve the same. The Committee submitted its Report to the Government in September, 2018 containing the strategy for doubling of farmers' income by the year 2022. The DFI strategy as recommended by the Committee include seven sources of income growth viz. 1) Improvement in crop productivity, 2) Improvement in livestock productivity, 3) Resource use efficiency or savings in the cost of production, 4) Increase in the cropping intensity, 5) Diversification towards high value crops, 6) Improvement in real prices received by farmers, 7) Shift from farm to non-farm occupations. The premises of the strategy for Doubling farmers income is based on the primary principles Increasing total output across the agricultural sub-sectors through realizing higher productivity, Rationalizing/ reducing the cost of production, Ensuring remunerative prices in the agricultural produce, Effective risk management, Adoption of sustainable technology.

Keywords- Doubling Farm Income, DFI, Strategies, Policies**IRRIGATION MANAGEMENT FOR CHICKPEA BASED SYSTEM UNDER DIFFERENT LAND CONFIGURATIONS****GANAJAXI MATH, BASAMMA PATIL AND YAMANUR**¹**Directorate of Research, University of Agricultural Sciences, Dharwad-580 005**²**Department of Genetics and Plant Breeding, College of agriculture, Dharwad, UAS, Dharwad**

In India, chickpea accounts for about 45% of total pulses produced in the country. The global production of chickpea is about 14.25 m t million tonnes and of which 11.38 m t tonnes will be contributed by India and accounts to 71% of total world production. Chickpea, mainly grown under rainfed condition in India and crop experiences moisture stresses at flowering and pod development stage which reduces the productivity of the crop. Hence the study was conducted to find out the effect of irrigation and land configuration on the productivity of chickpea. Based on two years' pooled analysis, it was concluded that among the interaction between land configurations and irrigation stages, BBF+ wheat intercrop in furrow irrigation given at both branching and pod development stage recorded significantly higher seed yield (2195 kg/ha) as compared to flat bed method and it was on par with ridges and furrow method and BBF without wheat where irrigation given at both stages and also one irrigation at pod development stage. Number of pods/plant, 100-seed weight (g) and Dry weight (g/plant) were also significantly high in this treatment. When productivity and monetary net returns were considered, among the interactions, broad bed furrow with one row of wheat intercrop in furrow irrigation given at both branching and pod development stages recorded significantly higher chickpea equivalent yield (2429 kg/ha) and net returns (Rs. 1,13,171 ha⁻¹) over others (Table 1). It is due to additional amount from wheat seed yield was contributed to higher chickpea equivalent yield and net returns. Hence, BBF with one row of wheat intercrop in furrow with two irrigations at branching and pod development stage was productive and economically viable under rainfed condition of northern transition zone of Karnataka.

FARMING FOR THE FUTURE: A COMPREHENSIVE STUDY OF ORGANIC AGRICULTURE IN INDIA**GANAVI, N R¹, RAVIKUMAR, S², DR. RAGHAVENDRA, K J³, DR. LOKESHA, H⁴**¹**Ph.D. Agricultural Economics, University of Agricultural Sciences, Bengaluru**²**Ph.D. Agricultural Economics, University of Agricultural Sciences, Bengaluru**³**Scientist (Agricultural Economics), ICAR- Indian Institute of Farming Systems Research, Modipuram, Meerut**⁴**Professor (Agricultural Economics), University of Agricultural Sciences, Bangalore**

Organic farming in India, deeply rooted in traditional practices, is experiencing a renaissance driven by concerns over environmental and health impacts of conventional agriculture. This study presents an overview of organic farming in India, analyzing trends in area, production and export dynamics of organic products. Data from the National Programme for Organic Production (NPOP) and the Agricultural Processed Food Products & Export Development Authority (APEDA) were utilized, with methodologies including a Compound Annual Growth Rate, percentages, and Markov chain analysis to find out the stable markets for organic export from India. Results revealed significant growth in organic farming areas and producers, with states like Madhya Pradesh, Maharashtra, and Rajasthan leading in cultivation and production. Major export destinations include the U.S.A., European Union, and Canada. Markov chain analysis showed that USA, Canada and EU are the most stable markets for India's organic products. The study concludes that organic farming in India holds immense potential and requires continued governmental support overcome challenges. Policy perspectives encompass promoting organic farming zones and simplifying certification processes. The growth in organic farming areas and producers reflects a promising future for sustainable agriculture in India, aligned with global environmental conservation efforts and sustainable development goals.

Keywords: Organic farming, APEDA, NPOP, Export dynamics, Compound Annual Growth Rate, Markov Chain, Organic certification, Sustainability.

ASSOCIATION OF GENETIC DIVERGENCE WITH HETEROSIS FOR FORAGE TRAITS IN MAIZE**¹GANGADHARA DOGGALLI*, ²MAHADEVU P., ³LOHITHASWA H. C., ⁴B. G. SHEKAR AND ⁵MALLIKARJUNA N.****¹Ph.D. Scholar, Dept. of Genetics and plant Breeding, UAS, Dharwad****^{2&3}Professor, Dept. of Genetics and plant Breeding, UAS, GKV, Bengaluru****⁴Professor, Dept. of Agronomy, UAS, GKV, Bengaluru****⁵Asst. Professor, Dept. of Plant Pathology, UAS, GKV, Bengaluru**

Assessment of genetic distance between parents and selection of diverse parents are extensively used in many crops. Current study focuses the importance of genetic distance assessed through morphological traits in 54 fodder maize inbred lines and its impact on heterotic expression in resultant 200 single cross fodder maize hybrids. . This study focuses on assessing genetic diversity among 50 maize inbred lines, utilizing Mahalanobis D² statistics and combining ability analysis. The 50 inbred lines were categorized into seven clusters based on Mahalanobis D² statistics, with cluster II accommodating the highest number of inbred lines (18), followed by cluster III (14). While comparing the mean green fodder yield in top performing hybrids synthesised with parents of higher genetic distance, it is understood that the genetic distance had definite impact on yielding heterotic hybrids with superior green fodder yield. It is evident from identification of a single cross The cross combinations viz., 1-5-12 × VL121096, 1-17-19 × CAL-1443, 1-19-5 × CAL-1443, MAI-179 × VL108867, 1-5-12 × VL121096, 1-44-9 × CM-202 recorded greater green fodder yield and superior standard heterosis (20.88%). The correlation studies revealed significant positive association between higher genetic distance of parents and heterotic performance of hybrids. The correlation coefficients and linear regressions were used to know the effects of parental genetic distance in determining heterosis and *per se* performance of the hybrids. Parental genetic distance exhibited significant negative association and significant linear regression along with very low coefficient of determination with better parent heterosis (BPH) and non-significant with *per se* performance of the hybrids.

Keywords: Genetic Diversity, Mahalanobis D², Genetic Distance, Heterobeltiosis**THE INFLUENCE OF WEATHER PARAMETERS ON THE POPULATION OF EARLY SHOOT BORER, *CHILO INFUSCATELLUS* SNELLEN ON SUGARCANE****GANGURDE S. M., NALAWADE S. V. AND BHILARE R. L.****Central Sugarcane Research Station, Padegaon, Tal. Phaltan, Dist. Satara (M.S.)**

The studies on the seasonal incidence of early shoot borer, *Chilo infuscatellus* Snellen on sugarcane variety Co 86032 was conducted in the *Suru* season of the year 2021-22 at the Entomology section of Central Sugarcane Research Station, Padegaon, Dist. Satara, in Maharashtra state. It was revealed from the studies that the incidence of early shoot borer was first noticed in 11th MW. The population of early shoot borer was first noticed in 11th MW at 1.25 per cent. The incidence of early shoot borer was observed from 11th to 26th MW in the range of 0.88 to 10.08 per cent. The highest incidence of early shoot borer 10.08 per cent was recorded during 15th MW and minimum incidence of 0.88 per cent was observed in the 25th MW. The peak incidence of early shoot borer was found in the range of 8.52 to 10.08 per cent during 13th and 15th MW, respectively. Correlation study of early shoot borer population with different weather parameters showed that there was a significant positive correlation with maximum temperature and had a non-significant negative correlation with minimum temperature and rainfall whereas it has significant and negative correlation with morning and evening relative humidity. The effect of bright sunshine hours with per cent damage by early shoot borer showed a non significant positive correlation.

Keywords: Weather parameters, seasonal incidence, early shoot borer, *Chilo infuscatellus*, Snellen, correlation, non-significant, positive correlation, negative correlation**EFFECT OF WEATHER PARAMETERS ON INCIDENCE OF SAFFLOWER APHID, *UROLEUCON COMPOSITAE* (THEOBALD)****GANGURDE S. M., NEHARKAR P. S. AND SONKAMBLE M. M.****Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Dist. Parbhani (M.S.)**

The field experiment was conducted at Research Farm of the Department of Agricultural Entomology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Dist. Parbhani (M.S.) during the year *rabi* 2020-21 and 2021-22. The studies on the seasonal incidence during *rabi* 2020-21 and 2021-22 revealed that the population of safflower aphid started from 50th MW and 51th MW during *rabi* 2020-21 and *rabi* 2021-22, respectively. The peak of the safflower aphid population was noticed on 6th MW and 5th MW in both the seasons, respectively. The population of natural enemies viz., coccinellids and *Chrysoperla* observed in 51th and 1st MW during *rabi* 2020-21 and in 52th and 1st MW during *rabi* 2021-22, respectively. However, the peak coccinellids activity was noticed during 6th and 5th MW and that of *Chrysoperla* was observed during 6th and 5th MW of *rabi* 2020-21 and 2021-22, respectively. Non-significant negative correlation was observed between maximum temperature, minimum temperature, morning relative humidity, rainfall and bright sunshine hours with the aphid population during the year 2020-21 and the correlation coefficient was -0.414, -0.341, -0.067, -0.365 and -0.036, respectively. Whereas, aphid population was positively non-significant (0.105) with the evening relative humidity. During the year 2021-22, the correlations of aphid population with maximum and minimum temperature were significantly negative with correlation coefficients of -0.513* and -0.619**, respectively whereas non-significant positive correlations between morning relative humidity (0.368), evening relative humidity (0.262), rainfall (0.145) and bright sunshine hours (0.242). There was non-significant negative correlation between maximum temperature, minimum temperature, morning relative humidity, rainfall and bright sunshine hours with the coccinellids population during first season 2020-21. Whereas, correlation of coccinellids population was positively non-significant (0.124) with the evening relative humidity. The correlations of

coccinellids population with maximum and minimum temperature, morning relative humidity, evening relative humidity and rainfall were negatively non-significant during the year 2021-22 whereas non-significant positive correlation with bright sunshine hours (0.303). The correlation studies revealed that there were significant negative correlations between minimum and maximum temperature with *Chrysoperla* population during the year 2020-21. The correlations of *Chrysoperla* population with morning relative humidity (0.365), evening relative humidity (0.273), rainfall (0.122), and bright sunshine hours (0.232) were positively non-significant. During the year 2021-22, there was non-significant negative correlation existed between *Chrysoperla* and maximum temperature (-0.381) while significant negative correlation with minimum temperature (-0.611**). However, morning relative humidity (0.235), evening relative humidity (0.86), rainfall (0.048) and bright sunshine hours (0.408) recorded positive non-significant correlations with the *Chrysoperla* population.

Keywords: Safflower aphid, weather parameters, *Uroleucon compositae*, positive correlation, negative correlation, non-significant, correlation coefficient, coccinellids, *Chrysoperla*

ARTIFICIAL INTELLIGENCE (AI) IN STRENGTHENING AGRICULTURAL EXTENSION SERVICES

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AI refers to the simulation of human intelligence in machines that are programmed to think, learn and problem solving like humans. Artificial Intelligence (AI) is revolutionizing agricultural extension services by enhancing productivity, sustainability, and food security. It leverages data-driven insights to optimize decision-making processes for farmers and extension agents and analyses diverse datasets, including weather patterns, soil conditions, crop health and market trends, empowering stakeholders with valuable information. The fusion of agricultural expertise with the computational prowess of AI promises to be a transformative force, addressing the various shortcomings in the extension system. Many ICAR institutes have contributed immensely to AI by way of doing research in various machine learning techniques such as Artificial Neural Networks, Fuzzy systems, Genetic Algorithms, Classification etc. Extension personnel are essential alongside AI because they provide the human touch, interpreting AI-generated insights, tailoring advice to local contexts, addressing unique farmer needs, and fostering trust and adoption. On investigating various researches, there are various factors that highlight role of AI in strengthening agriculture extension services. In context to the above stated facts and reviews a conceptual framework has been produced by the researcher to integrate AI with agricultural extension services.

Key words: Artificial Intelligence, Artificial Neural Networks, Fuzzy Systems, Genetic Algorithms, Extension Services.

HABITAT SUITABILITY MODELLING OF *TOR PUTITORA* (HAMILTON, 1822) IN BEAS RIVER BASIN (HIMACHAL PRADESH)

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India is a megadiverse country that houses around 10% of world's species. The aim of present study confined to estimate the habitat suitability of *Tor putitora* in Beas River. Total three sampling zones i.e. Z1, Z2 and Z3 were selected based upon geomorphology. The present study was carried out to investigate the Habitat suitability of *Tor putitora* in Beas River with a stretch of around 170 km from 2023 to 2024. Sampling was carried out upstream and downstream during six months periods. Results revealed that the *Tor putitora* population has been reduced to a great extend ranging from 0.9% to 8.0%. The minimum percentage was observed from 2023 to 2024. By Habitat suitability modelling it was found that the suitability range of water velocity, depth, slope and DO in upper Beas basin ranges between 0.6 m/s to 1 m/s, 0.4 m to 1m, 0.3 - 1% and 0.6-1mg/l respectively whereas the optimum water velocity, depth, slope and DO for the *Tor putitora* species of mahseer in the upper Beas basin was measured to be 1 - 3 m/s, 1 - 4 m, 1 to 4 % and 0 - 8mg/l respectively. To determine the feasibility and simulation of dynamics of aquatic organisms and fish populations, the habitat suitability curve (HSC) was designed.

Keywords: *Tor putitora*, Habitat suitability modelling, suitability, Beas, India.

EFFECT OF PREHARVEST NUTRIENT APPLICATION AND BAGGING WITH DIFFERENT COLORS OF POLYTHENE ON QUALITY AND SHELF-LIFE OF RAINY SEASON GUAVA (*PSIDIUM GUAJAVA* LINN.) CV. ALLAHABAD SAFEDA

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The experiment was conducted at the Research Farm of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during 2020-21 and 2021-22. This study investigates the impact of pre-harvest nutrient application and polythene bagging with different colors on the quality and shelf-life of rainy season guava (*Psidium guajava* L.). Conducted in a randomized complete block design, the experiment evaluates various nutrient treatments and bagging techniques to determine their influence on guava's physical and biochemical attributes. Nutrient treatments include foliar sprays of calcium nitrate, potassium nitrate, and boric acid, while bagging treatments involve polythene bags in different colors (white, yellow, blue, and transparent). The results indicate that both nutrient application and bagging significantly enhance the fruit's quality parameters such as weight, firmness, and vitamin C content. Notably, fruits

bagged in white and yellow polythene bags, combined with calcium nitrate treatment, exhibit superior quality and extended shelf-life compared to other treatments. The study concludes that the strategic combination of pre-harvest nutrient application and colored polythene bagging can effectively improve the postharvest quality and longevity of guavas, offering a practical approach for farmers to enhance fruit marketability during the rainy season. These findings provide valuable insights for optimizing guava production and storage, contributing to better economic returns and reduced postharvest losses.

Keywords: Guava, Bagging, Foliar application, Nutrients, Foliar spray, etc.

EXPLORING LEPIDOPTERAN POLLINATOR DIVERSITY IN THE FOREST ECOSYSTEMS OF SERAJ VALLEY, NORTH WESTERN HIMALAYAS: TRANSITORY INVESTIGATION

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Lepidopterans, comprising butterflies and moths, are vital components of biodiversity within the Seraj Valley of the North Western Himalayas. Seraj valley lies in the Mandi and Kullu district of Himachal Pradesh. Lepidoptera plays a vital role in the pollination and preservation of both indigenous and cultivated plant varieties, offering a myriad of essential services including ensuring food security, sustaining livelihoods, and aiding in carbon sequestration. Most angiosperms are pollinated by insects, making insect pollinators crucial for the survival of these plants. Through field surveys conducted across various habitats and altitudinal gradients within the Seraj Valley, documented a rich diversity of lepidopteran species. Findings reveal a varied occurrence and distribution pattern of lepidopterans across different altitudinal zones. At lower elevations (1000-2000 meters), a profusion of species, including the Common Blue and Painted Lady, thrives amidst the diverse floral resources of the valley's lower forests. In mid-elevational zones (2000-3000 meters), we observed a shift in species composition, with the emergence of specialist pollinators such as specialist butterflies and various moth species, indicative of their reliance on specific plant species abundant in these zones. In the subalpine and alpine zones (above 3000 meters), the diversity of lepidopteran pollinators declined, yet unique high-altitude specialists such as the Himalayan Apollo and various species of skipper butterflies were encountered, adapted to the challenging environmental conditions prevailing at these altitudes. This study underscores the importance of understanding lepidopteran biodiversity dynamics and their responses to climatic disturbances for effective conservation strategies in the Seraj Valley and beyond.

Keywords: Altitude, Conservation, Diversity, Lepidoptera, Pollination.

APPLICATION OF INFRARED THERMOGRAPHY FOR SEASONAL MASTITIS ASSESSMENT IN HOLSTEIN FRIESIAN CROSSBRED COWS: A COMPREHENSIVE APPROACH

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Mastitis is the costliest production disease that affects the dairy industry globally. Thus, smart and non-invasive technology like infrared thermography (IRT) is the need of the hour to tackle mastitis. The present study focuses on thermal imaging of the pre-milking, milking, and post-milking udder; pre-milking and post-milking teat and the short milking tube (SMT) of Holstein Friesian crossbred (HFCB) cows during different seasons (Summer, Winter, Autumn and Rainy) to identify subclinical (SCM) and clinical mastitis (CM) cases using a handheld Darvi DTL007 IR camera. A total of 98-117 lactating HFCB cows were screened out using IRT regularly throughout the year. The udder health status was further assessed using the California mastitis test and somatic cell count (SCC). The results of the SCC analysis revealed a difference ($p < 0.01$) in healthy SCM and CM-affected quarters. The thermogram analysis revealed a significant difference ($p < 0.01$) in the mean values of monthly-seasonal analysis and the degree of increment in seasonal thermogram analysis of the pre-milking, milking, and post-milking udder skin surface temperature (USST); pre-milking and post-milking teat skin surface temperature (TSST) and the SMT of healthy, SCM, and CM-affected quarters. The highest increment in the temperature was observed during the winter season for SMT, USST, and TSST. Thermograms of SMT, USST, and TSST showed a very strong correlation with the CMT scores and $\log_{10}$ SCC ($p < 0.01$). Henceforth, irrespective of the seasons studied in the present work, IRT is an efficient, supportive tool for the early identification of SCM and CM in HFCB cows.

Keywords: Clinical mastitis, HFCB cows, sub-clinical mastitis, thermal imaging

BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) IN BIOMASS CONVERSION AND REGENERATIVE AGRICULTURE

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The conversion and recycling of biowastes into compost and feed protein using a dipteran insect larval, the Black soldier flies (*Hermetia illucens*), opens up new possibilities for circular economy-based regenerative agriculture. Compost made with Black Soldier Fly Larvae (BSFL) is known as 'brown live gold' and has significant potential for India's sustainable agricultural practices, promising to play an important role in shaping a more food-secure and environmentally sustainable agriculture, poultry feed, and aquaculture. BSFL plays an

important role in the management of organic wastes/debris, and the valorization of diverse biodegradable wastes. The larval frass produced by bioconversion of organic wastes has been discovered to be a high-quality source of fat/oil and proteins in biodiesel production, and it is increasingly being used in a variety of industries for animal feeding, chitin derivatives in waste water treatment plants, biopolymers such as chitin, and soil composting. Entire larvae or processed pupae and larvae of BSF can be incorporated into poultry, fish, dog, and pig feed, as an alternative to branded popular feed supplements. The practical simplicity of producing insects on a micro, small, and medium size might create countless job opportunities for qualified and unskilled laborers joining the job market each year. The widespread use of proteins, lipids, and chitin extracted from BSFL encourages industrial innovation and new infrastructures, integrated farming system and as industry players use cutting-edge processes to produce high-quality products.

Keywords: Agrowastes, Black Soldier Fly Larvae, Composting, Animal feed, sustainability.

PORTABLE MECHANIZED MAIZE SHELLER: A SOLUTION TO REDUCE DRUDGERY OF FARM WOMEN IN MAIZE PRODUCTION

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Maize cultivation, a cornerstone of global agriculture, is confronted with numerous obstacles, including labor shortages, escalating wages, and the arduousness of manual tasks, particularly maize shelling according to the research farm women are involved in above cited activity by using traditional method and with the hand operated maize Sheller (small and marginal farmers). In response, our research endeavors to mitigate these challenges by harnessing technology to enhance work performance and alleviate the drudgery experienced by farm workers, especially women. The focal point of our study is the development and assessment of a portable mechanized maize sheller, meticulously designed to streamline the shelling process and optimize productivity. Through extensive testing and comparative analysis conducted across diverse agricultural settings, we meticulously evaluate the performance of the mechanized sheller in key areas such as output capacity, labor requirements, operational costs, and seed quality preservation. Our findings unequivocally demonstrate the transformative potential of the mechanized sheller. Compared to traditional shelling methods, it boasts superior efficiency, significantly reducing man-days and operational expenses while simultaneously bolstering output capacity. Moreover, seed quality assessments reveal minimal adverse effects on germination rates, affirming the technology's efficacy in preserving seed integrity. Critical to our investigation is the feedback garnered from farmers engaged in large-scale testing. Their enthusiastic endorsement underscores the pragmatic value and broad acceptance of the mechanized sheller within farming communities. Particularly noteworthy is its suitability for small and marginal farmers. In conclusion, by facilitating labor efficiency, reducing drudgery, cost effective and improving economic viability, the mechanized maize sheller holds immense promise for fostering sustainable agricultural development and bolstering food security in maize-producing regions worldwide.

SWOT ANALYSIS OF SOCIAL INNOVATION IN RURAL INDIA

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As we all know that 71% Indian population lives in rural areas, where their contribution to the Indian economy is much less than in urban areas. To increase their contribution to the Indian economy government, private and other sectors are also working in this field, in the same social innovator, social incubation, social entrepreneurs and social enterprises also are working. In this chapter, we will discuss social innovation's strengths, weaknesses, opportunities, and threats in rural areas.

Key points: social innovation, social innovators, social incubation, social entrepreneurs, social enterprise, India, SWOT analysis, etc.

SEASONAL INCIDENCE OF FALL ARMYWORM, *SPODOPTERA FRUGIPERDA* (J. E. SMITH) AND THEIR NATURAL ENEMIE IN RELATION TO WEATHER PARAMETERS

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The field experiment was conducted on the field of progressive farmer Shree. Baburao MhaskeDomegoan, Taluka Ambad, Dist. Jalna under the guidance of college of agriculture Badnapur during kharif 2021, to know the seasonal incidence of fall armyworm, *Spodoptera frugiperda* egg masses of fall armyworm 28th SMW 3th week of July with the mean population of 0.10 larvae/plant and 0.30 egg masses/plant respectively. The peak populations were observed in the 2nd week of August (32nd SMW) with mean population of 3.20 larvae/plant and egg masses of fall armyworm were 0.80 egg masses/plant. The correlation between fall armyworm *Spodoptera frugiperda* with weather parameters during kharif 2021 results indicate that the population demonstrated a non-significant negative correlation with maximum temperature, minimum temperature, morning humidity, evening humidity and rainfall. The correlation between egg masses of FAW in relation to weather parameters indicate that the population demonstrated a non-significant positive correlation with morning, evening humidity and rainfall. The natural enemies like LBB, predatory spider and predatory bug were also recorded during a season with ranged from 1.2 to 2.2 per plant, 0.2 to 2.2 per plant and 0.4 to 0.85 per plant respectively. The population of LBB reached to peak in 31st SMW with 2.20 per plant.

Keywords: Seasonal incidence, armyworm, natural, enemies, weather parameters, *Spodoptera frugiperda*, Maize.

SOIL HEALTH, LAND RESOURCES, SOIL SURVEY AND LAND USE PLANNING AND MANAGEMENT**GHODKE R.V.¹ AND PAGARE Y.D.²****College of Agriculture, Latur, VNMKV, Parbhani, MH**

The present study was conducted in Latur, Renapur and Ausa talukas of Latur district from Marathwada region of Maharashtra state, with an objective to study the attitude of farmers towards soil health card. From each selected talukas four villages were selected randomly for research study. Ten respondents from each village were selected randomly to comprise a sample of 120 respondents. One short case study method of ex- post-facto medium research design was adopted for this study. It was observed that, majority (70.83%) of the respondents had medium farming experience, nearly half (40.84%) of the respondents had education level up to secondary school, three fourth (75.00%) of the respondents had medium level of annual income, nearly half (49.17%) of the respondents comes under the category of semi- medium, more than two third (67.50%) of the respondents belonged to 'fair' cropping pattern category, more than half of the respondents (59.17%) had membership in more than one organization, nearly two third (63.33%) of the respondents had medium contact with the extension personnel, majority (75.83%) of the respondents had medium level use of sources of information, nearly two third (65.83%) of the respondents had medium level of innovativeness, majority (64.17%) of the respondents had medium level of scientific orientation, majority (73.33%) of the respondents had medium level of knowledge. The result regarding attitude of farmers towards soil health card revealed that, majority (71.67%) of the respondents had favourable attitude towards soil health card. Independent variables like annual income, land holding, cropping pattern, use of sources of information, innovativeness, scientific orientation and knowledge had possessed highly significant and positive relationship with their attitude towards soil health card. While the education and social participation had possessed positively significant relationship with their attitude towards soil health card. Remaining two variables like farming experience and occupation had positive and non-significant relationship with their attitude towards soil health card. In the present study, some constraints faced by farmers in application of soil health card was also studied. In this regarding the data are given in Table 4.17. It can be observed that major constraints faced by farmers were: unavailability of micronutrients status of soil ranked first with score (81.67%), followed by difficulty in calculating fertilizer dose on the basis of nutrient status of soil (80.83%), unable to operate internet (78.33%), received soil health card after crop harvest (72.50%), Unavailability of internet facility (63.33%), time gap between soil sample taken and issuing card is too high (60.83%) and Collection of soil sample was not done in presence of farmers (55.00%). It was concluded that major suggestions given by farmers to overcome the constraints associated with the acceptance of soil health card programme were: Availability of micronutrient status should be displayed (76.67%), followed by crop wise recommendation dose of fertilizers should be given (73.33%), farmers should be trained to take sample of its own soil (72.50%), soil health card should be issued to crop season (70.00%), internet facility should be provided at village level (65.83%), soil sample procedure should be done in presence of farmers (62.50%) and soil testing laboratory should be established at Taluka level with highly qualified supporting staff (17.50%).

(Keywords – Soil health card, Attitude)

ASSESSMENT OF GROWTH AND PRODUCTIVITY OF FODDER TREE SPECIES WITH INTERCROPS UNDER AGROFORESTRY SYSTEMS IN NORTHERN TRANSITIONAL ZONE OF KARNATAKA, INDIA**GIRISH B. SHAHAPURMATH* AND S. S. INAMATI*******Assistant Professor, Department of Forest Resource Management, College of Forestry, Sirsi, Uttara Kannada district, Karnataka, India******Professor and Head, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Kannada district, Karnataka, India**

Fodder shrubs and trees (browse) play a significant role both in farming systems, where they are protected as fallow species, and in livestock production. A field experiment was conducted to assess the growth and productivity of fodder tree species with intercrops under agroforestry systems in Northern Transitional zone of Dharwad region of Karnataka in India during 2018-19 and 2019-20 in kharif and rabi seasons. The fodder plantation was established in 2014 with seven fodder tree species with a spacing of 5m × 3m Viz., 1. *Calliandra calothyrsus*, 2. *Albizia lebbbeck*, 3. *Leucaena leucocephala*, 4. *Sesbania grandiflora*, 5. *Gliricidia sepium*, 6. *Moringa olifera*, 7. *Bauhinia purpurea* and 8. Sole Field Crops (soybean and safflower). The experiment was conducted with Randomized Block Design (RBD) with three replications. Among seven fodder tree species evaluated under agroforestry systems, the highest MAI in volume of wood was reported in *Moringa olifera* (5.042 and 5.625 m³ ha⁻¹) followed by *Leucaena leucocephala* (4.414 and 4.880 m³ ha⁻¹). *Gliricidia sepium* produced the highest MAI in total tree biomass (4.18 and 4.90 t ha⁻¹) followed by *Moringa olifera* (3.81 and 4.25 t ha⁻¹) as compared to other fodder tree species studied. The pooled data of 2018 and 2019 reported maximum green fodder yield recorded in *Calliandra calothyrsus* (474.17, 586.07 and 429.46 kg ha⁻¹) followed by *Leucaena leucocephala* (444.26, 555.33 and 388.73 kg ha⁻¹) which varied significantly from other fodder tree species at all the stages of pruning intervals. Total fodder yield recorded for the year 2018 and 2019 showed significantly higher values of green fodder yield which were recorded in *Calliandra calothyrsus* (1462.89 and 1516.52 kg ha⁻¹ respectively) followed by next best fodder tree *Leucaena leucocephala* (1365.88 and 1410.75 kg ha⁻¹) for the year 2018 and 2019 respectively which varied significantly from other fodder tree species. The maximum per cent dry matter production recorded in T₁ - *Calliandra calothyrsus* + FC (50.01, 51.05 and 52.03 %) followed by T₃ - *Leucaena leucocephala* + FC (47.13, 48.20 and 49.24 %) at all the stages of pruning intervals. There was a gradual increase in dry matter from rainy to spring and winter seasons in all the fodder tree species examined. Green tree fodder yield was positively correlated with light interception (0.544) at 5 per cent significant level and negatively correlated with light transmission ratio (-0.383). Hence, these agroforestry systems have an additional role of improving socioeconomic status of farming community providing them additional income.

Key words: Fodder banks, woody perennials, Mean Annual Increment, pruning height and interval, lops and tops, cutting frequency, total tree biomass.

FLORISTIC COMPOSITION AND REGENERATION STATUS OF NON TIMBER FOREST PRODUCTS (NTFPS) SPECIES IN SELECTED FOREST RANGES OF SIRSI FOREST DIVISION OF UTTARA KANNADA DISTRICT OF KARNATAKA

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Study was conducted at Sirsi, Hulekal and Siddapur range of Sirsi Forest Division. The species diversity of NTFP species recorded highest (3.57) in the Hulekal Forest Range followed by Siddapur range (3.56) and lowest was recorded in the Sirsi range (3.49). *Olea dioica* has the highest Importance Value Index (IVI) value of 24.34 followed by *Hopea ponga* (21.10) and *Caryota urens* (17.43) in Sirsi range with 58 species and 30 families. Species with IVI Values, *Aporosa lindleyana* (24.61) followed by *Olea dioica* (21.33) and *Knema attenuate* (19.16) were dominant in Hulekal range with 70 species and 34 families. The Siddapur range dominated by *Aporosa lindleyana* has the maximum IVI (24.97) followed by *Olea diaca* (20.74) and *Caryota urens* (17.48) with 60 species and 27 families. IVI of regeneration diversity of seedlings as follows, *Caryota urens* has maximum IVI of 22.14, followed by *Syzygium cumini* (20.77) and *Aporosa lindleyana* (19.98) in Sirsi range. *Aporosa lindleyana* (17.48), *Caryota urens* (15.71) and *Syzygium cumini* (11.84) species were highest IVI of the regenerating species in Hulekal range. *Aporosa lindleyana* (27.43) followed by *Syzygium cumini* (24.63) and *Caryota urens* (16.98) recorded highest IVI of regenerating species in Siddapur range. Hulekal range recorded the highest number of regenerating individuals of 3120 followed by Siddapur (2506) and Sirsi range (2267) per 200 m². The size class distribution showed the decreasing trend of stems from lower to higher size class exhibiting a reverse J-shape curve graph indicating promising growth of regenerating species. Some of the common NTFPs used during household survey were *Garcinia cambogia*, *Garcinia indica*, *Mangifera indica*, *Myristica malabarica*, *Cinnamomum zeylanicum* and *Sapindus emarginatus*. The TSS Marketing Society is marketing most of the NTFP's with 23 commercialized NTFP's during 2021-22 and majorities were medicinal plants. Nutmeg was the most procured and sold product, followed by *Garcinia cambogia*.

Keywords: Importance Value Index (IVI), regeneration diversity, commercialized NTFP's, household survey

STATUS OF REGENERATION AND UTILITY PATTERN OF *TERMINALIA CHEBULA* RETZ. IN SIRSI FOREST DIVISION OF UTTARA KANNADA DISTRICT OF KARNATAKA

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The present study was conducted in five natural populations of *Terminalia chebula* Retz. Distributed habitats in dry deciduous, moist deciduous and semi-evergreen forests of the Sirsi Forest Division of Uttara Kannada district in Karnataka. In every natural population, 5 quadrates of 20m×20m, size plots were randomly laid out to study the population structure and vegetation diversity of the tree species. In each quadrat, five nested quadrats of 1m×1m, in size were laid out to study the regeneration status. The entire study area tree species comprised 68 Species representing 53 genera and 28 families. All the sites are dominated by the *Terminalia chebula* tree in its natural population according to the ranking of IVI. The IVI value ranged between 30.59 to 47.29. The highest IVI was recorded from the Hulekal range (47.29), followed by Janmane (38.16). Banavasi recorded IVI of 33.42, Sirsi 33.18 and a lower IVI was recorded by Siddapur range (30.59). The value of the Shannon-wiener index of growing stock ranged between 2.84 to 3.15 in the studied area. The Simpson index varied between 0.06 to 0.08 and the Evenness index between 0.83 to 0.88. The IVI of the regeneration layer in *Terminalia chebula* distributed habitat ranged between 27.42 to 13.47. The highest IVI of *Terminalia chebula* regeneration is found in Hulekal range (27.42), followed by Janmane (22.06), Banavasi (15.04), Sirsi (15.00) and Siddapur (13.47). The Shannon-wiener index of the regeneration layer ranged between 3.03 to 2.81. Simpson's index values varied from 0.06 to 0.08. Evenness index values were found between 0.10 to 0.12. The present study also documented utilization patterns of the Harar tree by participatory discussion method through a questionnaire survey. A total of 85 families from 22 villages of Sirsi Forest Division were surveyed and 15 different using patterns and 7 various medicinal usages were documented.

Keywords: Population structure, vegetation diversity, natural population, growing stock, utilization patterns, questionnaire survey

ZINC BIO-FORTIFICATION AND YIELD ENHANCEMENT OF URDBEAN (*VIGNA MUNGO* L.) THROUGH NUTRIENT MOBILIZING MICROORGANISMS

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Excessive and long term use of chemicals exerts deleterious effects on soil microorganism, affects the fertility status of soil hence reduces yield and also pollutes environment. Microbial inoculation into the soil can be a beneficial and sustainable approach towards modern agricultural practices. Also, these organisms have the ability of providing insoluble forms of nutrients into soluble forms to the plant. In the present study, combination of nutrient mobilizing organisms and recommended cultural practices have been used to study their effect on yield and nutrient content and uptake by urdbean. A field experiment was conducted during kharif season of 2017 and 2018 at N. E. Borlaug Crop Research Centre of Govind Ballabh Pant University of Agriculture & Technology, Pantnagar (Uttarakhand) to study on zinc bio-fortification and yield enhancement of urdbean (*Vigna mungo* L.) through nutrient mobilizing microorganisms. Results revealed that yield

attributes viz. number of pod per plant, number of seed per pod and 1000-seed weight was noted from T₁₁ (Rhizobium + Zn Nm + PGPR + ZnO @ 28.0 kg/ha + RDF) whereas, T₇- Rhizobium + Zn Nm + PGPR + RDF resulted in longest pods. The highest seed yield, straw yield N, P and Zn content by grain and straw was recorded under T₁₁. These results indicated that nutrient mobilizing organisms posses beneficial effect on various yield attributing characters and also enhance the nutrient content and uptake by grain and straw in urdbean.

Keywords: Zinc, Bio-fortification, Urdbean, Growth, Yield, Nutrient content

ORGANIC AND NATURAL ECOFRIENDLY FARMING

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Organic and natural eco-friendly farming represents a sustainable approach to agriculture that prioritizes environmental health, biodiversity, and human well-being. This farming method eschews synthetic pesticides, herbicides, fertilizers, and genetically modified organisms (GMOs) in favor of natural and organic inputs. The abstract outlines the principles, practices, and benefits of organic and natural eco-friendly farming. At its core, organic farming emphasizes soil health and fertility through practices such as crop rotation, composting, and the use of cover crops. These techniques enhance soil structure, water retention, and microbial activity, leading to improved nutrient cycling and reduced erosion. Additionally, natural pest control methods like biological predators and diverse crop plantings help minimize the need for chemical interventions. Natural eco-friendly farming integrates traditional agricultural knowledge with modern scientific understanding to create resilient farming systems. By promoting agroecological principles, such as biodiversity conservation and ecosystem services, this approach enhances farm resilience to pests, diseases, and climate variability. Moreover, by reducing reliance on external inputs, organic farming fosters self-sufficiency and resilience among farmers, particularly in resource-limited contexts. Beyond environmental benefits, organic and natural eco-friendly farming has significant socio-economic advantages. It promotes rural livelihoods by creating employment opportunities, supporting small-scale farmers, and fostering community development. Moreover, by producing healthier food without synthetic chemicals, organic farming contributes to improved human health and well-being, reducing the risks associated with pesticide exposure and promoting nutritious diets. In conclusion, organic and natural eco-friendly farming represents a holistic approach to agriculture that harmonizes with nature, fosters sustainability, and supports the well-being of both people and the planet. Embracing this paradigm shift in agriculture is essential for addressing pressing global challenges such as food security, climate change, and environmental degradation.

SOIL AND WATER CONSERVATION & IRRIGATION

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In India, soil and water conservation, along with effective irrigation practices, are paramount for sustaining agricultural productivity, ensuring food security, and safeguarding natural resources amidst the country's diverse climatic and geographical conditions. This abstract provides insights into the challenges, strategies, and implications of soil and water management in the Indian context. India's agriculture sector faces multifaceted challenges, including soil degradation, water scarcity, and erratic rainfall patterns exacerbated by climate change. In response, various soil conservation techniques such as contour bunding, watershed management, and afforestation initiatives have been implemented across different regions to mitigate soil erosion, enhance soil fertility, and preserve moisture content. These efforts aim to safeguard arable land from degradation and promote sustainable land use practices crucial for smallholder farmers' livelihoods. Concurrently, addressing water scarcity through efficient irrigation practices is imperative for optimizing agricultural productivity. In India, traditional methods like canal irrigation coexist with modern techniques such as drip and sprinkler irrigation, tailored to suit diverse cropping patterns and water availability. Moreover, the promotion of water-saving technologies and policies like the National Water Mission underscores the government's commitment to enhancing water use efficiency and equitable distribution. However, despite concerted efforts, challenges persist, including groundwater depletion, soil salinity, and inadequate infrastructure for water management. Sustainable solutions necessitate integrated approaches that combine soil and water conservation measures with technological innovations and community participation. Furthermore, policy interventions focusing on incentivizing conservation practices, promoting crop diversification, and strengthening institutional capacities are pivotal for scaling up sustainable agriculture initiatives nationwide. In conclusion, soil and water conservation, coupled with efficient irrigation practices, are indispensable for India's agricultural resilience and water security. Embracing holistic strategies that balance socio-economic development with environmental sustainability is essential for ensuring the well-being of present and future generations in the agrarian landscape of India.

Keyword: Water conservation, Irrigation, Rainfall.

EVALUATION OF COLOUR VALUES AND BIOCHEMICAL QUALITY PARAMAETRS OF CHIA INCORPORATED POMEGRANTE SYRUP AND RTS

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Aim: To assess the instrumental colour values (L^* , a^* and b^*) and quality parameters of chia seeds incorporated pomegranate syrup and RTS prepared by using sucrose and fructose sugars. **Hypothesis :** The chis seeds incorporated syrup and RTS may change the biochemical parameters of pomegranate. **Methodology :** In the present study, pomegranate fruit juice and chia seeds were utilized for the preparation of pomegranate syrup and RTS (ready to serve) with infusion of soaked chia seeds by using sucrose and fructose for syrup preparation. In this investigation, syrup and RTS were exploited at different combinations using both syrups made from sucrose and fructose. The different treatments were assessed for the colour values and biochemical parameters such as TSS, pH, titratable acidity and brix to acid ratio. **Results:** In case of RTS and syrup, treatment T₄ (80 % Pomegranate juice + Sugar 65 °Brix + 20 % chia seeds) recorded maximum amount of L^* value (28.47 and 24.67 respectively). The treatments which consisting of higher percentage chia seeds are impacted on the a^* value and b^* values. The treatment control II T₅ (100 % Pomegranate juice + Fructose 45 °Brix) recorded lowest pH value (2.84 and 2.57 respectively). **Interpretation:** Combining pomegranate syrup with chia seeds can indeed provide numerous health benefits. Pomegranate syrup is known for its high antioxidant content, particularly punicalagins and anthocyanins. Chia seeds, on the other hand, are a nutritional powerhouse. They are packed with fiber, protein, omega-3 fatty acids, and various essential micronutrients. The fiber in chia seeds promotes healthy digestion by supporting regular bowel movements and maintaining gut health. When combined, pomegranate syrup and chia seeds create a synergistic effect, providing a wide range of health benefits.

Keywords: pomegranate, chia seeds, syrup, RTS, TSS, titratable acidity and pH

OUTCOMES OF KVK'S KISAN MOBILE SANDESH IN SEEKING OF AGRICULTURAL INFORMATION FOR INCREASING THE INCOME OF TRIBAL FARMERS IN BARWANI DISTRICT OF MADHYA PRADESH"INDIA

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ICT is an innovative technology that provides access to useful information through telecommunication. This telecommunication is a means of spreading information over large distances in a timely manner. It is similar to information technology or it can be considered equivalent to information technology but especially it is useful as a good medium of effective communication. Agriculture related advisory services is the innovative services of ICT which provides advisory services for specific crops and specific locations and facilitates the farmers for seeking new agricultural information on time. K.V.K. avail the different types of farm support to the agricultural sector and Kisan Mobile Sandesh (KMS) is a special tools for providing the timely knowledge and information to the tribal farming community. This present research work was conducted in district Barwani of Madhya Pradesh. The total sample consisted of 120 tribal respondents for this study. A large portion of the respondents (72.48 %) perceived high efficacy of agriculture related farm advisory category in seeking of agricultural related information. In this research, the zero order correlation coefficient between independent and dependent variables was determined. Education, social participation, land holding size, annual income of farmer, credit orientation, mass media exposure, innovativeness, participation in extension activities, information seeking behaviour of farmer, frame of mind towards farm broadcast were noted having significant relationship with efficacy of farm advisory. A large portion of the respondents (63%) tribal farmers reported that farm messages should be based on innovative technologies of agriculture and allied sectors.

Key words- ICTs, Consequences, Farm related advisory, Agricultural Knowledge and Information, Mobile, Internet, KMS, Simple random sampling and Tribal farmers.

TREND ANALYSIS OF RAINFALL AND TEMPERATURE OVER NAGALAND, INDIA**GRACE NENGZOUZAM¹, SALAM LAMYANBA LUWANG^{1**}, NINGTHOUJAM MANDA DEVI¹ LIZA G KIBA²**¹Department of Agricultural Engineering and Technology, School of Engineering & Technology, Nagaland University, Nagaland²Project Associate, Department of Agricultural Sciences, Nagaland University, Nagaland, India

Rainfall and temperature are important meteorological parameters for agricultural production, especially in the context of climate change. Agriculture is one of the most important sectors in Nagaland as most people depends on agriculture as their source of livelihood. With meagre landholdings and financial instability, farmers in this state depend entirely on rainfall as their source of water supply for irrigation. Understanding precipitation pattern in a changing environment is imperative when rainfall received during the monsoon period is nearly 80% of the state's total precipitation. The present study has been carried out to investigate the rainfall and temperature trend analysis in Nagaland. The non-parametric Mann-Kendall's trend analysis has been employed to inspect the change of rainfall and temperature and Sen's slope to determine its magnitude on 15 meteorological stations. A daily time series of rainfall, minimum and maximum temperatures of 39 years i.e., 1981-2020 were employed for the study using raingauge data from Water Resources Department of Nagaland. The average annual rainfall received during the study period ranges from 944.88 (in Dimapur) to 2134.7 mm (in Wokha). The seasonal and annual trends for the daily rainfall depth, minimum and maximum temperatures were analysed at four different levels of significance, viz. 0.1%, 1%, 5%, and 10%. The annual rainfall trend showed an increasing trend in eight stations while the rest showed a decreasing trend. An overall increase in maximum temperature while an overall decrease in the minimum temperature was observed over the meteorological stations in Nagaland.

Keywords: - Mann- Kendall's, Trend Analysis, Rainfall, Sen's Slope, Time Series

EXPLORING THE PHYLOGENETIC RELATIONSHIP OF OLYRA WITH BAGRIDAE FAMILY USING DNA BARCODES**GRISHMA S. PATIL^{A,C}, NEVIL PINTO^A, RUPAK NATH^B, MUKUNDA GOSWAMI^A**^aICAR - Central Institute of Fisheries Education, Mumbai, India^bSt. Anthony's College, Shillong, Meghalaya, India^cPh.D. Scholar at Mangalore University, Karnataka, India

North East India is a part of two biodiversity hotspots, the Eastern Himalayan and the Indo-Burman. With respect to its biogeographical location and the water drainage system, all the Northeastern Indian States are blessed with enormous freshwater fish diversity. Many of these freshwater fishes have economical and ornamental importance. SL Hora in 1936 formed the family Olyridae, which had a single genus, *Olyra* in it. Later in 1991, Mo on the basis of his morphological cladograms, transferred *Olyra* into the Bagridae family. Through literature review, it is understood that the inter generic phylogenetic relationship among the Bagridae family is not much clear. Keeping this in mind, the aim of this study was to understand the phylogenetic relationship of *Olyra* with the other genera within the Bagridae family. In this study, COI barcodes from three bagrid catfish species, *Olyra longicaudata*, *Mystus bleekeri* and *M. cavasius* were generated and compared to 84 COI barcodes sourced from NCBI belonging to different genera under the Bagridae family. The inter generic relationship among the different Bagridae catfishes was studied by constructing three phylogenetic trees, viz., Neighbor-Joining (NJ), Bayesian and Maximum Likelihood (ML). In both the Bayesian and ML trees, the *O. longicaudata* specimens are not forming a part of the the Bagridae familial clade (*Bagrichthys* + *Bagrus* + *Batasio* + *Chandramara* + *Hemibagrus* + *Leiocassis* + *Mystus* + *Pelteobagrus* + *Pseudobagrus* + *Sperata* + *Tachysurus*). Our phylogenetic interpretations are based on molecular data as opposed to cladistic interpretations observed by Mo in 1991. Based on these results, we would like to propose the transfer of the genus *Olyra* from Bagridae family back to its original family, Olyridae as proposed by SL Hora in 1936.

Keywords: COI Barcodes, Bagrid catfishes, *Olyra*, North East India, Siluriformes

INFORMATION COMMUNICATION TECHNOLOGY IN INDIAN AGRICULTURE: AN OVERVIEW**GUNESHORI MAISNAM, KSHITIJ PARMAR, ABHA SHARMA, DHANANJAY SURESH GAIKWAD, AJAY TOMAR**^{*}Assistant Professor-II, Amity University, Noida Uttar Pradesh

Rural development and Agriculture occupy a substantial place in country, s economy. In order to efficiently promote agriculture and rural development, investigate the types and frequency of communication media and ICT owned and used by farmers, assist in designing appropriate expansion strategies and delivering improved ICT expansion and Information technology upheaval is impending quickly and more recognizable in every sector. A felt need of farmers is timely availability of information n technology, monsoon behaviour and market opportunities. Regular extension services usually do not reach the farmer at the right time and place. The research aimed to identify the reality of using information and communication technology for farmers. The collected data were analysed using descriptive and inferential statistics. The ICTs' features that attract farmers include diversity of broadcast languages, diversity of agricultural information disseminated, and ability to facilitate direct communication between actors. To promote broad dissemination of agricultural innovations through ICTs, agricultural stakeholders must be considered, while integrating farmers and journalists in all phases of the process. The integration of the agricultural innovations' diffusion through ICTs in the agricultural policies and the ITCs' operators' agendas is a priority. A sound strategy is needed to make aware about the benefits and on how to be availed it. Improving the socio-economic status of a farmer is must, and ICT plays an important role in it. The researchers recommend intensifying specialized training courses in the use of information and communication technology and taking the obstacles that the study found into consideration when preparing a future indicative plan in this field.

Key words: ICTs, Impact, Agriculture,

OPTIMIZATION AND THE COMPARATIVE STUDY OF HYDROTHERMAL PRETREATMENT ON HYDROLYSIS OF WATER HYACINTH**GUNJAN SINGH¹, YOGITA JAIN² AND RADHIKA SINGH***¹*Department of Chemistry, Dayalbagh Educational Institute, Agra, Uttar Pradesh, India²Faculty of Engineering, Dayalbagh Educational Institute, Agra, Uttar Pradesh, India

Water hyacinth (*Eichhornia crassipes*) is a common aquatic weed in tropical or subtropical regions. Due to its high growth rate, it is considered as a major hazard to aquatic ecosystems and agriculture. Native habitats have suffered because of this invasive species as it chokes rivers and lakes. Recent research and current energy demand make this aquatic weed a very good substrate for biofuel production. The present work outlines a unique pretreatment technique utilizing water hyacinth (WH) and Petha wastewater PWW which results in the stabilization of both wastes. In the present study, for pretreatment of (WH) wastewater released from the petha industries was chosen, which is highly alkaline nature (pH between 12.0 and 14.0). This pretreatment aided in the lignocellulosic breakdown of WH, which is easily digested anaerobically to produce biofuel. This paper aimed to compare the effect of thermal pretreatment methods (heating, and microwave) on the hydrolysis, and compositional analysis of WH. Microwave and heating pretreatment was done at different power and temperature respectively for different period of time. The microwave pretreatment done at 10% power for 25 mins produced highest solubilization (2485.7 ± 0.07) with maximum power output 1200 W. On the other hand, heating pretreatment was done at 80 °C for 5mins produced highest solubilization (1465.9 ± 0.03). The effects of these treatments on the composition and structure of WH were studied by Field Emission Scanning Electron Microscope (FESEM) and Energy-dispersive X-ray spectroscopy (EDX). Therefore, we can handle the disposal issue of extremely alkaline PWW and WH at the same time using the green co-pretreatment method.

Keywords: Water hyacinth, petha wastewater, green pretreatment, microwave, and heat.**MOLECULAR CHARACTERIZATION OF BETASATELLITES (DNA B) ASSOCIATED WITH TOBACCO LEAF CURL VIRUS DISEASE FROM KARNATAKA****GURUDEVI, V. NAVALI*¹ K. T. RANGASWAMY² AND S. BASAVARAJ³**¹Assistant Professor of Plant Pathology, College of Horticulture, Hiriuru, KSN University of Agricultural and Horticultural Sciences, Shivamogga²Rtd. Professor of Plant Pathology, University of Agricultural Sciences, GKVK, Bengaluru³Assistant Director, National Institute of Plant Health Management, Hyderabad

Biological characterization of begomoviruses associated tobacco leaf curl disease of different isolates were collected during 2016-2018 viz., TbLCV-MYS, TbLCV-MAN, TbLCV-CHN, TbLCV-SHG, TbLCV-DVG and TbLCV-BEL. Betasatellites (DNA β) are important host range and symptom determining molecules that associate with begomoviruses of the family Geminiviridae. They are highly diverse and geographically widespread. For the detection of DNA β in TbLCV isolates, used a pair of specific DNA β primers. All the six isolates yielded a characteristic amplicon of 1.4 kb size along with positive control on gel electrophoresis. All the amplified products were sequenced. The six DNA β sequences obtained were subjected to NCBI BLAST. BLAST search analysis of TbLCV-MYS isolate which showed highest per cent sequence similarity with Cotton leaf curl Multan betasatellite isolate (Ac.KF964654.1) of 97 per cent, TbLCV-MAN isolate showed 95 per cent sequence similarity with Papaya leaf curl virus betasatellite isolate India:Bangalore (Ac.KJ605113.1). TbLCV-CHN isolate showed highest per cent sequence similarity with Tobacco leaf curl betasatellite (TbLCuB: Ac. LT795119.1) of 98 per cent. TbLCV-SHG isolate showed 96 per cent sequence similarity with Tomato leaf curl Bangladesh betasatellite isolate Guntur (Ac.KX302716.1). TbLCV-DVG isolate showed highest per cent sequence similarity with Sunflower leaf curl virus betasatellite (Ac. JX678964.1) with 94 per cent. TbLCV-BEL isolate showed highest per cent sequence similarity with Sunflower leaf curl virus betasatellite isolate (Ac.JX678964.1) of 92 per cent. The results confirmed the association of different DNA β with all the six isolates collected from Karnataka.

Keywords: Tobacco, leaf curl, isolates, DNA-B, Molecular characterization**DIFFERENTIAL EXPRESSION OF RICE SHOOT GENES IN RESPONSE TO THE INOCULATION OF DIAZOTROPH *KLEBSIELLA OXYTOCA* UNDER NITROGEN STARVATION****H N RANJITHA, P U KRISHNARAJ *, Y P ARUN , S P PRALHAD, S M PRALHAD****Dept. of Microbiology, UAS, Dharwad**

Diazotrophs play a crucial role in nitrogen fixation either independently or in association with rice plants, contributing significantly to nitrogen availability. With growing interest in enhancing nitrogen fixation efficiency and understanding molecular interactions with rice, new diazotrophs are under scrutiny. In this study, we identified and characterized *Klebsiella oxytoca* as a potent diazotroph, exhibiting superior nitrogenase activity and promoting rice seedling growth notably in hydroponic conditions. *K. oxytoca* demonstrated additional plant-promoting traits such as auxin (IAA) production, ammonia (NH₃) production, and phosphate (P) solubilization abilities. To delve deeper into its effects on rice gene expression under varying nitrogen conditions, we conducted transcriptome analyses. RNA sequencing of rice shoots subjected to nitrogen starvation with *K. oxytoca* inoculation was compared with shoots grown under nitrogen starvation alone and with 100% nitrogen supplementation. Differential expression analysis revealed significant regulation of gene expression patterns. Notably, 93 genes were down-regulated and 53 genes were up-regulated compared to the nitrogen-starved control, while 63 genes were down-regulated and 37 genes were up-regulated compared to the 100% nitrogen-supplemented control. These genes encompassed diverse metabolic pathways

including nitrogen assimilation, carbohydrate and amino acid metabolism, fatty acid biosynthesis, photosynthesis, and various transport and regulatory processes. These findings suggest that the nitrogen fixed by *K. oxytoca* is assimilated into rice tissues, influencing a wide array of metabolic pathways. The intricate molecular interactions between *K. oxytoca* and rice indicate the potential for enhancing nitrogen utilization efficiency and overall plant growth. This study sheds light on the multifaceted role of diazotrophs in plant-microbe interactions and agricultural sustainability.

Keywords: Rice, Diazotroph, Biological nitrogen fixation, PGPR, RNA-Seq, Transcriptome

GUMS: COMMERCIALY VALUABLE PLANT PRODUCTS FOR VALUE ADDITION

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Gums are generally exuded by plants in liquid form and on exposure to the air it gets into translucent tears and remains attached to the bark of the stem or branch. Gums are nothing but complex carbohydrate derivatives of a polysaccharide nature; they are soluble in nature or form mucilage by absorption of water. Gums and resins are probably the most extensively used and traded NTFPs than food, medicine and fodder items. Many natural gums are sweetish in taste and some may be astringent and bitter. Natural gums are used as ingredient in food industry, pharmaceutical formulations, preparation of laddu, sweet meat syrups, and fine water colours. Gums are also used in preparation of face powders, as ingredient in glycerin soap creams, paints, varnishes, lithographic works, and preparation of envelopes and postage stamps. India is the largest producer of natural resins and gums; leading producer of gaur, karaya and psyllium gums. Annually about 5000 tons of gum is produced in India from different plants. At present natural gum and its allied products are having total trade of \$ 587 M in global market. Though there are more than 30 commercially important species in the country; but most important are *Anogeissus latifolia* (Ghatti gum), *Acacia nilotica* (Gum Arabic), *Acacia senegal* (True gum Arabic), *Sterculia urens* (Gum karaya), *Pterocarpus marsupium* (Kino gum), *Butea monosperma* (Bengal kino gum), *Lannea coromandelica* (Jhingan gum), *Cyamosis tetragonoloba* (Gaur gum). Due to over exploitation and practice of unsustainable gum harvesting techniques, the growth and population of these ecologically and economically valuable species is affected. Hence, it is very essential for development of proper gum harvesting techniques for maintaining ecologically viable population and conservation of these species for the future.

Keywords: Gum, Polysaccharides, Food industry, Pharmaceutical, Unsustainable harvesting

CINNAMOMUM ZEYLANICUM: AN COMMERCIALY VALUABLE SPICE YIELDING TREE SPECIES SUITABLE FOR AGRO-FORESTRY IN UTTARA KANNADA, KARNATAKA, INDIA

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C. zeylanicum, known as true cinnamon or 'sweet wood', is the earliest known spice in India. It is native of Sri Lanka and Malabar Coast of India. It is one of the most popular spices used by mankind. From breakfast rolls to spiced cookies, pudding and pies to quick breads and chutneys, cinnamon finds its way into recipes for standard family fare as well as special treats. Cinnamon is the second most important spice (next to black pepper) sold in the U.S. and European markets. The main commercial product of cinnamon trees is the dried bark of the stem (quills, quillings, chips), leaves and essential oils derived from leaf, stem-bark and root-bark. Cinnamon is used in the food industry as a spice for flavoring various foods such as pickles, cakes, biscuits, sweets, liquor, in food preservation and in the soap industry. Leaf oil is a rich source of eugenol, whereas bark oil is rich in cinnamaldehyde; both have tremendous use in flavouring, perfumery and pharmaceutical industries. It is also adopted in folk medicine as antispasmodic, carminative, stimulating, digestive, astringent, aphrodisiacal, antiseptic, antioxidant, aromatic, hypertensive, sedative and vasodilator agent. Presently, in Karnataka farmers are widely incorporating cinnamon in different farming systems and gaining higher income by harvesting and marketing of cinnamon leaves and immature fruits. Cinnamon plants starts flowering and fruiting at the age of 3-4 years and economic yield starts after 8 years. At the age of 8-10 years with fully developed crown single tree can produce 8-10 kg of immature fruits and after drying 2.50 to 3.0 kg; dried leaves Rs. 40-50/kg. Presently, farmers are getting Rs. 1500 per kg dried immature fruits and earn around 2.5 to 3.0 lakh per ha by intercropping cinnamon plants with Agri-horti crops such as areca nut, mango, curry leaf, garcinia, agar wood, citrus, soyabean, millets, etc (with 100 plants per ha with 10 m × 10 m spacing).

Key words: Cinnamon, Immature fruit, Karnataka, Essential oil, Perfumery

PROTECTIVE INFLUENCE OF ALOE VERA AGAINST BIOCHEMICAL ALTERATION INDUCED BY RADIATION AND CADMIUM ON VALUE OF ACID PHOSPHATE, ALKALINE PHOSPHATE, DNA AND RNA CONTENT OF MOUSE JEJUNUM**HARDEEP KUMAR¹, ASHWANI KUMAR²****Science Teacher, Govt. Sr. Sec. Smart School, Handwal, HSP**

Aloe Vera is a good radio protector and can be given to cancer patients during radiotherapy to minimize the side effects of exposure to radiations. Excessive exposure of Gamma radiation causes pathological and biological changes in the body tissues resulting in metabolic derangement which may leads to cellular damage or even death. Metals like Cadmium usually occur in environment may not cause more changes as such but may act as a pollutant and enters in biological system through air, water or food . So there is a need to protect living as well as nonliving things which are the part of our environment from excessive radiations and heavy metals. From many studies it is concluded that some chemicals may overcome the effect of radiation and heavy metals but these chemicals shows their own toxic effects. Many studies show that Aloe Vera is a good radio protector and effective to overcome the effects of heavy metals like Cadmium. Present paper highlights the protective role of Aloe Vera against biological changes induced by radiations and cadmium alone or in combination in small intestine of Swiss albino mice by observing the changes on acid phosphate enzyme, alkaline phosphate, DNA and RNA content.

Keywords: Radiation, Aloe Vera, cadmium, Heavy Metals**EXPLORING THE POTENTIAL OF SULFATED POLYSACCHARIDES FROM RED SEAWEEDS FOR SUSTAINABLE AQUACULTURE****HARINI G*, AYUSHI BHARDWAJ, ASHUTOSH DANVE, NA I SABET DOHTDONG, ELINA JOSE VETOM AND YASH KHALASI****ICAR - Central Institute of Fisheries Education, Versova, Andheri (W), Mumbai, Maharashtra, India**

The identification of metabolites from marine resources exhibiting biological activity has escalated substantially in the last few decades. Seaweeds are a valuable source of structurally diverse bioactive metabolites which represent about 9% of marine biomedical compounds. Complex carbohydrates, such as polysaccharides extracted from seaweeds, can also influence immunological responses in aquatic animals, boosting disease resistance. The complex group of macromolecules called sulfated polysaccharides (SPs), which are found in the extracellular matrix of seaweeds, are thought to have immunomodulatory, antioxidant, anticoagulant, anticancer, and anti-inflammatory properties. Galactans, also marketed as agar and carrageenan, are the predominant sugar polymers of red seaweeds, which are made up of repeating galactose units with varying degrees of sulfate substitution. They are extracted by various techniques like hot water extraction using acid and alkali treatments, microwave-assisted, enzyme-assisted, ultrasound treatments, and ionic liquid-based extraction. Characterization of size and functional groups for SPs can be done with FTIR, NMR, and size exclusion chromatography. The SPs found in red seaweeds are widely employed as thickening and stabilizing agents in the food industry and have been the focus of several studies investigating their potential therapeutic properties in vertebrates and other invertebrate animal models. The characteristics, nutritional advantages, and possible uses of these polysaccharides in improving the sustainability and effectiveness of aquafeed formulations have been the subject of numerous studies. The growth and fatty acid profile of rainbow trout, rohu, and white-leg shrimp were found enhanced upon dietary supplementation of red seaweeds and extracted SPs. In white-leg shrimp, it also increased the expression of immune genes. Furthermore, scientific investigations into the bioactive compounds of different seaweeds could also shed light on their modes of action and possible synergistic effects, revolutionizing the development of green aquafeed for sustainable aquaculture.

Keywords: Sulphated polysaccharides, Seaweeds, Disease resistance, Green aquafeed, Sustainable aquaculture**BIOTIC AND ABIOTIC STRESS MANAGEMENT IN FRUIT CROPS****HARISH CHANDRA YADAV^{1*}, ANAND SINGH¹, VISHVAJEET SINGH¹, PUSHPENDRA¹ AND SAURABH²****¹Department of Fruit Science, College of Horticulture, Banda University of Agriculture and Technology, Banda, U.P., India****²College of Community Science, Banda University of Agriculture and Technology, Banda, U.P., India**

Fruit crops encounter numerous challenges arising from both biotic and abiotic pressures, leading to a significant impact on their growth, productivity, and quality. To mitigate biotic stress, Integrated Pest Management (IPM) approaches, which combine cultural, biological, and chemical control methods, have proven to be effective. Biotechnology has advanced in recent years, with genetic engineering providing promising opportunities to increase crop resilience to biotic stressors while minimizing environmental impacts. Abiotic stresses, such as drought, salinity, extreme temperatures, and soil nutrient deficiencies, can significantly reduce the productivity of fruit crops. To enhance fruit crop resilience to abiotic stressors, precision agriculture techniques show potential. However, developing stress-tolerant cultivars is still challenging due to genetic diversity in cultivated fruit crops. Furthermore, there are regulatory hurdles and public perception issues surrounding biotechnological interventions that pose barriers to the adoption of genetically modified crops. In addition, the complex interactions between biotic and abiotic stressors require holistic management strategies that address multiple stress factors simultaneously. In order to develop new stress management solutions, it is necessary for plant breeders, biotechnologists, horticulturist, agronomists, and environmental scientists to collaborate. Interdisciplinary collaboration would allow for the integration of omics technologies, such as genomics, transcriptomics, and metabolomics, which can provide insights into the molecular mechanisms behind stress responses and help identify stress-tolerant traits for breeding purposes. Additionally, sustainable agricultural practices like agroecology and organic farming can promote resilience to both biotic and abiotic stresses while also preserving ecosystem health. To managing biotic and abiotic stresses in fruit crops requires a comprehensive approaches and strategies. Taking advantage of technological advancements and encouraging interdisciplinary collaboration can improve the resilience and sustainability of fruit crop production in the face of evolving stress challenges.

Keywords: Abiotic stress, Biotic stress, Fruits, Stress management

REVERSE GENETICS - A STRAIGHT FORWARD APPROACHES FOR VEGETABLE IMPROVEMENT**HARISH, B. M.^{1*}; SHREEDEVI BADIGER²; MANOJ SAINI³; KISHORE KUMAR, G. K.⁴; DEEPAK S KORE.⁵**

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- 4) Ph.D. Scholar, Dept. of Vegetable Science, University of Horticultural Sciences, Bagalkot, Karnataka, India.
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Though many crop improvement strategies viz., introduction, selection, hybridization, mutation, transgenic etc., are available but, the ever increasing human demands for the crops with increased production, high nutraceutical value, long lasting storability, high adaptability, resistant to various biotic and abiotic stresses etc., are found not completely fulfilled hence, reverse genetic tools are considered the effective alternatives. These reverse genetic tools comprise of RNAi (RNA interference)-which pertains to the interfering the RNA at specific site to make its expression increased or decreased, Antisense-which specifically regards to the making of the gene antisense to specific enzyme and making it non-reactive, Gene Over Expression-this is useful where the expression should be in high demand for the specific trait controlling by the specific genes, Knock-out/Genome Editing-this being the very popular reverse breeding technology and have imposed highly on the modern varietal (transgenic) development programmes, Transcriptome Analysis and TILLING (Targeting Induced Local Lesions IN Genome). Amongst all these novel approaches, RNAi and TILLING, which has been recognised as a great option in exploiting the sequenced genome for identifying useful genes that can be further employed in crop improvement specially vegetable crops, this demands the comprehensive insight of the procedure and also knowledge about the abilities of these reverse genetics tools in vegetable improvement.

Keywords: Reverse genetics, RNAi, TILLING, Biotic stress, Abiotic stress, Crop improvement

ENVIRONMENT FRIENDLY ZNS THIN FILM DEPOSITION BY CHEMICAL BATH DEPOSITION TECHNIQUE FOR OPTOELECTRONIC DEVICE APPLICATIONS**DR. HARISHCHANDRA K. SADEKAR****Department of Physics, Mula Education Society's Arts, Commerce and Science College, Sonai (MS) India**

Thin film optoelectronic device applications a toxic CdS material is used. This is a harmful to environment. This can be replaced by nontoxic CuS semiconducting material. The ZnS semiconductor thin film was deposited by a simple, economical and green synthesis chemical bath deposition (CBD) technique without any harmful complexing agent. The chemical bath deposition method is very simple; it requires temperature below 100°C. In this study we deposited ZnS thin film on to glass substrates at 70°C by CBD. The film was characterized by Scanning Electron Microscope (SEM), X-Ray Diffraction (XRD) and optically by UV-VIS spectrophotometer. SEM micrograph shows uniform deposition of thin film, XRD shows hexagonal structure and optical study shows wide band gap 3, 46 eV. These morphological, structural and optically study shows the film is useful for optoelectronic device applications.

Keyword: Thin Film; semiconductor; optical; ZnS semiconductor

UNDERSTANDING THE ENVIRONMENTAL DYNAMICS AND PLANKTON COMMUNITY COMPOSITION DURING THE MASSIVE OUTBREAK OF BIOLUMINESCENT NOCTILUCA SCINTILLANS (MYZOOA: DINOPHYCEAE) ALONG THE SOUTH-WEST COAST OF INDIA**HARITHA PRASAD^{1,2*}, JASMINE PURUSHOTHAMAN¹, AISHEE BHOWAL^{1,2}**¹**Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal**²**Department of Zoology, University of Calcutta, Kolkata, West Bengal**

An intense bloom of the heterotrophic dinoflagellate *Noctiluca scintillans* (Macartney) Kofoid & Swezy, 1921 (NS) was observed along the Udupi coast of Karnataka, southwest coast of India, during the post-monsoon season of 2021. The bloom was witnessed with an intense green discolouration of surface water, spread over an area of 5 km² along the coast. The peak abundance of NS cells was 3.9×10^5 cells/L with the maximum measured bioluminescence intensity of 2.21×10^5 mega photons cm⁻² s⁻¹. The photophobic response of zooplankton (mainly copepods) to the bioluminescent flashes might have facilitated the bloom development thereby reducing the grazing pressure. During peak bloom periods, the average abundance of microphytoplankton, microzooplankton (except dinoflagellates) and mesozooplankton groups was on the downturn. Microzooplankton groups observed in the bloom stations were dinoflagellates, ciliates, and metazoan larvae. The high abundance of *Noctiluca scintillans* in the coastal waters of Udupi and the associated grazing pressure on diatoms can be considered as the reason for relatively low abundance of diatoms in the bloom stations. Apart from NS, the major microzooplankton species in these bloom stations were dinoflagellates, namely, *Tripes furca*, *Dinophysis caudata*, *Tripes brevis*, *Tripes humilis*, *Tripes declinatus*, *Tripes massiliensis*, *Gonyaulax spinifera*, and *Tripes fusus*. The chlorophyll-*a* concentration increased during peak bloom (6.11 µg/L), coincident with the relatively high ammonia concentrations (4.46 µg/L) which can be attributed to the release of ammonium upon cell death. Elevated levels of ammonia can significantly disrupt the structure of the zooplankton community in the immediate vicinity as well as in adjacent areas. Furthermore, in the bloom stations, dissolved oxygen concentrations were relatively lower, primarily due to increased respiration and the decomposition of sinking detrital NS. Collectively, our incidental observation illustrates the ramifications of a dinoflagellate bloom capable of destabilizing the equilibrium of the pelagic ecosystem.

Keywords: *Noctiluca scintillans*; bloom; plankton dynamics; environmental drivers; Arabian Sea

CARBON FARMING: A MOVE TOWARDS SUSTAINABLE AGRICULTURE***HARSH A. KAMANI¹, SARYU TRIVEDI¹, V. S. RANPARIYA¹ AND HIMALAY R. PATEL¹**¹Assistant Professor, Department of Agriculture, Faculty of Sciences, Marwadi University, Rajkot, Gujarat, India

Carbon farming employs scientifically validated methods to mitigate carbon emissions while maintaining agricultural productivity, aiming for carbon neutrality in the agricultural sector to promote overall sustainability. In the context of pressing climate change concerns and the imperative for sustainable agriculture, carbon farming, or carbon-neutral agriculture, assumes critical importance. These practices encompass a variety of management techniques recognized for their ability to sequester carbon or reduce greenhouse gas (GHG) emissions. The Natural Resource Conservation Service (NRCS) has identified around thirty-five such practices, which not only enhance soil health and carbon sequestration but also yield additional benefits such as improved soil water retention, biodiversity, and resilience. Key carbon farming practices include minimizing tillage, reducing fertilizer application, incorporating companion crops, replacing fallow periods with cover crops, and enhancing water management on farms. Moreover, carbon farming advocates for sector-wide carbon footprint assessments to devise mitigation strategies, promoting the adoption of various agronomic and technological interventions for carbon sequestration. Aligning with global sustainability objectives, India has pledged to reduce GHG emissions as part of its 2030 sustainable development agenda. This necessitates concerted efforts to mitigate carbon footprints across all sectors, including agriculture, which historically has received less attention in emissions reduction due to political and social factors. Developing and implementing a robust strategy to address agricultural emissions is crucial. Providing financial incentives to farmers through mechanisms such as monetary support and carbon credits can play a pivotal role in encouraging the adoption of carbon-friendly practices. By prioritizing carbon farming initiatives, stakeholders can effectively combat agricultural emissions, significantly contributing to broader climate mitigation efforts while ensuring the resilience and sustainability of agricultural systems.

Key words: Carbon farming, Carbon foot printing, Carbon sequestration, Sustainable development goals (SDGs)**PERFORMANCE OF PEARL MILLET BASED INTERCROPPING SYSTEM WITH VARIED NITROGEN LEVELS*****HARSH A. KAMANI¹, L. K. ARVADIYA², SARYU TRIVEDI¹, V. S. RANPARIYA¹ AND HIMALAY R. PATEL¹**¹Assistant Professor, Department of Agriculture, Faculty of Sciences, Marwadi University, Rajkot, Gujarat, India²Associate Research Scientist, Department of Agronomy, N. M. Collage of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India

Field experiment was conducted during summer seasons of 2021 and 2022 at College Farm, Navsari Agricultural University, Navsari, Gujarat, India. The experiment was carried out with seven intercropping treatments viz., I₁ - sole pearl millet, I₂ - sole black gram, I₃ - sole cow pea, I₄ - pearl millet + black gram (paired 2:1), I₅ - pearl millet + cow pea (paired 2:1), I₆ - pearl millet + black gram (paired 3:2) and I₇ - pearl millet + cow pea (paired 3:2) and two nitrogen levels viz., N₁ - 100 % RDN and N₂ - 75 % RDN were evaluated in RBD with factorial concept with three replications. The pearl millet grain equivalent yield (PGEY) was recorded significantly higher under planting of pearl millet and intercrops in the proportion of 2:1 (paired row) than the rest intercropping systems. Similarly, application of 100 % RDN recorded higher values for PGEY. The higher land equivalent ratio (LER) was also recorded under 2:1 paired row intercropping system. After crop harvest, significantly the higher values of available N were observed in sole black gram and cow pea followed by 3:2 paired row intercropping systems. Similarly, 100 RDN recorded significantly higher available N. Economics of pearl millet based intercropping systems indicated that net return was the maximum under treatment combination of pearl millet + cow pea (2:1 paired row) and application of 100 % RDN (₹ 88316/ha) followed by pearl millet + black gram (2:1 paired row) and application of 100 % RDN (₹ 84493/ha). The lowest net return was recorded under treatment combination of pearl millet + black gram (3:2 paired row) and 75 % of RDN (₹ 57843/ha).

Key words: Intercropping, Pearl millet Grain Equivalent Yield (PGEY), Land Equivalent Ratio (LER), Net return**A JOURNEY FROM VISION TO FUNCTIONALITY: THE IOT-INTEGRATED REFRACTANCE WINDOW DRYER'S QUEST FOR SMART DRYING PERFECTION****HARSH DADHANEYA¹, PRABHAT K. NEMA^{1,*}**¹Department of Food Engineering, National Institute of Food Technology Entrepreneurship and Management, Kundli, Sonipat, Haryana, India

Background: The technique known as refractance window drying (RWD) has been recognized for its significant potential to dry commodities with higher quality at lower economic costs. This article outlines and describes an image of an RW dryer with Internet of Things (IoT) capabilities. This article has been created to serve as a blueprint for a future IoT based smart dryer. Scope and approach: To preserve the product's quality and nutrient profile, the RW dryer includes an IoT-enabled temperature monitoring and control system. When it comes to producing fruit leather, many producers and farmers prefer to use the tedious and unpredictable open sun drying method, which significantly affects the sample's nutritional profile. This RW dryer with IoT connectivity is a sustainable and eco-friendly method of drying fruits and vegetables while reducing nutritional loss. **Key findings:** IoT has transformed numerous sectors, and household appliances are no exception. One such invention is the IoT-based RW dryer, which aims to improve the effectiveness and user experience of conventional RW dryers. With increased energy efficiency, real-time monitoring, dynamic drying algorithms, and predictive maintenance, this smart dryer offers users with convenience, sustainability, and customized drying solutions.

Keywords: Refractance Window Drying (RWD); Internet of Things (IoT); IoT-integrated IR-assisted RWD; fruit leather.

HORTICULTURE IN SPACE EXPLORATION**HARSH SAINI*, DOLLY SAINI AND TEJENDRA KUMAR****Department of Horticulture, R.S.M. (P.G.) College Dhampur, Bijnor (U.P)**

The integration of horticulture into space exploration represents a critical advancement for sustaining long-term human presence beyond Earth. This abstract explores the multifaceted role of horticulture in supporting astronauts' physical and psychological health, providing fresh food, recycling waste and contributing to life support systems. Key areas of focus include the development of plant growth systems adaptable to microgravity and other extraterrestrial environments, the selection of plant species with high nutritional value and resilience, and the optimization of resource use, such as water and light. Advances in controlled environment agriculture (CEA) technologies, including hydroponics, aeroponics, and bioregenerative life support systems (BLSS), are essential for creating efficient and sustainable plant growth habitats. The research also addresses the challenges of growing plants in confined spaces and limited resource availability. Successful horticultural systems will enhance food security, reduce reliance on Earth-based resupply missions, and promote psychological well-being by providing a connection to nature. By integrating horticulture into the broader context of space exploration, this research contributes to the feasibility of long-duration missions to the Moon, Mars and beyond, ultimately supporting the vision of human settlement in space.

Keywords: Space horticulture, Controlled environment agriculture (CEA), Microgravity plant growth, Bioregenerative life support systems (BLSS) and Aeroponics

HEAVY METAL CONCENTRATION IN DIFFERENT TISSUES OF COMMERCIALY IMPORTANT FINFISHES EXPLOITED AT COASTAL REGIONS OF MANGALURU, KARNATAKA, INDIA**HARSHA NAYAK*, SRUTHISREE C², MANJAPPA N³, HARISH BD⁴, RAJANNA KB⁵ AND CHETHAN N⁶**^{1,3}**Fisheries Research and Information Centre (I), Hesaraghatta, KVAFSU, Bengaluru**²**Zonal Agricultural and Horticultural Research Station, KSNUAHS, Shivamogga**⁴**Dept of Fisheries Hydrography, Babasaheb Sawant Konkan Krishi Vidyapeeth Ratnagiri**^{5,6}**Fisheries Research and Information Centre (I), Hebbal, KVAFSU, Bengaluru**

Heavy metals are toxic metals and above a normal level can affect the quality, safety and marketability of seafood. Heavy metals occur naturally in the marine environment as well as it is considered as a major anthropogenic contaminant in coastal and marine environments worldwide. They pose a serious threat to human health, living organisms and natural ecosystems because of their toxicity, persistence and bioaccumulation characteristics. It can contribute to degradation of marine ecosystems by reducing species diversity and abundance by accumulating of metals in living organisms through food chains. Mangalore and Malpe are the two major fishing harbours, which account for more than 65% of the total fish catch in Karnataka. Commercially important fish populations live in coastal area that contains high levels of heavy metals from industrial and agricultural wastes or human activities. Marine fishes are highly vulnerable to chemical contaminants including heavy metals some of them bioaccumulate and biomagnifies along the aquatic food chain. In the present study, accumulation levels of iron, nickel, copper, zinc, cadmium, lead and arsenic were determined in different tissues of finfishes exploited at coastal region of Mangalore. The concentration of heavy metals such as Fe, Ni, Cu, Zn, Pb, Cd and As in different tissues of fishes varied from 0.02360-1.15124, 0.00011-0.03291, 0.00024-0.42977, 0.00117-0.16447, 0.00040-0.19445, 0.00001-0.00180 and 0.00016-0.04943 µg/g respectively. The observed concentrations of heavy metals were found to be within the permissible limit.

Key words: Heavy metal, Finfishes, Coastal region

ORGANIC AND NATURAL ECOFRIENDLY FARMING**HARSHADA R. GALANDE^{1*}, MANISHA A. KHARAT² AND NEHA M. AROLKAR³**^{1,2,3}**Ph.D. Scholar, College of Agriculture, V.N.M.K.V., Parbhani**

Organic farming is considered as an ecologically, socially and economically viable agricultural production system. Organic farming as a alternative farming system try to mimic ecological processes while minimizing external inputs are often suggested as more sustainable forms of food production. Organic and natural ecofriendly farming as a production system which avoids or largely excludes the use of synthetic inorganic inputs such as fertilizers, pesticides, hormones, livestock feed additives and to the largely rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection. Organic and natural ecofriendly farming includes the concept that the soil, plant, animals and humans are linked. There are four main pillars of organic and natural ecofriendly farming i.e. organic threshold standards, reliable mechanisms regarding certification and regulatory affairs, technology packages and efficient and feasible market network. Organic and natural ecofriendly farming works on the basis of four main principles of organic production i.e. the principle of health, the principle of ecology, the principle of fairness and the principle of care. There are different components are included in organic and natural ecofriendly farming i.e. crop and soil management, compost, on-farm waste recycling, crop diversification, soil solarization, non-chemical weed management, bio-manures, botanical pesticides and biofertilizers. The prolonged and over usage of chemicals has however resulted in human and soil health hazards along with environmental pollution. The key characteristics of organic and natural ecofriendly farming is include protecting the long term soil fertility and minimizes the chemical residues from soil, and provide highly nutritious and chemical free produce.

Keywords: Organic farming, Ecofriendly, soil fertility, biofertilizers.

ORGANIC AND NATURAL ECOFRIENDLY FARMING**HARSHADA R. GALANDE^{1*}, MANISHA A. KHARAT² AND NEHA M. AROLKAR³**^{1,2,3}**Ph.D. Scholar, College of Agriculture, V.N.M.K.V., Parbhani**

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Keywords: Organic farming, Ecofriendly, soil fertility, biofertilizers.**ROBOTIC, DRONE AND DIGITAL AGRICULTURE TECHNOLOGY****HARSHIT KUMAR****Ph.D. Research Scholar, Department of Horticulture, Rajasthan College of Agriculture, MPUAT Udaipur, Rajasthan**

Robotic, drone and digital agriculture technologies revolutionize farming through automation, data analytics and precision techniques. Robots autonomously perform tasks like planting, weeding and harvesting, reducing labour and chemical inputs. Drones capture aerial imagery for crop monitoring, enabling farmers to make data-driven decisions on nutrient management and pest control. Digital agriculture tools integrate data from various sources, such as soil sensors and weather forecasts, to optimize farming practices. By harnessing these technologies, farmers can increase efficiency, maximize yields and minimize environmental impact. Robotic, drone and digital agriculture represent transformative approaches to sustainable and productive farming in the modern era, meeting the challenges of feeding a growing global population while conserving natural resources.

Keywords: Revolutionize, Drone, Precision Techniques, Autonomously, Aerial imagery, Digital agriculture, harnessing, Transformative approach, Sustainable etc.**IMPORTANCE OF PRESERVING REGIONAL BIODIVERSITY OF JAMUN (*SYZYGIUM CUMINI*)****HARSHITA MALI****Ph.D. Research Scholar, Department of Horticulture, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology- Udaipur (Rajasthan, India- 313001)**

In the rich tapestry of Indian regional biodiversity, the *jamun* fruit (*Syzygium cumini*) stands as a testament to the country's natural abundance. Nutritionally, *jamun* is a powerhouse, rich in antioxidants, vitamins, and minerals. Its consumption offers numerous health benefits, including improved digestion, enhanced immunity, and management of chronic conditions like diabetes. As a fruit crop mainly growing in wild, *jamun* contributes to livelihood to countless indigenous communities all over India, who collects forest products as a primary source of income. Moreover, *jamun*'s diverse genetic variations harbour immense potential for agricultural innovation and resilience. Its organised cultivation can create employment opportunities, ranging from farming to processing and marketing, thus fostering economic growth and stability. However, rapid urbanization, unchecked deforestation, and monoculture farming practices pose threats to the natural habitats of *jamun* trees. Preserving existing biodiversity is thus crucial for developing new varieties that are disease-resistant, climate-resilient, and high as well as early yielding. Conservation initiatives must prioritize the protection of native habitats, promote sustainable agricultural practices, and raise awareness about the importance of preserving indigenous crops. In conclusion, the preservation of *jamun* biodiversity is not merely an environmental imperative but also a socioeconomic necessity. By nurturing this invaluable resource, we can bolster agricultural resilience, alleviate poverty, and enhance the nutritional well-being of people, thus paving the way for a healthier, prosperous and sustainable future.

Keywords: biodiversity, conservation, jamun, resilience & sustainable

MANAGEMENT OF FENNEL APHID, *HYADAPHIS CORIANDRI* (DAS) WITH BIOPESTICIDES**HEERA KUMARI*, S.K. KHINCHI, SHEETAL KUMAWAT****Department of Agricultural Entomology, S.K.N. College of Agriculture, Jobner, Rajasthan**

A field experiment on the relative efficacy of botanical and biopesticides against aphid *Hyadaphis coriandri* (Das) on fennel was conducted in 2021-22. The results revealed that azadirachtin 0.03 EC proved most effective, followed by NSKE (5%) and Neem oil (1%), whereas, *Metarhizium anisopliae* 1.15 WP, *Beauveria bassiana* 1.15 WP and *Leacanicillium lecani* 1.15 WP were proved least effective. The treatment of Karanj oil (1%) and karanj seed extracts (5%) were found moderately effective against aphid. The maximum net profit of Rs. 42150 was obtained with azadirachtin 0.03 EC followed by NSKE 5% (Rs.33737) and Neem oil 1% (Rs. 32590). The minimum net profit of Rs.18995 was observed in plots treated with *L. lecanii* 1.15 WP followed by *B. bassiana* 1.15 WP (Rs. 20408), *M. anisopliae* 1.15 WP (Rs. 21822), Karanj oil (Rs. 24998) and KSE (Rs. 25891).

Key words: *Hyadaphis coriandri*, fennel, biopesticides, azadirachtin, Karanj oil, karanj seed extracts

SPIRULINA: CONCEPTUALIZATION, DEVELOPMENT, AND PRACTICAL APPLICATIONS IN FOOD INDUSTRY: A REVIEW**HEMA DEUPA¹, PRIYANKA SHANKAR²****¹Department of Food & Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University, Vidya Vihar, Raebareli Road, Lucknow, India****²Department of Human Development & Family Studies, School of Home Science, Babasaheb Bhimrao Ambedkar University, Vidya Vihar, Raebareli Road, Lucknow, India**

Spirulina is the most nutritious and concentrated food which is well known for its antioxidants (catalase, superoxide dismutase, glutathione peroxidase, Vitamin C and E), phytonutrients (including total phenol, flavonoids, and tannin), probiotics, and nutraceutical properties. The amino acid composition of spirulina protein ranks among the highest in the plant-based products, surpassing even soyabean in quality. The present review focuses on the potential application of spirulina within the food industry and emphasizes the need for successful commercialization. The methodology includes the development and application of Spirulina based-fortified food products, with major emphasizes on richness of nutrient, bioactive components, therapeutic properties in the food circuits, and versatile utilization in various food supplements, underscoring its potential to enhance the nutritional value of a wide range of products. Hence, Spirulina can be considered to be a promising alternative to conventional food sources, offering a viable solution to feed the future world and fight against hunger and malnutrition.

Keywords: Spirulina, Protein, Antioxidant, Superfood, Nutraceutical

PHYTOCHEMICAL SCREENING AND *IN VITRO* THROMBOLYTIC ACTIVITY OF HONEY OF INDIAN STINGLESS HONEYBEE *TETRAGONULA IRIDIPENNIS***HEMANT B. ZOPE, DIPALI G. WANKHADE, MANOJKUMAR Z. CHOPDA, NAMRATA G. MAHAJAN AND DEVESHRI S. SONAWANE*****Department of Zoology, M. J. College (Autonomous), Jalgaon, (M.S.) India.**

Atherothrombosis is the main cause of cardiovascular diseases. Cardiovascular diseases (CVDs) take the lives of 17.7 million people every year, 31% of all global deaths due to the Heart attacks and strokes caused by a vessel blockage by thrombus. Thrombolytic drugs are available in market, however, they cause some side effects and expensive. Recently, Meliponiculture in India has become popular because the honey has a unique taste, a mix of sweet, sour and bitter which is highly valued. Therefore, present research work carried out to investigate the phytochemical compositions of stingless bee honey and to evaluate *In vitro* thrombolytic activity of honey of stingless honeybee (*Tetragonulairidipennis*) using plasma clot method. Clot lysis is check at two concentrations of honey against the artificially prepared plasma clot. Streptokinase used as standard and sterilized distilled water used as control. The percentage of clot lysis was analysed by computing the difference between weights of clot. The test honey at concentration 1ml / 10ml and 1ml / 5ml showed $9.958 \pm 0.860\%$ and $4.397 \pm 0.452\%$ clot lysis respectively. Our findings showed that stingless bee honey contains varied phytochemicals – tannins, alkaloids, flavonoids, terpenoids, carotenoids, coumarins, saponins. The stingless bee honey has the potential to dissolve clot, therefore, it is urgent need to isolate the active molecule which is therapeutically beneficial in future use.

Keywords: Thrombosis, Stingless honeybee, *Tetragonula iridipennis*, Photochemical, Thrombolytic activity.

SUSTAINABLE AGRI-BUSINESS DEVELOPMENT AND FOOD MARKETING MANAGEMENT - OPPORTUNITIES & CHALLENGES IN INDIA**HEMANT KUMAR LAMBA^{*1}, HARISINGH², KAVITA NITHARWAL³, SURENDAR RUNDLA⁴ AND SUNIL CHOUDHARY⁵**¹Ph.D, Research Scholar, Department of Ag. Economics & Management, RCA, MPUAT, Udaipur (RAJ.)²Associate Professor, Department of Agricultural Economics & management, MPUAT, Udaipur (Raj.)^{3&4}Ph.D. Scholar, Department of Ag. Economics, RVSKVV, Gwalior, (MP.)⁵M.Sc. Student, Department of Ag. Economics & Management, RCA, MPUAT Udaipur (RAJ.)

A well-organized and efficient marketing system plays a vital role in the economic growth of a nation. In addition to facilitating the safe and orderly disposal of the produce, an effective marketing system serves as a catalyst to encourage higher production in terms of incentive prices. The great bulk of people reside in rural areas. Approximately 56% of the population works in agriculture, which accounts for 18% of the country's income, hence agriculture and rural prosperity, are closely related. Farm earnings must be maximized by diversification through integrated crop, livestock, fishery, and horticulture operations in order to usher in rural wealth. This requires a well-organized system of marketing for these commodities. Thus, there are five major agri-business segments, namely, input manufacturers, input suppliers, integrated agri-business, market intermediaries, food processors and marketers. Agribusiness is seen as having a significant impact on enhancing product quality, accessibility, etc. In order to take advantage of the potential presented by the liberalized global market, we should prepare for a marketing revolution with all of its rainbow hues, following the "Green Revolution," which guaranteed plentiful production and food security in India. This would ensure a fair price to the farmer and availability of qualitative products to the consumer at reasonable prices. The whole gamut of agri-business is under scrutiny, since changes are swift, a serious thought on the question of meeting the challenges sustaining of the transformation is the need of the hour.

Keywords: Agribusiness, Sustainable Agriculture, Food chains, Marketing Management.**ECOLOGICAL IMPACT OF HEAVY METALS ON AQUATIC ENVIRONMENT WITH REFERENCE TO AQUATIC LIFE HUMAN HEALTH****HEMANT KUMAR SHARMA AND ARUN KUMAR SINGH****School of Education, Jaipur National University, Jaipur, Rajasthan, India**

In the industrialization era, pollution has deteriorated the quality and diversity of aquatic life. Industries discharge their waste containing heavy metals into the water bodies. Heavy metals have a high density that is harmful even in low quantity. These metals enter aquatic habitats through various sources, home effluents, including industrial waste, atmospheric sources and other metal-based businesses as well as E-Waste. These heavy metals accumulate in different organs of the fish causing mortality. This effect first appears in blood and affects the fish by alteration of blood components making the fish weak, anemic and vulnerable to diseases. Heavy metal pollution is responsible for degenerating aquatic species, creating physical abnormalities in creatures and contaminating the aquatic environment. These poisonous heavy metals cause a variety of fish ailments like decrease in hatching rate, teratogenesis and bioaccumulation in the tissues etc. The contamination of heavy metals in aquatic bodies and ecosystems has a significant influence on the food chain. Because fish people consume fish, it has an indirect impact on their health. These heavy metals also have a higher impact on the environment because they remain for longer periods and have bio-accumulative capabilities, leading water health to deteriorate. This study offers insight into the disruption of fish and human physiology, their reproductive ability by heavy metals. This review provides baseline data on the heavy metals and aquatic environment, especially fish and human health. The data will increase sensitivity to preventing and managing aquatic environmental pollution, particularly heavy metal contamination.

Keywords: Aquatic environmental pollution, Bio-accumulative, Fish physiology, Heavy metal, Human health.**BLENDED LEARNING: A NEW TREND IN EDUCATION****HEMANT KUMAR SHARMA AND REKHA SHARMA*****School of Education, Jaipur National University, Jaipur, Rajasthan, India****Department of Education, S. S. G. Pareek P.G. College, Jaipur, Rajasthan, India***

This study addressed several outcomes, implications, and possible future directions for blended learning (BL) in higher education in a world where information communication technologies (ICTs) increasingly communicate with each other. In considering effectiveness, the authors contend that blended learning (BL) coalesces around access, success, and students' perception of their learning environments. Success and withdrawal rates for face-to-face and online courses are compared to those for BL as they interact with minority status. Blended learning (BL) is an innovative concept that embraces the advantages of both traditional teaching in the classroom and ICT supported learning including both offline learning and online learning. It has scope for collaborative learning; constructive learning and computer assisted learning (CAI). Blended learning (BL) needs rigorous efforts, right attitude, handsome budget and highly motivated teachers and students for its successful implementation. As it incorporates diverse modes so it is complex and organizing it is a difficult task. The present paper discusses the concept of blended learning (BL), its main features and prerequisite of its implementation. Scope of blended learning in Indian educational system is also discussed. The present paper also tries to explain that how blended learning (BL) is an approach that needs to be adopted.

Keywords: Blended Learning (BL), ICT Supported Teaching Learning Process, Traditional Teaching Learning Process, and Computer Assisted Learning, Online Learning.

RESPONSE OF DIFFERENT CULTIVARS OF BLACK RICE TO INTEGRATED WEED MANAGEMENT UNDER NAGALAND CONDITIONS**HILLEL M CHISHI^{1*}, DEBIKA NONGMAITHEM¹, LENMEM YOSUNG², PAARDENSHA IVY CHINIR³ TAKHELMAYUM MALEMNGANBI⁴**^{1*,1,2&4}**Department of Agronomy, School of Agricultural Sciences, Nagaland University, Medziphema**³**Department of Soil and Water conservation, School of Agricultural Sciences, Nagaland University, Medziphema**

Proliferation of weeds in the rice field is posing significant challenges, adversely impacting the growth and productivity of a rice crop. Moreover, Black rice in comparison with other rice in upland condition are more susceptible to weed infestation resulting in huge reduction in crop yield. A field experiment was conducted to study the “Response of different cultivars of black rice to integrated weed management under Nagaland conditions” at the experimental farm of School of Agricultural Sciences (SAS), Nagaland University, Medziphema campus during *kharif* season of 2021 and 2022. The experiment was laid out in split plot design with four integrated weed management viz. W₁- Weedy check (Control), W₂- Hand weeding (15 and 30 DAS), W₃- Pretilachlor @ 1.0 kg ha⁻¹ (PE) fb HW at 40 DAS and W₄- Pretilachlor @ 1.0 kg ha⁻¹ (PE) + Bispyribac sodium @ 25g ha⁻¹ (PoE) at 20 DAS in the main plots while four cultivars viz. C₁- Chakhao Poiraiton, C₂- Chakhao Amubi, C₃- Wairi Chakhao and C₄- Khurukhul Chakhao in the sub-plots which were replicated thrice. Based on the findings from the two years of experiment it was found that among the weed management treatments hand weeding at 15 and 30 DAS recorded highest growth, yield attributes and yield which was followed by pretilachlor @ 1.0 kg ha⁻¹ (PE) fb HW at 40 DAS while among the cultivars Chakhao Poiraiton followed by Chakhao Amubi recorded highest growth, yield attributes as well as yield. Additionally, highest B:C ratio was recorded with pretilachlor @ 1.0 kg ha⁻¹ (PE) fb HW at 40 DAS along the cultivar Chakhao Poiraiton.

Keywords: Black rice, Chakhao Poiraiton, cultivars, pretilachlor, weeding, yield.**ACCELERATING THE CROP BREEDING CYCLES: A SPOTLIGHT ON SPEED BREEDING*****HIMALAY R. PATEL¹, V. S. RANPARIYA¹, SARYU TRIVEDI¹, HARSH A. KAMANI¹ AND KANTHA D. ARUNCHALAM²**¹**Assistant Professor and ²Dean, Department of Agriculture, Faculty of Sciences, Marwadi University, Rajkot, Gujarat, India**

Crop breeding plays a pivotal role in addressing global challenges such as food security, climate change adaptation, and sustainable agriculture. However, traditional breeding methods often encounter limitations in terms of time, resources, and responsiveness to rapidly changing environmental conditions. In response to these challenges, the concept of “speed breeding” has emerged as a promising approach to expedite the breeding process and enable the development of improved crop varieties at a much faster pace. Speed breeding is a novel technique that utilizes controlled environments, optimized growth conditions, and accelerated breeding cycles to significantly shorten the time required for generation turnover in plants. By manipulating factors such as photoperiod, temperature, and nutrient availability, speed breeding facilitates rapid growth and development, allowing multiple generations of plants to be grown in a single year. This accelerated breeding cycle enables breeders to quickly select for desired traits, such as yield, disease resistance, and stress tolerance, leading to the rapid development of new crop varieties with enhanced agronomic traits. Furthermore, speed breeding has the potential to revolutionize the field of plant breeding by expediting the delivery of genetic gains to farmers and addressing urgent agricultural challenges, such as the need for climate-resilient crops and the mitigation of yield losses due to pests and diseases. This review will provide an overview of the principles and methodologies of speed breeding, highlighting its potential applications in crop improvement programs. By harnessing the power of speed breeding, we can unlock new opportunities for sustainable agriculture and ensure the continued resilience and productivity of global food systems in the face of emerging challenges.

Key words: Accelerated Breeding, Controlled Environment, Speed Breeding, Controlled Environment Agriculture**SPECIES STRUCTURE AND COMPOSITION OF TROPICAL DRY DECIDUOUS FOREST ALONG THE TOPOGRAPHY****HIMANSHU KHANDEKAR*, S. P. VISHWAKARMA, ROSHANI PRADHAN****Dept. of Forest products and utilization, College of forestry and research station Sankara,****Mahatma Gandhi University of Horticulture and Forestry, Durg, (C. G.)**

The present research entitled “Species Structure and Composition of tropical Dry Deciduous Forest along the topography” was as conducted at Belgahna Forest Range of Bilaspur Forest Division of Chhattisgarh in the year 2022-2023. Based on the repeated reconnaissance of the area, three sites identified as hill top, Mid slope, Hill base along topography and representative of the region’s vegetation were selected for detailed study. A plot of 100 m x 100 m area visually representative of the overall vegetations was selected and marked on each site for the periodical study. The forest vegetation on each stand was analyzed by placing 10 randomly placed quadrats (each 10 x 10 m in size) within the representative 1 ha area. The sum total of 21 genus and 22 plants species comprised of 17 families encountered at different study sites. Tree density ranged from 150-460 stems ha⁻¹. Total tree basal cover ranged from 8.92 to 24.90 m² ha⁻¹. Species diversity was higher on site-1 as compared to site-2 and site-3. The most dominant tree species was *Shorea robusta*, co-dominated by *Diospyros melanoxylon*. Second layer was dominated by *Tectona grandis* followed by *Diospyros melanoxylon*. In ground storey vegetation was dominated by *Diospyros melanoxylon* followed by *Tectona grandis*. Shannon diversity index of diversity ranged from 1.83-2.74. Equitability (e) ranged from 1.10 to 1.32, species richness ranged from 1.37-3.42, concentration of dominance (Simpson index) varied from 0.25- 0.32. Beta diversity values of trees ranged from 3.33 to 5, for sapling it ranged from 4.44 to 5.71.

Keywords: Topography, Diversity, Dominance, Basal cover, IVI.

PRECISION PLANT DISEASE MANAGEMENT**HIMANSHU KUMAR GUPTA¹, RAJNEESH KUMAR AWASTHI¹, GANESH KUMAR², AND NIRAJ KUMAR PRAJAPATI³**^{1,2}Dept. of Plant Pathology, Post Graduate college, Ghazipur, (U.P.) – 233001²Dept. of Agri. Chemistry & Soil science, Post graduate college Ghazipur, (U.P.) – 233001³Dept. of Horticulture, SAST, Babasaheb Bhimrao Ambedkar University, Lucknow, (U.P.) –

As the global population continues to grow, the demand for sustainable and efficient agricultural practices has become increasingly pressing. One innovative approach that has gained significant attention in recent years is precision plant disease management. At the core of this concept is the integration of advanced technologies, such as sensors, drones, and machine learning algorithms, to optimize the detection, diagnosis, and treatment of plant diseases. By leveraging these tools, farmers and agronomists can now access a wealth of real-time data that allows them to respond to threats with unprecedented precision and effectiveness. Key to this approach is the ability to identify disease outbreaks early, often before visible symptoms appear. Through the use of hyperspectral imaging and other sensor-based technologies, growers can detect the biochemical and physiological changes indicative of disease long before they become apparent to the naked eye. This early warning system enables rapid intervention, minimizing the spread of the disease and reducing crop losses. Moreover, precision plant disease management relies on the integration of various data sources, including weather patterns, soil conditions, and historical disease records. By analysing these multifaceted data sets, researchers can develop predictive models that help guide targeted disease management strategies, such as the application of precise amounts of fungicides or the implementation of tailored crop rotation schedules. As the global agricultural landscape continues to evolve, the adoption of precision plant disease management stands as a promising pathway towards ensuring food security, improving environmental sustainability, and enhancing the overall resilience of our food production systems.

Keywords: Sensor technology, Hyperspectral imaging, Predictive modelling, Data integration, Targeted interventions.

DETERMINATION OF ASSOCIATION OF YIELD COMPONENTS BY PATH ANALYSIS IN TOMATO (*SOLANUM LYCOPERSICUM* L.)**HIMANSHU SINGH¹, G.C. YADAV², HAREESH KUMAR MAURYA², BRIJESH KUMAR MARUYA³, NIHARIKA SINGH⁴ AND VIKAS PATEL⁴**¹Research Scholar, Department of Vegetable Science, College of Horticulture, Banda University of Agriculture and Technology²Professor, School of Agricultural Sciences and Technology, Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh³Research Scholar, Department of Vegetable Science, College of Horticulture, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, (U.P.)⁴Research Scholar, Department of Vegetable Science, College of Horticulture and Forestry, ANDU&T Kumarganj Ayodhya

The present investigation was conducted in Randomized Block Design with 38 genotypes (including three checks) of tomato in three replications for thirteen quantitative traits. The present experiment was conducted at Main Experiment Station of Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Ayodhya (U.P.) during Rabi 2019- 20. The objectives were to assess the path analysis for fruit yield and yield contributing characters. Path coefficient analysis indicated that highest positive direct effect on fruit yield per plant was exerted by average fruit weight followed by marketable fruit yield per plant, number of fruits per plant, total soluble solids, number of fruits per cluster, plant height and locules per fruit. These traits may be given more emphasis for direct selection of high yielding tomato genotypes in future breeding programmes.

Keywords: Path, tomato, genotypes

RAINBOW TROUT REALMS: EXPLORING THE PRODUCTION SPECTRUM, PRESERVATION CHALLENGES, AND FUTURE PROSPECTS**Hishani Kumari, Kushal Thakur, Danish Mahajan and Rakesh Kumar*****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, India**

The cold-water fin fish known as rainbow trout is becoming more and more popular in aquaculture because of its distinct biological traits, advantageous nutritional profile, as well as high economical value. Trout farming is made possible by the cold-water resources, which also add to the sport's recreational and commercial appeal. Nevertheless, there are obstacles facing the rainbow trout business, including market accessibility, disease outbreaks, habitat deterioration, and environmental issues. To overcome these issues, conservation initiatives, strict laws, sustainable agricultural methods, and innovative technology are required. The sustainability of rainbow trout farming in the long run depends on cooperation between scientists, farmers, and regulatory agencies while protecting natural ecosystems. Because of advancements in aquaculture methods, adoption of sustainable practices, and appreciation of the trout's importance to local businesses and tourism, rainbow trout farming has a bright future. The growing health consciousness and environmental consciousness among consumers is projected to drive up demand for quality seafood alternatives such as rainbow trout. The continued development of trout farming has the potential to make a substantial contribution to local livelihoods as well as the global food economy.

Keywords: Rainbow trout, Conservation, Production, innovative Techniques, Challenges, prospects, Indian Himalayan Region

EVALUATION OF THE GROWTH AND NUTRITIONAL PARAMETER OF BRINJAL (*SOLANUM MELONGENA* L.) GROWN IN BOTH NATURAL AND CONVENTIONAL FARMING SYSTEMS

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The experiment was carried out at the Vegetable Research Centre, GBPUAT, Pantnagar, Uttarakhand, during the kharif season of 2022–2023 to determine which cultivars are suitable for use in sustainable farming. Similar to organic farming, natural farming is an agricultural method that benefits the environment and is becoming more and more popular among farmers. The main objective of this research is to compare cultivars developed under conventional and natural farming. Therefore, in order to conduct research that would raise productivity, it is necessary to improve the various traits and combining ability of the varieties. Ten genetically distinct parents of brinjal were selected, three were used as testers and the remaining seven as lines. These parents were assessed using the line × tester design and put in a randomized block design with three replications. The parents transitioned in 2022 between September and November. Consequently, after crossing, twenty-one F₁ hybrids were produced. These hybrids and their ten parents were examined in the forthcoming 2023 kharif season. The observation on growth and nutritional parameters *i.e.*, plant height, number of branches, TSS and Phenol content. The result state that in RDF, PB-416 × Kashi Uttam, PB-416 × PB-414 were found superior whereas and in Natural farming Pant Rituraj, PB-405, PB-416 × Pant Rituraj, PB-146 × Kashi Uttam were superior in terms of nutritional parameter.

Keywords: Conventional farming, Natural farming, nutritional parameters

IMPACT OF NEP IN AGRICULTURAL EDUCATION

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The implementation of the New Education Policy (NEP) of 2020 has brought about significant transformations in agricultural education within India. NEP-2020 aims to revolutionize the sector by aligning it with global standards and addressing contemporary challenges. One notable impact is the introduction of Academic Credit Banks, facilitating the recognition and transfer of academic credits among students, thereby enhancing flexibility in course selection and promoting inclusivity. Additionally, NEP-2020 advocates for diversified degree programs in agricultural universities, offering various entry and exit points for students to earn certificates, diplomas, or degrees based on their educational achievements. This approach accommodates learners with diverse aspirations and backgrounds, fostering a more inclusive educational environment. Experiential learning has gained prominence under NEP-2020, emphasizing practical training, internships, and hands-on coursework alongside theoretical instruction. This approach equips students with practical skills applicable to real-world agricultural practices, enhancing their overall understanding of the subject matter. Moreover, NEP-2020 emphasizes the integration of technology in agricultural education, promoting the use of digital tools, online platforms, and agricultural innovations to enhance teaching and research capabilities. This integration prepares students for the technological advancements shaping modern agriculture and enhances the quality of education and research collaboration. Furthermore, the policy addresses multidisciplinary challenges by incorporating elements of humanities and social sciences into agricultural education. This interdisciplinary approach fosters a comprehensive understanding of agricultural issues, including socio-economic factors, policy implications, and environmental sustainability. In summary, the impact of NEP-2020 on agricultural education is profound, aiming to produce skilled professionals equipped to address the evolving challenges and opportunities in the agricultural sector. Through innovative initiatives and holistic approaches, NEP-2020 seeks to elevate the standard and relevance of agricultural education in India, ultimately contributing to the advancement of the agricultural sector and the nation's overall development.

Keywords: NEP, Agricultural education, New Education Policy, Digital tools

FOOD PROCESSING AND VALUE ADDITION

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Food processing and value addition are critical components of the food supply chain that enhance the quality, safety, shelf-life and nutritional value of food products. Food processing encompasses a range of techniques and methods employed to transform raw agricultural products into consumable food items. These processes include cleaning, sorting, grading, milling, cooking, freezing, drying, packaging and preservation. Each step in the processing chain adds value to the food product by improving its sensory attributes, nutritional content, and marketability. Value addition in the context of food processing refers to the enhancement of a food product's value through the incorporation of additional ingredients, flavors, nutrients or functional properties. Value-added food products often command higher prices in the market due to their perceived quality, convenience, and unique characteristics. Examples of value-added food products include fortified cereals, flavored beverages, pre-packaged meals and functional foods enriched with vitamins, minerals, or probiotics. Producers benefit from food processing and value addition through increased market opportunities, extended product shelf-life, and reduced food waste. Value-added products allow farmers and food manufacturers to capture higher margins and differentiate their offerings in competitive markets. Additionally, processing and value addition can help mitigate post-harvest losses and improve overall food security by making seasonal

crops available year-round. The food industry benefits from food processing and value addition by driving innovation, promoting economic growth, and meeting evolving consumer demands. Value-added products stimulate economic development in rural areas by creating employment opportunities, supporting small-scale producers, and fostering entrepreneurship. In conclusion, food processing and value addition play a crucial role in ensuring food safety, quality, and accessibility while driving economic development and innovation within the food industry. Embracing sustainable processing practices and value-added innovations can help address global food security challenges, promote inclusive growth, and improve overall nutrition and well-being.

A REVIEW OF SUSTAINABLE BIOFUEL PRODUCTION PATHWAYS: FROM FEEDSTOCK CULTIVATION TO CONVERSION TECHNOLOGIES

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The lesser production of biofuels, results in over-reliance on finite fossil fuels resources, higher greenhouse gas emissions, and such other forms of environmental degradation. It exacerbates energy insecurity, geographical instability, and economic depression. Without an alternative, global energy production would stretch our local ecosystems, warm temperatures, and limit energy production and consumption. Therefore, sustainable biofuels should be produced to combat climate change, fossil fuel dependency and promote environmental sustainability. Clean, renewable feedstock utilization sustainable biofuels that minimize land-use impacts, and enhanced utilization of the energy-process manufacturing process sum up to be uniform and assured clean energy delivered. Biofuel production pathways in which renewable biomass is utilized are a practical substitute to fossil fuels. They are great for the future as each provides a significant reduction in greenhouse gas emissions and several other benefits. Remorse, due to growing environmental fishermen, the world biofuel production pathways have become more popular and efficient in reducing greenhouse gas emissions and increasing self-regulation sources. The urgency of sustainable biofuel production emanates from several environmental, social, and economic challenges. Notably, the traditional procedures lead to substantial land-use changes, deforestation, water use, and competition with food crops. This scenario results in environmental degradation, land use conflicts, and food scarcity and thus carbon neutrality doubted due to indirect land use changes and emissions from processing. There is an urgent need to adopt sustainable pathways that focus on environmental degradation reduction, conservation of natural resources, and socio-economic development. This review paper assesses the various stages of sustainable biofuel production, including feedstock cultivation, harvesting, preprocessing, conversion technologies, and end-use. It identifies the challenges and opportunities of each stage and recommendations on various ways to improve the sustainability of the entire biofuel production process and to summarize the existing information about sustainable biofuel production processes and highlight key challenges, technological developments, and expectations.

Key words: Biofuel, Eco-friendly, Green energy, Renewable source, Environmental sustainability

MOLECULAR IDENTIFICATION OF APHID SPECIES AFFECTING SOME LEGUME CROP OF WEST BENGAL

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Leguminous crops are well known for their unique nitrogen fixing ability, soil improving ability, and a high-quality protein source. In crop rotation systems, the small-seeded legumes provide nitrogen to subsequent crops and are significant forage crops for grazing animals. Cowpea, Chickpea, Field pea and Ground nut are most beneficial and protein rich legume crop in the Leguminosae family. Cow pea has a high protein content (28%) and termed as rich man's vegetable and a poor man's meat crop, being high in protein (24–29%) and oil (45–50%), the kernels of the groundnut are also a good source of several vitamins. Protein content in field pea (21–23%) and Chickpea (19–20%). Sap-sucking insects such as aphids cause significant yield losses in these legume crops by draining plant nutrients, hindering their growth, development and production, as well as vectoring viruses such as Groundnut rosette virus, aphid-borne mosaic virus and many more. Having a complex life cycle with distinctive morphology and social behavior Aphids have created a obligatory relationships with bacterial endosymbiont. This insect group is fascinating for further research for all these reasons. Based solely on morphological identification, the intra-ordinal relationships and strain identification among aphid species are quite difficult and highly challenging. On the other hand, information provided by advanced molecular data has resolved such problems. In this study, Aphid sample were collected from different location of west Bengal. By using Cetyl Trimethyl Ammonium Bromide method DNA was extracted from Aphid sample, then amplification was done using polymerase chain reaction with Mitochondrial Cytochrome Oxydase I gene specific primers. For further molecular research of Aphids, a fragment sized 658 bp of the Mitochondrial Cytochrome Oxydase I gene was sequenced using the Sanger sequencing method. It is confirmed that the species were *Aphis craccivora* by the BLAST result.

Keywords- Aphid, Legume crop, Cytochrome Oxydase I gene, Molecular identification

STUDY ON HETEROSIS BREEDING FOR QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF BRINJAL UNDER TARAI REGION OF UTTARAKHAND

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The experiment was conducted during kharif season 2022-23 at the Vegetable Research Centre GBPUAT, Pantnagar, Uttarakhand. 13 genetically diverse parents of brinjal (*Solanum melongena* L.) were selected in which 10 parents were used as lines and remaining 3 parents were used as tester. These parents were evaluated in a line $\times$ tester mating design and arranged in randomized block design with three replication each. The crossing of parents was made during 2022 between September to November. Thus, 30 F₁S hybrids were made after crossing and evaluation of these hybrids and their 13 parents have done in next kharif season of 2023. Lines, testers, and hybrids exhibited wide variation among them for different characters under study. The major objective of this investigation was to estimate the extent of heterosis for fruit yield and its component. Most hybrids displayed positive relativity with yields. The observation on yield and quality i.e., plant height, days to first flowering, days to first fruiting, total soluble solid and yield per plants were recorded. The result was stated that the hybrid combination PBGL-5 $\times$ Pant Rituraj, PBGL-5 $\times$ Pant Samrat, Pusa Kaushal Pant $\times$ Samrat and PBGL-5 $\times$ Kashi Uttam were superior than the standard check (Pant Rituraj and Pant Samrat) in term of yield contributing characters. Above mentioned parents can be used in further breeding Programme for improvements of respective characters of brinjal.

Keywords: Brinjal, Heterosis, Hybrid, Line $\times$ Tester

QUANTITATIVE MORPHOMETRIC ANALYSIS OF KHOVA RIVER BASIN IN NAGALAND, INDIA

IMYANGLULA

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Remote sensing technology based on satellites has shown to be an effective instrument in the research of drainage networks, the study of surface morphological features, and their link with soil erosion management prospects at the basin level. The current study emphasizes the usefulness and advantages of remote sensing and GIS-based analysis for quantitative and qualitative assessment of humid regions of the Khova basin in Nagaland. The Khova catchment latitude and longitude are N 25°46'51.6" and E 93°43'37.8", respectively. The Shuttle Radar Topographic Mission (SRTM) DEM with a spatial resolution of 30 m is employed in ArcGIS to analyze morphometric parameters and map production. The results revealed that a dendritic pattern is dispersed into a total stream length of 266.22 km for all the orders across a drainage area of 110.45 km². The mean bifurcation ratio is 4.2, indicating it is in the normal basin category. The elongation ratio was 0.49, which was less elongated than average. According to the form factor measurement of 0.19, the research region was considered to have less runoff, an elongated shape, and less peak flow for a longer duration.

Keywords: GIS, Khova basin, ArcGIS, Morphometric, Runoff.

ALTERNARIA LEAF SPOT (*ALTERNARIA BRASSICAE*) OF MUSTARD (*BRASSICA SPP.*)

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A widespread fungal disease that harms mustard plants, Alternaria leaf spot induces substantial yield losses as well as deterioration of quality. The objective of this research is to look into all facets of Alternaria leaf spot in mustard crops, encompassing its pathogenicity, epidemiology, and options for management. Initially, an analysis is carried out on the pathogenicity of Alternaria species on mustard leaves, emphasizing the methods by which these fungi invade and settle in host tissues. It is essential to understand the pathogenicity in order to create efficient management plans. Second, the epidemiology of Alternaria leaf spot is looked at, taking into consideration variables including the disease cycle, spore dissemination, and conditions in the environment that favour the growth of the disease. Understanding epidemiology is useful for anticipating disease outbreaks and putting preventive strategies in place in a timely manner. In addition, the study explores the host plant sensitivity and resistance mechanisms that affect Alternaria leaf spot severity and spread. Additionally, covered are the possibility of producing resistant cultivars and the part played by genetic variables in host resistance. In addition, the control of Alternaria leaf spot is discussed, including chemical and cultural approaches. The usefulness of cultural techniques including crop rotation, cleanliness, and adequate irrigation in lowering the incidence of disease is assessed. The effectiveness and environmental effects of the usage of fungicides and biocontrol agents are also evaluated. This study highlights the significance of integrated disease control strategies by offering a thorough overview of Alternaria leaf spot in mustard crops

Keywords: Alternaria, leaf spot, mustard, pathogenicity, epidemiology, management, fungal disease, environmental factors, host resistance, control measures.

A TECHNIQUES OF WEED IDENTIFICATION AND CONTROL IN MILLET CROPS: A REVIEW**ER. INDRAVEER SINGH¹, DR. ATUL KUMAR SHRIVASTAVA², ER. MANISH PATEL³, DR. AJAY KUSHWAH⁴**¹Ph.D. Research Scholar, College of Agricultural Engineering, JNKVV, Jabalpur, MP²Professor & Head, Department of Farm Machinery & Power Engineering, College of Agricultural Engineering, JNKVV, Jabalpur,³Assistant Professor Department of Farm Machinery & Power Engineering, College of Agricultural Engineering, JNKVV, Jabalpur,⁴Guest Faculty Department of Farm Machinery & Power Engineering, College of Agricultural Engineering, JNKVV, Jabalpur, MP

Millets are the primary food source for millions of people in tropical regions of the world supplying mineral nutrition and protein. Millets possess rich nutrients and a climate resilience property when compared to the other cereals such as rice and wheat. As the millets are grown predominantly during the hot and humid rainy season, weeds grow profusely and deprive these crops of vital nutrients and moisture and reduce the yield considerably. Because of a wider row spacing and slow initial growth in millets, weeds are more problematic during the early crop growth period. Early control of the weeds is, therefore, considered necessary to optimize the yield. A review of the literature suggests that satisfactory Weeds belong to various groups viz., grasses, sedges and broad leaved weeds (BLW) are associated in finger millet cultivation. The weed management practices are limited to five options viz., preventive, cultural, mechanical, chemical and biological methods. The common weed control method used is the hand weeding which is time consuming and also difficult to control weeds. Although manual weeding is effective, it is costly, tedious and time consuming. Fischer et al. (2001) reported that the increasing cost of labour have made these methods uneconomical for weed control. Since single method is not able to control all weeds up to desired level, integration of weed management practices can be an effective weed control strategy to achieve greater weed control efficiency weed control can be achieved by supplementing pre emergence herbicides with one manual or mechanical weeding.

Keyword: Millets, weed identification, method of weeding, nutrition and protein.

FABRICATION AND EVALUATION OF FUNCTIONALIZED CLAY-BASED COMPOSITE BEADS FOR DYES REMOVAL FROM AQUEOUS SOLUTIONS**INDU CHOPRA*, CHAKRAPANI SAIKRISHNA KISHORE, THUNGASHAN KIKON, ANKIT KUMAR, ATUL MEENA, DEBARUP DAS AND V.K. SHARMA****Division of Soil Science and Agricultural Chemistry, ICAR-Indian Agricultural Research Institute (IARI), New Delhi -110012, India**

In order to reduce agriculture dependence on fresh water sources, irrigation with dye loaded effluents can serve as alternate sources of water for crops but their long term application can lead to soil and crop contamination. On the other hand, crop residue generation in North India (rice residue) has also resulted in environmental issues caused due to stubble burning. To treat the dye loaded industrial effluents, rice straw can serve as an excellent material. But the low adsorption capacity and difficulty in recovery of these materials limits their application. To address the multiple issues, clay-based composite beads were prepared for treating dye-contaminated aqueous solutions. The composite of calcined bentonite and calcined rice straw (1:3 ratio) was prepared which was further used to prepare sodium alginate beads. The beads were then assessed and compared for the maximum adsorptive removal of dyes from aqueous solutions. Composites and prepared beads were analysed and characterized through, CHNS, BET and FTIR analysis. On the basis of adsorption capacity and stability of beads, it was found that beads loaded with 3g composite material showed maximum dye removal efficiency for Congo red (28.50 mg/g) and Crystal violet (32.65 mg/g). On the basis of results obtained, it could be concluded that clay based agricultural waste composite beads can effectively remove Congo red and Crystal violet and their mixture from the simulated effluents with efficient recovery from the aqueous solutions thus managing the problem of contaminated effluents as well as utilization of agricultural waste based materials for environmental sustainability.

Keywords: Environmental sustainability, Rice straw, Composites, Alginate beads, Dye removal

A STUDY ON ROLE OF GREEN NANOPARTICLES AS NANO FERTILISER AND NANOPESTICIDES**INDU SHARMA¹ AND BHARTI KUMARI²**¹Department of Biotechnology, Nims Institute of Allied Medical Science and Technology (NIAMST), NIMS University, Jaipur, Rajasthan²Department of Chemical Petroleum and Hydrogen Technology, Nims Institute of Engineering and Technology (NIET), NIMS University Rajasthan, Jaipur, Rajasthan, India

Nanoparticles hold promise in agriculture as nanofertilizers and nanopesticides due to their high surface area, reactivity, and ability to penetrate plant tissues efficiently. Nanofertilizers can deliver nutrients more effectively, reducing waste and environmental impact, while nanopesticides offer targeted delivery, potentially reducing the amount needed and minimizing off-target effects. However, thorough research is needed to ensure safety for both crops and the environment. Nanofertilizers: Nanoparticles such as nano-sized versions of essential nutrients like nitrogen, phosphorus, and potassium can be designed to enhance nutrient uptake by plants. For instance, zinc oxide nanoparticles have been used to deliver zinc to plants more efficiently, improving growth and yield. Nanopesticides: Nanoparticles can be used to encapsulate pesticides, reducing their release into the environment and minimizing off-target effects. For example, encapsulating pesticides like neonicotinoids in biodegradable nanoparticles can improve their targeted delivery to pests while reducing their impact on non-target organisms. These examples highlight how nanotechnology can revolutionize agriculture by improving nutrient delivery and pest management while minimizing environmental impact. However, it's essential to conduct thorough research to ensure the safety and efficacy of these nano-based solutions.

Keywords: Nanoparticles, Green synthesized, Nanofertiliser, Nanopesticides

PLASTIC & ENVIRONMENT**INDU SINGH¹, SEEMA MALIK²**¹Associate Professor, Department of Chemistry, Meerut College Meerut²Assistant Professor, Department of Botany, Meerut College Meerut

Plastic pollution poses a grave threat to the environment, impacting ecosystems, wildlife, and human health. The accumulation of plastic, not only harms marine life through ingestion but also leaches toxic chemicals into the environment, threatening terrestrial ecosystems. Micro plastics, tiny plastic particles, further exacerbate the issue, infiltrating food chains and potentially reaching human populations. Mitigating plastic pollution requires multifaceted approaches, including reducing plastic production and consumption, implementing effective waste management systems, and promoting sustainable alternatives. Addressing this crisis demands global cooperation, innovative solutions, and concerted efforts from governments, industries and individuals to safeguard the environment for current and future generation.

EPIDEMIOLOGICAL STUDY OF LUMPY SKIN DISEASE OUTBREAK IN UTTARAKHAND**IRTIQA MANZOOR¹, J.L SINGH¹, NIDDI ARORA¹, MAANSI², A.H. AHMAD³, MUNISH BATRA⁴**¹Department of Veterinary Medicine, College of Veterinary & Animal Sciences, G.B. Pant University of Agriculture & Technology, Pantnagar, U.S Nagar, Uttarakhand, India.²Department of Veterinary Public Health & Epidemiology, College of Veterinary & Animal Sciences, G.B. Pant University of Agriculture & Technology, Pantnagar, U.S Nagar, Uttarakhand.³Department of Veterinary Pharmacology & Toxicology, College of Veterinary & Animal Sciences, G.B. Pant University of Agriculture & Technology, Pantnagar, U.S Nagar, Uttarakhand.⁴Department of Veterinary Pathology, College of Veterinary & Animal Sciences, G.B. Pant University of Agriculture & Technology, Pantnagar, U.S Nagar, Uttarakhand.

The study was conducted in a Cattle population in Bindukhatta village of district Nainital of Uttarakhand during the year 2023. Lumpy skin disease was defined as an animal with nodular skin lesions or such clinical signs suggestive of LSD irrespective of laboratory confirmatory diagnosis. The epidemiological data of lumpy skin disease outbreaks in cattle reported during the monsoon season in the village were collected in a structured questionnaire. The animals were selected on the basis of clinical signs and the consent of owner to provide the samples. A total of 50 cattle out of 455 clinically examined cattle were affected with LSD, with an overall apparent morbidity rate of 10.99%. The typical clinical signs of LSD observed in our study were fever, enlarged prescapular lymph nodes, skin nodules mostly on head, neck, perineum, trunk and all over the body in some cases. The skin nodules at the distal part of limbs were burst open with subcutaneous tissue visible in most of the cases. The analysis was also carried out to identify the association between the possible risk factors (breed, sex, age, production status, and rearing conditions) and the prevalence of clinical disease. The prevalence of disease was more in cross breeds than indigenous cattle, and females than males. With regard to age, the disease was higher in the age group of > 3 years old than young animals. With respect to production status, lactating cows were more susceptible than non-lactating. The animals reared indoors were more susceptible and peak incidence of the disease in our study was observed during monsoon season (June to September), coinciding with the peak vector activity.

Keywords: Lumpy skin disease, epidemiology, cattle, morbidity**A SURVEY REPORT ON VEGETABLE PESTS IN NARAYAN NAGAR, CHARKHET, DISTRICT NAINITAL, UTTARAKHAND INDIA****ISHA CHANDRA¹ AND HIMANSHU P. LOHANI²**¹Research Scholar, D.S.B Campus, Department of Zoology, Nainital, Uttarakhand, India²Supervisor, Assistant Professor, D.S.B Campus, Department of Zoology, Nainital, Uttarakhand, India

Understanding the diversity of vegetable crop pests is crucial for agricultural management and sustainability. This study conducted in Char Khet, District Nainital, Uttarakhand, aimed to comprehensively analyze insect pests affecting vegetable crops to provide valuable insights for farmers. The research utilized survey and surveillance methods over an eight-month period from November 2022 to June 2023. A total of 10 insect species belonging to three orders (Coleoptera, Hemiptera, and Lepidoptera) were identified, with Chrysomelidae exhibiting the highest abundance among the families observed. Pest management predominantly relied on chemical pesticides, with limited usage of protective measures due to various factors including lack of knowledge and resources. The study area's climatic conditions, characterized by a short summer and prolonged rainy season, significantly influenced cultivation practices and pest occurrence. Farmers heavily relied on rainwater for irrigation, limiting cultivation to the rainy season due to water scarcity in other seasons. Lack of water availability during winter contributed to crop damage, primarily caused by dew. Findings underscore the importance of integrated pest management (IPM) training to promote sustainable pest control practices among farmers. Additionally, promoting alternative fertilization methods such as cow manure could enhance soil health and reduce dependency on chemical input. This study not only contributes to understanding local pest dynamics but also emphasizes the need for tailored agricultural practices considering regional climatic variations and resource constraints. Implementing sustainable pest management strategies and improving agricultural resilience to environmental challenges are essential for ensuring food security and economic stability in the region.

ROLE OF ALLELOPATHY IN AGRICULTURE AND SUSTAINABLE DEVELOPMENT**ISHA MIGLANI, RAJ SINGH****Department of Bio-Sciences and Technology, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala, Haryana, India**

Population increase, poverty, environmental degradation, and the use of synthetic herbicides are interdependent and closely linked and hence influence global food safety and stability of world agriculture. On the one hand, varied weeds, insects, and other pests have caused a tremendous loss in agricultural crop productivity annually. On the other hand, the use of synthetic insecticides, herbicides, fungicides, and other pesticides significantly disturbed the ecology of biotic communities in agricultural and natural ecosystems. Eventually, it destroyed the ecological balance in food chains. Interestingly, natural products released by the plants (allelochemicals) are secondary metabolites involved in ecological interactions and could be an important source of alternative agrochemicals. Mainly released by the plants as an outcome of acquaintances with other plants in their vicinity, these allelochemicals can also be used as eco-friendly substitutes for synthetic herbicides and other pesticides. Despite these facts, agrochemicals are either preferred over allelochemicals or the latter are not known in the direction of their use in achieving sustainability in agriculture.

Keywords: Allelochemicals, Herbicides, Sustainable Agriculture**PROFILE CHARACTERISTICS AND ADOPTION OF RECOMMENDED PRACTICES APIARY MANAGEMENT PRACTICES IN THE KUMAON HILLS OF UTTARAKHAND****ISHITA MISHRA****PhD Research Scholar, Department of Agricultural Communication, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand**

The secret to realizing beekeeping's full potential for beekeepers and the environment is finding the ideal balance between these two domains. In the Kumaon highlands, beekeeping is an essential component of the small-holder farming system and a major source of extra financial income for subsistence farming. Four villages from the Bhimtal Block in the Nainital district—Jeoli, Gaga, Baluti, and Chopra—were specifically chosen to participate in the current study. The respondents were chosen using the census approach, and the profile traits of the beekeepers were ascertained through the use of a pretested interview program. The study's conclusions showed that nearly all of the respondents who were questioned were male, and the bulk of them (68.42%) were between the ages of 31 and 52. 96.05% of the respondents fell into the general category, while 35.53% had completed their schooling in middle and high school. The respondents' family size was medium (81.57%) and they belonged to a nuclear family system (43.43%). According to the data, over half of the participants had a medium yearly income (61.84%), a medium number of boxes owned (63.16%), a medium level of beekeeping expertise (78.95%), and a medium ability to take risks. Majority of the farmers also reflected medium (68.42%) extent of adoption of recommended bee keeping practices. The results of the study will be helpful to extension personnel and scientists to orient their work on major thrust area which are profitable and applicable in the realm of Apiculture.

INTERACTION OF AUUB 209 (*STREPTOMYCES ENISSOCAESILIS*) AND AUDT 626- (*STREPTOMYCES RACEMOCHROMOGENES*) RHIZOBACTERIA AND *SCLEROTIUM ROLFII* ROOT ROT PATHOGEN ON RELATIVE EXPRESSION OF DEFENCE RELATED GENES IN SOYBEAN THROUGH QRT-PCR**ISHWARI G. HIREMATH^{*1}, SHAMARAO JAHAGIRDAR¹, P. U. KRISHNARAJ², S. A. ASHTAPUTRE¹, AND D. N. KAMBREKAR³****^{*1}Department of Plant Pathology, UAS Dharwad, Karnataka, India****²Department of Agricultural Microbiology, UAS Dharwad, Karnataka, India****³Department of Agricultural Entomology, UAS Dharwad, Karnataka, India**

The present investigations were carried out to assess the interaction of rhizobacteria and target pathogen in soybean ecosystem at Molecular Genetics Lab, UAS, Dharwad to gain the insights into molecular basis of host-pathogen interaction during 2022. Defence related genes were analysed for their expression levels in response to pathogen (*Sclerotium rolfsii* Sacc.) and rhizobacterial isolates (AUUB 209- *Streptomyces enissocaesilis* and AUDT 626 (*Streptomyces racemochromogenes*) through quantitative real time polymerase chain reaction. A total of five defence related genes viz., Pathogenesis related protein 1 (*PR 1*), Pathogenesis related protein 2 (*PR 2*), Pathogenesis related protein 2 (*PR 10*), Polyphenol oxidase (*PPO*) and Chalcone synthase (*CHS*) were selected and analysed for their expression levels under different treatments where rhizobacteria were applied as seed treatment (10g/kg seeds) and drenching at 35-40 days after sowing. The results revealed that the highest expression levels of *PR 1* (2.75 fold), *PR 2* (7.88 fold), *PR 10* (4.16 fold) and *PPO* (8.50 fold) observed in the treatment (Host + Pathogen + AUUB 209 + AUDT 626) and the highest (3.27 fold) *CHS* gene expression was recorded in the treatment (Host + AUDT 626). The positive check (Host + Pathogen + *Trichoderma harzianum*) recorded 2.42, 5.74, 4.15, 6.33 and 1.34 fold change of *PR 1*, *PR 2*, *PR 10*, *PPO* and *CHS* genes respectively. This is the first report on rhizobacteria and root rot pathogen interaction in soybean in India.

Keywords: Interaction of *Streptomyces* species, *Sclerotium rolfsii*, Defense genes, qRT-PCR

SHIFT IN RAINFALL PATTERN ON THE PERFORMANCE OF SOYBEAN (*GLYCINE MAX* L. MERRILL) IN TRANSITIONAL TRACT OF KARNATAKA, INDIA**J. A. HOSMATH¹, G. SOMANAGOUD² AND C. B. KABADAGI³**¹Professor and Head, Department of Agricultural Meteorology, College of Agriculture, University of Agricultural Sciences, Dharwad²Principal Scientist & Head, All India Coordinated Research Project on Soybean, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad³Technical Officer, GKMS Project (IMD Unit), Department of Agricultural Meteorology, College of Agriculture, University of Agricultural Sciences, Dharwad

The normal sowing window recommended for getting higher soybean seed yield is the 1st fortnight of June in transitional tract of Dharwad (Karnataka state, India). The sowing window influences a lot on seed yield of photo and thermo sensitive crops like soybean. The trials carried out on the production of soybean (Cv.JS 335, JS-93-05 & Dsb -21) in vertisols of Main Agricultural Research Station, University of Agricultural Sciences, Dharwad over 17 rainfed (*kharif*) seasons (2006 to 2023) indicated that in 6 seasons (2006, 2007, 2013, 2021, 2022 and 2023) the soybean crop was sown in the month of June (with the normal onset of monsoon) against 10 seasons (2008, 2009, 2010, 2011, 2012, 2014, 2015, 2016, 2017, 2018) in the month of July (under delayed onset of monsoon). A yield variation in soybean was noticed under normal as well as delayed onset of monsoon. Sowing of soybean under delayed onset of monsoon reduced the soybean seed yield to the extent of 38 percent (average yield of 1860 kg/ha) compared to normal onset of monsoon (June sowing) with average soybean seed yield of 2979 kg/ha. The research findings over 17 years clearly indicated that from 2008 season onwards the onset of monsoon was not as per the guide dates. Hence, in years to come, the rainfall prediction is under question?, whether the onset of monsoon would be delayed/normal. The results of this investigation clearly indicated that under delayed onset of monsoon the performance of photo and thermo sensitive crops like soybean would be affected in terms of seed yield. The findings of Bomngam Karlo and Hosmath (2020) indicated that the soybean genotypes like Dsb-31 and Dsb-32 recorded significantly higher seed yield (2504 kg/ha and 1936 kg/ha, respectively) compared to Dsb-21 (1737 kg/ha), JS-9305 (1576 kg/ha) under delayed onset monsoon. Hence, there is a need to develop new soybean genotypes and agro-techniques for delayed onset of monsoon.

EXPLORING THE DIVERSITY AND HOST ASSOCIATIONS OF HYMENOPTERAN EGG PARASITIDS IN THE INDIAN SUNDARBANS: TOWARDS A SUSTAINABLE AGRICULTURE**¹J. ABITHA* AND ²K. RAJMOHANA1****¹Zoological Survey of India, New Alipore, Kolkata, West Bengal, India²Department of Zoology, Ballygunge Science College, University of Calcutta, Kolkata, West Bengal-

Insect parasitoids regulate the population of their host arthropods, as their larvae develop by feeding in or on their body, eventually killing them. Hymenopteran parasitoids are effective biocontrol agents against crop pests, offering sustainable alternatives to chemical pesticides. Parasitoids are categorised as - egg, larval and pupal - among which egg parasitoids warrant special attention because they eliminate pests before they can damage crops, outcompeting larval and pupal parasitoids. Conducting a taxonomic inventory of indigenous parasitoids and their hosts is crucial for integrating them into IPM programs. However, taxonomy and host associations of parasitoids are not fully understood. This study aims to address the gap by investigating hymenopteran egg parasitoids and their host associations within the Indian Sundarbans. Over the study period (2021-2024), 223 egg masses from 7 insect orders - Lepidoptera, Hemiptera, Coleoptera, Neuroptera, Mantodea, Blattodea, and Orthoptera - were field-collected and reared in the laboratory. With 95 egg masses parasitized, the overall parasitism rate was an impressive 42.6%. In Lepidoptera and Hemiptera, the egg parasitism rates were 45.29% and 25.7%, respectively. The family Scelionidae (Platygastridae) and the genus *Telenomus* Haliday, within this family, were most prevalent and were recorded parasitizing the eggs of Hemiptera, Lepidoptera, and Neuroptera, among other species. A widespread occurrence of *T. remus* Nixon, an exotic species introduced to India for biocontrol decades ago, was detected. Rearing data revealed a female-biased emergence, highlighting their biocontrol potential. Overall, the egg parasitoids reared were morphologically characterized as 20 species in 10 genera across 6 families within 2 superfamilies. An undescribed species of *Telenomus* attacking predatory arthropods were also identified. This research aims to contribute to sustainable agricultural practices in the Sundarbans, where agriculture serves as the primary means of livelihood.

Keywords: Egg parasitoid, Host association, Indian Sundarban, Sustainable agriculture**EVALUATING SPATIAL VARIABILITY OF GROUNDWATER QUALITY IN A PADDY ECOSYSTEM: A CASE STUDY****J. B. KAMBALE^A, UMESH BARIKARA^B AND D. BASAVARAJA^C**^ADepartment of Agricultural Engineering, College of Agriculture, Bheemaranagudi, University of Agriculture Sciences, Raichur^BAgriculture Extension Education Centre, Nalwar, University of Agriculture Sciences, Raichur, India^CDepartment of Environmental studies and Agro forestry, College of Agriculture, Bheemaranagudi, University of Agriculture Sciences, Raichur, 585104, India

In the paddy environment of Bheemaranagudi, which is situated in the UKP Command region, this study examines the geographical variability of groundwater quality. To collect groundwater samples prior to and following paddy transplantation, a total of fourteen bore wells were meticulously chosen as sampling locations. The study evaluated physicochemical parameters including as pH, EC, TDS, total alkalinity, total hardness, Ca²⁺, Mg²⁺, SO₄²⁻, Cl⁻, F⁻, NO₃⁻, PO₄²⁻, Na⁺, and K⁺ using standard analytical procedures. The groundwater quality was thoroughly assessed by examining these factors. The results of this investigation shed important light on the dynamics of groundwater

quality in the ecosystem of paddy fields. Moreover, in order to improve the comprehension of spatial fluctuations, sophisticated ArcGIS software was employed to produce maps that illustrate the geographic arrangement of every parameter during the investigation. By providing insight into the complex interplay between groundwater quality and paddy farming, this research advances our understanding of the possible negative effects of agricultural practices on water resources. Using spatial analysis helps to give a thorough picture of the dynamics of groundwater quality, which in turn helps with sustainable farming methods and efficient water resource management plans in the study area.

Keywords: Groundwater quality, Paddy ecosystem, Spatial variability

RESPONSE OF RICE GENOTYPES FOR THEIR INTERACTION WITH *BACILLUS SUBTILIS* FOR BLAST DISEASE RESISTANCE

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Rice (*Oryza sativa* L.) is a crucial staple for 3.5 billion people globally, facing threats from diseases like bacterial blight, sheath blight, and the devastating rice blast caused by *Magnaporthe oryzae*. In a study at the Agricultural Research Station, University of Agricultural Sciences, researchers evaluated twenty rice genotypes' response to blast, treated with *Bacillus subtilis* and untreated. Results indicated significant reduction of blast incidence in treated IR-64, GNV 1905, and IET-25220 genotypes compared to untreated, with 17 genotypes exhibiting moderate resistance. This reduction suggests *B. subtilis* potentially activates the plants' defense responses, perhaps through Induced Systemic Resistance (ISR). The interaction likely triggers defense-related genes in pathways involving salicylic acid (SA) and Jasmonic acid (JA), enhancing plant resilience. These findings underscore *B. subtilis* as a promising bioinoculum for blast control, offering prospects to bolster rice yields. This study illuminates the potential of biocontrol agents like *B. subtilis* in sustainable disease management, thereby safeguarding global food security amidst looming challenges in agricultural production.

Keywords- *Bacillus subtilis*, Blast disease, PGPR, Rice.

EFFECT OF *BACILLUS SUBTILIS* ON RICE SEEDLING GROWTH IN HOAGLAND'S NUTRIENT SOLUTION: A STUDY IN PLANT-MICROBE INTERACTIONS"

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The current investigation on "Studies on effect of *Bacillus subtilis* on rice seedling growth in Hoagland solution" was carried out University of Agricultural Sciences (UAS), Raichur. The main objectives of the investigation include the evaluation of rice genotypes for their interaction with *Bacillus subtilis* for yield and yield-related traits and effect of *B. subtilis* on induced systemic resistance (ISR) in rice plants by triggering genes. The phenotypic growth (shoot and root)-related responses of rice plants to *B. subtilis* inoculation in Hoagland's solution was studied. Twenty selected genotypes including six popular varieties viz., Gangavathi Sona, MTU-1010, BPT-5204, RNR 15048, IR-64 and GNV-1089 from ARS, Gangavathi constituted the experimental material for the current investigation conducted in RBD design with two replications. The effect of *B. subtilis* on the advance of root and shoot length of rice seedlings in Hoagland's solution has been studied under laboratory conditions. Treated Gangavathi sona and MTU 1010 genotypes exhibited a rapid upsurge in seedling growth than untreated seedlings in Hoagland's solution. The twenty *B. subtilis* treated genotypes have shown a positive effect on the growth of root and shoot length compared to untreated seedlings in Hoagland's solution.

TOXIC EFFECT OF ARSENIC ON OXIDATIVE STRESS MARKERS AND ANTIOXIDATIVE RESPONSES IN RICE (*ORYZA SATIVA* L.) SEEDLINGS

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Aim: In this study we investigated parameters related to oxidative stress and the response of different non enzymatic antioxidants in rice seedlings exposed to arsenic. **Methodology:** The methodology involved assessing the influence of arsenic treatment on α -amylase activity through a starch plate test using embryoless half-seeds. Additionally, seven-day-old seedlings were cultivated under varying arsenic concentrations. After 20 days, plants were harvested, divided into roots and shoots, and analyzed for antioxidants and stomatal morphology. The DM accumulation was evaluated by calculating the DM accumulation rate (%). **Results:** The findings suggest that decreased activity of α -amylase could delay the mobilization of endospermic reserves, resulting in impaired seed germination and decreased accumulation of antioxidants such as proline and phenols in seedlings under elevated arsenic levels in both shoots and roots. This leads to an overall reduction in dry matter accumulation, causing a higher percentage of dry matter and regulating stomatal closure. **Interpretation:** The current research indicates that exposure to arsenic inhibits plant growth and triggers oxidative stress. In addition to implementing and enhancing policies to

curb environmental pollution, including direct soil contamination and arsenic uptake through irrigation water, understanding how rice plants metabolize arsenic-induced damage is crucial for devising biotechnological approaches to mitigate its effects.

Keywords: Arsenite, Oxidative stress markers, Phenolics, Proline, Rice

ORGANIC AND NATURAL ECO-FRIENDLY FARMING

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Chemical fertilizers, pesticides and fungicides are widely used in agriculture to improve crop yields. Most of the compounds used are synthetic, and their overuse causes environmental pollution and human health problems. Currently, several countries are working to reduce the use of agrochemicals. Organic agriculture is now emerging as a sustainable alternative to traditional agriculture using environmentally friendly strategies such as the application of organic fertilizers from plant and animal waste and pesticides based on plant extracts and microbials. However, the availability of commercial bio-pesticides and organic fertilizers is very limited because there are certain barriers to the commercialization of biological products. These barriers include small available quantities of raw materials and strict registration laws requiring toxicological tests and other studies that are expensive and time consuming.. Healthy soil is the foundation upon which sustainable agriculture is built. Farming practices differ mainly based on soil inputs and crop protection measures. In conventional chemical farming practice, indiscriminate use of chemical fertilizers and pesticides destroy the beneficial soil micro flora change the soil nature and also contribute to the high crop production cost. Heavy metals from the polluted soil may enter the food chain in significant amounts and show adverse health effects. The essence of natural farming is to minimize the external inputs to the farm land, and nurture the soil fertility. It was shown that enrichment of soil occurs through propagation of beneficial soil microbes. It encourages the natural symbiosis of soil micro flora and crop plants. Mulching can maximizes the moisture content in the soil, forms the cover for the earthworms and minimizes the weed propagation. The objective of this review is to provide details about the various organic fertilizers and pesticides that do not have the same disadvantages as synthetic compounds in terms of persistence and toxicity.

Keywords- Organic farming, Natural farming, mulching, sustainable, organic fertilizers, bio-pesticides

FACTORS DETERMINING FARMERS INNOVATIVENESS: ANALYTICAL HIERARCHY METHOD

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Farmers innovativeness is ability of farmers first of its kind to generate new idea, process or product or to modify existing idea, process or product in an agricultural ecosystem compared to others in the given system. Farmers innovativeness plays a key role in augmenting the desired agricultural activity. Hence, it is required to measure the farmers innovativeness in all facets by developing a composite index. In the present study, all the relevant indicators contributing to farmers innovativeness were taken into account. In the present study, Analytical Hierarchy Method was used to calculate the weightage of dimensions and indicators. A total of 80 experts including progressive farmers, academicians and agricultural extension scientists were asked to give the weightages. Of which, 55 experts had responded. Of the five dimensions, Conceptual competencies were ranked first (0.32), followed by Learning competencies (0.29) and Strategic competencies (0.26). Major factors determining innovativeness across the dimensions were social norm (0.83), proactiveness (0.44), persuasive ability (0.32), critical thinking (0.36), inquisitiveness (0.35), profit orientation (0.33) and technology orientation (0.29). To validate the judgments given by the experts, inconsistency ratio was also calculated for all the indicators, and it was below 10% indicating the consistent judgements. These indicators could be used to nurture the farmers innovativeness.

MOLECULAR AND MORPHOLOGICAL DIVERSITY ANALYSIS IN INDIAN BITTER GOURD ACCESSIONS USING MICROSATELLITE MARKERS

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Bitter gourd is gaining attention as a nutrient-dense vegetable with a growing demand for enhanced yield and nutritional content. Therefore, this study was carried out to explore the genetic diversity related to yield and yield-associated traits as well as molecular characterization in bitter gourd accessions. This study examined 45 genotypes encompassing 14 landraces, 5 primitive cultivars, 3 wild species and 23 other germplasm in addition to 5 standard cultivars. Analysis of variance indicated significant differences among the 50 genotypes for yield and associated traits. The genotypes IC-505621, IC-470556, Preethi, IC-505623 and Phule Green Gold exhibited outstanding performance with desirable morphological traits. Ward's clustering analysis revealed extensive genetic diversity among the germplasm accessions by grouping them into four distinct clusters. Cluster IV exhibited the highest divergence with the greatest intra and inter-cluster distances. Among 37 SSR markers, 22 polymorphic loci and 84 alleles were detected with the highest polymorphism information content and gene diversity for BG_gSSR_247 marker. Unweighted neighbor-joining (NJ) phylogenetic dendrogram delineated three distinct groups. Genetically and morphologically diverse accessions identified in this study serves as valuable genetic reservoirs for breeding initiatives aimed at developing high-yielding nutritionally enriched cultivars.

Keywords: Bitter gourd, Diversity, SSR markers, Clusters, Yield

IMPROVED POWER GENERATION OF SOLAR CELLS USING MIXED SURFACTANTS**DR JAGRATI MEENA****Janki Devi Bajaj Government Girls College, Kota, Rajasthan^{1,2}**

Photogalvanic cells are solar cell that converts solar energy into electric energy and capable of doing solar power generation and storage simultaneously. Photogalvanic cells works on Photogalvanic effect and these cells may be an energy source for the future if their electrical performance is increased. The performance of Photogalvanic cells containing Toluidine Blue, EDTA and mixed Surfactant (Nals+CPC+ Tween -80) has been studied to improve power generation. The surfactant not only gives rise to stability of the system but also enhances the conversion efficiency, storage capacity, and other electrical parameters. Dye–surfactant interaction in aqueous solutions plays an important role in Photogalvanic cells. The effect of various parameters on the electrical output of the cell, such as P^H , light intensity, diffusion length, and electrode area were observed. The current-voltage relations of the cell have been measured in dark and light under both forward and reverse direction. Fill factor and conversion efficiency of the cell were calculated by using the equation. The mechanism is proposed for the generation of photocurrent in Photogalvanic cells.

Key words: Photopotential, Photocurrent, fill factor, conversion efficiency.

RESPONSE OF THE PREDATORY SPIDER *HYLLUS SEMICUPREUS* AGAINST TOBACCO CATERPILLAR IN LABORATORY CONDITIONS**JAGRATI UPADHYAY*, PRIYANKA MISHRA DUBEY, VIJAY BAGARE & SAYAN CHOWDHURY****Faculty of Agriculture, Mangalayatan University Jabalpur, M.P.**

Spiders are the main predators of the majority of phytophagous insects and remain in the ecosystem for a long time, even after crop harvesting. An experiment was conducted in the Biocontrol Laboratory of Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, M.P. India to determine the predatory potential of the spider *Hyllus semicupreus* (Araneae: Salticidae) as a test predator on the tobacco caterpillar *Spodoptera litura* (Lepidoptera: Noctuidae), major pest of soybean crop. Tobacco caterpillar directly feeds upon the chlorophyll content of the leaves ultimately leads to the skeletonized appearance of leaves. This study was conducted to chalk out the better alternative to the chemical based insecticides. Predatory spider from Salticidae family came out to be the best alternative for chemical control. A spider can feed according to its feeding capacity only, depending on its abdominal size. The study revealed that the predatory potential varied from 20 to 100% according to prey density of tobacco caterpillar and fell under the II type of functional response as regards guild functioning. In experiments, the number of *S. litura* consumed by *H. semicupreus* was found to increase with the increasing *S. litura* densities at a decreasing rate. This investigation further gave us the scope of utilization of the spiders of Salticidae family, for pest management in organic farming system.

Key words: Spider, *Hyllus semicupreus*, *Spodoptera litura*, soybean, predator, potential prey density, functional response, guild functioning, correlation coefficients, pest management.

REVERSE BREEDING: ACCELERATING INNOVATION FOR CROP IMPROVEMENT**JAGVEER SINGH RATHORE^{1*} AND LAXMI KANWAR²****M.Sc. Scholar, Department of Genetics and Plant Breeding****¹Sri Karan Narendra Agriculture University, Jobner****²Agriculture University, Kota**

Several plant breeding techniques have been developed that help feed the world through high-yielding varieties. In order to accelerate the process more precisely and effectively new plant breeding methods are needed. Several new plant breeding techniques (NPBT) have been developed in the last two decades and have evolved rapidly in recent years; among them, **reverse breeding** is one. One of the most desirable achievements in plant breeding is the ability to directly establish parental lines for any heterozygous plant through the innovative approach known as reverse breeding (Dirks *et al.* 2009). It has been tested in Arabidopsis by Wijnker *et al.* 2012. It is producing complementing parental lines for any heterozygous plant through a chiasmatic meiosis (meiosis without crossovers). The reverse breeding procedure involves the following steps: 1. Select heterozygote and suppression of meiotic recombination 2. Generation and selection of haploids; production of doubled haploids 3. Selection of complimentary lines through marker assisted selection and crossing of complementary lines to develop superior hybrids. Reverse breeding is used to multiply a highly heterozygous plant from a homozygous parental line, maintain hybrid stability and improve parental lines genetically to enhance hybrid performance. By speeding the breeding process and increasing the number of genetic combinations, RB enables breeders to respond to farmer demands for improved varieties much more quickly. Hybrids do not contain any genetic modification, so they are safe for the environment and used for food and feed production. In crops where seed production is an issue, such as cucumber, onion, broccoli and cauliflower, emphasis should be focused on producing hybrids.

Keywords: Reverse breeding, heterozygote, doubled haploid and marker assisted selection.

EXPLORING THE ROLE OF EPIGENETIC REGULATION IN PLANT DEVELOPMENT: UNVEILING NATURE'S HIDDEN CODE***JAHNVI VYAS¹, HIMALAY R. PATEL², SARYU TRIVEDI² AND HARSH A. KAMANI²**¹Under Grad. Scholar and ²Assistant Professor, Department of Agriculture, Faculty of Sciences, Marwadi University, Rajkot Gujarat, India

Epigenetic regulation is a fascinating mechanism that influences gene expression without altering the underlying DNA sequence. In recent years, researchers have increasingly recognized the crucial role of epigenetics in orchestrating various aspects of plant development. Plants exhibit remarkable developmental plasticity, enabling them to adapt to diverse environmental conditions throughout their lifecycle. Epigenetic modifications, including DNA methylation, histone modifications, and small RNA-mediated pathways, play pivotal roles in modulating gene expression patterns underlying these developmental processes. DNA methylation, for instance, involves the addition of methyl groups to cytosine bases, regulating gene transcription by influencing chromatin structure and accessibility. Histone modifications, such as methylation, acetylation, and phosphorylation, dynamically alter chromatin architecture, thereby modulating gene expression in response to developmental cues or environmental stimuli. Additionally, small RNAs, including microRNAs and small interfering RNAs, regulate gene expression post-transcriptionally, contributing to fine-tuning developmental programs. Manipulating epigenetic mechanisms offers promising avenues for crop improvement, including enhanced stress tolerance, yield optimization, and trait inheritance. Moreover, deciphering epigenetic regulatory networks in model plants provides valuable insights into the fundamental principles governing plant biology, with broader implications for ecological and evolutionary studies. Continued research efforts aimed at unraveling the complexity of epigenetic mechanisms in plants promise to unveil novel strategies for sustainable agriculture and deepen our understanding of plant biology.

**A REVIEW ON CHEMICALLY INDUCED SEED DORMANCY IN MUNG BEAN TO PREVENT PRE-HARVEST SPROUTING
JAI PRAKASH GUPTA^{1,*} AND SUCHI MODI¹**¹Department of Botany, Rabindranath Tagore University, Raisen (M.P.), India

Pre-harvest sprouting in mung beans (*Vigna radiata* L.) has serious financial implications since it causes large yield losses, lower-quality seeds, and diminished crop marketability. Chemical treatments that induce seed dormancy have shown promising effect in addressing this issue and ensuring the generation of quality mung bean seeds. The various kinds and processes of seed dormancy, including physiological, morphological, physical, and chemical dormancy, have been emphasised in this review. Chemical inducers have been investigated as possible agents to induce seed dormancy in mung beans and other legumes. These include synthetic substances like maleic hydrazide, sodium azide, and plant growth regulators like abscisic acid, ethylene, auxins, and cytokinins. These chemical inducers act by inhibiting germination processes, changing the hormone balance, and changing the expression of genes associated with germination and dormancy. Numerous factors including concentration, timing, application technique, environment, and genotypic variation, affect how efficient these inducers are. Even though chemical treatments, to induce seed dormancy and inhibit pre-harvesting sprouting in mung beans have shown encouraging results, there are still issues and possible hazards that need to be resolved. Prior to widespread use, it is imperative to assess environmental problems, food safety considerations, and economic feasibility. Overall, mung bean seed dormancy can be induced by chemical inducers, which offers a viable way to reduce pre-harvest sprouting while maintaining consistent yields and seed quality. However, for this method to be successfully implemented in agricultural operations, a comprehensive approach that takes sustainability, safety, and effectiveness into consideration is required.

Keywords: PHS, hormones, dormancy, plant growth regulators.**BIOLOGY AND MANAGEMENT OF FALL ARMYWORM (FAW) *SPODOPTERA FRUGIPERDA* (J.E. SMITH) ON SPRING MAIZE IN CHITWAN****JANARJAN ADHIKARI*****Kathmandu University, Panchkhal, Kavrepalanchowk, Nepal**

Fall armyworm, (*Spodoptera frugiperda*), is the most devastating pest of maize, native to Southern America and was reported for the first time on 9 May 2019 in Nepal. The pest is polyphagous with high fecundity and can have multiple pest generations in single cropping season. In case of severe infestation, fall armyworm (FAW) caused more than 50% damage to crop. Since, the pest is new in Nepal, it makes necessary to study its biology and identify the appropriate management practices to control the pest below economic threshold level. In this study we reared FAW from egg to adult stage in Entomology Laboratory at Agriculture and Forestry University. We studied the insect's mean egg incubation period, larval period, pupal period, adult development period and life cycle. Similarly, field experiment was conducted to evaluate the efficiency of chemical pesticides, biopesticides and ecological pest management in maize. The experiment consisted of eight different treatments that included Chlorantraniliprole 18.5% SC, Emamectin benzoate 5% WG, Spinosad 45% SC, Spinetoram 11.7% SC, *Bacillus thuringiensis* var *kurstaki* (Bt), Azadirachtin (3000 ppm), *Desmodium intortum* and untreated control with three replications laid out in Randomized Complete Block Design. We observed mean number of damaged leaves, number of live larvae, damage score, cob weight and grain yield. The laboratory results showed that egg incubation period, larval period, pupal period, adult development period and life cycle period were 2-3, 11, 7, 5-7 and 26 -28 days, respectively. Results of field experiment showed that Emamectin benzoate and Spinosad were effective in reducing the number of damaged leaves, number of live larvae, damage score, and increased cob and grain weight. Biopesticides and *Desmodium* were found less effective than chemical insecticides, but the use of biopesticides were better than the control in managing FAW in maize field.

Keywords: Fall armyworm, *Spodoptera frugiperda*, Maize, Life cycle, Biopesticides

BALANCED CULTIVATION: NATURAL FARMING FORTIFIED WITH INTEGRATED NUTRIENT MANAGEMENT IN TUBEROSE (*POLIANTHES TUBEROSA* L.) CV PRAJWAL**JASPREET KAUR, RANJAN K SRIVASTAVA, CHANCHAL TIWARI, B.D. BHUI, SATISH CHAND AND AYUSH SAH****Department of Horticulture****G. B. Pant University of Agriculture and Technology, Pantnagar Uttarakhand, India**

Natural farming, a conventional way of farming prioritizes soil health, biodiversity, and ecosystem resilience. Tuberose, a bulbous crop bears highly fragrant loose and cut flowers, renowned for its essential oil and medicinal values. It is a heavy feeder crop. Thus the present study was conducted to understand the effect of INM in combinations with Ghanjeevamruth, Jeevamruth, Herbal Kunapajala (cow extract-based formulations) on growth, flowering and bulbs production of tuberose in the foothills of Himalayas. Seven treatments viz., T₁- 100% RDF (Control), T₂- 100% Ghanjeevamruth + Beejamruth, T₃- 100% Kunapajala + Ghanjeevamruth + Beejamruth, T₄- 100% Jeevamruth + Ghanjeevamruth + Beejamruth, T₅- 50% RDF + 50% Ghanjeevamruth + Beejamruth, T₆- 50% RDF + 50% Kunapajala + Ghanjeevamruth + Beejamruth and T₇- 50% RDF + 50% Jeevamruth + Ghanjeevamruth + Beejamruth replicated thrice in RBD design. Uniform sized healthy bulbs having diameter of 2.5 - 3.5 cm were treated with Beejamruth for 2 hours under shade condition. RDF @150:150:150 kg/ ha, Ghanjeevamruth @ 5 tons/ha as basal dose, Herbal Kunapajala and Jeevamruth @ 500 L/acre at 30 days of interval as foliage and soil application were applied in the month of April, May and June. The results revealed that, the days taken to bulb sprouting was significantly reduced with the application of T₃, T₄ and T₇ whereas maximum was in control. On the other hand, sprouting percentage after 30 days of planting was maximum in T₆ and T₇ while least observed in T₁. With respect to vegetative parameters, highest plant height and leaf width after 30, 60 and 90 days of sowing were significantly higher in T₆, whereas, maximum number of leaves was depicted by T₁ after 30 and 60 days of sowing. Also, maximum numbers of spikes, spike length and number of florets per spike were significantly higher in T₁. However, rachis length and diameter of cut spike was maximum in T₂. Highest number of bulbs and bulblets were produced by T₁ and T₆ respectively.

POPULATION DYNAMICS AND EFFECT OF ABIOTIC FACTORS ON *MEGALUROTHRIPS USITATUS* AND *MELANAGROMYZA OBTUSA* IN PIGEONPEA**JASPREET SINGH, AKHILESH KUMAR¹, SMITA SINGH¹, BK TIWARI¹, AK PANDAY² AND SB DAS²****JNKVV-College of Agriculture, Rewa (M.P.)**¹**JNKVV-Krishi Vigyan Kendra, CoA, Rewa (M.P.)**²**JNKVV-College of Agriculture, Jabalpur (M.P.)**

Pigeonpea (*Cajanus cajan* (L.) Millsp.), is a tropical and subtropical grain legume. It is also known as *tur*, *arhar* and redgram. The pigeonpea has high protein content (22.3%), which meets a major portion of the country's vegetarian population's protein demands, it is an essential component in increasing food security and nutrition for many poor home. Insect pests like pigeon pea just as much as people do. In India, it has been seen being attacked by more than 150 different insect species at different stages of crop growth. Even though India accounts for more than 90% of worldwide pigeon pea production, productivity has always been a cause for concern. Due to a number of factors, both abiotic and biotic, including low productivity of pigeon pea throughout the nation. Infestations of insects are the main biotic variables that impact this crop's output. The population of flower thrips recorded ranged between 0.5 to 4.6 (per flower) during October to February month of 2022-23. Weekly observation on the population dynamics of *Megalurothrips usitatus* revealed that the infestation of flower thrips was first time observed during 4th week of October (44th SMW) i.e., 1 (per flower) when the crop was at reproductive stage (131 days) with max. and min. temperature were 31.08 °C and 14.4 °C respectively, RH was 72.28 % and 40.71% during morning and evening hours respectively. From the correlation study, it was inferred that mean population of flower thrips had negative correlation (r = -0.608) (Fig. 4) with max. temperature. The population of maggots of pod fly recorded ranged between 0.2 to 1.6 (per pod) during October to February month. Weekly observation on the population dynamics of *Melanagromyza obtusa* revealed that the infestation of pod fly was first time observed during 4th week of October (44th SMW) i.e., 0.5 per pod when the crop was at reproductive stage (131 days) with max. and min. temperature were 31.08 °C and 14.4 °C respectively, RH was 72.28% and 40.71% during morning and evening hours respectively. From the correlation study, it was inferred that mean population of maggots of pod fly had negative significant correlation (r = -0.694) (Fig. 5) with max. Temperature and negative significant correlation (r = -0.603) (Fig. 6) with min. temperature.

ALGAL PROMISE: ASSESSING THE ENVIRONMENTAL IMPACT OF SPIRULINA CULTIVATION AS A SUSTAINABLE FOOD SOURCE**JATIN PALIWAL****Student of BSc. (Hon's) Agriculture, School of Agriculture Science, LNCT University Bhopal, (M.P.), India**

A potential answer in the pursuit of sustainable agriculture is spirulina (*Arthrospira platensis*), a cyanobacterium recognised for its nutritional advantages. Because of its low environmental impact and exceptional nutrient uptake efficiency, spirulina farming is becoming more and more popular. This type of aquaculture is particularly sustainable because it uses a lot less water than conventional crop cultivation and thrives in brackish water, which is unsuitable for most agricultural methods. Spirulina is an environmentally friendly substitute for traditional protein sources because of its high yield per area and capacity to sequester carbon dioxide. This microalga grows quickly in just a few days, its biomass doubles, allowing for more frequent harvesting and higher productivity. Its cultivation also avoids the need for pesticides and herbicides, minimizing chemical runoff and maintaining the quality of the local water supply. Spirulina Cultivation Requirement in India: Spirulina cultivation in India requires warm temperatures (20-35°C), alkaline water (pH 8-11), and ample sunlight. It

thrives in non-arable land using minimal fresh water, making it suitable for Indian conditions. Spirulina farming presents a feasible business model for communities in arid and semi-arid regions. Benefits to Farmers: Cultivating spirulina offers high yield and profitability with low input cost, benefiting farmers economically. Spirulina farming presents a feasible business model for communities in arid and semi-arid regions. Spirulina farming could be incorporated into current agricultural systems to promote environmental sustainability and help alleviate concerns related to food security. Spirulina farming is unique among sustainable agricultural practices because it provides a nutrient-rich food source in an environmentally and financially sustainable manner, with a potential global impact.

GENETIC POLYMORPHISM AND POPULATION STRUCTURE OF *EARIAS VITTELLA* THROUGH RAPD AND MTCOI MOLECULAR MARKERS: AN ELABORATE MOLECULAR PROFILING STUDY

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Genetic diversity among the *E. vittella* populations (39 locations) was studied by using RAPD primers. A total of eight RAPD primers were used to detect the polymorphism among the populations. Among the eight RAPD primers tested, OPA-09, OPA-11, OPA-12 and OPK-14 resulted in 100 per cent polymorphism with PIC value of 0.842. A dendrogram was constructed using similarity matrix, which showed four major clusters. A lone cluster contained the larval population from Yemmiganur which is considered as uni subcluster among all subclusters. The differences in the banding patterns with the RAPD primers revealed that polymorphism existed within the populations, which might be due to variations in single nucleotide resulting in variation in restriction sites. The specific mt COI primer was used in the current study enabled successful amplification of most collected specimens, which were sequenced bidirectional and then submitted in NCBI website for accession numbers. Generated sequences of present study showed 97 to 99 per cent similarity with data base sequences. A phylogenetic tree was constructed using neighbor joining (NJ, ML) method depicted cohesive clustering of the identified sequences of *E. vittella*. Tajima's D statistic revealed the existence of low genetic polymorphism among the 35 mt COI sequences of *E. vittella* populations.

ADSORPTION STUDIES ON SEQUESTERING OF SYNTHETIC DYE FROM AQUEOUS SOLUTION

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Dyeing is a key process in textile industries in which the decolorization of dyeing bath has to be done for providing higher efficiency of dyeing of apparels. A substantial part of this process deals with pigments, which are released to the environment after decolorization due to incomplete dye fixing. Most of the dyes having synthetic origin and usually denoted to be highly toxic substances. Wastewater from these industries poses serious environmental problems. One of the widely used water treatment technologies is biosorption, biosorbents are recognized as a green, cost-effective and efficient alternative. Therefore, the search for locally or regionally available biomass for dye removal has gained rapid attention. In this context, a comprehensive understanding of the biosorption capacity of different biosorbents is necessary. In this study, the adsorption potential of an adsorbent prepared from *Jatropha* plant leaves was evaluated for the removal of Methyl Orange (MO) dye from aqueous solution. Batch adsorption experiments were performed with different operational parameters such as adsorbent dosage, initial dye concentration and contact time. The adsorption capacity of experimental leaf powder for the removal of MO dye was correlated by both Freundlich and Langmuir isotherms. The kinetic study revealed that the second-order kinetics were in better agreement with both first- and second-order kinetics. The thermodynamic adsorption parameters showed that the adsorption process is exothermic. Experimental data show that *Araucaria* plant leaf powder was effective in removing MO from aqueous solutions.

Keywords: Biosorption, Methyl Orange, Pseudo-first order

ROLE OF ANIMAL ASSISTED INTERVENTIONS AS NON MEDICATED THERAPY IN HUMAN HEALTH

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Animal-assisted therapy (AAT) refers to the presentation of an animal to one or more persons for the purpose of providing a beneficial impact on human health or well-being. Interactions with animals provide emotional and physical health benefits for diverse human populations including the elderly, children, physically handicapped, deaf, blind, emotionally or physically ill, and the incarcerated. It provides opportunities for motivation, education, or recreation to enhance quality of life. Animal-assisted activities are delivered in a variety of environments by specially trained professionals, paraprofessionals, or volunteers in association with animals that meet specific criteria. It is delivered and/or directed by health or human service providers working within the scope of their profession. It is designed to promote improvement in human physical, social, emotional, or cognitive function. Dog, cat, horse, birds and toy animals are most often used in therapy. The therapy is used in the treatment of psychiatric patients afflicted with depression, schizophrenia, phobias and addiction problems. Loneliness is easier to endure in the company of animals. It is also applied in cardiovascular diseases, dementia, Alzheimer's disease, child cerebral paralysis, rheumatoid arthritis, AIDS, and other diseases. Research shows a more rapid reduction of symptoms of many diseases when animals are included in the therapeutic process.

Keywords: Animal, Therapy, Physical, Human, Disease

PERFORMANCE OF INDIGENOUS AND IMPROVED POULTRY BREEDS UNDER RAISED STALL FED HOUSING SYSTEM OF GOAT FARMING: AN INNOVATIVE APPROACH FOR ADDITIONAL INCOME

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There is lot of scope for sheep and goat farming, as it is easy to manage and has sustainable income. In view of this, farming community moving towards rearing of sheep and goat in raised stall fed housing system. As there is lot of space available underneath the housing system, that space will be effectively utilized for rearing poultry birds for both meat and egg purpose which will be an additional source of income to farmers. Hence in this regard, performance of various indigenous and improved poultry breeds were studied at ICAR- KVK Dharwad in systematic scientific manner with objective to get additional income from poultry farming in underutilized space of the stall fed housing system of sheep/goat farming. In the present study, five week old chicks of 50 each of the indigenous (Local, Kadaknath) and improved (Giriraja, Swarnadhara) poultry breeds were reared in both conventional deep litter (T0) and raised stall fed goat housing system (T1). Body weight gain and feed conversion ratio (FCR) was recorded at 1st, 10th and 16th week and egg production was recorded in up to 45th week. There is no significant change in the body weight gain, mortality and egg production in both the system of rearing, but during growth FCR was significantly lower ($P < 0.05$) in T1 than T0. Also production cost was studied for the integrated goat (25 no.) cum poultry farming (200 no.) in raised stall fed housing system with net profit of Rs.358592/- as compared to conventional deep litter system Rs. 197397. In conclusion, such integrated sheep and or goat cum poultry farming gives 81.66% additional income than rearing sheep or goat alone, thereby effective utilization of space for poultry farming which provides sustainable nutritional and livelihood security.

Key words: Stall fed, Housing system, Goat, Poultry, Space, Income

PHYTOREMEDIATION OF HEAVY METALS (CR AND PB) CONTAMINATED SOILS BY *CALENDULA OFFICINALIS* L. WITH THE USE OF SALICYLIC ACID.

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The pot experiment was conducted to estimate the phytoremediation potential of *Calendula officinalis* L. an ornamental plant for the Chromium and Lead contaminated soils. Soil was collected from Sheila Dhar institute of soil science farm at Prayagraj, Uttar Pradesh, India. Soil was contaminated with Cr and Pb and filled in each pot, *Calendula officinalis* L. Was grown as a test plant Cr was applied as @ 0, 30 and 60 mg kg⁻¹ and SA was applied as @ 0, 2 and 4 mmol kg⁻¹. And Pb was applied as @ 0, 35 and 70 mg kg⁻¹ and SA was applied as @ 0, 2 and 4 mmol kg⁻¹. The result showed that the maximum potential of concentration in Cr 12.08 and 11.96 mg kg⁻¹ and Pb 16.44 and 15.28 mg kg⁻¹ in shoot and root of *Calendula officinalis* L. plant respectively in the pot treated with 4 mmol kg⁻¹ SA. And minimum potential of concentration in Cr 3.42 and 3.24 mg kg⁻¹ and Pb 3.82 and 3.70 mg kg⁻¹ in shoot and root of *Calendula officinalis* L. plant respectively in the pot treated with 2 mmol kg⁻¹ SA. Therefore, SA 4 mmol kg⁻¹ application may be recommended to reduce dry biomass of *Calendula officinalis* L. and enhance the Cr and Pb concentration in shoot and root of *Calendula officinalis* L. Thus, it may be concluded that salicylic acid (SA) can play a significant role in reducing the uptake of Chromium and Lead through *Calendula officinalis* L.

Keywords: Bioaccumulation, *Calendula officinalis* L. heavy metals and phytoremediation

ABIOTIC STRESS MANAGEMENT IN WHEAT: STRATEGIES AND CHALLENGES

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Wheat, as one of the primary staple crops worldwide, faces significant challenges from various abiotic stresses, including drought, salinity, heat, and cold stress. These stresses severely affect wheat productivity, leading to substantial yield losses globally. This abstract provides an overview of current strategies and challenges in managing abiotic stress in wheat. Conventional breeding efforts aim to develop stress-tolerant wheat cultivars through the selection and crossing of genotypes with desirable traits such as drought tolerance, salt tolerance, and heat resilience. However, the slow pace of traditional breeding methods necessitates the exploration of alternative strategies to expedite the development of stress-tolerant varieties. Biotechnological approaches, including marker-assisted selection (MAS), genetic engineering, and genomic studies, offer promising avenues for accelerating the breeding process and enhancing stress tolerance in wheat. Genetic engineering techniques, such as gene editing and transgenic approaches, allow for the precise manipulation of target genes associated with stress tolerance, offering unprecedented opportunities to engineer wheat varieties with tailored traits. In conclusion, effective management of abiotic stress in wheat requires a coordinated effort involving conventional breeding techniques, biotechnological advancements, and genomic studies. By integrating these approaches, researchers can accelerate the development of stress-tolerant wheat varieties capable of withstanding adverse environmental conditions, thus ensuring global food security in the face of climate change.

Keywords: Abiotic stresses, drought tolerance, salt tolerance, heat resilience, and cold stress, conventional breeding techniques, traditional breeding methods, biotechnological approaches, marker-assisted selection (MAS), genetic engineering.

ANATOMICAL AND PHYTOCHEMICAL STUDIES OF GENUS CHORCHOURS L. OF MARATHWADA REGION IN MAHARASHTRA**JOGDAND SAKSHEE DADASAHEB, DR. AHIRE DILIP UTTAM****M.S.G. College Malegaon, Nashik**

Everyone including the specialist, knows that a good Illustration is far superior and more efficient in recognizing plants than lengthy descriptions, or even keys. In the recent years there has been growing interest in plant diversity studies in general and floristic studies in particular Illustrations of plants are as old as human civilization and yet, there is ever greater need for good Illustration. The present work is a sincere attempt to provide an illustrative key to the species of Genus Corchorus L Linn Method includes, Feld study, herbarium study & Illustrations based on plant specimens. Besides the time-consuming process of correct identification cation of plant species can be minimized, if such fora is easily accessible available at the nearest reference point.

EVALUATION OF RHEOLOGICAL PROPERTIES OF MUFFIN FLOUR FOR DEVELOPMENT AND STANDARDIZATION OF MUFFIN: A BAKERY PRODUCT**¹JOTHILAKSHMI, K. AND ²*G. GAYATHRY****¹Assistant Professor, Food Science and Nutrition, Community Science College and Research Institute, Madurai – 625 104, Tamil Nadu, India****²* Assistant Professor, Agricultural Microbiology, Krishi Vigyan Kendra, Vridhachalam - 606 001, Tamil Nadu, India**

The investigation on the rheological properties of multigrain muffin flour, physico-chemical composition, development of muffins, sensory evaluation was carried out in Community Science College and Research Institute, Madurai, TamilNadu,India. The different treatment combinations and proportions involving flour from refined wheat (RW), finger millet, kodo millet flour and cowpea were evaluated for the rheological properties such as water absorption, viscosity and gelatinization temperature of multigrain millet flour using rapid visco analyzer. Muffins were developed and assessed for loaf volume, loaf weight, moisture, pH, TSS°Brix, total sugar, reducing sugar, protein, calcium, phosphorus and vitamins. Sensory evaluation was done using 9 point hedonic scale method. The water absorption rate of the muffin was high in cowpea+ RW flour (1.538g) followed by kodo millet+cowpea+RW flour (1.435g) when compared to that of RW flour alone (1.014g). The finger millet + RW flour combination had a lower viscosity of 61.75 ml/sec and gelatinization temperature of 85°C and highest score for cowpea+ RW flour of 228.42 ml/sec. The overall acceptability scores were higher of 87.5% for finger millet + RW flour combination. Nutrient parameters were statistically significant for finger millet +cow pea+ RW flour with protein content of 11.80g, calcium116.25 mg, 326.20 mg phosphorus and 2.56 mg of iron/100gm. Hence, the both the rheological and physico-chemical properties were highly suitable for 25:25:50 treatment combination of finger millet+cowpea+RW flour and offers a convenient mixing proportion for development of muffins, both in terms of rheology and sensory characteristics.

Keywords: Millet flour, rheology, muffin, nutrients, organoleptic evaluation**CLIMATE CHANGE AND ITS IMPACT ON SERICULTURE: A REVIEW****JUGABRAT SARMA¹, DIPANKAR BRAHMA², DHIRAJ SAIKIA³, AARHATA NATH⁴ AND BITOPAN DAS⁵****¹Senior Research Fellow, ICAR ATARI, Zone-VI, Kahikuchi, Guwahati****²Ph.d Scholar, Department of Sericulture, Forest College and Research Institute, TNAU****³M.Sc. Scholar, Department of Agril. Meteorology, Assam Agricultural University, Jorhat****⁴M.Sc. Scholar, Department of Agril. Entomology, Tamil Nadu Agricultural University, Coimbatore****⁵M.Sc. Scholar, Department of Soil Science, Assam Agricultural University, Jorhat**

Sericulture is an agro-based cottage industry with immense socio-economic significance, particularly in developing nations. India, being the second-largest producer of silk, has witnessed a substantial rise in domestic production and demand for silk over the past few decades. In 2022–2023, out of the total raw silk production of 36,582 MT in India, 8,904 MT was bivoltine and 18,750 MT was cross-breed mulberry, Tasar production was 1318 MT, and Muga and Eri silk production was 261 MT and 7349 MT, respectively. The rich cultural legacy and long history of sericulture is facing remarkable challenges due to the effects of climate change. Climatic variations, particularly in temperature, humidity and precipitation patterns, can significantly impact the growth and development of silkworm host plants, making it challenging to maintain suitable host plants for silkworms. Heat stress, rising temperatures, and other weather fluctuations have detrimental effects on the silkworm seed production industry. Climate change may also influence the distribution and frequency of diseases and pests that affect silkworms. Furthermore, droughts and water scarcity resulting from climate change can jeopardize sericulture by making it more difficult to obtain water for irrigation or by drying up existing water sources. Recent changes in global climate phenomena and the resulting loss of the mulberry, muga, tasar, and eri silkworms have drawn attention from all over the world due to the fact that raw silk makes up a sizable portion of the GDP of the country, underscoring the substantial impact of climate change on silkworms.

BIODEGRADING OF METHANE FLUX BY METHANOTROPHIC BACTERIA FROM PADDY FIELD UNDER SUBMERGED CONDITION**JYOTI CHOUDHARY¹, S. S., MORE, M. C., KASTURE, MAHENDER CHOUDHARY²**¹Department of Soil Science and Agricultural Chemistry, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (MH)²Department of Agronomy, G. B. Panth

Methanotrophic bacteria, utilizing methane as their sole carbon and energy source. Methanotrophic bacteria are crucial in the global carbon cycle and play a vital role in mitigating methane emissions. Methanotrophic bacteria, found in freshwater, marine, and terrestrial environments, are crucial biological sinks for methane emission reduction. They are studied for substrate specificity and classified as type I and type II using molecular methods. The experiment undertaken during *khari*f, 2022-23 at experimental farm, department of Soil Science and Agricultural Chemistry, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli, Dist. Ratnagiri. The field experiment was laid out in the factorial complete randomised design, consisting 16 treatment combinations comprising two factors i.e. four different nutrient sources viz, control, recommended dose through chemical fertilizer, recommended dose through konkan Annapurna briquette and gliricidia application and four different methanotrophic consortium viz, control, type I, type II, and type Ib which were replicated three time to study. Based on the experimental findings, concluded that the application of methanotrophic consortium effectively mitigate methane emission by reducing methane flux, in that Type-I methanotrophic consortium applied @ 5ml per pot was found more effectively reduced the methane flux @ 13% compared to green organic manuring. combine effect of nutrient source and methanotrophic bacteria also significantly reduce methane flux in that type I and Konkan Annapurna Briquette (34:14:6 % N:P₂O₅:K₂O) application effectively reduce methane flux. On the other hand, application of glyricidia organically without application of methanotrophic bacteria encouraged methane flux

HORMONAL THERAPY ENHANCED THE YIELD AND HEAT TOLERANCE BY MODULATING STAY GREEN TRAIT IN WHEAT (*TRITICUM AESTIVUM* L.)**JYOTI MEHRA¹, PRAMOD KUMAR² AND RAKTIM MITRA²**¹Department of Botany, Plant Physiology & Biochemistry, College of Basic Sciences & Humanities, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India²Division of Plant Physiology, ICAR-Indian Agricultural Research Institute, New Delhi

In India, wheat crop is often exposed to heat stress during anthesis and grain filling. Heat stress, during grain filling induces leaf senescence and forced maturity results in poor yield. Hormone therapy is an option to control leaf senescence and maintaining stay green trait. Therefore, in order to study the hormonal regulation of stay-green trait under heat stress in wheat, an experiment was conducted using two contrasting genotypes Chirya 3 (stay green type) and HD 2329 (non- stay green type). Experiment comprised of two main treatments i.e. normal sown condition (18 Nov) and late sown (18 Jan) heat stress condition and five sub- treatments i.e. Control (Water spray), Lovastatin (Lova) (an inhibitor of cytokinin), BAP, TDZ and (CoCl₂) (ethylene inhibitor) at anthesis stage to alter the endogenous level of phytohormones. Heat stress reduced SPAD value, NDVI, leaf area, membrane stability, photosynthetic pigments, photosynthesis, Fv/Fm ratio, YII, yield and its attributes and enhanced leaf senescence score (LSS), NPQ, lipid peroxidation, H₂O₂, antioxidant enzymes activity and CHLase activity. However, application of BAP, TDZ, and CoCl₂ enhanced SPAD value, NDVI, leaf area, membrane stability, photosynthetic pigments, photosynthesis, Fv/Fm ratio, NPQ, yield, heat tolerance index and restricted LSS, lipid peroxidation, H₂O₂, chlorophyllase activity, heat susceptibility index. Thus, BAP, TDZ, and CoCl₂ treatments enhanced yield and heat tolerance by modulating stay green trait. Further, lovastatin treatment confirmed the role of cytokinins in the stay-green trait.

BIO-EFFICACY OF INSECTICIDES AGAINST LEAF WEBBER, *ANTIGASTRA CATALAUNALIS* DUPONCHEL INFESTING SESAME**JYOTI SHARMA*, GADHIYA, V. C. ** AND VINOD KUMAR*****

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The experiment on bio-efficacy of insecticides against leaf webber, *Antigastra catalaunalis* Duponchel infesting sesame was carried out in field conditions at Instructional farm, Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh during *Khari*f, 2021. For managing the leaf webber, different nine insecticides were estimated on capsule damage as a foliar application. The data revealed that lowest damaged capsule was found in the treatment of chlorantraniliprole 18.5 SC @ 0.005% (2.87 capsule/plant) and chlorfenapyr 10 SC @ 0.015% (3.62 capsule/plant) with 69.06 and 60.96 per cent reduction over control, respectively. Spinosad 45 SC @ 0.0003% (4.14 capsule/plant), emamectin benzoate 5 + lufenuron 40 WG @ 0.005% (4.62 capsule/plant) and novaluron 5.25 + indoxacarb 4.50 SC @ 0.016% (5.36 capsule/plant) with 55.38, 50.28 and 42.34 per cent reduction over control, respectively were significantly more effective than remaining insecticides. Despite that, profenofos 40 + cypermethrin 4 EC @ 0.088% (8.60 capsule/plant) and thiodicarb 75 WP @ 0.15% (9.05 capsule/plant) with 7.32 and 2.53 per cent reduction over control, respectively were recorded as least efficient treatments. The treatment chlorantraniliprole 18.5 SC @ 0.005% recorded highest avoidable yield loss (51.15%), yield (692 kg/ha) and net realization (₹ 40710). The maximum ICBR was spotted in the treatment of spinosad 45 SC @ 0.0003% (1:20.30) and followed by chlorantraniliprole 18.5 SC @ 0.005% (1:15.42), emamectin benzoate 5 + lufenuron 40 WG @ 0.005% (1:14.61) and chlorfenapyr 10 SC @ 0.015% (1:11.66).

Key words : leaf webber, sesame, capsule damage, insecticides, chlorantraniliprole

IMPACT OF MINIMUM SUPPORT PRICE IN INDIAN AGRICULTURAL FARMING, FARMERS INCOME AND ECONOMY**^{1*}JYOTI SINGH, ²KAUSHAL KUMAR AND ³MATA PRASAD****¹Department of Agriculture, Sardar VallabhBhai Patel University of Agriculture & Technology, Meerut,(U.P.)****²Department of Agricultural Economics & Statistics, D.D.U. Gorakhpur University, Gorakhpur****³Department of Horticulture, B.B.A.U, Lucknow**

The Minimum Support Price (MSP) mechanism in India has long been regarded as a crucial policy aimed at safeguarding the interests of farmers and ensuring food security. Based on the comprehensive review of existing literature, government reports, and empirical studies, this study assesses the effectiveness of the MSP framework on Indian agricultural farming practices, focusing on its implications for farmer income and the broader economy. On one hand, MSP serves as a price floor, providing farmers with a guaranteed income for their produce and thereby incentivizing production. This has been particularly beneficial for small and marginal farmers, who constitute a significant portion of India's agrarian workforce. However, despite its intended benefits, the MSP regime faces several challenges and criticisms. Critics argue that MSP has led to distortions in crop choices, favoring crops covered under the support price mechanism while neglecting others. Moreover, the effective implementation of MSP has been marred by issues such as inadequate procurement infrastructure, administrative inefficiencies, and disparities in access among regions and crops. In conclusion, this study underscores the significance of MSP in Indian agricultural policy and it also emphasizes the need for reforms to address the shortcomings of the current MSP framework, including enhancing procurement infrastructure, diversifying crop coverage, and promoting market-oriented solutions. By addressing these challenges, India can harness the full potential of MSP to foster inclusive growth, alleviate rural poverty, and strengthen agricultural sustainability.

Keywords: Sustainable Agriculture, MSP, Crop productivity, Socio-economic, Farmer income growth

THE IMPACT OF THE NATIONAL EDUCATION POLICY (NEP) ON THE EDUCATION SYSTEM: A COMPREHENSIVE ANALYSIS**JYOTISINGH^{1*}, VIJAY KUMAR YADAV²AND GHANSHYAMYADAV³****¹Department of Agricultural Sciences, Shri Venkateshwara University, Gajraula, UP, India****²Department of Management, Delhi Technical Campus, GGSIP University, New Delhi****³Department of Engineering ITS Engineering College, Greater Noida**

In India, the implementation of NEP, introduced in 2020, represents a paradigm shift in Indian education policy, emphasizing holistic development, flexibility, and inclusivity. One of its primary objectives is to transform the existing rigid structure into a more flexible and multidisciplinary framework, promoting critical thinking, creativity, and problem-solving skills among students aims to lay a strong foundation for lifelong learning and development for the integration of technology in education, promoting digital literacy and access to quality educational resources. It also emphasizes the importance of vocational education and skill development, with the evolving demands of the job market also reforms in teacher training and recruitment, focusing on continuous professional development and merit-based selection processes. Moreover, the NEP proposes structural changes in higher education, including establishment of multidisciplinary universities, introduction of a credit-based system to facilitate seamless mobility and transfer of credits, advocates for greater autonomy and accountability for educational institutions, fostering innovation and excellence in teaching and research. It holds promise for revitalizing the Indian education system, its successful implementation on effective collaboration among policymakers, educators, stakeholders, and civil society. Addressing challenges such as infrastructure development, resource allocation, and socio-economic disparities will be crucial in realizing the full potential of the NEP. In conclusion, the NEP represents a transformative vision for the Indian education system to nurture, empowered, skilled, and globally competitive individuals. However, realizing this vision will require sustained efforts, adaptability, and collaboration to overcome challenges and ensure equitable access to quality education.

Keywords: National Education Policy (NEP), Education system, Quality Education, Transformative vision

DEVELOPMENT AND ASSESSMENT OF KODO MILLET COOKIES VALUE ADDED WITH GINGER POWDER***JYOTITIWARI*NEETU MISHRA*****Department of Family and Community Sciences, University of Allahabad, Prayagraj, Uttar Pradesh, India**

Kodo millet (*Paspalumscrobiculatum*) is an underutilized cereal which is the most affordable and has plethora of nutrition containing significant concentrations of protein, mineral (such as calcium and iron) and vitamins (such as B-complex). It is also low in simple carbs and gluten-free, making it ideal for people with type II diabetes, cardiovascular disease, and gluten sensitivities. Whereas *Zingiberofficinale*., commonly known as Ginger (Adarak in Hindi), belongs to the Zingiberaceae family, cultivated as spice & a folk medicinal plant and possess antioxidant, anti-inflammatory, and nutraceutical properties aids in the battle against several illnesses. According to several researches, millets have largely replaced the usage of refined flour, suggesting a possible use in bread goods. The main objectives of this study were a) Development of Kodo millet cookies by value addition of Ginger powder and evaluation of its sensory and nutritional parameters, b) Evaluation of the poly phenolic content and c) Antioxidant such as DPPH and FRAP activity. Basic formulation for production of Kodo millet cookie with desired sensory quality was obtained by incorporating 30% kodo flour and 10% of dry ginger powder with 20 minutes of baking time. Since the optimised formulation has a low moisture content (i.e., <5%) hence, it has an extended shelf life as well as it contains ample amounts of carbohydrate, protein, and fat (69%, 15%, and 8%, respectively). The improved formulation might be suggested to people of all ages, especially for growing children, lactating and pregnant women and gluten sensitive patients suffering from Diabetic, Celiac and Cardiac diseases due to its high complex carbohydrate, protein, fibre, antioxidant and gluten free content.

EFFECT OF PLANT BASED PESTICIDES IN GRAIN STORAGE MANAGEMENT**DR. JYOTIUIKEY, 2. DR. SUSAN MANOHAR****Dept. of Zoology, Sarojini Naidu Govt. Girls P.G. Autonomous College, Bhopal, (M.P), India. E-mail- jyoti.uikey91609@gmail.com****Dept. of Zoology, M.G.M.P.G. College, Itarsi, (M.P), India.**

The utilization of plant-based pesticides in grain storage management presents a promising avenue for sustainable pest control. This review paper examines the efficacy, mechanisms of action, and challenges associated with the adoption of botanical alternatives in grain storage facilities. Highlighted are the diverse phytochemical compositions of plant-based pesticides, their low toxicity to non-target organisms, and their compatibility with integrated pest management strategies. Despite their potential benefits, obstacles such as formulation complexities, limited chemical data, and regulatory hurdles hinder their widespread use. Addressing these challenges through collaborative research efforts and regulatory support is crucial to realizing the full potential of plant-based pesticides in grain storage management. By integrating these natural solutions into storage practices, we can promote food security while mitigating environmental and health risks associated with synthetic pesticides.

Keywords: plant-based pesticides, grain storage management, agriculture, integrated pest management, pest control.

RURAL ECONOMIC DEVELOPMENT IN UTTAR PRADESH**JYOTI AND NET RAM****Research Scholar, Department of Applied & Regional Economics, MJPRU, Bareilly****Research Scholar, Department of Agronomy MJPRU, Bareilly**

Rural economic development in Uttar Pradesh (U.P.) is a critical imperative for addressing poverty, inequality, and socio-economic disparities in one of India's largest states. This abstract provides an overview of the current state of rural economic development in U.P., highlighting key challenges, opportunities, and strategies for fostering inclusive and sustainable growth in rural areas. The rural economy of U.P. is predominantly agrarian, with agriculture serving as the primary source of livelihood for a significant proportion of the population. However, the agricultural sector faces numerous challenges, including low productivity, land fragmentation, water scarcity, and outdated farming practices. Additionally, rural areas in U.P. grapple with inadequate infrastructure, limited access to markets and services, high levels of unemployment, and persistent poverty. Despite these challenges, there are several opportunities for promoting rural economic development in U.P.

Keywords: Uttar Pradesh, Rural development, Economic growth, Agriculture, Infrastructure, Employment, Poverty alleviation, Sustainable development, Entrepreneurship Innovation, Skill development, Environmental sustainability, Governance and Public-private partnerships

EXPLORING KLEBSIELLA PNEUMONIAE CAPSULE POLYSACCHARIDE PROTEINS TO DESIGN MULTIEPITOPE SUBUNIT VACCINE TO FIGHT AGAINST PNEUMONIA**JYOTIRMAYEEDY, SOUMYARANJANMAHAPATRA, NAMRATAMISRA, MRUTYUNJAYSUAR*****School of Biotechnology, Kalinga Institute of Industrial Technology (KIIT) Deemed to be University, Bhubaneswar**

Klebsiella pneumoniae, which is among the top three pathogens on the World Health Organization's priority list, is one of the gram-negative bacteria that doctors and researchers around the world have fought for decades [1]. In India, approximately 68,000 pneumonia infection cases are found every year. Capsular polysaccharide (CPS) protein is widely known as an important *K. pneumoniae* virulence factor. The acidic CPS allows the pathogen to escape phagocytosis and serum killing by the host immune system. Thus, it has been the most characterized target for novel vaccines and drug discovery [2]. The inefficacy of currently available antibiotics due to multidrug-resistant strains urges the search for new types of antibacterial agents [3]. The study was performed to identify the putative epitopes of the CPS protein, composition of amino acids and their distribution in epitopic regions, conservancy, world population coverage, secondary and tertiary structure, disulphide engineering, physicochemical and biochemical characteristics, and molecular interaction between the chimeric multi-peptide construct and human TLR-4. Eight 9-15mer antigenic epitopes were selected based on high antigenicity and immunogenicity scores. Molecular dynamics simulation analysis of RMSD, RMSF, Radius of gyration, and H-bonds plots showed the stable configuration and high binding affinity for the TLR-4 receptor. In addition, the immune simulation results demonstrated that the multiepitopic construct can elicit an immune cascade against the pathogen and is capable of producing adequate antigen processing and presentation to CD4+ and CD8+ cells, as evidenced by the increased concentration of antigen processing cells such as dendritic cells and macrophages. The study also revealed that *K. pneumoniae* can be possibly recognized by the TLR-4 of host immune cells that are responsible for the adaptive immune response and could potentially be used for prophylactic or therapeutic applications.

INTENSITY OF PEDUNCLE BLIGHT AND ANTHRACNOSE IN TUBEROSE (*POLIANTHES TUBEROSA* L.) FLOWER CROP IN KARNATAKA STATE.**K. B. YADAHALLI^a, FAROOQKHAN^b AND I. K. KALAPPANAVAR^c**^aDepartment of Plant Pathology, College of Agriculture, Hanumanamatti, India.^bDepartment of Plant Pathology, UAS, GKVK, Bengaluru, India.^cDepartment of Plant Pathology, UAS, Dharwad, India.

Tuberose (*Polianthes tuberosa* L.) is the most important plant for the cultivation of long term spikes under tropical and subtropical ornamental bulbous flowers. It is entitled to be “king of flowers”. It is famous for its elegant appearance and sweet fragrance. In world, more than 90 countries are involved in commercial flower production. The estimated world floriculture products to hover around 20 billion dollars. The Netherlands, United States and Japan are the leading producer in the world. China and India are dominant in terms of area under flower cultivation. In India the area under tuberose cultivation is 16.19 thousand hectares with a production of 107.91 thousand metric tonnes of loose flowers and 89.29 thousand metric tonnes of cut flowers. Among Indian states, Karnataka ranks fourth in area and third in production after West Bengal, Tamil Nadu and Andhra Pradesh. The area under tuberose cultivation in Karnataka is 2.19 thousand hectares with a production of 17.43 thousand metric tonnes of loose flowers and 3.71 thousand metric tonnes of cut flowers. In recent days two new diseases viz., Peduncle blight and Anthracnose is causing severe yield loss in northern Karnataka. Peduncle blight caused by *Lasiodiplodia theobromae* causes 40 to 60 per cent yield loss. Whereas in favourable condition extends up to 92 per cent. The anthracnose caused by *Colletotrichum gloeosporioides* severity is ranges from 18-27 per cent. This was the first attempt to record the severity of peduncle blight and anthracnose of tuberose in northern Karnataka, because these foliar diseases are causing enormous yield loss and there is no information available on the severity of these diseases in this region. A roving survey was carried out for peduncle blight and anthracnose of tuberose caused by *Lasiodiplodia theobromae* and *Colletotrichum gloeosporioides* respectively, in major affected areas of northern Karnataka. From the results obtained, it was clear that, vegetative state is more vulnerable to the attack of the pathogens than flowering stage irrespective of the locations. Red soil type recorded higher disease severity as compared to black soil. Among the surveyed areas, the severity of peduncle blight of tuberose was maximum in Tumminakatti village (45.33%) of Haveri district while anthracnose severity was maximum in Saidapur farm (31.11%) of Dharwad district. Least disease severity of peduncle blight and anthracnose was recorded in Chandanamatti (13.33%) and Nigadi (6.67%) villages of Dharwad taluk of Dharwad district respectively.

Keywords: Tuberose, *Lasiodiplodia theobromae*, *Colletotrichum gloeosporioides*, peduncle blight, anthracnose**PREVALENCE OF SCLEROTIUM WILT OF BRINJAL IN KARNATAKA STATE****K. B. YADAHALLI¹, S. J. KIRANKUMAR² AND G. M. HEDGE³**¹Department of Plant Pathology, College of Agriculture, Hanumanamatti, UAS, Dharwad²Areca Nut Research Centre, Keladi Shivappa Nayaka UAHs³AICRP on Wheat and Barley, University of Agricultural Sciences, Dharwad

Brinjal or eggplant (*Solanum melongena* L.) is an important solanaceous crop of sub-tropics and tropics. It is known as king of vegetables in India. It is an important vegetable crop of Bangladesh, India, China and Philippines. The fruits of brinjal are widely consumed in various culinary preparations and are rich source of nutrients. It is low in calories and fats, contains mostly water, protein, fiber and carbohydrates. The brinjal is affected by many plant pathogens. Among them important fungal diseases are damping off (*Pythium* spp.), phomopsis blight (*Phomopsis vexans*), leaf spot (*Cercospora melongenae*), Alternaria leaf spot (*Alternaria melongenae*), little leaf of brinjal (Phytoplasma) and collar rot (*Sclerotium rolfsii*). The disease severity will be more at the early flowering and peak fruiting stage of brinjal and the fungus survive in the soil for years together by producing sclerotial bodies. *S. rolfsii* has been reported to cause the fruit yield losses up to 30 to 50 per cent. The Sclerotium wilt of brinjal is an important disease and occurs severely in the brinjal growing areas of northern Karnataka. In order to know the occurrence of disease and factors contributing for incidence of disease, a study was conducted to gain knowledge about prevalence of sclerotium wilt of Brinjal in northern Karnataka districts. A roving survey was conducted in five northern Karnataka brinjal growing districts during rabi 2020-21, observing Sclerotium wilt incidence and calculating percentages using Wheeler's formula (1969). The survey collected data was used to reveal a correlation between disease incidence and soil type, irrigation type, mulch type, and crop stage. The survey conducted in five districts of northern Karnataka (Belagavi, Bagalkot, Dharwad, Haveri and Gadag) revealed that maximum disease incidence of 35.07 per cent was recorded in Narendra village of Dharwad district followed by Nulageri village (17.71%) of Haveri district. No disease incidence was observed in Hanchinal village of Belagavi district and Pettur village of Bagalkot district. The average mean of district for Sclerotium wilt of brinjal was also recorded and results revealed that, Dharwad district showed maximum per cent disease incidence (12.39%) followed by Haveri (9.03%), Gadag (7.93%) and the least per cent disease incidence (6.89%) was recorded in Bagalkot district. A study on brinjal sclerotium wilt found that edaphic factors and agronomic practices, such as flooded irrigation and lack of mulching, contribute to high disease incidence in all five districts. Flooding spreads inoculum, while mulching improves soil temperature and restricts sclerotial germination. The fruiting and flowering stages of crops are most susceptible to disease due to nutrient imbalance and *S. rolfsii* invasion, urging the need for integrated management strategies to reduce brinjal sclerotium wilt.

Keywords: Sclerotium wilt, roving survey, disease incidence, brinjal, phomopsis blight

GROWTH TRENDS, TRADE AND SELF-SUFFICIENCY IN OILSEED SECTOR IN INDIA**K. L. BACHHAO¹, S. R. TORANE², A. D. CHAKRANARAYAN³, P. J. KSHIRSAGAR⁴, T. V. NAVGHARE⁵**¹Ph.D. Scholar, Department of Agricultural Economics, DBSKKV, Dapoli (MS) India,²Deputy Director of Research (AE) & Head, Department of Agricultural Economics, DBSKKV, Dapoli (MS) India³Ph.D. Holder, Department of Agricultural Economics, DBSKKV, Dapoli (MS) India⁴Associate Professor, Department of Agricultural Economics, DBSKKV, Dapoli (MS) India⁵Assistant Professor, Department Agricultural Economics, DBSKKV, Dapoli (MS) India

This research paper provides a comprehensive analysis of India's oilseed sector spanning from 1949 to 2021, examining key aspects such as production, consumption, trade dynamics, pricing trends and self-sufficiency of India in oilseed sector. A gradual expansion in oilseed was indicated by compound annual growth rates in area (1.34%), production (2.86% and productivity (1.53%), albeit with higher instability in production. Analysis of edible oil production, import, and consumption trends from 1995 to 2021 indicates a significant shift towards growing reliance on imports, with domestic production averaging 83.90 lakh tonnes and imports averaging 83.49 lakh tonnes, leading to a decline in self-sufficiency from 64.98 per cent to 44.30 per cent. While, domestic production and availability of edible oils show steady growth to the tune of 2.29 percent and 2.51 percent respectively. However, imports recorded growth at substantially 9.36 percent, surpassing domestic production growth. Pricing trends analysis from 2001 to 2021 reveals a dynamic nature of export and import prices, with export prices growing at a CAGR of 7.18 per cent and import prices at 7.39 per cent. The research underscores need to minimize the reliance on imports to bridge the gap between domestic production and consumption and emphasizing the need for strategic interventions to ensure stability and sustainability.

Keywords: Exports, Imports, Trade deficit, Strategic measures, Self-sufficiency, Trade imbalance, oilseeds, edible oil, Dependency, Domestic production, Compound Annual Growth Rate.

ROLE OF NANOMATERIALS IN HORTICULTURE: AN OVERVIEW**K. M. NAIK*, N. D. DAPURKAR****Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, MH**

Nanotechnology has become increasingly important in horticulture due to its significant impact on crop production, plant health, and resource management. Nanomaterials like nanofertilizers improve nutrient uptake efficiency, reducing environmental impact and optimizing resource usage. These nanomaterials, characterized by a particle size less than 100 nm, play a significant role in various stages of plant life, including seed germination, seedling vigor, root development, growth, photosynthesis, and flowering. Moreover, they mimic the actions of antioxidative enzymes like superoxide dismutase (SOD), catalase (CAT), and peroxidase (POX), thereby aiding in protecting plants against oxidative stress. Similarly, nanopesticides are more effective in managing pests and diseases, reducing reliance on conventional chemical treatments. Role of nanomaterial in horticulture is broad, alongside their advantageous effects, the application of nanomaterials has also been shown to have phytotoxic effects, as they can elevate the generation of reactive oxygen species (ROS). The increased ROS levels have the potential to harm cellular membranes, proteins, and nucleic acids. Thus, understanding the mechanisms through which nanomaterials provide cellular, biochemical, and molecular protection to plants under stressful environmental conditions is crucial. This review systematically explores the role of nanomaterials in horticulture. Additionally, it discusses the balanced approach, taking into account ethical, environmental, and regulatory considerations to maximize benefits while mitigating risks.

Keywords: Nanomaterials, Horticulture, Sustainability, Growth, Yield

EFFECT OF NANO UREA FOLIAR SPRAY ON GROWTH AND YIELD OF KHARIF MAIZE (ZEA MAYS L.)**K. M. NAIK*, N. D. DAPURKAR****Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, MH**

The field investigation entitled 'Effect of nano urea foliar spray on growth and yield of Kharif maize (Zea mays L.)' was conducted during Kharif season 2021-2022 at experimental farm, Department of Agronomy, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani with a view to study the effect of nano urea foliar spray on growth and yield of Kharif maize. The experiment was laid out in RBD with three replications and ten treatments Viz., T1- RDN with commercial urea in 2 equal splits, T2- Foliar spray of 100% RDN with nano urea in 2 equal splits - 20 & 40 DAS, T3- Foliar spray of 100% RDN with nano urea in 3 equal splits - 20, 30 & 40 DAS, T4- Foliar spray of 100% RDN with nano urea 4 equal splits - 10, 20, 30 & 40 DAS, T5- Foliar spray of 75% RDN with nano urea 2 equal splits - 20 & 40 DAS, T6- Foliar spray of 75% RDN with nano urea 3 equal splits - 20, 30 & 40 DAS, T7- Foliar spray of 75% RDN with nano urea 3 equal splits - 20, 30 & 40 DAS, T8- Foliar spray of 125% RDN with nano urea 2 equal splits - 20 & 40 DAS, T9 – Foliar spray of 125% RDN with nano urea 3 equal splits - 20, 30 & 40 DAS, T10 – Foliar spray of 125% RDN with nano urea 4 equal splits - 10, 20, 30 & 40 DAS. Maize cv. used for experimental study was KOMAL. Results showed that application of RDN with commercial urea in 2 equal splits (T1) produced taller plant height (232 cm), more no. of functional leaves (8.72), leaf area (35.52 dm²) and dry matter accumulation (315 g) with maximum no. of grain row-1 (38), no. of grain rows cob-1 (16), no. of grain cob-1 (608), grain weight cob-1 (135.72 g), cob weight without husk (149.74 g) and maximum grain yield (6812 kg ha⁻¹). It was followed by foliar spray of 125% RDN with nano urea 4 equal splits - 10, 20, 30 & 40 DAS (T10) (6300 kg ha⁻¹) which was at par with foliar spray of 125% RDN with nano urea 3 equal splits - 20, 30 & 40 DAS (T9) and foliar spray of 100% RDN with nano urea 4 equal splits - 10, 20, 30 & 40 DAS (T4). Minimum growth and yield attributes were obtained with T5- Foliar spray of 75% RDN with nano urea 2 equal splits - 20 & 40 DAS which was on par with with foliar spray of 100% RDN with nano urea in 2 equal splits - 20 & 40 DAS (T2), foliar spray of 75% RDN with nano urea 3 equal splits - 20, 30 & 40 DAS (T6) and foliar spray of 75% RDN with nano urea 3 equal splits - 20, 30 & 40 DAS (T7).

Keywords: Nano Urea, Kharif Maize, Foliar Spray, Growth, Yield

INHERITANCE STUDY ON JASSID (AMRASCABIGUTTULABIGUTTULA) TOLERANCE IN F₂ POPULATION OF UPLAND COTTON (GOSSYPIMUMHIRSUTUM L.)**K YAKSHA, S RAJESWARI, N PREMALATHA AND N MANIKANDABOOPATHI****Department of Cotton, Centre for Plant Breeding and Genetics, Tamil Nadu Agriculture University, Coimbatore**

India is one of the largest producers of cotton in the world, but the productivity of cotton is comparatively low. One of the major factors limiting the productivity in cotton is pest infestation. Earlier cotton production was inhibited by the boll worms which is now coped up with Bt cotton but sucking pest infestation is still a prime concern. This study was conducted in the F₂ population of four upland crosses- TVH002 x RAHC1039, TCH1894 x NDLH32, CO17 x KC2 and TVH002 x KC3, which were evaluated for the inheritance pattern of jassid tolerance. Three of the four crosses segregated in 3:1 ratio (Resistant, susceptible) and the fourth cross segregated in 13:3 ratio (Resistant, susceptible), showing digenic interaction. Further molecular investigation is essential to confirm this pattern of inheritance and progress the work in this direction.

Keywords: Jassid tolerance, inheritance, jassid injury, grading**ASSESSMENT OF PLANT GROWTH-PROMOTING RHIZOBACTERIA: ANTAGONISTIC ACTIVITIES AND DETERMINATIVE FACTORS****KAHKASHAN ARZOO¹, ERAYYA¹, SMITA PURI², REKHA BALODI³ & KALMESH, M⁴ & J. KUMAR⁵**¹Department of Plant Pathology, Bihar Agricultural University, Sabour, Bhagalpur, Bihar*²Department of Plant Pathology, Jawaharlal Nehru Krishi Vishwavidyalaya Jabalpur, M. P³ICAR, National Centre for integrated Pest Management, New Delhi⁴Department of Entomology, Bihar Agricultural University, Sabour, Bhagalpur, Bihar⁵G. B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand

Antagonistic potential of seventy plant growth promoting rhizobacteria (PGPR) isolated from rhizospheric and rhizoplane soils from plains of Uttarakhand was assessed. Antagonism potential was ascertained against four fungal pathogens viz., *Bipolaris sorokiniana*, *Colletotrichum gloeosporioides f.sp. mangiferae*, *Fusarium oxysporum f.sp. lycopersici* and *Rhizoctonia solani* following dual culture plate technique. Among the seventy isolates, 30 isolates were shown to inhibit the radial growth of the all four pathogens under *in vitro* conditions. A great diversity was seen in the antagonistic behavior of the isolates with Pfa-50 and Pfa-22 showing more than 50% inhibition percent against all the test pathogens except *Fusarium* where it was only 39.1 percent in case of Pfa-50 and 46.9% in case of Pfa-22. Further elucidation of mechanism of biological control potential among thirty screened isolates was carried out for HCN production and chitinase activity. Of those 30 isolates only 22 showed positive response for HCN production and chitinase activity. The remaining eight isolates were neither chitinase producer nor HCN producer. The antagonistic potential of these isolates might be due to the production of other antimicrobial compounds. The screened isolates may further be evaluated under field conditions and may be incorporated in integrated pest management practices and can also be used in organic farming system.

Keywords: Biocontrol, PGPR, Growth promotion, Plant disease, Metabolites**UNEARTHING THE PHYTO-CONSTITUENTS, ANTIOXIDANT EFFICACY, AND ANTIMICROBIAL COMPARATIVE STUDY OF PROLINE FUNCTIONALIZED ZINC OXIDE NANOPARTICLES OF MOMORDICA DIOICA WITH THAT OF ITS SEED EXTRACT AND THE FORMULATION OF HERBAL INSECT REPELLENT SPRAY USING THE SEED EXTRACT*****¹KAILAKSHI & *²NISHTHA**^{1,2}Department of Biosciences, UIBT, Chandigarh University, Mohali, Punjab, India

Momordica dioica, commonly known as kantola or spiny gourd, is a species of vine in the Cucurbitaceae family found primarily in the tropical and subtropical regions possessing notable therapeutic properties. The main objective of this research work was to compare the antioxidant potential, antifungal, and antibacterial activity of the seed extract of *Momordica dioica* with its green fabricated (Proline functionalized) Zinc Oxide nanoparticles (ZnO NPs). Qualitative analysis of the seed extract revealed the presence of several phytoconstituents like terpenoids, phenols, saponins, coumarins, cardiac glycosides, flavonoids, etc. The DPPH method was employed to determine the extract's effectiveness as an antioxidant at multiple concentrations (10 µg/ml – 80 µg/ml) by inhibiting the free radicals. *Momordica dioica*'s seed extract exhibited an IC₅₀ value of 46.15 µg/ml indicating a notably strong antioxidant and the highest % RSA was exhibited at the concentration of 80 µg/ml and was observed to be 32.89%. Additionally, *Momordica dioica*'s methanolic seed extract and its Proline-functionalized ZnO nanoparticles were evaluated at multiple concentrations (10 µg/ml – 50 µg/ml) for its antibacterial activity against five test pathogens such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Listeria monocytogenes*, and *Bacillus cereus*. Among the chosen bacterial strains, the most pronounced antibacterial effectiveness was observed against *Bacillus cereus* (89.28 % inhibition) by the seed extract and *Listeria monocytogenes* (93.10 % inhibition) by the Proline-functionalized ZnO nanoparticle. The minimum inhibitory concentration (MIC) values ranged from (0.125 mg/ml – 8 mg/ml). The highest MIC value was (8 mg/ml) observed in the case of *Pseudomonas aeruginosa* for both the seed extract and ZnO NP, while the lowest MIC (0.25 mg/ml) was observed in the case of *Listeria monocytogenes* by the ZnO NP and (0.25 mg/ml) in the case of *Bacillus cereus* by the seed extract. Additionally, the antifungal activity of both the seed extracts as well as the Proline-functionalized ZnO nanoparticles was evaluated against selected fungal strains of *Rhizopus stolonifer*, *Aspergillus flavus*, *Penicillium purpurogenum*, and *Aspergillus niger* was assessed. Amid the selected fungal strains, the most notable antifungal efficacy was demonstrated against *Rhizopus stolonifer* (100% inhibition) by both the seed extract and the Proline-

functionalized ZnO nanoparticles. The MIC values ranged from (0.05 mg/ml – 6 mg/ml). The highest MIC value was (6 mg/ml) observed in the case of *Aspergillus niger* by the seed extract and *Penicillium purpurogenum* by the ZnO NP. The lowest MIC (0.05 mg/ml) was observed in the case of *Rhizopus stolonifer* by both the seed extract as well as the ZnO NP. It is observable that the Proline functionalized ZnO nanoparticles showed better antimicrobial efficacy as the enhanced antimicrobial efficacy of the Proline functionalized nanoparticles against the selected microbial strains is evident, attributed to their enlarged surface area and unique physicochemical properties. These nanoparticles demonstrate enhanced penetration into microbial cells, facilitating their antimicrobial effects through mechanisms such as oxidative stress, membrane disruption, and DNA damage. Since *M. dioica* comprises a substantial number of bioactive compounds, it exhibits therapeutic and insecticidal properties as evaluated from the result of formulating herbal insect repellent has several merits for both the environment and human use because that is developed with organic substances, and has a pleasing fragrance, are affordable, and limit exposure to chemicals. Evaluations are carried out on a wide range of aspects of the herbal insect-repellent formulation, including homogeneity, pH, volatile matter, preservatives, stickiness, texture, and biodegradability.

EFFECT OF ORGANIC AND INORGANIC SOURCES OF NITROGEN ON YIELD, QUALITY OF WHEAT AND SOIL FERTILITY IN INCEPTISOL OF VARANASI

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There is a growing gap between the demand for nutrients and their supply, and the excessive use of agrochemicals like inorganic fertilizers, pesticides, herbicides, and fungicides has detrimental effects on human health, soil quality, and the environment. To address this issue, an experiment was conducted to evaluate the impact of organic amendments as a partial substitute for inorganic fertilizers. The results showed that combining organic manures with inorganic fertilizers yielded superior outcomes. The experiment took place in November 2020-2021, focusing on wheat cultivation in the Net House of the Department of Soil Science and Agricultural Chemistry at Banaras Hindu University, Varanasi. Various treatment combinations of organic and inorganic sources were applied alongside the recommended dose of fertilizer (RDF) and zinc. The treatments included: T₁: Control, T₂: RDN* through urea (100%) (120:60:60) Kg ha⁻¹, T₃: 50%RDN through urea + 50%N through FYM (14 t ha⁻¹), T₄: 50%RDN through urea + 50%N through Vermicompost (5 t ha⁻¹), T₅: 50%RDN through urea + 50%N through Poultry Manure (5.26 t ha⁻¹), T₆: 50%RDN through urea + 50%N through Sewage Sludge (7.5 t ha⁻¹), T₇: 100% N through FYM (28 t ha⁻¹), T₈: 100% N through Vermicompost (10 t ha⁻¹), T₉: 100% N through Poultry Manure (10.53 t ha⁻¹), T₁₀: 100% N through Sewage Sludge (15 t ha⁻¹). Among the various organic amendments, poultry manure was found to be the most effective due to its high nutrient content. Yield-related parameters such as plant height, spike count per plant, spikelet number, spike length, grain yield, stover yield, and harvest index, as well as grain quality, were significantly influenced by the application of organic amendments. Additionally, the post-harvest soil properties were impacted by the type of manures used, resulting in observable changes in physicochemical soil characteristics. This study demonstrates that using optimal fertilizer doses can maximize crop yield while minimizing harm to the ecosystem. Sustainability can be achieved through the integration of nutrient management practices, emphasizing the urgent need for such approaches in the current agricultural context.

FRONTLINE DEMONSTRATIONS: EMPOWERING MAIZE FARMERS WITH INTEGRATED PEST MANAGEMENT FOR COMBATING FALL ARMYWORM

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The fall armyworm, scientifically known as *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae), originates from the Americas then it was reported for the first time causing severe damage on maize in Karnataka, India, during May 2018. Subsequently spread to different parts of India which is caused huge loss to maize cultivators. In this view ICAR- KrishiVigyan Kendra, Dharwad conducted 30 Front Line Demonstrations in the farmer's fields on Integrated Pest management (IPM) of fall army worm in Maize crop during 2018-2022. The results showed that average net return per hectare Rs. 39704 was recorded in demonstrated plot, while it was Rs. 30460 under farmers practice. The cost benefit ratio was 2.23 and 1.91 for demonstration and farmer's practices respectively. The average additional benefit of Rs. 9244 was recorded in demonstration plot. The integrated pest management practices gave 11.43 and 8.44 percent increase in yield in comparison with the control. Chlorantraniliprole, emamectin benzoate, and *Nomuraearileyi* are promising components for the integrated pest management of fall armyworm in India.

Keywords: Fall armyworm, Karnataka, Front Line Demonstrations, Maize

ETHNO-MEDICINAL SURVEY OF PLANTS USED AGAINST DIABETES IN SURGANA REGION OF NASHIK DISTRICT (MAHARASHTRA)**KALE A.S., TAMBES S.S., TAMBES R.*****Department of Botany, L.V.H. College Panchavati (Nashik)*****Department of Botany L.V.H. College Panchavati (Nashik)*****MG Vidyamandir's S.P.H. College Pharmacy Malegaon (Nashik)**

The present paper deals with the plant based folk practices used in the treatment of diabetes. The survey was conducted in Surgana region of Nashik district. Even though modern medical facilities are not available in these places. Peoples in villages still use plant therapy to a considerable extent. They still depend traditionally on wild plants for their vicinity. The medicinal plants comparatively easy, the lower cost, and to a popular belief that plant derived medicines are better suited for the body. So the Adivasi (Folk) people like Bhil, Kokani, Pawara, Vanjara etc., are the real treasures of ancient traditions and cultural heritage. So a proper documentation and preservation of these practices are essential. Paper includes 25 plant species belongs to 19 families, 23 genera and 25 species.

Keywords: Diabetes, Ethno-medicine, Surgana.**ASSESSMENT OF PESTICIDES-INDUCED OXIDATIVE STRESS IN FRESHWATER FISH: IMPLICATIONS FOR AQUATIC ENVIRONMENTAL HEALTH****KALPANA SINGH*¹, VANDANA GARG¹****¹Department of Zoology, Deva Nagri College, Meerut, Uttar Pradesh, India**

This study aimed to assess the effects of chlorpyrifos and clomazone exposure on oxidative stress in *Channa punctatus* fish. The fish were subjected to three sub-lethal concentrations of chlorpyrifos [high dose (0.6 ppm), mild dose (0.3 ppm), and low dose (0.16 ppm)] and clomazone [(high dose of 0.5 ppm, mild dose of 0.25 ppm and low dose of 0.08 ppm)], while a control group was included for comparison. The results demonstrated a significant increase in the concentration of malondialdehyde (MDA), a marker of lipid peroxidation, was observed in the tissues of fish exposed to chlorpyrifos and clomazone, further emphasizing the dose-dependent and time-dependent effects. Glutathione peroxidase (GPx) activity exhibited significant alterations across tissues, with higher doses and prolonged exposure leading to more pronounced effects. These findings suggest that chlorpyrifos and clomazone exposure can induce oxidative stress in various tissues of *C. punctatus* fish, potentially leading to detrimental consequences for their health and survival. Consequently, this study underscores the significance of monitoring and regulating pesticide use in aquatic environments to mitigate potential ecological risks.

GC-MS PROFILING OF METABOLITES OF ENDOPHYTIC FUNGI CURVULARIA ORYZAE FROM DISTIMAKEDISSECTUS. KALPASHREE M M¹ AND DR. KRISHNA K²**Research Scholar¹ and Professor. P.G. Department of Botany², Yuvaraja's College (Autonomous), Mysuru**

In recent days endophytic fungi are recognized as an excellent source of widely occurring natural products of natural products, mostly secondary metabolites. The vital use of these fungi may provide benefit to current demand for novel biomolecules in agriculture, medical and pharmaceutical industries. This research emphasizes on the numerous fungal endophytes that have been isolated from *Distimakedissectus* which has known to be a rich herbal source. The isolates were identified based on the morphological identification and molecular characterisation. *Curvularia oryzae* was found to be the most predominant. The selected fungal isolate *Curvularia oryzae* was screened for the production of secondary metabolites, followed by extraction using ethyl acetate. Ethyl acetate fraction of culture filtrate was subjected to GC-MS analysis, resulted in the identification of several compounds and some are known to have medicinal properties, such as anti-fungal and anti-bacterial effects. This analysis revealed the presence of various metabolites/bio-compounds viz., 3-Octen-2-one, 1-Undecene 9-methyl, 1-Dodecanol, Oxalic acid, allyl hexadecyl ester, 2-Undecanol, Formic acid, oct-2-yl ester etc. These findings suggest the potential bio active compounds could be used in the development of antimicrobial agents that can be used in pharmaceuticals and agrochemicals. Fungal based products offer a unique opportunity to discover novel therapeutic agents to combat various infectious agents and agricultural pathogens. This study is an important step to investigate the biodiversity of fungal endophyte and to explore novel bioactive compounds from natural resource.

Keywords: *Distimakedissectus*, *Curvularia oryzae*, Endophytic fungi, Bioactive compounds, Gas Chromatography - Mass Spectrometry (GC-MS Profiling).

BIOEFFICACY OF SOME INDIGENOUS PRODUCTS AND BIO-PESTICIDES IN THE MANAGEMENT OF EGGPLANT SHOOT AND FRUIT BORER (*LEUCINODES ORBONALIS* GUENEE) IN JHANSI, UTTAR PRADESH, INDIA

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An experiment was conducted to observe the efficacy of some indigenous products and bio-pesticides in the management of Eggplant shoot and fruit borer (*Leucinodes orbonalis* Guenee) on brinjal during Rabi season, 2022-23 at Organic Research Farm Karguaji, Department of Entomology, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (Uttar Pradesh). The experiment was laid out in Randomized block design with nine treatments replicated thrice along with a control plot to check the efficacy of selected bio-pesticides against eggplant shoot and fruit borer (*Leucinodes orbonalis* Guenee). In the series of shoot infestation, the efficacy of treatments on first spray showed that per cent shoot infestation was minimum in treatment T₄Bt. 2.0 kg/ha, followed by T₁*Beauveria bassiana* 2.0 lit/ha, T₃Neem oil 5%, T₈*Metarhizium anisopliae* 1.5 lit/ha, T₂NSKE 5%, T₅Panchagavya 0.01%, T₇Castor oil 5% and T₆Garlic extract 5% as compared to T₉ control. All the treatments were found effective and significantly superior over the control. Based on percent fruit infestation on eggplant, minimum fruit infestation was observed in treatment T₄Bt. 2.0 kg/ha, followed by T₁*Beauveria bassiana* 2.0 lit/ha, T₃Neem oil 5%, T₈*Metarhizium anisopliae* 1.5 lit/ha, T₂NSKE 5%, T₅Panchagavya 0.01%, T₇Castor oil 5% and T₆Garlic extract 5% as compared to T₉ control. All the treatments were found effective and significantly superior over the control. Same trend of effectiveness of treatments was found in both the cases i.e. in shoot infestation as well as in fruit infestation.

Keywords: Eggplant, Bio-efficacy, *Bacillus thuringiensis*, *Beauveria bassiana*, Neem oil.

VALUE ADDITION OF BABY'S BREATH (*GYPSOPHILA PANICULATA*) CV. CASSIOPEIA BY TINTING WITH ARTIFICIAL FOOD DYES

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Gypsophila (*Gypsophila paniculata* L.) commonly known as Baby's-breath is a member of Caryophyllaceae family and is native to Central and Eastern Europe. *G. paniculata* (2n=34) is a perennial herbaceous shrub that is the only species used as cut flowers in the genus *Gypsophila*. *G. paniculata* is commonly used as fresh or dried filler in flower arrangements and bouquets because of its ornamental value; it ranks among the top ten best-selling cut flowers in the world's floriculture market. Furthermore, the plants of *G. paniculata* contain a variety of bioactive compounds with potential medicinal values, including flavonoids and triterpenes. One of the most important decorative characteristics and the main attraction of many floricultural species (such as lisianthus, roses, and carnations) is their type of flower. Of all those different kinds of flowers, the double flower is regarded as the most important and valuable kind. Value addition is a method of increasing the economic value of a product. Different value addition techniques are used in horticultural products to increase its economic value, especially in floricultural products. Tinting is one of the value addition techniques used in cut flowers to increase the economic and aesthetic value of simple white and light coloured flowers with food colouring dyes in different novel colour shades. The study "Value addition of cut flowers of Baby's breath by tinting with artificial food dyes" was conducted in laboratory of Department of Horticulture, Assam Agricultural University, Jorhat, Assam during April 2024, with six treatments. The results of the experiment revealed that, quantity of dye uptake (ml), time taken for colour absorption, percentage of florets tinted and differed significantly. However, maximum quantity of dye uptake (ml) was recorded in rose pink (9.22) and minimum in chocolate brown (7.12), time taken for colour absorption (hrs.) was maximum (1.89) in red which is on par with chocolate brown (1.43) and minimum in rose pink (0.85) which is on par with spinach green (0.95), maximum percentage of tinted florets was recorded in rose pink (85.19) and minimum in Red (69.81), maximum vase life (5.67 days) was recorded in rose pink and minimum in red (4.99 days) which is on par with chocolate brown (4.12 days). Among the different food dyes and methods of absorption, rose pink @ 3% by stem absorption had shown best vase life of *Gypsophila* flowers.

Keywords: baby's Breath, Cut Flowers, Tinting, Value Addition, Floristry

SMART AGRICULTURE: HYDROPONICS AND AEROPONICS

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Soil-based agriculture is now facing various challenges such as urbanization, natural disasters, climate change, and indiscriminate use of chemicals and pesticides which is depleting the land fertility. Among different problems, the most important one is the decline in per capita land availability. With 6 billion people on earth, the per capita land availability is currently 0.25 hectares and by 2050 it will be 0.16 hectares. Currently hydroponic and aeroponics cultivation is gaining popularity around the world because of efficient resource management and quality food production. Hydroponics is a viable solution towards more sustainable food production while avoiding hazardous chemicals. Hydroponics is the art of soilless agriculture in which growing of plants in a soil-less medium, or an aquatic-based environment. Hydroponic growing systems use mineral nutrient solutions to feed the plants in water using soilless media. Those agricultural farming

systems could be one sustainable alternative to provide different types of produce that require less water, less fertilizer and less space which will increase the yield per unit area. The main advantage of those modern cultivation systems is the conservation of water and less or no use of agrichemicals which are dangerous to the human body when applied and especially when eating in the food. Plant roots in this system are suspended in a dark enclosure, while a nutrient-dense solution is sprayed on the roots at certain intervals. Aeroponic techniques have proven to be commercially successful for propagation, seed germination, seed potato production, tomato production, leaf crops, and micro-greens. Vegetable crops like potatoes, yams, tomatoes, lettuce and some leafy vegetables are being commercially cultivated aeroponic systems.

Keywords: Aeroponic, agrichemicals, climate change, Hydroponics, sustainable

EVALUATING THE EFFECTIVENESS OF PHOSPHATE SOLUBILIZING BACTERIA ON PLANT GROWTH AND DEVELOPMENT OF TARTARY BUCKWHEAT (*FAGOPYRUM TARTARICUM* (L.) GAERTN.)

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Tartary buckwheat (*Fagopyrum tartaricum*) is rich in amino acids, lysine, dietary fiber, lipids, minerals, and rutin. Its health benefits include reduced high blood pressure, lowered risk of cardiovascular disease and other chronic illnesses, as well as exhibiting antioxidant and anti-inflammatory properties. Plant nutrients especially phosphorus has shown increased yield of tartary buckwheat crop even in low nitrogen level in soil. This brings an opportunity to utilize the use of Phosphate Solubilizing Bacteria (PSB) to supplement the growth parameters. There are limited studies conducted to evaluate the effect of PSB in Neglected and Under-utilized Crop Species (NUS) and almost none in tartary buckwheat. This study aims to quantify the phosphate solubilizing capacity of different PSB isolated from fast growing species (*Alnus nepalensis* and *Bambusa balcooa*) and identify the compatible strain with Nepalese tartary buckwheat varieties. Initially, bacteria were isolated from the soil and subjected to screening on Pikovskaya's agar. Among different isolates obtained, four isolates showed phosphate solubilizing activity by producing halo-zone around the bacterial colonies. Phosphate Solubilizing Index (PSI) of An8 and B9 was found to be 2.5 while that of An6 and An9 was found to be 2.45 and 2.41 respectively. Higher the PSI, higher is the ability to solubilize phosphate. The isolates were further evaluated for their proficiency in solubilizing phosphate in Pikovskaya broth medium. Concentration of solubilized phosphate of these four isolates was calculated among which An8 showed least phosphate concentration of 363 µg/ml while An9 exhibited highest concentration of 485 µg/ml. These strains, characterized by their high phosphate solubilization capacity, showed great potential for utilization as biofertilizers in forthcoming agricultural practices. Pot experiment to identify compatible strain among the four bacteria with Tite-1 and Tite-2 varieties of Nepal is being carried out in high hill (2000 masl) area of Sindhupalchowk district.

RE-EXPLORATION OF NAVGRAHAVATIKA IN INDIA FOR ENVIRONMENT AND HUMAN HEALTH

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Navgraha Vatika is related to the Navgraha of our planetary system. The word "Navgraha" refers to the nine celestial bodies or planets of our solar system and "vatika" represents the garden and greenery. In which the garden is made by planting nine important plants in particular geometry and symmetrically in the right directions. The description of this type of garden is found in ancient Indian history. According to Indian astrology, nine planets maintain the energy of this universe, which has a profound effect on the life of the earth. The Navgrahas and their related plants are as follows: Surya - Madar tree, Chandra - Palash tree, Mars - Khair tree, Guru - Peepal tree, Venus - Gular tree, Shani - Shami tree, Rahu - Doob grass, Ketu - Kush. It is believed that the smoke emanating from using the wood of these plants in the Yagya destroys the harmful germs present in the environment and the air becomes pure. According to Indian Astrology, the plants of Navgraha have a good and profound effect in attracting human health and divine energy power and keeping the environment pure and pure. Unfortunately, such new planetary gardens have become extinct. This is also a reason to establish navgrahavatika in order to bring the entire universe on the earth. It would be noteworthy to mention that more oxygen is being released by navgraha plant species as compared to any other plant species. In today's dynamic era, due to increasing technology, there is a very bad effect on the life of human beings. Therefore, to avoid these effects, there is a need to make our people's life, environment beauty and healthy by re-building and establishing Navgraha Vatika in India and welcoming our lost tradition.

Keywords: Navgraha, Geometry, Symmetrically, Vatika, Establishment

FLORAL TRAITS AND ANATOMICAL FEATURES OF CASSIA FISTULA

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Cassia fistula is a medium sized deciduous or semi-deciduous tree, 10 to 15m tall with a straight trunk to 5m in height and 1 m in diameter. The stem bark is pale grey, smooth and slender when young and dark brown and rough when old. The leaves are alternate, spirally arranged, each pinnae bearing leaflets. The flowers are showy, bright yellow in colour, pentamerous and slightly zygomorphic in shape. They are borne on terminal, drooping racemes about 30-60 cm long which can be grouped by 3. The fruit is a pendulous, cylindrical, indehiscent pod. It is black, glabrous and many seeded. The seeds are ellipsoid, glossy light brown in colour. The Latin name "cassia" meaning fragrant

and aromatic plant. In Ayurvedic medicine, the golden shower tree is known as aragvadha, meaning "disease killer". The fruit pulp is considered a purgative and self-medication or any use without medical supervision is strongly advised against in Ayurvedic texts. Though it has been used in herbalism for millennia, little research has been conducted in modern times. Flower extract exhibits anti-aging properties on skin. In the present investigation, flower traits, seed shape, spore structure, microscopic and anatomical features of different plant parts have been studied using SEM microscope. These investigations were conducted on the plants of different geographical populations. The results indicate that there were no major differences among the studied populations. These studies can be useful in understanding the pollination system and adaptability of the plant to changing climatic conditions. Further, the results of the present work forms the basis of research work that can be carried out for the genetic characterization and improvement of this plant species in future.

BIOINSPIRED APPROACH: VITEX NEGUNDO AND ACORUS CALAMUS SILVER OXIDE NANOPARTICLES FOR EFFECTIVE MANAGEMENT OF MELOIDOGYNE INCOGNITA

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The root-knot nematode *Meloidogyne incognita* (*M. incognita*) poses a substantial threat to vegetables, causing considerable economic loss. This study elucidates the process of green synthesis and characterization of silver oxide nanoparticles from *Vitex negundo* (*V. negundo*) and *Acorus calamus* (*A. calamus*) in combating the second juvenile stage of the Root-knot nematode (*M. incognita*). Pure silver oxide nanoparticles (AgONPs) were synthesized from *V. negundo* and *A. calamus* extract with particle sizes ranging from 60-80 nm in diameter. An extract of a plant part and a metal ion were mixed in a fixed ratio and a color change was observed, proving the formation of nanoparticles. The characterization of silver oxide nanoparticles has been done by XRD, FTIR, UV, SEM, and TEM. In this study, we investigated the antagonistic activity of synthesized AgONPs against *M. incognita* with 20, 40, 60, 80, and 100 ppm concentrations. The highest mortality of J2s was found in the 100 ppm concentration of AgONPs after 48 h of exposure and the least mortality was observed at 20 ppm after 24 hours. The unique effects of silver made it of particular interest for the synthesis of nanoparticles process due to its evocative physical and chemical properties. Thus, it will offer an excellent eco-friendly strategy to optimize yield under pathogens attack and provide prospects of green synthesized-based nanoparticle development for pest control. *V. negundo* and *A. calamus* hold tremendous promise for revolutionizing pest management strategies in agriculture. Plants-mediated silver oxide nanoparticles will also help to resolve the current toxicity concerns and future challenges in agriculture.

Keywords: Green synthesis, Nanoparticles, Root-knot nematode, Mortality, Nematicides.

EFFECTIVE MANAGEMENT OF STORED GRAIN PESTS, RHYZOPERTHA DOMINICA AND SITOPHILUS ORYZAE USING SEED PROTECTANTS: A NON-CHEMICAL SUBSTITUTE

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Cereals are vital to our nation's economy since they meet the global food demand of the rising population. Despite improved yield potential in the previous years, a large part of produce is being wasted due to post-harvest losses during storage in wheat and barley. Among stored grain pests, *Rhyzoperthadominica* and *Sitophilus oryzae* pose severe threat to post-harvest storage of grains. Therefore, farmers often choose to use synthetic pesticides as a quick cure for pest management. The excessive reliance on pesticides has resulted in serious environmental and economic issues worldwide. Thus, exploring eco-friendly approaches is now essential for effective management of stored grain pests. The studies on the management of *R. dominica* and *S. oryzae* in association with wheat and barley were conducted to determine the effect of seed protectants on pest mortality and percent repellency. Seven seed protectants (neem oil, eucalyptus oil, karanj oil, castor oil, sweet flag powder, turmeric powder and diatomaceous earth) were tested against *R. dominica* and *S. oryzae*, by mixing them directly with wheat and barley grains. Among these treatments, maximum adult mortality of *R. dominica* and *S. oryzae* in treated wheat seed was observed in sweet flag powder (83.21% and 80.00%, respectively) followed by neem oil (69.67% and 69.17%, respectively). However, the minimum adult mortality was observed in turmeric powder (7.89% and 6.78%, respectively). The similar trend was observed in barley also. The treatment of sweet flag powder to wheat and barley seeds was found to be highly repellent followed by neem oil, eucalyptus oil, diatomaceous earth and castor oil in series for both the pests. Whereas, turmeric powder and karanj oil have shown non-repellent properties.

Keywords: Wheat, barley, management, stored grain, pests, botanicals, sweet flag, neem, biotic stress

AGRICULTURE 5.0: IOT, AI, MACHINE & DEEP LEARNING, CLOUD COMPUTING, BIG DATA ANALYTICS, BLOCKCHAINS FOR SMART AND SUSTAINABLE PRECISION FARMING

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There are several reports which suggest that by 2050, we ought to make 70% more food than what we are producing today. These targets can only be achieved by what we say: Sustainable Precision Agriculture, Smart Farming, Automated & Robotics Farming, Agriculture 5.0 etc. But these technical terms are actually not as tough as they seem to be. The development of numerous crucial technologies, including GPS and satellite imaging, in the 1980s led to the emergence of precision agriculture. Internet of Things (IoT) term coined in 1999 by Kevin

Ashton but became popular beyond 2012. It can be used for Tagging Things (RFIDs), Feeling Things (Sensors), Shrinking Things (Nano Technology) and Thinking Things (Embedded Intelligence). In agriculture, we can use IoT in many ways viz. smart sprinkler control, weather and soil monitoring through sensors, live farm data, efficient usage of inputs, livestock monitoring through RFIDs etc. AI is a field of computer science that uses a variety of algorithms, including machine and deep learning ones, to learn from and interpolate data in an effort to resemble human intelligence. AI offers substantial benefits to farmers in terms of components, technologies and applications. They can offer advice to farmers on how much demand there will be, what crop kinds to plant to maximize profits, how to use pesticides, and potential price trends. As AI significantly lessens the labour and resource deficit, it will be a powerful tool for agriculture companies to deal with the increasing complexity of modern agriculture. Big data, Cloud Computing, Blockchain Technology also offer great technological advancement in Modern, Smart Sustainable Farming.

Keywords: Artificial Intelligence, Machine and Deep Learning, Sustainable and Precision Agriculture, Internet of Things, RFIDs.

DEVELOPMENT OF A POLLUTION-FREE SEPARATOR FOR DECORTICATED GROUNDNUTS

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Mainly, manually operated low cost groundnut decorticator cleaning components are not provided, so after decorticating, the seeds are winnowed to separate seeds from thrash. The conventional method of separating grain or kernels from the mixture is performed by blowing high-speed air, which causes great air pollution. This air pollution needs to be reduced. This work aims to develop a conceptual design of a unit for separating grains or kernels from the threshed mixture. There are various methods and devices for cleaning; the inclined draper separator is one of them. The Inclined draper separator senses a difference in shape and surface texture to separate seeds on an inclined plane. A mixture to be separated is metered onto the center of an inclined draper belt traveling in an uphill direction. Round or smooth seeds, which roll or slide down the draper faster than the draper is traveling up, drop off, and are caught in one side. Flat and rough-coated seeds or thrash are carried to the top of the incline and dropped into another side. Belts with different degrees of roughness may be used as the draper. The rate of feed should be slow enough to allow each seed to act individually. The angle of incline is set to assure rolling or sliding of the desired lower fraction. The experiment was conducted in SV CAET & RS, IGKV, Raipur (C.G.). In experimentation, it was found that in developed draper separator, the velvet material was found better over carpet and jute material; further, the detailed study with velvet material was conducted for best-suited deck angle, conveyor speed, and feed rate. A higher deck angle (27°) gives significantly higher cleaning efficiency.

Keywords: Pollution, decorticated groundnut, draper separator, conveyor belt, deck angle, friction material, cleaning efficiency.

CULTURAL AND MORPHOLOGICAL VARIABILITY AMONG *ALTERNARIAALTERNATA*(FR.) KEISSLERISOLATES CAUSING ALTERNARIA BLIGHT OF TOMATO IN RAJASTHAN

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Present investigation was undertaken for analysis cultural and morphological variability among *Alternariaalternata*(Fr.) Keissler isolates causing Alternaria blight of tomato collected from major tomato growing area of Rajasthan. Variability in reference to cultural and morphological characteristics was recorded for twelve isolates of *A. alternata* collected two from each districts Jaipur (Alt-J1 & Alt-J2), Bundi (Alt-B1 & Alt-B2), Kota (Alt-K1 & Alt-K2), Chittorgarh (Alt-C1 & Alt-C2), Sirohi (Alt-S1 & Alt-S2) and Udaipur (Alt-U1 & Alt-U2) with their respective collected area exhibited cultural variations in colony diameter, colour of the colony & peripheral margin, growth pattern, topography, thickness of mycelium mat and sporulation density ($\times 10^3/\text{mm}^2$ medium) on PDA medium at $26 \pm 1^\circ\text{C}$ after 7 days of incubation. The results revealed that all the twelve isolates showed significant variations in colony characteristics on 7th day of incubation under PDA medium and uniform environmental conditions. Among all, isolate Alt-U1 isolated from Udaipur district showed dark black greyish pigmentation with white peripheral margin, regular smooth growth pattern, aerial topography, thick mycelium mat of colony exhibited highest colony diameter 89.33 mm, maximum sporulation rate 13.19×10^3 conidia/ mm^2 medium sporulation. While, isolate Alt-J2 isolated from Jaipur district showed dark green colour colony with irregular rough growth pattern, brown colony margin and flattened submerged colony topography with thick mycelial mat, exhibited lowest 60.33 mm diameter, minimum 9.37×10^3 conidia/ mm^2 medium sporulation. In morphological variation conidial formation was observed in each isolate and variation in length, width, number of septation was recorded. Among all the twelve isolate, Alt-U1 showed largest size beaked conidia with length and width of 31.90 ± 0.93 (28.20 - 34.20) $\times$ 15.94 ± 0.51 (13.10 - 16.10) μm with 4-5 horizontal and 2-3 transverse septation. The length and width of isolate Alt-J1 produce conidia measured in smallest size with 14.97 ± 0.95 (11.00 - 17.20) $\times$ 7.48 ± 0.53 (4.60 - 7.65) μm in length and width without beaked with 2-3 horizontal and 1-2 transverse septation.

Keywords: Variability, *A. alternata*, Alternaria blight of tomato, cultural and morphological.

GENETIC ANALYSIS OF BREAD WHEAT (*TRITICUMAESTIVUM* L. EMTHELL) GENOTYPES FOR YIELD AND ITS COMPONENT TRAITS**KARISHMA RANI¹, S.C. GAUR^{2*}, P.N. SINGH¹, TARKESHWAR³, SAURABH¹, KAMLESH KUMAR¹, LAL BHADUR GAUR⁴, AJAY KUMAR GAUR¹**¹Department of Genetics and Plant Breeding, B.R.D.P.G. College, Deoria (UP)²Principal, M.M.M.P.G. College Bhatpar rani, Deoria (UP)³Department of Genetics and Plant Breeding, A.N.D.U.A.&T., Ayodhya (UP)⁴Subject Matter Specialist, Krishi Vigyan Kendra, Jaunpur II (UP)

The present study has been conducted at the Agricultural Research Farm of B.R.D.P.G. College (Campus), Deoria in a randomized block design to evaluate the extent of variability, heritability and direct and indirect effects of component traits on grain yield. The experiment was planned in the rabi 2022 with fifteen elite wheat cultivars sourced from Banaras Hindu University, Varanasi. All the recommended cultural practices were adopted to raise a good crop. The data were observed on fourteen quantitative traits of wheat. The analysis of variance showed a good amount of variability present among these cultivars of wheat as all the genotypes were significant for all the traits at given probability levels. The traits days to 50% flowering (90.7%), plant height (cm) (87%), days to maturity (91%), spike length (cm) (85%), no. of spikelets per spike (76%), 1000 grain weight (g) (86%) and biological yield per plant (g) (87%) showed very high heritability in broad sense. Most of the traits showed moderate level of genetic advance in percent of mean like flag leaf area (25.39%), spike length (26.20%), number of grains per spike (20.51%), biological yield per plant (29.14%), grain yield per spike (20.51%) and harvest index (20.69%). The genotypic (GCV) as well as phenotypic coefficient (PCV) were high for the traits flag leaf area, spike length, no. of grains per spike, biological yield per plant, grain yield per plant and harvest index. At phenotypic level the characters plant height (0.4034), ear length (0.6521), no. of spikelets per spike (0.4467), grain weight per spike (0.5265) and harvest index (0.3643) showed a strong association with grain yield per plant. The traits days to 50% flowering (0.1192), peduncle length (0.2591), ear length (0.3714) and biological yield (0.7713) exerted high amount of direct effects while biological yield via test weight, ear length, plant height and harvest index via ear length, no. of spikelets per spike, biological yield and test weight possessed high indirect effects on yield.

Keywords: Grain Yield, *Triticum aestivum*, Heritability, Correlation Coefficient, Path Coefficient, GCV, PCV.**SCREENING OF TOMATO HYBRIDS FOR DROUGHT RESISTANCE USING POLYETHYLENE GLYCOL AND FIELD INDUCED MOISTURE STRESS****KARTHIK G U^A, LAKSHMIDEVAMMA T N^B, MAHANTESHANAIKA B N^A, DILEEPKUMARMASUTHI^A, VILAS D GASTI^A AND GOLLAGI S G^C**^AKITTUR RANI CHANNAMMA COLLEGE OF HORTICULTURE, ARABHAVI^BCollege of Horticulture, Bengaluru^CHorticultural Research and Extension Centre, Tidagundi, Bijapur

Tomato (*Solanum lycopersicum* L.) is the second most important vegetable crop grown worldwide and is classified as drought-sensitive crop. Most of the available tomato cultivars are highly susceptible to drought stress, the most sensitive stages being seed germination and early seedling growth. Sustainable mitigation strategy is to develop drought tolerant cultivars through genetic characterization and identification of novel and useful genetic resources. However, concentrated research on drought tolerance in tomato is very scanty. So, the present experiment was conducted at Kittur Rani Channamma College of Horticulture, Arabhavi, during 2021-22, which involved the development and evaluation of thirty single cross hybrids along with their thirteen parents and one check (Arka Rakshak) under greenhouse condition using different moisture stress regimes (control, 10 days irrigation interval and 20 days irrigation interval) as well as under laboratory using polyethylene glycol - 6000 (0%, 8% and 16%). The parents and hybrids were also screened using 11 EST-SSR markers to identify the potential parental lines and cross combinations. Results from the early seedling screening using PEG-6000 showed a reduction in seedling growth parameters i.e., germination percentage, shoot length and seedling vigor index with higher concentrations of PEG compared to the control. Further, molecular screening using 11 EST-SSR markers resulted in monomorphic bands among all the parents and hybrids. Screening under field moisture stress regimes revealed a significant decrease in plant height, total dry matter, leaf area and yield, while root length and proline content increased under drought stress conditions. Among the parental lines, EC-638519, Arka Meghali and Kashi Anupama as well as the hybrids EC-608269 × Kashi Anupama, Arka Meghali × EC-634394 and Arka Saurabh × EC-638519 exhibited better performance in terms of yield and drought related parameters at both early seedling stage and later vegetative and reproductive stages.

Keywords: Genetic characterization, Drought sensitive, Single cross hybrids, PEG-6000

DOCUMENTATION OF WILD EDIBLES AND ITS ETHNOBOTANICAL USES IN SIRSI REGION OF UTTARA KANNADA, CENTRAL WESTERN GHATS, INDIA

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Forests serve as abundant reservoirs of plant resources and they play a vital role in promoting sustainable development, traditional medicine, and global food security. In the central Western Ghats, the forest consists of rich diversity of wild edibles utilized by local residents for various purposes like food and medicine, drawing upon their ethnobotanical wisdom. Recognizing this significance, an initiative was undertaken to study and document the array of wild edibles and their ethnobotanical uses in the Sirsi region of Uttara Kannada, India, situated within the central Western Ghats. Information was gathered through semi-structured questionnaires from 35 rural respondents aged between 30 and 80 years. A total of 57 different wild edibles from 36 families were identified, with the Lamiaceae family being the most prevalent (9.90%), followed by Apiaceae (7.67%) and Myrtaceae (7.35%). Among these, *Centella asiatica* (5.36%) emerged as the most commonly encountered species, followed by *Alternanthera sessilis* (5%) and *Syzygium cumini* (4.64%). Various plant parts, including leaves (43%), fruits (8%), seeds (3%), bark (1%), flowers (1%), roots, and tubers (3%), were utilized by the respondents. Notably, none of the respondents reported using these products for commercial purposes. The survey also unveiled a wide spectrum of ethnobotanical uses, spanning medicinal applications such as *Centella asiatica* for treating coughs and headaches, culinary uses like *Basella alba* as a wild vegetable and *Myristica fragrans* as a spice, as well as other purposes such as *Sesbania grandiflora* for cattle feed and *Lawsonia inermis* for hair dyeing. Additionally, various items like *Jatropacurcus* twigs for toothbrushes and *Entada scandens* seeds for minor home decorations were highlighted. This wealth of ethnobotanical knowledge represents a valuable repository of traditional uses, particularly in medicine, and serves as a foundation for further medicinal research, underscoring the importance of documenting and preserving this knowledge.

Keywords: Forests, Western Ghats, Wild edibles, Ethno-botanical, Diversity

WOOD ANATOMICAL RESPONSE TO CLIMATE CHANGE

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Trees hold a unique record within their wood anatomy, reflecting past environmental conditions. Tree rings and wood anatomical traits, like vessel size and density, offer valuable insights into a tree's response to climate, *e.g.*, the form of the xylem is influenced by a combination of internal (genetic) and external (environmental) factors, impacting important functional traits like hydraulic safety and efficiency. These alterations significantly impact tree performance, survival, and ability to sequester carbon. Many studies suggest a strong link between temperature and vessel diameter. Warmer temperatures tend to favour wider vessels, potentially enhancing water transport efficiency. The variations in rainfall patterns can lead to greater individual variability in wood anatomical traits compared to tree-ring width. In gymnosperms such as white spruce (*Picea glauca*), it is observed that the area within the xylem and the thickness of cell walls were notably responsive to drought, suggesting a flexible adaptation to changes in conditions that limit growth, particularly in the reinforcement of latewood cells. This highlights the complex interplay between different climatic factors and wood formation. Beyond temperature and precipitation, the influence of climate appears to differ between tree types. Deciduous trees may exhibit less sensitivity in their wood structure compared to evergreen species. This suggests that evergreens might be more susceptible to fluctuations in environmental conditions. Understanding how wood anatomical features respond to climate change is crucial. By analysing these features, we can gain valuable information about a tree's vulnerability to drought or reduced hydraulic efficiency. This knowledge can inform conservation efforts and guide the selection of tree species more resilient to future climate scenarios.

Keywords: Tree, Wood anatomy, Gymnosperms, Deciduous trees, Xylem

CRITICAL MICELLE CONCENTRATION OF TITANIUM CARBOXYLATES IN BENZENE-CYCLOHEXANE MIXTURE

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The thermal effect on the conductance behavior of Titanium Carboxylates (Myristate, Palmitate and Sterate) in the mixture of benzene-cyclohexane was studied. Progress been made to find out CMC dissociation constant (k), molar conductance at infinite dilution ($\wedge_m^\infty$), energy of activation of conductance (E_a) and heat of dissociation (ΔH°) of these carboxylates under different conditions. It has been observed that the CMC values of Titanium carboxylates (Myristate, Palmitate and Sterate) increases with increase in concentration.

Keywords: Benzene, Cyclohexane, conductance, CMC, heat of dissociation

PHENOTYPIC SCREENING OF CHICKPEA GENOTYPES FOR HEAT STRESS**KARTIKEYSOOTRAKAR, ANSHUMAN SINGH, MEENAKSHI ARYA, BIRENDRA KUMAR CHOUDHARY, JYOTIRAJPOOT AND S.K. CHATURVEDI****Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**

The chickpea (*Cicer arietinum* L.) is a self-pollinating true diploid ($2n=2x=16$) cool season legume crop that comes in second place to the common bean among food grain legumes worldwide. It is primarily cultivated for its seeds, which are abundant in protein. Additionally, chickpea seeds are a good source of fiber, unsaturated fatty acids, beta-carotene, and minerals like calcium, potassium, phosphorus, magnesium, iron, and zinc. Chickpea was reported as an important tool in prevention of bronchitis, cholera and constipation. Besides, regular consumption of legumes like chickpea may prevent diabetes and reduce the risk of heart diseases. Phenotyping of 1020 entries received from ICAR-NBPGR under DBT Chickpea project was conducting under delayed planting condition. Delayed sowing was done on 18th January 2023 to coincide the reproductive stage with the high temperature. Raised bed was covered with paddy straw soon after sowing for enhancing the early germination. Desi chickpea variety JG 14 and IPC 2006-77 and Kabuli chickpea variety RLBGK -1 used as a check in this experiment. These checks were sown at the interval of 24 entries. One bed consists of 48 genotypes and 3 checks. Observations on various yield attributes including filled and unfilled pods were recorded total 20 promising accessions viz., EC 8683, EC 9431, EC 8699, EC 9764, EC 4753, EC 8320, EC 4699, EC 4733, EC 4736, EC 8120, EC 8471, EC 7942, EC 8175, EC 86, EC 136, EC 143, EC 812, EC 1392, EC 1579 and EC 2397 exhibiting heat tolerance identified for detailed study. Out of these EC 8699 and EC 1392 was found most heat tolerant germplasm accessions.

Keywords: Chickpea, legumes, RLBGK -1 and germplasm**PHOTOCATALYTIC PERFORMANCE OF GRAPHITIC CARBON NITRIDE FOR THE DEGRADATION OF ORGANIC DYES****KARUNA CHAUHAN¹, DIPTONIL BANERJEE*****Thin Film and Nanotechnology Laboratory, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad, UP, India**

Graphitic carbon nitride ($g-C_3N_4$)-based photo catalysts have shown high efficiency for organic dyes removal. This study report that $g-C_3N_4$ nanostructure can be synthesized by low temperature hydrothermal process. As prepared sample $g-C_3N_4$ was characterized using X-ray diffraction (XRD), Energy Dispersive X-ray (EDX), scanning electron microscope (SEM), UV-Vis and Fourier transformed infrared (FTIR) spectroscopy. Thermal stability of the sample was analyzed with the help of thermal gravimetric and differential thermal analysis (TG-DTA) study. EDX confirms the elemental composition of sample whereas XRD result confirmed the proper phase formation. UV-Vis spectra helped calculation of the optical band gap of the material. It has been shown that the as prepared $g-C_3N_4$ has high ability to remove poisonous organic dye like Methylene Blue through the photon assisted catalytic process under UV photon. It has been shown that the removal efficiency crosses 80 % within a time interval of 60 minutes which is believed to be due to prolong electron-hole pair separation under UV irradiation.

Keywords: Photocatalysis, Graphitic carbon nitride, Dye, Water pollution, Adsorption**INFLUENCE OF BUNCH TRIMMING AND FEEDING ON YIELD AND QUALITY ATTRIBUTES OF BANANA CV. GRAND NAINA****KAUSTUBHYASHVANTDESHMUKH******PG Student, Department of Fruit Science, Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola- 444104, Maharashtra, India**

The visible differences can be seen in the growth of banana hands after flowering, distal hands cannot cope with the growth of proximal hands. As a result, distal hands mature late and remain undersized which are not suitable for export. Hence, sold in local market at a marginal return. Therefore, taking this problem under consideration efforts were made to maximize yield and export oriented better quality banana production. The treatment allocated bananas possessed ideal size, glossy external appearance and colour which not only attracts consumers but also fetches higher remunerative prices in market as compared with control. Bunch trimming and bunch feeding with KNO_3 is relevant as concerned for quality and export-oriented production of banana. So, keeping above view, it was felt necessary to investigate the potential impact of levels of hand trimming and bunch feeding with placement of KNO_3 at the excised distal stalk end on growth attributes, yield attributes and economics of banana in present study. The present investigation was carried out at the Experimental farm of Agricultural Research Station, Achalpur, Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India during year 2022-2023 to study the influence of bunch trimming and feeding on yield and quality attributes of banana cv. Grand Naine. The experiment was laid out in Factorial Randomized Block Design (FRBD) with 9 treatments and each treatment replicated thrice. Accordingly, distal hand was trimmed after retention of 7 hands, 8 hands and 9 hands with feeding of 5 g, 7.5 g, 10 g and 12.5 g KNO_3 per bunch in 100 ml of water. The improved technique of 9 hand retention with feeding of 7.5 g KNO_3 holds promising impact over early maturity (83 days) shortened the crop cycle by 16 days interval from flowering to harvesting as compared to control, weight of bunch (25.46 kg), weight of hand (3.03 kg), weight of finger (132.83 g), number of fingers per bunch (16.77), length of finger (22.27 cm), diameter of finger (4.03 cm), graded yield (25.46 t/ha), fruit yield (113.19 t/ha), shelf life (9 days), total soluble solids (21.67 °B) pulp/peel ratio (3.50) and economics of banana (BCR 2.72).

Keywords: Bunch trimming, bunch feeding, banana cv. Grand Naine, KNO_3 , growth, yield, economics

PROTEIN QUALITY AND FUNCTIONAL CHARACTERISTICS OF UNDERUTILIZED PULSE EXTRACTS**KAVITA, HEMALATHA S*, ARCHANA G. LAMDANDE, GANAJAXI MATH*****Department of Food Processing & Technology, B. Tech Food Technology, College of Community Science, University of Agricultural Sciences, Dharwad-580005, Karnataka**

A study was conducted to isolate and study functional properties of protein from underutilized pulses from cowpea, horse gram and moth bean by using acid-base, ultrasonication, enzymatic and air-classification method were conducted. Protein quality and functional properties for extracts were carried out by AOAC method, protein yield was calculated. The per cent yield of protein extracted from four methods by cowpea was ranged from 25.80 to 11.67 %, for horse gram 19.50 to 12.67 % and for moth bean 19.00 to 12.00 %. The percentages of protein in cowpea isolates ranged from 51.93 to 91.40 per cent, for horse gram, it ranged from 49.13 to 81.37 per cent and moth bean, ranged from 47.30 to 83.50 per cent. Water absorption capacity for cowpea protein isolate (CPI) ranged from 1.51 to 3.00ml/g, for horse gram protein isolate (HPI) ranged from 1.43 to 2.23ml/g and moth bean protein isolate (MPI) ranged from 1.73 to 2.21ml/g. oil absorption capacity for CPI ranged 1.83 to 2.50ml/g, for HPI ranged from 1.51 to 2.27ml/g and MPI ranged 1.50 to 2.27ml/g. *In vitro* protein digestibility and protein digestibility corrected amino acid score was higher in cowpea protein isolate 91.60 % and 80.60 % respectively, extracted through ultrasonication method. Compared to the acid-base, enzymatic and air-classification method, an increase in protein content was achieved through ultrasonication method. The ultrasound-assisted alkaline extraction method provided a good strategy for protein extraction with higher extraction level, shorter extraction time and reduced water consumption and had good protein quality and functional properties. Hence proteins may be ideal for fortification and assist in providing the necessary nutrition for the unprivileged.

EXPLORING THE SIGNIFICANT BIOCONTROL AND PLANT GROWTH POTENTIAL OF ENDOPHYTIC FUNGI AGAINST THE PEA ROOT ROT COMPLEX IN HIMACHAL PRADESH, INDIA**KAVITAKUSHWAHA^A, JOGINDERPAL^B, DEVINDER K. BANYAL, GAURAV KATOCH AND SURINDER PAUL^C****^ADepartment of Plant Pathology, Rani Lakshmi Bai Central Agriculture University, Uttar Pradesh, Jhansi, India****^BDepartment of Plant Pathology, CSK Himachal Pradesh Krishi Vishvavidyalaya Palampur, Himachal Pradesh, India****^CICAR- Indian Grassland and Fodder Research Institute (IGFRI), Himachal Pasturelands, Palampur, Himachal Pradesh, India**

Pea root rot complex (PRRC), incited by various fungal and oomycetes pathogens, is commonly acknowledged as a significant obstacle leading to decreased global pea production. Within the framework of this investigation, fifty-one endophytic fungi were isolated from the roots of healthy pea plants gathered from the sub-humid and dry temperate regions of Himachal Pradesh, India. Eight particularly potent endophytic fungi, showing heightened antagonistic properties in initial screenings, were evaluated for their antagonistic effects against the economically detrimental and highly prevalent PRRC pathogen *Fusarium oxysporum* using the dual culture technique. *In vitro* assessments revealed that the highest mycelial inhibition of 82.22% was achieved with the JPE19 isolate. Microscopic examinations conducted on the interaction zone between the fungal endophyte and the hyphal tip of *F. oxysporum* revealed varying degrees of abnormalities in the hyphae of the targeted pathogen. Through glasshouse and field trials, the most significant disease control percentage was attained with the treatment involving the *Schizophyllum* sp. isolate JPE19, demonstrating 79.42% and 74.29% disease control, respectively. Furthermore, notable plant growth parameter enhancements were observed under glasshouse and field conditions. The representative fungal endophytes were identified through morpho-cultural characteristics and ITS sequence analysis. Root colonization assays, conducted through plate counting and confocal microscopic analysis, provided substantial evidence of higher colonization in plants treated with the endophytes. The total and recovered counts of endophytes were notably higher in roots treated with the *Schizophyllum* sp. isolate JPE19, indicating successful establishment and persistence of the inoculated strain within the endosphere of pea plants. The findings obtained from this study represent, to the best of our knowledge, the initial documentation of the biocontrol and plant growth-promoting potential of endophytic fungi inhabiting peas, thus advancing our efforts towards developing commercial bio-formulations of these fungi as an environmentally friendly approach for effectively managing the severe PRRC disease.

ARTIFICIAL INTELLIGENCE IN INTERNET OF THINGS**KAVITA NITHARWAL^{*1}, HEMANT KUMAR LAMBA², KIRAN CHOUDHARY³, SURENDAR RUNDLA⁴, SNEHA PANDEY⁵****^{1,4}PhD Research scholar, Department of Ag.Economics COA, RVSKVV, Gwalior, (MP.)****²Ph.D Research scholar, Department of Ag.Economics & management, RCA, MPUAT, Udaipur (RAJ.)****³MSc Student, Department of Agronomy, COA- Jodhpur, AU – Jodhpur (Raj.)****⁵Guest Faculty, Department of Ag.Economics, COA, Gwalior, (MP.)**

The way the Internet works is constantly changing from being a "Internet of Computers" (IoC) to a "Internet of Things" (IoT). Massively linked systems, often referred to as Cyber Physical Systems (CPS), are developing as a result of the integration of several factors, including infrastructure, embedded technology, intelligent objects, people, and physical surroundings. A vast "Internet of Everything in a Smart Cyber Physical Earth" is where we're headed. The next "smart revolution" may be brought about by IoT and CPS combined with "data science." The issue that then emerges is how to process the massive amounts of data created with the far inferior present computational capacity. An answer to this issue has been the focus of data science and artificial intelligence (AI) research. IoT with AI can therefore lead to a significant advance. This is not simply about decreasing human labour, saving money, or using smart technology. It is far more than that; it is improving people's lives. IoT will continue to face several severe problems, such as security risks and ethical dilemmas. IoT with AI may sound exciting, but what matters most is how the general public views it—whether they regard it as a benefit, a burden, or a danger.

Keywords: Artificial Intelligence, Internet of Things, Intelligent Systems

PLANT RESPONSE TO XENOBIOTICS WITH FOCUSING ON HEAVY METALS: A REVIEW**KAVIYASELVAN V¹, SUBHADIP BANERJEE², JHUMA DATTA³****^{1,2,3}Department of Agricultural Biochemistry, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal**

Increasing industrialization and modernization contribute significantly to the release of harmful xenobiotic and toxic wastes into the environment, including soil, air, and water. Human activities such as improper waste management, mining, chemical fertilizer use, and sewage sludge application accelerate soil, air, and water contamination. Heavy metals and metalloids, both essential and non-essential, enter the environment through natural and anthropogenic sources. While essential metals like Fe, Cu, Zn, and Ni are vital for plant growth and metabolism, their excessive concentrations negatively affect plants. Non-essential metals such as As, Pb, Cr, and Cd, when present in high levels, cause adverse health effects in plants. In terrestrial plants, roots are the primary site of exposure to metal contaminants, while aquatic plants are exposed throughout their entire body. Metal contamination disrupts physiological and biochemical processes in plants, leading to altered metabolism, reduced growth, chlorosis, necrosis, wilting, and water imbalance. Metal toxicity varies based on their affinity for ligands containing O-, N-, and S-containing groups. Plants have evolved various adaptive mechanisms to cope with metal stress, including immobilization, plasma membrane exclusion, restricted uptake and transport, synthesis of specific metal transporters, induction of stress proteins, and chelation and sequestration by specific ligands. Research on natural variations in plants' ability to accumulate, tolerate, and detoxify heavy metals offers valuable insights. Understanding these mechanisms can aid in identifying plants suitable for remediating heavy metal-contaminated environments. Collaboration across diverse research domains will further enhance our understanding of hyperaccumulation mechanisms, facilitating the selection of plants for effective environmental remediation strategies.

Keywords: Heavy Metals, Xenobiotics, Immobilization, Ligand Chelation, Metal Transporters.

GC-SPROFILING OF METABOLITES FROM CLADOSPORIUM CHALASTOSPOROIDES ISOLATED FROM EUPHORBIA LACINIATA KAVYAB.C¹ AND DR. KRISHNAK²**¹Research Scholar and ²Professor, P.G. Department of Botany, Yuvaraja's College (Autonomous), Mysuru**

Fungal metabolites are valuable sources of bioactive compounds with diverse applications in pharmacology, agriculture, and ecology. For this purpose, endophytic fungi were isolated and identified from different parts of the Euphorbia laciniata plant. Cladosporium chalastosporoides was found to be the most abundant. Hence, this endophyte was taken for further analysis. Metabolites were extracted using standard techniques and subjected to GC-MS analysis for compound identification. This process revealed a diverse array of metabolites produced by Cladosporium chalastosporoides. Notable compounds included 1-Docosene, 3-Eicosene, Pentacos-1-ene, 1-Nonadecene, 3-Tetradecene, etc., some of which are known for their antimicrobial or antifungal properties. The identification of bioactive compounds by GC-MS (Gas Chromatography-Mass Spectrometry) is based on the molecular weights, peak areas, mass fragmentations, and retention times. Most of these compounds have therapeutic properties and are used in the pharmaceutical field. The identification and characterization of metabolites from Cladosporium chalastosporoides isolated from Euphorbia laciniata highlight the potential biotechnological and pharmaceutical applications of these compounds.

Keywords: Euphorbia laciniata, Cladosporium chalastosporoides, Endophytic fungi, Bioactive compounds, Gas Chromatography-Mass Spectrometry (GC-MS Profiling)

OPTIMIZING HARVEST TIMING FOR ENHANCED ESSENTIAL OIL YIELD AND VOLATILE ORGANIC COMPOUND ANALYSIS IN STRAW BERRY (FRAGARIA × ANANASSA DUCH.)**KAVYA D¹, MUTUMPREEMA DEVI², SOMNATH MANDAL³, BINAYAK CHAKRABORTY⁴, PRODYUT KUMAR PAUL⁵ AND GURURAJ GOUR⁶****¹Department of Post-harvest Management, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal.****^{2,4,5,6}Department of Pomology and Post-harvest Technology, Uttar Banga Krishi Viswavidyalaya, Pundibari, West Bengal.****³Department of Biochemistry, Uttar Banga Krishi Viswavidyalaya, Pundibari, West Bengal**

The present study was conducted to standardize the harvesting time (H1-75 DAP, H2-82 DAP, H3-89 DAP, H4-96 DAP, H5-103 DAP, H6-110 DAP, H7-117 DAP) of strawberry for maximum essential oil estimation and characterization of volatile organic compounds (GC-MS) of strawberry. Harvesting at 96 DAP (H4) resulted in fruits with the largest size (diameter: 4.13 cm, length: 4.86 cm, weight: 31.41 g, volume: 21.32 cc). However, biochemical analysis revealed that H1 had the highest TSS and TS, while H7 had the lowest. TA was highest in H7 and lowest in H1. H4 exhibited the highest ascorbic acid content (53.82 mg/100 g), while H1 had the lowest (39.74 mg/100 g). EO content was highest in H4 (0.054%) and lowest in H7 (0.010%). A total of 37 compounds were identified in fresh fruits of strawberry, with the highest chemical compound being tetratriacontane with a relative area of 7.51, followed by triacontane (RA=7.20). In the essential oil, 35 chemical compounds were identified, with the highest recorded by eicosane-2-methyl with a relative area of 7.06, followed by octadecane-2-methyl (RA=5.31). Hence, we can conclude that strawberry cv. Winter Dawn should be harvested between 96 DAP to 103 DAP to achieve maximum EO and maximum VOCs.

Keywords: Essential oil, strawberry, volatile organic compounds

RESPONSE OF HUMIC ACID AND INORGANIC FERTILIZERS ON VEGETATIVE GROWTH OF DAHLIA (*DAHLIA VARIABILIS* L.)**KEDARMAHADEV GHEWARE^{1*}, NOMITA LAISHRAM², ARVINDER SINGH³ AND KRISHNA KAUSHIK⁴**¹PhD Scholar, Division of Floriculture and Landscaping, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, 180009 J&K, India^{2&3}Asst. Prof. Division of Floriculture and Landscaping, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, 180009 J&K, India⁴PhD Scholar, Division of Floriculture and Landscape Architecture, SVPUAT, Meerut, U.P., India

The study aimed to explore the response of humic acid (HA) on the vegetative growth of dahlia (*Dahlia variabilis* L.). Eighteen combinations of HA and Recommended Dose of Fertilizer (RDF) were applied, including control. These combinations comprised various ratios and application methods, such as soil application of humic acid and humic acid foliar spray. The field experiment was conducted at Sher-e-Kashmir University of Agricultural Science and Technology of Jammu, J&K, India in 2023-2024. The results of the study revealed that the most favourable outcomes in terms of plant height (82.60 cm), number of leaves per plant (84.40), number of branches per plant (8.60), and stem length (74.90 cm) were observed in treatments T₈ and T₁₂. These treatments involved the application of 75% RDF along with either soil application of humic acid at 10 kg ha⁻¹ (T₈) or foliar spray of humic acid at 0.2% (T₁₂). Based on these findings, it is recommended that the combination of 75% RDF with soil application of humic acid at 10 kg ha⁻¹ (T₈) or foliar spray of humic acid at 0.2% (T₁₂) may be considered for enhancing the vegetative growth of dahlia plants.

Keywords: -*Dahlia*, *humic acid*, *RDF*, *vegetative growth***TRADITIONAL METHODS OF SOIL AND WATER CONSERVATION IN NAGALAND, INDIA; A WAY TOWARDS SUSTAINABLE AGRICULTURE****KEHOKHUNU¹ AND RINU SAKHONG¹****SAS, School of Agricultural Sciences, Medziphema, Nagaland**

The State, Nagaland lies between 25°60' and 27°40' latitude north of the equator and between the longitudinal lines 93°20' and 95°15'. The state has a wet-dry climate with an average annual rainfall of 1800mm-2500mm. In spite of good rainfall during monsoon season; water scarcity is very prevalent during dormant seasons. Hence, there is a need to revive indigenous method of soil and water conservation which can not only have positive implication in the region but also in regions having undulated hilly topography. Nagaland being a predominant agrarian state, survived side by side traditional/ indigenous farming systems practices since time immemorial. Their indigenous knowledge, skill, experiences have been a compatible approach towards a sustainable economy and socio and cultural lifestyle of the people. Therefore, a review on the indigenous farming system has been carried out to understand the influence of soil and water conservation and management in the region.

CORRELATION AND PATH ANALYSIS STUDIES IN FINGER MILLET GENOTYPES FOR YIELD AND YIELD CONTRIBUTING TRAITS (*ELEusine CORACANA* L. GAERTN)**KETANANAND****Department of plant breeding and genetics, Assam agricultural university, Jorhat**

Finger millet (*Eleusinecoracana* (L.) Gaertn.) is a vital small millet crop cultivated in India for its diverse uses in human food, forage, and hay. However, in regions like Assam, where cultivation is predominantly undertaken by tribal communities in hill districts, the yield potential of finger millet remains largely untapped. Addressing this yield gap is imperative to meet the growing demand for this nutritious grain. In this study, 39 genotypes of finger millet were evaluated during the *Kharif* season of 2022 at the experimental field of Plant Breeding and Genetics, B.N. College of Agriculture (AAU), Biswanath Chariali, Assam. The trial was conducted under a Completely Randomized Block Design (CRBD) with three replications. Significant positive correlations were observed between grain yield per plant and several morpho-physiological traits namely biological yield per plant, harvest index, total chlorophyll content, chlorophyll stability index, and 1000-grain weight at both phenotypic and genotypic levels. Additionally, plant height and relative water content exhibited positive and significant relations, albeit at the genotypic level only. These findings suggest the potential utility of these traits as selection criteria for breeding programs aimed at developing high-yielding finger millet genotypes. Furthermore, path coefficient analysis identified specific traits with a direct and positive effect on grain yield per plant. These traits encompassed the number of basal tillers per plant, plant height, ears per plant, 1000-grain weight, days to 50 percent flowering, biological yield per plant, relative water content, harvest index, and total chlorophyll content. The identification of these traits and their direct influence on grain yield underscores their importance in breeding efforts targeted at enhancing finger millet productivity. This research highlights the significance of phenotypic and genotypic trait selection in improving finger millet yield, offering valuable insights for breeders and researchers working towards sustainable crop improvement strategies in Assam and beyond.

Keywords- Finger millet, Correlations, Traits, Path coefficient, Yield

GREEN SYNTHESIS OF ZN O NANOPARTICLES ,CHARACTERIZATION AND ITS RESILIENT ANTIMICROBIAL ACTIVITY**¹KHANDAGALE P.P., ²DR.P.R.PATEL, ³ DR. L. V. GETHIYA ,⁴ DR. VAIBHAV MEHTA****¹Ph.D. Scholar, Department of Plant Pathology, NM college of Agriculture, Navsari, Gujrat, India****²Associate professor and Head, Department of Plant Protection ,ASPEE college of Horticulture, NAU, Navsari, Gujarat, India.****³Associate professor, Department of Entomology, NM college of Agriculture, Navsari, Gujrat, India.****⁴Assistant professor(Nano Technology),Division of Plant Biotechnology, ASPEE ShakilamBiotechnology Institute , NAU, Surat, Gujarat, India**

Nano technology is the third world innovation of the twenty first century to apply the knowledge the size with micro ness(less than 100 nm.) in various field with ready and handy equipment having reliability and feasibility for its application for our benefit staring from large room computer to small tiny smartphones. Agriculture is not far untouchable from that arena of its scientific application. Micro nanoparticles called the magic bullets used in pesticides ,fungicides, fertilizers and herbicides with plant growth promoting nano system offers its efficient utilization, absorption inside the crop gives us benefitted result in precise, effective and remarkable manner. They are important in rainbow revolution of agriculture in sustainable manner for India and world also. Nanoparticles synthesized with biochemical ways are nontoxic than its physical and chemical methods have a great potential targeting to the specific plant tissues for release their charges at target cell part to achieve desired results. Zinc is the well-known anti- microbial and essential micronutrients components. They also enhance a biotic and biotic stress management potential in the plant .When its ZnO NPs particle synthesized with garlic bulb extract having UV-vis spectroscopy nm size 300-380 nm ,SEM with 48 nm size . In our *in vitro* study to control false smut of rice fungal pathogen [*Ustilaginoideavirens* (Cooke) Takahashi] (teleomorph *Villosiclava virens*, Tanaka) found(72%) inhibition at 10 ppm concentration than the Nativio @400 ppm the standard chemical control having inhibition @ 96%.At the same time the gram negative bacteria of lemon canker(*Xanthomonascitri* sub sp. *citri*) showing highest inhibition(84.90%) at 100 and above ppm concentration against them (Tuyishimeet *et al.*,2022). From above study we confirmed that the bacterial prokaryotes having more complex cell wall with high level of lipids (Peptidoglycan) require higher concentration to rapture cell wall by ROS activity than fungal cells(glucoschitin). The garlic green synthesized Zn ONPs are most economical, organic in origin ,sustainable way to manage the disease giving poison free food to consumer community without toxicity and pollution to bio sphere.

CLIMATE CHANGE IS THE SINGLE GREATEST THREAT TO A SUSTAINABLE FUTURE**KHEMENDRA CHOUDHARY¹, RAVINDRA KUMAR MEENA², MAHENDRA CHOUDHARY³ AND RAGHUVVEER CHOUDHARY⁴, GAURAV VERMA⁵****¹Ph.D. Scholar, Department of Agronomy,Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India****²Ph.D. Scholar, Department of Genetics and Plant Breeding, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India****³Ph.D. Scholar, Department of Agronomy, G.B. Pant University of Agriculture and Technology, Pantnagar, India****⁴Ph.D. Scholar, Department of Agronomy, Junagarh Agricultural University, Junagarh, India****⁵Ph.D. Scholar, Department of Agronomy,Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India**

In the contemporary era, the discourse surrounding sustainability is dominated by a singular, overarching threat: climate change. sustainability embodies the pursuit of equilibrium between human needs and environmental health, ensuring present well-being without compromising the ability of future generations to meet their own needs. However, the relentless march of climate change disrupts this delicate balance, threatening to unravel the fabric of global stability and prosperity. the multifaceted dimensions of climate change, elucidating its far-reaching impacts on ecological systems, socio-economic structures, and geopolitical landscapes. From rising temperatures and extreme weather events to melting ice caps and sea-level rise, the manifestations of climate change reverberate across continents, exacerbating vulnerabilities and magnifying inequalities. climate change acts as a force multiplier, intensifying existing challenges such as food insecurity, water scarcity, and mass displacement. Vulnerable communities, particularly in low-income regions, bear the brunt of these compounding crises, facing heightened risks of poverty, conflict, and displacement. In the face of such existential threats, urgent action is imperative. the critical importance of collective efforts to mitigate greenhouse gas emissions, transition to renewable energy sources, and build resilience against the impacts of climate change. Moreover, it emphasizes the indispensable role of international cooperation, policy innovation, and public engagement in forging a sustainable pathway forward.

Keywords: Sustainability, climate, Vulnerable, temperature, mitigate

EFFECT OF CHEMICAL FERTILIZER, POULTRY MANURE AND THEIR INTEGRATION ON GROWTH OF FODDER OAT (AVENA SATIVA L.)**KHOLU MARY¹, S.K. JHA² & EDWIN LUIKHAM¹**¹Department of Agronomy, College of Agriculture, Central Agricultural University, Imphal-Manipur, India²Department of Agronomy, College of Agriculture, Indira GandhiKrishiVishwavidyalaya, Raipur, Chhattisgarh, India

Oat is gaining significance in agriculture in many countries owing to considerable scientific evidence to support its use as food, feed and fodder. The growth of fodder oat is directly related to the nutrient supply. It requires a large quantity of nitrogenous fertilizers. However, application of high dose of nitrogenous fertilizers leads to soil and water pollution in the long run and can also raise the possibilities of nitrate hazards to livestock. Some researchers reported that integration of poultry manure and nitrogen fertilizer helps to restore degraded soils. Therefore, a field experiment was conducted to study the effect of integrated nutrient management on growth at different stages of fodder oat. The experiment was laid out in a randomized block design (RBD) with three replication consisted of seven treatments. The observations on various growth parameters were recorded at 20 days interval i.e. at 20, 40, 60, 80 DAS and at the time of harvest. The study revealed that the maximum plant height, fresh weight of plant, number of leaves plant per plant and the number of tillers plant per plant were recorded in the treatment applied with 75% recommended dose of fertilizer + 2 t poultry manure ha⁻¹. It is concluded that integrated nutrient management involving 75 % RDF along with 2 t PM ha⁻¹ was found to be the most effective in terms of growth for fodder oat cultivation as compared to the sole application of poultry manures or chemical fertilizers.

Keywords: Chemical Fertilizer, Fodder oat, Growth, INM & Poultry manure**ETHNOBOTANICAL STUDY OF PLANTS USED IN SOCIO-ECONOMIC & MAGICO-RELIGIOUS PRACTICES IN NORTH-WESTERN HIMALAYAS INDIA*****KHUSBUPATHANIA, *DEEKSHABHOGAL¹ MUNIT SHARMA AND **JYOTIKAJLA*****Research Scholar, Department of Botany, Thakur PG College of education, Dhaliara**¹Assistant Professor Department of Botany, Thakur PG College of Education

The Indian Himalayan region (IHR) is endowed with certain variety of medicinal and therapeutic plants. North-Western Himalayas Region contributes 10% of total geographical area of country. These states consist of significant wealth of biodiversity. Biodiversity consists of different plants that have medicinal value, socio-economic value & magico-religious value. These plants are used by tribal and urban people. These plants can be used in various large scale practices such as in pharmaceutical industry, Ayurveda and beverages etc. Information collected on the traditional use of plants in the local health care system by the tribal communities of Himalayan region use 86 plant species belonging to 69 genera and 34 families to cure about 70 different ailments. Maximum number of plant species used in herbal formulations belonged to families Asteraceae, Apiaceae, Gentianaceae, and Polygonaceae. These plants are also used by the local communities for several uses in addition to medicinal and aromatic purposes for their healthcare. Further these plants are used for phytochemical screening due to their rich content of bioactive compounds.

Keywords: Medicinal plants, Magico-religious plants, Socio-economic plants, Bio-active compounds**DEVELOPMENT OF POTENTIAL MICROBIAL CONSORTIA AND THEIR APPRAISAL ON WHEAT (TRITICUM SPHAEROCCUM)****KHUSHBOOTAMBOLI AND INDU SHARMA****Department of Biotechnology, NIMS Institute of Allied Medical Science and Technology (NIAMST), NIMS Institute of Engineering and Technology (NIET), NIMS University, Rajasthan, Jaipur, 303121, Rajasthan, India**

Currently, chemical fertilizers and pesticides are extensively used in agriculture to increase production and yields, yet they lead to soil degradation, nutrient depletion in crops, and environmental harm. Therefore, integrating bacterial cultures into organic farming practices offers potential benefits. These cultures, consisting of diverse bacteria, enrich soil, enhance crop quality, and maintain optimal nutrient levels. Experimentation, both with seeds and field applications, demonstrates that this bacterial culture enhances soil fertility, strengthens plant roots, thickens shoots, and improves flowering, resulting in higher fruit yields. Additionally, field applications show that the soil becomes softer, more porous, and better at absorbing rainwater, which over time could improve groundwater levels and reduce water needs in farming while fostering the proliferation of beneficial organisms like earthworms. This bacterial culture has been trialed on various crops such as paddy, wheat, in laboratory settings, showing significant growth enhancement and disease prevention effects. Field experiments with this bacterial consortium suggest that applying it to soil, regardless of sterilization, establishes colonies of beneficial bacterial strains, which supply nutrients in easily digestible forms to plants, thereby enhancing plant immunity and output quality. This process involves collecting samples from diverse environments, establishing enrichment cultures, employing selective isolation techniques, and confirming nitrogen-fixation capability through various assays. This isolation process not only enhances our understanding of microbial diversity but also holds promise for applications in agriculture, bioremediation, and sustainable development.

Keywords: Microbial consortium, Wheat, Organic farming, Crop growth

MILLETS OF INDIA: ITS HISTORY, TRENDS AND PROSPECTS.**KILI V AWOMI*¹****Department of Agronomy, SAS, Nagaland University, Medziphema Campus**

Millets are one of the world's oldest domesticated farmed crops, grown for food and animal fodder since time immemorial. Millets have been a staple in Northern Africa for thousands of years and they were also a staple in China and India before other cereals like rice and wheat gained prominence. Millets in India declined as a result of the negative consequences of the green revolution during the mid-1960's, however, in recent times, millets now often referred as nutri-cereals have made a comeback owing to the national year of millets in 2018 followed by the international year of millets 2023 and have put itself on the list of distinctive agricultural goods resulting in high demand in the international market. India being the world's largest producer of millets where 21 of its states has been growing it successfully has produced 17.32 million tonnes during 2022-23. Millets with their adaptability to various agro-climatic conditions and multiple benefits like health outcome, nutraceutical properties and its climate resilience have shown great prospect. It is also proving to be a great tool for addressing malnutrition of the country. The millet exports have been ever increasing, at the same time in 2022-23 it recorded \$75.45 million as compared to the previous year of \$62.95 million. The millet value added products also registered a growth of 12.4 % during the same year showing significant increase in the stand of millet products in the global market. Popular brands like ITC, Britannia, etc. have also shown great interest in the millet sector and they believe this market to have great potential. It is estimated that Indian millet based packaged food market was valued at \$38 million in 2022, and it is expected to cross \$90 million by 2027.

Keywords: Millets, green revolution, nutri-cereals, value added products.

A CASE STUDY OF GRADING HERITAGE TREES**KIMAYA D. JOSHI, VINAYAK K. PATIL, SATISH S. NARKHEDE, MANISH C. KASTURE, NITESH V. DALVI****College of Forestry, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli, Dist Ratnagiri, Maharashtra, India**

A heritage tree typically comprises a large, individual tree that carries particular importance with respect to its age, rarity, size, and aesthetic, botanical, ecological, and historical value. However, this value may be lesser or greater depending on the cultural, scientific, visual settings these trees may be embedded in. Although heritage trees documentation is in vogue, no attempt has so far been made for grading the value of heritage trees in India. Such a grading framework – TreeAH standing for Tree Assessment of Heritage - has been made available recently by Barrell Tree Consultancy, UK. Using this framework, the heritage trees of Dapoli town, Ratnagiri, Maharashtra, India documented in an earlier study were graded. Two hundred eighty three heritage trees were graded using the information on their visual impact, scientific value and cultural connections. Trees were graded as Grade I (trees of exceptional interest), Grade II* (trees of particular importance and of more than special interest), Grade II (trees of special interest) and Emerging (trees close to becoming of special interest). Total 5 trees were found in Grade I, 14 in Grade II*, 27 in Grade II, and 237 in Emerging grade. The conflicts between development and conservation in urban settings revolve around heritage trees. A compromise between felling and retaining heritage trees can be achieved using this grading system. Implications of such a prioritization scale are discussed. Designation of trees with their heritage grade can generate better awareness among the beneficiaries and saviours of these trees to ensure sustainability of their conservation. The very best trees can be included as elite members the national resource pool and can be aligned within a worldwide consistent framework of international ranking.

Keywords: Heritage trees, Grading, elite, ranking

FUNCTIONALIZATION OF CHITOSAN-BASED NANOFERTILIZER WITH DIFFERENT NITROGEN SOURCES AND ITS IMPACT ON SEED GERMINATION AND SEEDLING GROWTH IN MAIZE (ZEA MAYS L.)**KINJAL MONDAL^{1*}, KRATI SOLANKI², JUGNU PATHAK², POOJA¹, VINOD SAHARAN¹****¹Department of Molecular Biology and Biotechnology, Maharana Pratap University of Agriculture and Technology, Udaipur-313001 (Raj.), India****²Department of Biotechnology, Mohanlal Sukhadia University, Udaipur-313001 (Raj.), India**

Seed is one of the basic and crucial inputs in agriculture for optimum crop production. Successful seed germination in agriculture is therefore very important and convenient to generate healthy and economic yield as well as new genetic combinations in large population. Nevertheless, seeds are vulnerable to pests and pathogen attack which results decrease in seed viability. Seed treatments are aimed to protect the mushy seeds as well as the tender seedlings from both the biotic and abiotic stress factors at early growth stages. In this context, chitosan based nanofertilizers have been vindicated as promising material for seed treatments. It is renowned for many decades to exhibit exceptionally tremendous biological functionalities. Its structural conformity has disclosed a riddle regarding its bio-functionality, which is centred in the amino (-NH₂) and hydroxyl (-OH) functional groups. Chitosan at nano scale can easily penetrate across the cellular barriers and flow via narrow intracellular junctions in epithelial cells and show controlled/targeted delivery of agrochemicals. Further surface functionalization of chitosan with different nitrogen sources (ammonium and nitrate) have found to work better (with respect to root and shoot length, germination percentage, seed vigor index, root number and seedling length) on the maize seeds *in vitro* as compared to control checks. We anticipate nitrogen functionalized chitosan significantly enhances the activities of α -amylase and protease at the time of seed germination and promote mobilization of reserve food inside the seed.

Keywords: Seed germination, chitosan, nanofertilizer, surface functionalization

ROLE OF ORTHOSILICIC ACID AND SPERMIDINE IN MITIGATING TERMINAL HEAT STRESS IN *BRASSICA JUNCEA* KIRAN¹, NEERAJ KUMAR¹, VINOD GOYAL¹, SUDEEP SINDHU²

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The study investigates the efficacy of OSA (orthosilicic acid) and Spd (Spermidine) as exogenous treatments to alleviate the adverse effects of heat stress on *Brassica juncea*. Foliar application of two concentrations of OSA (20 ppm and 30 ppm) and two concentrations of Spd (1mM and 2mM) was given at vegetative stage and flowering stages in both varieties. Through experimentation, it was analyzed that the application of OSA (20 and 30 ppm) and Spd (1 and 2mM) effectively mitigate heat stress-induced damage in *Brassica juncea* plants. Various physiological (as relative water content, and total chlorophyll content), biochemical (Hydrogen peroxide content and relative stress injury), and antioxidant defense enzymes (SOD, CAT and POX) were assessed to evaluate the efficacy of these treatments. The physiological parameters including relative water content (%), gas exchange parameters (including photosynthetic rate, transpiration rate and stomatal conductance), chlorophyll index, total chlorophyll content (mg/gFW), canopy temperature depression (°C) showing their maximum increase after 20 ppm OSA treatment in timely sown condition and after 1mM Spd at late sown condition. Results indicated that OSA and Spd application modulated stress-responsive pathways, resulting in improved 1000 seed weight under heat stress by 19% in RH 725 variety and 23% in RH 761 variety after 20 ppm OSA treatment by maintaining physiological homeostasis in Indian mustard. Minimum increase was observed after 2mM Spd treatment in physiological parameters however, for antioxidant enzymes the minimum increase was after 20 ppm OSA in both timely and late sown conditions after single and double spray. This study provides valuable insights into the sustainable strategies to enhance heat stress resilience and incontributing to the development of heat-tolerant cultivars and sustainable crop management practices.

Keywords: Orthosilicic Acid, Spermidine, terminal heat stress, *Brassica juncea*, Chlorophyll

AMAZING BENEFITS OF MUSHROOMS FOR THE ENVIRONMENT, HUMANS AND BEYOND

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Mostly mushrooms are known as a food item. They are protein rich and contain many bioactive compounds. They are also known for their medicinal value. However some of them are known for their poisonous nature. However, they have an important place in the ecosystem and many types have important environmental benefits. Fungi which produce mushrooms are critically important in earthbound ecosystem as they recycle nutrients to plants by degrading them lot of ecologists are beginning to realize that actually mushrooms really run the world. They have several benefits for bioremediation. They have the ability to remove toxic pollutants from the environment, it can be done by several methods such as bioaccumulation, biosorption and bioconversion. Beside it, mushroom secrete extracellular enzymes that obliterate hazardous pollutants. They are effective in the transformation of pesticides and degradation of contaminated soils. Overall mushroom offer a cost effective and ecologically responsible approach to bioremediation. An increasing number of the ecofriendly entrepreneurs are looking for its new uses. Present study highlights many such roles associated with them.

Keywords: Mushroom, environment, Bioremediation, degradation of pollutant

BIOCHEMICAL STUDY ON COMMON (*FAGOPYRUMESCULENTUMMOENCH*)AND TARTARY BUCKWHEAT (*FAGOPYRUMTARTARICUMGAERTN.*) COLLECTED FROM DISTRICT CHAMBA OF HIMACHAL PRADESH

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Buckwheat is an important traditional crop plant of tribal communities inhabiting high altitude regions of upper Himalayas. Buckwheat and its products have emerged as popular health food due to its high nutritional and therapeutic potential. Its health promoting effects are attributed to the presence of flavonoids and some non flavonoid compounds like rutin, quercetin, vitexin, coniferin, D-chiro-inositol etc. Both common and tartary buckwheat contain ample amount of nutrients but tartary buckwheat has become more popular choice in the development of functional food than the common buckwheat due to its better disease preventive effects like antioxidant, antidiabetic, anticancer etc. The aim of the present study is to analyze nutritional and antioxidant activity of landrace varieties of buckwheat from district Chamba of Himachal Pradesh. The extracts of different parts (shoot, flower and grains) of common and tartary buckwheat were analyzed for the content of nutrients and antioxidant activity. Highest total carbohydrate content was recorded in tartary buckwheat grains (50.5%). The percentage of fat content ranges from 2-7% in both the species. Total phenol and flavonoid content was highest in the methanolic extract of common buckwheat flowers (183 mg GAE/100mg and 569.29 mg QE/100mg) and tartary buckwheat grains (96.35 mg GAE/100mg and 336.29 mg QE/100mg). Total antioxidant activity was highest in methanolic extract of common buckwheat flower (58.36mg AAE/100mg) followed by tartary buckwheat flowers (38.93 mg AAE/100mg). This study provides significant information on the phytochemical distribution and biochemical activities of different parts of common and tartary buckwheat plant that will enrich the functional food value of buckwheat.

Keywords: Common buckwheat, tartary buckwheat, functional food, flavonoids, antioxidant activity, rutin.

EXPLORING THE CHEMICAL COMPOSITION OF INDOOR AND OUTDOOR PM_{2.5} AT TWO DIFFERENT MICRO-ENVIRONMENTS OF INDIA**KIRTI SINGH, NEELAMBAGHEL, K. MAHARAJKUMARI AND APARNA SATSANGI*****Department of Chemistry, Dayalbagh Educational Institute, Dayalbagh, Agra, Uttar Pradesh, India**

In recent decades, with the increasing energy demands and urbanization air pollution has become the most important environmental problems causing climate changes. The present study was planned to assess simultaneous measurements of PM_{2.5} indoors and outdoors in residential buildings and University Campus of Agra in India. PM_{2.5} samples were collected from the 2 sites using Envirotech APM 821 sampler. It was observed that the concentrations of PM_{2.5} were higher indoors at residential site (indicating dominance of indoor emission sources probably cooking and building materials), and outdoors at the university site, as there were no prominent indoor emission sources at the University site. Infiltration analysis showed transport of outdoor PM_{2.5} particles indoors in the summer and monsoon season due to prevailing winds. Further, chemical characterization i.e. assay of metals and water-soluble inorganic ions (WSII) revealed dominance of Zn, Na, Ba, Cr and Ni indoors at the residential site while Mg, Al, K and Pb were dominant outdoors at the university campus. Despite having crustal origin, Ca²⁺ and SO₄²⁻ were observed to be the dominant ions at University, indoors though it was dominant outdoors at residential site. Chemical speciation of the WSII at both the sites showed dominance of (NH₄)₂SO₄, NH₄NO₃, outdoors at both the sites, while CaSO₄ and NaCl were dominant indoors at the university and residential site respectively. Further, major findings of this study would aid in the development of efficient air pollution management measures to reduce indoor human exposure to PM_{2.5} and lower the potential human health risk.

Keywords: Chemical speciation, elemental composition, Indoor-outdoor PM_{2.5} and infiltration.**INTEGRATED NUTRIENT MANAGEMENT IN COMMERCIAL CUT FLOWERS: A REVIEW****KIVI H YEPTHO*¹****Department of Horticulture, SAS, Nagaland university, Medziphema Campus**

Floriculture is a branch of horticulture concerning cultivation of flowering and ornamental plants for garden and floristry. It includes cut flowers, cut greens, bedding plants, houseplants, seeds, bulbs, tubers, rooted cuttings, dried flowers, potted plants etc. The rising in living standards and unabated urbanization in the present day has led the world to growing demand of flowers and their products thereby, making the floriculture sector an important commercial trade. In India, commercial floriculture has emerged as hi-tech activity-taking place under controlled climatic conditions inside greenhouse which is being viewed as a high growth industry. The important floricultural crops in the international cut flower trade are rose, carnation, chrysanthemum, gerbera, gladiolus, gypsophila, tulip and lilies. The sustainability in agriculture system is a global issue. After the industrial revolution widespread introduction of inorganic fertilizers, has led to a decline in the use of organic materials in the cropping system and the indiscriminate use of fertilizers has adversely affected the soil fertility, crop productivity and particularly the environment. Flower cultivation is no longer exception to this. In this regard, the use of organic fertilizers is an appropriate approach to boost the productivity of flower crops. For the continuous development of floriculture sector, we need proper soil and nutrient management because proper plant nutrition supply is essential for successful production of floricultural crops in open and under protected conditions. And as such integrated nutrient management holds great promise in exhibiting the growing nutrient demands of intensive farming like floriculture. Likewise, farmers should focus their attention on cost-effective integrated nutrient management practices for generating higher revenue thereby contributing in the growth of floriculture industry.

Keywords: Cut flowers, floriculture, inorganic fertilizers, integrated nutrient management and organic fertilizers.**ASSESSING THE IMPACT OF NATIONAL EDUCATION POLICY ON AGRICULTURAL EDUCATION: A COMPARATIVE STUDY****KOMALKRITI****Ph.D. Research Scholar, Department of Extension Education and Communication Management, Ethelind College of Community Science, SHUATS, Prayagraj, U.P.**

Education policies play a pivotal role in shaping a nation's future by establishing the framework for developing human capital, fostering innovation and driving economic growth. Agricultural education has a direct link to a country's food security, agricultural productivity and rural development. Agricultural education encompasses a wide range of subjects. It is crucial not only for training the next generation of farmers and agricultural scientists but also for promoting sustainable practices, innovation in food production and rural community development. National education policies define the structure and content for educational institutions. In the context of agricultural education, these policies can influence curriculum design, teacher training and development, funding and resources, access and inclusion etc. This research paper explores the impact of national education policy on agricultural education by conducting a comparative study across different educational institutions. The primary objective is to understand how changes in education policy affect the structure, content and effectiveness of agricultural education programs. The study examines educational frameworks, curriculum development, funding allocations and teacher training initiatives within the context of agricultural education. The research methodology involves a mixed-methods approach, combining quantitative analysis of educational outcomes with qualitative insights from stakeholders in the education and agricultural sectors. Data is sourced from government reports, educational institutions and interviews with educators, policymakers and students. The findings indicate that national education policies have a significant influence on the quality and relevance of agricultural education. Based on the results, the paper provides recommendations for policymakers to design education policies that foster a strong connection between academic learning and real-world agricultural applications. Overall, this study contributes to the ongoing discourse on the role of education in fostering sustainable agricultural practices and offers insights into policy mechanisms that can support the development of a robust agricultural education system. **Keywords:** Agricultural Education, National education policy, Policy impact assessment, Policy implementation, Educational outcomes and quality.

BEHAVIORAL AND HISTOLOGICAL IMPLICATIONS OF MALACHITE GREEN ON *CYPRINUS RUBROFUSCUS***KOMAL KUMARI AND RESHMA SINHA****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, India**

Malachite green (MG) is a dye categorized within the tri-aryl methane family. It finds widespread application in the coloring of textiles, paper, leather, fur, and confectioneries. The unregulated discharge of dye effluents into water has adverse effects on non-targeted aquatic organisms. Furthermore, the reduced form of malachite green, known as leuco-malachite green (LMG), exhibits a prolonged presence in both fish tissues and environmental water. The study aims to assess the chronic toxicity (15days) induced by MG on *Cyprinus rubrofuscus* (size: 6.83 ± 0.13 cm and weight: 3.89 ± 0.14 g). The carp ($n=40$) were exposed to $1/5^{\text{th}}$ of 96h LC_{50} i.e. 0.087 mg/L of MG for 15 days. For this, two groups were maintained in duplicates in 20L dechlorinated water: group I – control ($n=10$), group II – 0.087 mg/L MG ($n=10$) at physicochemical properties (pH- 7.2 ± 0.1 , temperature- $27 \pm 2^{\circ}\text{C}$) of water. Toxicological assessment was made through behavioral, morphological, histological and micronucleus as endpoints. MG exposure resulted in the behavioral alterations such as hyperactivity, blood clot formation in the body, scale loss, and elevated mucous secretion in the fishes. Hepatological alterations included sinusoids congestion by blood, and vacuolization. The genotoxicity assay exhibited formation of micronuclei characterized by blebbing, indicating potential chromosomal damage and cellular stress. Therefore, outcome of this study provides valuable insight into potential risk associated with exposure of malachite green on aquatic organisms like carp fish.

Keywords: Fish, genotoxicity, histology, liver, MG, toxicity.**BIOCONTROL EFFICACY OF PATHOGENIC FUNGI ISOLATED FROM THE LEAVES OF *PARTHENIUM HYSTEROPHORUS*****KOMAL SAHU, RAJ SINGH****Department of Bio-Sciences and Technology, Maharishi Markandeshwar (Deemed to be University), Mullana-Ambala, Haryana, India**

One of the most aggressive invasive weeds, *Partheniumhysterophorus* (Asteraceae) is generating serious difficulties for the environment, economy, human health, and animal health in India and around the world. Some leaf spot fungal pathogens were isolated from the North East areas by using standard isolation techniques utilizing potato dextrose agar (PDA), during a series of intensive searches for natural enemies of *P. hysterophorus*. After applying Koch's postulates, it was discovered that the fungal pathogens isolated from the Parthenium weed were found pathogenic to the weed and can be used as biocontrol agents. Based on morphological, cultural, and molecular traits, the fungal isolates were identified and used for further experiments. The research aims to explore the biological control efficacy of pathogenic fungi to inhibit the Parthenium growth.

Keywords: *Partheniumhysterophorus*, fungal pathogens, Koch's postulates, biocontrol.**ROBOTIC, DRONE, DIGITAL AGRICULTURE TECHNOLOGY****KOMAL SHARMA, DR SANDEEP BHAKAR****M. Sc. Scholar, Department of Agriculture Extension Education, CCSHAU, Hisar****Assistant Professor, Department of Agricultural Extension Education, CCS HAU, Hisar, Haryana**

The integration of robotics, drones and digital technologies in agriculture has ushered in a new era of precision farming revolutionizing traditional agricultural practices globally. This chapter provides a comprehensive examination of the latest advancements in robotic, drone and digital agriculture technologies with a specific focus on their application in India. Beginning with an overview of the current challenges facing agriculture in India the chapter delves into the various technologies employed to address these challenges including robotic systems for planting and harvesting drones for crop monitoring and spraying and digital tools for data analytics and farm management. The chapter also discusses the potential benefits and challenges associated with the adoption of these technologies in Indian agriculture highlighting opportunities for further research and development in this rapidly evolving field.

Keywords: Robotics, Drones, Digital Agriculture, Precision Farming, Smallholder Farms, Agricultural Innovation, Sustainability, Technological Adoption, Rural Infrastructure, Economic Prosperity

PEARL MILLET IS A MIRACLE CROP FOR ARID AND SEMI-ARID CONDATION**KOMALSHEKHAWAT*, P. C. GUPTA¹, NEMI CHAND SHARMA²*****Assistant Professor (GF), Department of Genetics and Plant Breeding, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India****¹Professor & Head, Department of Genetics and Plant Breeding, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India****²Senior Research Fellow, ICAR- AICRP on pearl millet, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India**

Drought is one of the major environmental stresses resulting in a huge reduction in crop growth and biomass production. Pearl millet (*Pennisetum glaucum* L.) has excellent drought tolerance, and it could be used as a model plant to study drought resistance. Efforts have been made for identification of suitable hybrids for drought tolerance in pearl millet using different stress inducers viz.: Yield reduction, Mean productivity index, Relative efficiency index, Mean relative performance, Drought resistance index, Golden mean, and Drought tolerance efficiency. Hybrids ICMA 98222 × 481-500, ICMA 88004 × 501-510, ICMA 93333 × 551-560, ICMA 30199 × 481-500, ICMA 30200 × 561-570, ICMA 88004 × 551-560, ICMA 97444 × 571-580, ICMA 30209 × 571-580, ICMA 04999 × 571-580 and ICMA 30199 × 551-560 were identified as the most drought tolerant hybrids.

Keywords:- Drought, Mean productivity index, Hybrid, Pearl millet, Resistance**HIMALAYAN MEDICINAL AND AROMATIC PLANTS: A REVIEW OF THEIR ETHNO-PHARMACOLOGY, PHYTO-CHEMISTRY, THERAPEUTIC AND BIOLOGICAL ACTIVITIES*****KOMAL THAKUR, *MINAKSHI,¹MUNIT SHARMA & **KRITIKA*****Research Scholar, Department of Botany, Thakur PG College of Education, Dhaliara****¹Assistant Professor, Department of Botany Thakur PG College of Education, Dhaliara**

The Himalayan range is one of the most majestic range in the world spanning several countries including India, Nepal, Bhutan and China. The Himalayas are a treasure of medicinal and aromatic plants, many of which have been used for centuries in traditional healing practices. All people are reliant on plants for utilization for food, fodder, fuel, timber and medicines. The therapeutic plants of Himalayan region have been harvested from ancient time for their ethno-pharmacological uses, vast reservoir of non-nutrient bioactive compounds and phytochemical composition. During the study, a total of 105 plants are documented out of which 75 plants are used for their medicinal and therapeutic potential and rest of 30 plants are used for aroma and aesthetic due to their presence of bioactive compounds. By shedding light on the richness and significance of Himalayan medicinal and plants, this study seeks to contribute biodiversity conservation, environmental sustainability & economic development in the Himalayan region.

Keywords: Medicinal and Aromatic plants, Traditional practices, Phytochemicals, Biodiversity conservation, Environmental sustainability, Therapeutic practices.**DYNAMICS OF SOCIAL SUPPORT AND ITS RELATION WITH PSYCHOLOGICAL WELLBEING AMONG WOMEN UNDERGOING INVITRO FERTILIZATION TREATMENT****KONERU RAMYA* AND VINUTHA U MUKTAMATH¹*****PhD scholar, Department of Human Development and Family Studies, College of Community Science, University of Agricultural Sciences Dharwad, Karnataka,****¹Assistant Professor & Scientist, AICRP-WIA, University of Agricultural Sciences Dharwad, Karnataka**

Infertility is a current global health concern and its treatment constitutes invitro fertilization. However, the physical and psychological toll of IVF have detrimental effect on psychological health, success of treatment and retention. Social support has been shown to enhance health in communities around the world that are dealing with stressors related to their health, and its possible protective benefit for IVF patients is something that warrants more research. The objective of the study is to investigate the role of social support on IVF women and its relationship with psychological wellbeing among women undergoing IVF. The study sample included 284 women divided into two groups, where 142 women undergoing IVF treatment and a matched sample of 142 women (control) with natural pregnancy selected for the study through purposive and snowball sampling technique from Telangana and Karnataka states. Tools used for the study were a self-structured questionnaire to obtain demographic information, Multidimensional Scale of Perceived Social Support scale to assess social support and Depression, Anxiety and Stress Scale to measure psychological wellbeing. The findings reveal that the depression, anxiety and stress were significantly higher among women undergoing IVF than control group women (72% Vs 33 %). Regarding social support, the women with IVF receiving higher amount of partner support, but in control group a significantly greater amount of partner, family and friend support was observed. Statistically, a significant and positive relationship established between social support and psychological wellbeing in women undergoing invitro fertilization. The perceived social support was found to be a significant predictor for better psychological wellbeing among women undergoing invitro fertilization. Therefore, the results indicate that perceived social support can be a significant protective factor for psychological adjustment in women with infertility condition as well as it can act as a manual for mental health practitioners who deal with infertile couples.

Keywords: Social support, psychological wellbeing, invitro fertilization, infertility

A REVIEW ON NETTLE AND THEIR FUTURE POTENTIAL IN SIKKIM HIMALAYAN REGION**KOUSHIKBARUAH* AND MANJU RANA^A,*****Ph.D Scholar, Department of Horticulture, Sikkim University, Gangtok****^aAssistant Professor, Department of Horticulture, Sikkim University, Gangtok**

Nettle plants belong to the Urticaceae family is distributed globally across Asia, Europe, North Africa, and North America. In India, it thrives in the temperate and sub-tropical Himalayas, spanning from Kashmir to Sikkim, at elevations ranging from 1200 to 3500m. Known locally as Sisnoo in Sikkim, it grows in various soil types, preferring moist or damp conditions while avoiding waterlogged soils or weakly acidic/basic environments. Covered in stiff hairs on both sides, its leaves induce a burning sensation upon touch. Revered in cultural and traditional practices, the nettle plant is valued for its versatility and medicinal properties. It serves as a medicine, vegetable, tea and a natural fiber source. Notably, every part of the plant finds utility in food, fodder, medicine, cosmetics, agriculture, and textile industries. Previously, Western nations sourced this plant from Southeast Asia for textiles and pharmaceuticals but ceased due to pesticide concerns. This plant has a high potential to generate more foreign exchanges. As of 2024, the top exporters of nettles are: Mexico (\$479.2 million) followed by Netherlands (\$319.5 million) and Poland: \$299.1 million. The global stinging nettle fibers market is expected to reach \$11.3 million in 2023 and \$42.5 million by 2032. The stinging nettle root extract market is expected to reach \$62.3 million in 2024 and \$145.3 million by 2034. Sikkim being organic state holds significant potential for large-scale cultivation and global exportation, fostering entrepreneurship. This review contributes to preserving indigenous knowledge and advocating for sustainable utilization of the nettle plant.

Keywords: Nettle, Sikkim, Natural fiber, Traditional medicine, Ethnomedicine, Entrepreneurship**ENHANCING THE FRUIT YIELD AND QUALITY IN POMEGRANATE: INSIGHTS INTO DRIP IRRIGATION AND MULCHING STRATEGIES****KRIPARAM MEENAANDDR. S. S. LAKHAWAT****Department of Horticulture Rajasthan College of Agriculture, Udaipur, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan**

Pomegranate (*Punica granatum* L.) is a fruit tree that is globally distributed, especially in warm areas with low annual rainfall and limited water availability. This species exemplifies the critical role of water in agriculture and the need for efficient irrigation practices due to its characteristics, cultivation requirements, and geographic diffusion. In this study, we investigated the effects of drip irrigation and mulching on the vegetative growth, yield, and fruit quality attributes of pomegranate. The experiment involved three irrigation regimes (100% of evapotranspiration, 80%, and 60%) and three mulching treatments (no mulch, plastic mulch, and organic mulch) in a factorial combination. Both irrigation and mulching had significant positive influences on the yield and fruit quality attributes. Specifically, deficit irrigation strategies showed a negative impact on the fruit yield per tree, with a greater effect observed as the severity of the irrigation deficit increased. Mulching, on the other hand, led to a significant increase in the fruit yield, primarily attributed to an increase in fruit size. Furthermore, the analysis indicated that irrigation and mulching treatments had distinct effects on fruit traits such as the fruit length, width, volume, and rind thickness. Interestingly, the study highlighted that the effects of irrigation and mulching on fruit quality attributes were mostly independent of each other, suggesting an additive influence rather than an interaction between the two factors. These findings underscore the importance of considering irrigation and mulching practices for optimizing fruit quality in pomegranate cultivation, particularly in semi-arid regions. The results contribute valuable insights for farmers and researchers seeking to enhance fruit production and quality.

Keywords: Fruit quality, Drought, yield, water-saving technologies, tree; sustainable agriculture**RECENT ADVANCES OF TOTAL QUALITY MANAGEMENT (TQM) PRACTICES IN HORTICULTURE CROPS.****KRISHAN KANT MEENA^{*1}, ROHIT NAIN², KHEMENDRA CHOUDHARY³, SUKHDEV SINGH⁴****¹Msc, Department of Horticulture (Fruit science), Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana,****²Msc, Department of Soil Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India****³Ph.D. Scholar, Department of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India****⁴Msc, Department of Horticulture (Fruit science), Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana,**

In the realm of horticulture, the implementation of Total Quality Management (TQM) practices has experienced significant advancements in recent years, fostering substantial improvements in crop production, quality assurance, and overall efficiency within the industry. This aims to encapsulate the key developments in TQM specific to horticulture crops within a concise 250-word framework. One of the notable advancements in TQM practices in horticulture crops is the integration of cutting-edge technologies such as precision agriculture, remote sensing, and data analytics. These technologies enable growers to monitor crop health, optimize resource utilization, and make data-driven decisions, thereby enhancing both productivity and quality. Recent advances in TQM practices in horticulture crops encompass technological innovations, sustainable initiatives, supply chain enhancements, and post-harvest improvements, collectively driving significant improvements in productivity, quality, and sustainability across the industry.

Keywords:- Precision Agriculture, Supply Chain Management, Post-harvest Technology, Quality Assurance

PRELIMINARY SURVEY OF BUTTERFLIES FAUNA AT HAMIRPUR AND BILASPUR DISTRICTS OF HIMACHAL PRADESH, INDIA DURING ONE YEAR**KRISHAN LAL****Department of Zoology, NSCBM Govt. College, Hamirpur (H. P.)**

Butterflies of Hamirpur and Bilaspur districts were observed during May 2023 to April 2024. Butterflies were observed and photographed in different types of habitats including human habitation, forest and grassland areas. These were observed during morning and evening hours. Every week field was visited at least once. Indian Red Admiral, Common crow, Common Castor, Plain Tiger, Common Mormon, Five Ringlet, Red Pierrot, Chocolate pansy, grey pansy, blue pansy, yellow pansy, plain tiger, striped tiger, sailor, common leopard, common sergeant, Himalayan Pale grass, blue, Common grass yellow, orange awlet, Common lascar, club beak, bush hopper, painted lady, common jester, tricolored pied flat, spotted blue crow, cabbage white are some of the butterflies recorded during this period. This area is rich in butterfly diversity. Suitable habitat was found available for these butterflies in this region. The habitat should be conserved for future also.

Keywords: Habitat, conservation, diversity.**A STUDY OF BUTTERFLY FAUNAL DIVERSITY (LEPIDOPTERA) IN AGRA DISTRICT OF UTTAR PRADESH, INDIA****KRISHAN PRATAP SINGH¹, SHAURYAVARDHAN CHAUHAN²**¹**Biodiversity Research and Development Society**²**Dept. of Biotechnology, Sharda University, Greater Noida, Uttar Pradesh**

This study of butterfly faunal diversity was carried out in Agra district of Uttar Pradesh, India during 2022 to 2023. The butterflies have significant role in preserving ecosystem. Butterflies also serve as indicators of climate change. Following are the selected five sites in the study area for the survey of butterflies namely reserve forest of Keetham, Sewlawetlad Gwalior Road, Taj nature walk, Fatehpur Sikri and Fatehabad area due to different types of habitats. 45 species of butterfly were recorded belonging to the five following families Nymphalidae, Pieridae, Papilionidae, Lycaenidae and Hesperidae. The highest numbers of butterflies were recorded during the months of March to May and September to November. In this study the Simpson Index of diversity method was used to count the richness. The study area is rich in butterfly diversity and further research could be conducted to obtain more details and documentation on butterfly faunal diversity for the conservation.

Keywords: Butterfly, Diversity, Agra district, Conservation.**ENHANCING SOIL HEALTH AND LAND MANAGEMENT THROUGH SOIL SENSOR: A REVIEW*****KRISHNAB. HALAI¹, VATSALS. RANPARIYA², SARYUTRIVEDI² AND KRUNAL SUDANI¹**¹**Under Grad. Scholar, ²Assistant Professor Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat, India**

Soil health is fundamental, requiring nutrients, proper structure, and adequate water for supporting plant growth and ecosystem sustainability. Land management involves careful and sustainable use of large areas, inclusive planning, habitat preservation, erosion prevention, and addressing environmental needs. The significance of soil health lies in its role as the bedrock for plant life, offering essential nutrients, water, and structural support crucial for robust growth and food production. Without healthy soil, plants struggle to proliferate, impacting both food output and environmental stability. Soil sensors, resembling miniature gadgets, play a crucial role in maintaining soil health by measuring key parameters like moisture, temperature, and nutrient levels. They empower farmers and gardeners to understand their soil's needs accurately, enabling informed decisions on watering, fertilization, and soil management. This translates into healthier plants and improved crop yields. In contemporary agriculture, sensors act as invaluable allies to farmers, stationed in fields to monitor soil conditions closely. By relaying data to farmers' devices, these sensors facilitate timely actions such as irrigation and fertilization, similar to having a team of soil experts assist farmers in optimizing harvests. Looking ahead, the future of farming hinges significantly on sensor technology. Advanced sensors will enhance precision in monitoring soil moisture, temperature, and crop health, empowering farmers to optimize resource usage and minimize waste. Moreover, anticipated technological advancements may render sensors more affordable and user-friendly, democratizing access to soil health monitoring for farmers worldwide.

PESTICIDE USE BEHAVIOR AMONG FARMERS AND THEIR PERCEPTION OF THE ENVIRONMENTAL IMPACT**KRISHNA GUDADUR, S.S. DOLLI****Department of Agricultural Extension Education, University of Agricultural Sciences, Dharwad, Karnataka, India**

The study aimed to assess farmers' understanding of pesticide application in specific crops, namely paddy, cabbage, and grape, during the years 2019 to 2022. From the identified three districts—Koppal, Belagavi, and Vijayapura a total of 240 farmers were randomly selected, with 80 farmers chosen for each crop. The results indicated varying levels of pesticide application behavior among farmers, with grape growers exhibiting the highest behavior index at 50.48%, followed by paddy at 48.52%, and cabbage at 43.28%. Notably, high pesticide application behavior was observed in pest identification, with percentages of 69.00%, 53.63%, and 60.13% for paddy, cabbage, and grape respectively. Specifically, farmers showed a relatively high ability to identify pests in the field, surpassing sixty percent in all crops. However, the study also revealed low indices regarding the utilization of organic pesticides, with percentages of 3.88%, 9.88%, and 3.88% for paddy, cabbage, and grape respectively. Regarding perceived impact categories, in the paddy crop, 47.50% of farmers perceived a high

impact of pesticides, followed by low (32.50%) and medium (20.00%) impact categories. In cabbage, 35.00% of farmers fell into the medium impact category, with 33.75% in the high impact category and 31.25% in the low impact category. For grape crops, 37.50% of farmers perceived a medium impact, while 32.50% perceived a high impact and 30.00% perceived a low impact on the environment due to pesticide use. Overall, the study highlights the necessity for sustainable pesticide practices, including increased adoption of organic alternatives, and awareness of the environmental consequences associated with pesticide application in agriculture.

Keywords: Pesticides use behavior, Environmental impact, Paddy, Cabbage, Grape

STUDY THE IMPACT OF INTEGRATED NUTRIENT MANAGEMENT (INM) ON GROWTH OF DAHLIA (*DAHLIA VARIABILIS*)

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The Horticulture Research Center, Department of Floriculture and Landscaping Architecture, College of Horticulture, SVPUA&T, Meerut, Uttar Pradesh, studies Integrated Nutrient Management (INM) in dahlia in 2022–2023. INM optimizes plant growth and environmental impact with organic, inorganic, and bio-fertilizers. Dahlia plants received 19 INM treatments, including organic compost, chemical fertilizers, and bio-fertilizers, for a predetermined duration. INM affected dahlia growth based on plant height, leaf count, stem length, and spread. INM significantly impacts dahlia plant development parameters compared to typical fertilizer management. This Study shows T₁₇ was best in plant height 105.02 cm and stem length 85.73 cm followed by T₁₆ with plant height 103.53 cm and stem length 83.33 cm. T₁₃ is best in number of leaves per plant with reading 72.6 followed by T₁₂ with number of leaves per plant are 70 and T₁₂ is best preforming for plant spread 35.17 cm² followed by T₁₃ with plant spread 35.08cm². These findings suggest that bio-fertilizers' beneficial microorganisms and organic and inorganic nutrients promote dahlia plant growth. INM might support agriculture by reducing synthetic fertilizers and boosting soil health. This study reveals how INM promotes dahlia plant growth, demonstrating sustainable ornamental gardening. Further research should evaluate INM's effects on dahlia growth and development throughout time.

Keywords: INM (Integrated Nutrient Management), Bio-fertilizer, Sustainable agriculture, Microorganisms.

EFFECT OF ORGANIC MANURES AND BIO-ENHANCERS ON VEGETATIVE PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.) CV. PUSA GAURAV

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A field experiment was conducted during the years 2021-22 and 2022-23 on tomato cv. Pusa Gaurav to determine the effect of organic fertilizers and bio-enhancers on plant parameters. The investigation took place at the horticultural research center of the Department of Horticulture, located at the campus of Chaudhary Charan Singh University in Meerut (UP). The randomized block design was employed for the experiment, which was replicated three times. The number of treatments included in the study was sixteen i.e. T₁ (control), T₂ (FYM 100%), T₃ (Vermicompost 100%), T₄ (Poultry manure 100%), T₅ (FYM 75%+Vermicompost 25%+Jivamrut), T₆ (FYM 75%+ Poultry manure 25%+Jivamrut), T₇ (Vermicompost75%+ Poultry manure 25%+Jivamrut), T₈ (FYM 75%+Vermicompost 25%+Panchagavya), T₉ (FYM 75%+ Poultry manure 25%+ Panchagavya), T₁₀ (Vermicompost 75%+ Poultry manure 25%+ Panchagavya), T₁₁ (FYM 50%+Vermicompost 50%+Jivamrut), T₁₂ (FYM 50%+ Poultry manure 50%+Jivamrut), T₁₃ (Vermicompost 50%+ Poultry manure 50%+Jivamrut), T₁₄ (FYM 50%+Vermicompost 50%+ Panchagavya), T₁₅ (FYM 50%+ Poultry manure 50%+ Panchagavya), T₁₆ (Vermicompost 50%+ Poultry manure 50%+ Panchagavya). Different organic manures and bio-enhancers had a significant impact on all variables parameters related to growth attributes. The results showed that in all treatments, soil with vermicompost 50% + poultry manure 50% and foliar application of Jivamrut gave a positive effect on plant morphology i.e. plant height (98.40 cm and 99.30 cm), plant spread (34.33 cm and 34.06 cm), average leaf length (46.83 cm and 47.63 cm), and average leaf width (26.33 cm). and 26.76 cm), stem diameter (1.80 cm and 1.78 cm), root length (22.90 cm and 23.10 cm), number of leaves per plant (76.40 and 76.76), number of branches per plant (11.90 and 11.70), Fresh plant weight (1526.53 g and 1546.53 g), dry plant weight (289.26 g and 287.66 g) during 2021-22 and 2022-23 as compare to other treatments.

Keywords: Tomato, Farm yard manure, Vermicompost, Poultry manure, Panchagavya and Jivamrut.

APPLICATION OF RAMAN SPECTROSCOPY IN SEAFOOD QUALITY DETERMINATION AND SEAFOOD SAFETY ANALYSIS**KRISHNA VENI****Fish Processing Technology Department, ICAR- Central Institute of Fisheries Education, Versova, Andheri west, Mumbai**

Seafood quality determination and safety analytical techniques are helpful in assessing proper handling, preparation, process, transportation and storage of seafood in order to prevent food-borne illnesses and provide seafood products of the best possible standard for consumer acceptability and human health. As fish, on the other hand, are the most delicate food products, it is more prone to spoilage due to the microbial activity. It is crucial to closely monitor seafood safety and quality. While spectroscopic methods have several advantages over conventional techniques such as less time consuming, cost-effective, easy to use and interpret, less labour-intensive, affordability, high specificity and immediate response when it comes to evaluating seafood safety and quality. Among them, Raman spectroscopy is direct and non-destructive analytical technique, not interfered by water, little or no pre-treatment of samples and only small portions are needed in the analysis. Both organic and inorganic materials are suitable for Raman analysis. Their applications are involved in pre-harvest and post-harvest activities of seafood technology. It is employed in fish quality determination such as nutrient composition, lipid oxidation, protein denaturation, adulteration of seafood, detection of preservation techniques such as use of formaldehyde in seafood, antibiotic residues like nitrofurantoin, furazolidone, differentiation of fresh fish from frozen thawed fish and also monitoring a biological process such as fish fermentation. It can be applied for seafood safety analysis such as detection of biological hazard including harmful pathogen and spoilage bacteria, virus and fungus, physical hazards such as microplastics detection in aquatic environment and seafood, chemical hazards such as environmental contaminants such as Hg^{2+} , Cd^{2+} , methylene blue, mycotoxins, biotoxins like tetrodotoxin, histamine detection. From normal Raman spectroscopy to highly-equipped Raman techniques such as surface enhanced, tip enhanced, resonance, stimulated, coherent anti-stokes, surface enhanced hyper Raman spectroscopy and confocal Raman microscopy resolves most of the limitations of other spectroscopic methods and can be utilized for both qualitative and quantitative purposes.

Keywords: Seafood, spoilage, spectral technique, Raman scattering, quality, hazards.

INVESTIGATING THE DISTRIBUTIONAL DYNAMICS OF CARBON NANOTUBES IN ZEBRAFISH**KRITI KUMARI¹, RUPAM SHARMA¹, MUJAHIDKHAN A. PATHAN¹, TINCY VARGHESE², NALINI POOJARY³**¹**Fish Genetics and Biotechnology Division, ICAR-Central Institute of Fisheries Education, Maharashtra, Mumbai, India**²**Fish Nutrition, Biochemistry and Physiology Division, ICAR-Central Institute of Fisheries Education, Maharashtra, Mumbai, India**³**Aquatic Environment and Health Management Division, ICAR-Central Institute of Fisheries Education, Maharashtra, Mumbai,**

Carbon nanotubes (CNTs) represent a promising class of nanomaterials within biomedicine, applications in drug delivery, bio-sensing, and therapy. They offer distinct advantages such as excellent biocompatibility, stability, environmentally friendly synthesis, and easy surface modification. Though concerns about their toxicity during the manufacturing process have restricted their widespread adoption. Some methods of functionalizing CNTs have been developed to reduce toxicity and facilitate their transport within biological systems. Despite these advancements, our understanding of CNT toxicity, dispersion, and behaviour within biological environments has been limited, hampering their broader utilization. Hence, there is a critical need to comprehensively investigate the interaction of multi-walled carbon nanotubes (MWCNTs) within biological systems. Thus, it is extremely essential to understand the interaction of MWCNTs in a biological system. So, in this study the biodistribution of BSA-MWCNT and Fe_3O_4 -MWCNT was evaluated in *Danio rerio*. The experiment consisted 8 fish per treatment for biodistribution in duplicates. The sublethal doses (20mg) of CNTs were orally administered in *D. rerio*. The samples were collected for biodistribution on 1st, 7th and 28th day post administration. The samples were analysed using Raman Spectroscopy. The biodistribution of MWCNTs was observed higher in liver followed by gut and brain tissues at 28th day of exposure. The analysis revealed the presence of MWCNT till 28th day and major accumulation was observed in liver. The study provides basic information about the persistence and distribution of MWCNTs in Zebrafish which may be of tremendous helpful in biomedical science, targeted drug delivery, disease treatment in fishes and pharmaceutical sciences, especially for deciding the safe dose on CNTs for carrier systems for therapeutic agents in vivo.

Keywords: CNT, Zebrafish, BSA, Raman spectroscopy.

VALUE ENHANCEMENT OF AONLA: AN UNDERUTILIZED FRUIT***KRUNAL H. SUDANI¹, SARYU TRIVEDI², HARSH A. KAMANI² AND V. S. RANPARIYA**¹**Under Grad. Scholar, ²Assistant Professor, Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat,**

Aonla (*Emblica officinalis*), the king of arid fruits, popularly known as “Indian gooseberry”, is a small-sized minor subtropical fruit grown widely in North India. India ranks first in the world in aonla area and production volume. It is considered to be a “wonder fruit for health” because of its unique properties. The Aonla fruit valued for its nutritional and medicinal properties. It is a rich source of ascorbic acid (600-700 mg/100 g of pulp) and contains more ascorbic acid than that of citrus fruits. Its fruit have excellent therapeutic value which is utilized for treatment of several diseases from ancient times in the fruits of aonla. Asthma, bronchitis, scurvy, diabetes, anemia, weakness of memory, cancer, tension, influenza, cold, loss and grayness of hair etc. The postharvest losses in aonla vary from 30% to 40% due to its perishable nature, which reduces the market value. Value addition through processing would be the only effective tool for economic utilization of increased production of aonla in the future. Processing not only reduces the postharvest losses but also provides higher returns to the growers. A number of products such as murabba, pickle, candy, juice, squash, jam, jelly, powder, etc., are prepared from aonla fruits. The main use of this candy is for diabetic patient who can also eat and enjoy the taste of it.

Keywords: arid, gooseberry, ascorbic acid, therapeutic, postharvest etc.

INFLUENCE OF DIFFERENT YEAST STRAINS ON QUALITY OF POMEGRANATE FRUIT WINE**KRUTHIKA, M. H AND BABU, P******Professor of Horticulture, College of Agriculture, Hanumanamatti, UAS, Dharwad**

An investigation on wine making from fruits of pomegranate (*Punicagranatum*L.) var. Super Bhagwawas carried out using eight different yeast strains to find out their suitability for preparation of pomegranate wine and to understand their contribution to the quality of the wine prepared. Among the yeasts used, the strain *Saccharomyces cerevisiae* var. *ellipsoideus* produced maximum wine yield of 65.29 % with highest alcohol content of 5.67 % and minimum residual sugars of 6.93 % at the end of fermentation and thus considered as the best strain, and viable for making pomegranate fruit wine, particularly dry wine. On the other hand, wine prepared using the strain *Saccharomyces fermentati* had retained greater levels of total and reducing sugars, which is ideally suitable for making sweet dessert wine.

Key words: Pomegranate wine, Yeast strains, Chemical characterization, Sensory evaluation**STANDARDIZATION OF GRAFTING METHODS AND TIME OF GRAFTING IN JACK FRUIT (*ARTOCARPUS HETEROPHYLLUS* L.)****KULDEEP^{1*}, MANOJ KUNDU², HIDAYATULLAH MIR³, PAWAN KUMAR⁴,****1,2,3,4- Department of Horticulture (Fruit and Fruit Technology), Bihar Agricultural University, Sabour-813210, Bihar, India**

The study was conducted during 2020-21 at the Horticulture experiment station, BAU, Sabour, Bihar to standardize the grafting methods and time in jack fruit. The experimental findings revealed that wedge grafting during December-January had maximum survivability percent (92.40-93.6%). However, it decreased drastically after February-March in all the grafting methods. The earliest sprouting was recorded in softwood and side grafting which was done on 19th February (17.24 and 17.79 DAG, respectively). Further, at 100 DAG, a significantly higher number of leaves graft⁻¹ (16.72-26.31) along with bigger leaf length (8.96-10.20 cm) and leaf breadth (5.12-6.12 cm) was also recorded in wedge and side grafting done during December-January. In addition, it was also observed that the maintenance of the grafted saplings under shade net conditions had a performed effect on higher graft success with improved vegetative growth as compared to their maintenance under open conditions. Wedge grafting on 20th January and 5th January followed by keeping them under shade net condition had maximum height increment (34.83 and 31.00% higher than the respective open condition counterpart). On the other hand, a number of sprout graft⁻¹, a number of leaves graft⁻¹ and leaf size were also recorded as maximum in wedge and side grafting done during December-January followed by keeping them under shade net condition as compared to open condition. Thus, it can be concluded that the wedge and side grafting performed during the month of December-January using a 6-8 months old scion stick followed by keeping the grafted saplings under shade net condition is the most effective technique for mass multiplication of the jack fruit saplings under eastern Indian condition.

Keywords: Grafting, Leaf opening, Months, Sapling Diameter, Survivability**ADVANCING HORTICULTURE: EXPLORING AEROPONICS INNOVATIONS, BENEFITS, AND FUTURE PROSPECTS****KULDEEPHARIYANA****Department of Horticulture, RCA, MPUA&T-Udaipur, Rajasthan**

A cutting-edge cultivation technique gaining traction in horticulture. Aeroponics involves growing plants in an air or mist environment without the use of soil, utilizing nutrient-rich solutions delivered directly to the plant roots. The abstract explores the innovations and advancements in aeroponic systems, including vertical farming, aeroponic towers, and automated nutrient delivery systems. The abstract delves into the benefits of aeroponics, such as increased crop yields, water efficiency, reduced nutrient waste, and faster plant growth rates compared to traditional soil-based cultivation methods. It also discusses the potential for aeroponics to mitigate environmental challenges such as land scarcity, water shortages, and soil degradation, making it a sustainable solution for future agriculture. Furthermore, the abstract touches on the economic feasibility of aeroponics, analyzing production costs, labor requirements, and market demand for aeroponically grown produce. It also explores the role of aeroponics in urban agriculture, vertical farming initiatives, and its integration with smart technology for enhanced monitoring and control.

Keywords: Aeroponics, Horticulture, Cultivation techniques, Vertical farming, Nutrient delivery, Crop yields.**IMPROVING WHEAT (*TRITICUM AESTIVUM* L.) PRODUCTIVITY THROUGH SEED TREATMENT AND FOLIAR APPLICATION OF SEAWEED EXTRACT****KUMAR D LAMANI^{1*}, NAGESH RATHOD², UDAY G REDDY³ AND SUMA S. BIRADAR⁴****Department of Agronomy, University of Agricultural Sciences, Dharwad, Karnataka, India****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

A field experiment was conducted to study the "Improving wheat (*Triticumaestivum* L.) productivity through seed treatment and foliar application of seaweed extract" at AICW & BIP, MARS, UAS, Dharwad (Karnataka) during *rabiseason* of 2019-20 and 2020-21 in split plot design with seed treatment levels as a main plot and six foliar spraying levels as a sub plot and single control, replicated three times. Seed treatment with seaweed extract at 3ml /kg seeds recorded significantly higher growth parameters, yield attributes and economics returns over without seed treatment with seaweed extract. Foliar application of seaweed extract at 4ml l⁻¹ water at tillering and heading stage recorded significantly higher grain yield (9.16 %), straw yield (12.83 %), number of effective tillers (14.30 %), grain weight (37.50 %), gross returns

(Rs 1,38,292 /ha) and net returns (Rs 1,00,203 /ha) compared to other treatment. Combination of seed treatment with seaweed extract at 3ml /kg seeds with foliar application of seaweed extract at 4ml l⁻¹ water at tillering and heading stage recorded significantly higher grain yield (19.10 %), straw yield (27.80 %), number of effective tillers (41.75 %), grain weight per spike (61.02 %), plant height (38.51, 49.18 and 30.13 %), gross returns (Rs 1,41,694 /ha) and net returns (Rs 1,03,595 /ha) over the other treatments.

TISSUE SPECIFIC SUGAR ACCUMULATION AND SOFTENING OF FIG FRUIT (*FICUSCARICA* L.) ACCOMPANIED THE AMBIGUOUS RIPENING NATURE

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Ripening of fig (*Ficuscarica* L.) fruit is traditionally classified as climacteric; however, recent studies have suggested that distinct mechanisms exist in its inflorescence and receptacle tissues. Particularly, fig fruits are characterized by speedy increase in sugar, volume, color and softness in the late phase of ripening. In this study, excessive sugar accumulation and rapid changes in firmness of fruit were discussed followed with tissue-specific distinct ripening nature. In fig fruit, ABA plays key role in regulation of ripening by promoting ethylene production, as in the climacteric fruit, especially in the inflorescence. However, increasing accumulation of endogenous ABA until full ripeness and significantly low expression of ethylene-biosynthesis genes in the receptacle tissue suggests non-climacteric ripening. This distinct ripening nature also coordinated with higher sugar accumulation in inflorescence compared to the receptacle tissue. Analysis of 80 genes related to sugar metabolism and transporter proteins supported higher sugar content by exhibiting higher expression level of major genes in inflorescence than in receptacle tissue. Similarly, 16 genes encoding different softening enzymes were analyzed in inflorescence and receptacle tissue of both pollinated and parthenocarpic fig fruit. Generally, high expression level of genes were observed at matured green stages in parthenocarpic inflorescence compared to the pollinated ones. Particularly, expansin encoding genes had relatively lower expression level in pollinated inflorescence compared to parthenocarpic one. Interestingly, at full ripening stage all 16 genes showed similar pattern of expression in both receptacle and inflorescence tissues. Thus, study on rapid sugar accumulation and softening of fig fruit confirmed the tissue specific nature as distinct ripening regulation in inflorescence and receptacle.

Keywords: Fig, ripening, sugar accumulation, softening

CANCER RISK ASSESSMENT BY DUPLICATE DIET SAMPLING (DDS) AMONG THE INHABITANTS OF COASTAL COMMUNITY

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The present study deals with the baseline distribution of ²³⁸U, ²³²Th, and ⁴⁰K in the coastal regions of South East coast of India. Dietary sources were estimated by duplicate diet sampling (DDS) methods ingested by different age group representatives living among the coastal community. The average natural radionuclides content of ²³⁸U, ²³²Th, and ⁴⁰K (n=20) were (34.55), (356.51), and (56.08) Bq kg⁻¹ and was determined by duplicate diet studies in and around South East coastal area of India. The carcinogenic and non-carcinogenic risk assessment due to ²³⁸U, ²³²Th, and ⁴⁰K were calculated using DDS methods in children aged group 1 to 4, 5 to 9, 10 to 14, 15 to 17, adults, and pregnant women. In comparison to the coastal community, the hospital-based cancer registry (HBCR) was analyzed. To investigate the risk assessment the statistical analyses was done based on radionuclides activity and coastal community. The present results of natural radionuclides do not constitute a major radioactive concern to the local residents, according to Pearson correlation analysis, Principle component, and Cluster analysis report.

Key words: Duplicate diet studies, cancer risk assessment, radionuclides, Pearson Correlation, Principle component analysis and Cluster analysis

EFFECT ON FOOD SYSTEMS AND SOIL PRODUCTIVITY BY THE APPLICATION AND UTILIZATION OF DISTILLERY BYPRODUCTS AS ORGANIC MANURES IN DRYLAND REGIONS OF NORTHERN KARNATAKA, INDIA

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Aim: A field experiment was laid out to know the “effect on food systems and soil productivity by the application and utilization of distillery byproducts as organic manures in dryland regions of northern Karnataka, India, the experiment was carried out at the Regional Agricultural Research Station (RARS), Vijayapura, during *rabi* seasons of 2019-20. **Methodology:** The experiment comprising 11 treatments was laid out in recommended complete block design with three replications. The treatments were consisted of T₁: FYM @ 3t/ha; T₂: Pressmud @ 3 t/ha; T₃: Spentwash @ 5ml/kg of soil (1:10 dilution spentwash: water); T₄: 3 t/ha (Spentwash + FYM (1:3 mixing and curing for 25 days)); T₅: 3

t/ha (Spentwash + Pressmud (1:3 mixing and curing for 25 days)); $T_6 : T_1 + 100 \% \text{ RDF}$; $T_7 : T_2 + 100 \% \text{ RDF}$; $T_8 : T_3 + 100 \% \text{ RDF}$; $T_9 : T_4 + 100 \% \text{ RDF}$; $T_{10} : T_5 + 100 \% \text{ RDF}$ and $T_{11} : \text{Absolute control}$. **Results:** Significant build-up of soil fertility in terms of alkaline $\text{KMnO}_4\text{-N}$, Olsen-P, $\text{NH}_4\text{OAc-K}$ and DTPA extractable Zn, Fe, Cu and Mn; N fractions (Amino acid-N (mg kg^{-1}), Amino sugar-N(mg kg^{-1}), Ammonia-N(mg kg^{-1}), Hydrolysable-N(mg kg^{-1}), Total hydrolysable unknown-N(mg kg^{-1}), Acid insoluble-N(mg kg^{-1}) enzymatic activities (urease, dehydrogenase, acid phosphatase and alkaline phosphatase) and growth and yield of *rabi* sorghum were observed with spentwash at 5 ml/kg of soil (1:10 spentwash and water dilution) applied in conjunction with recommended dose of fertilizers. Hence, the application of spentwash at 5 ml/kg of soil (1:10 spentwash and water dilution) applied in conjunction with recommended dose of fertilizers (50:25:15 kg N: P: ZnSO_4 per ha) and combined application of spentwash with FYM (both the combinations were cured and mixed at 1:3 ratio for 25 days) are the best options for dryland agricultural production for enhancing the crop as well as soil productivity. An additional contribution of the experiment towards the best treatment or management options for soil productivity, food systems and the economy basket as influenced by the effect of FYM and distillery by-products and their combinations were well defined.

Keywords: SOC, FYM, Spentwash, Pressmud, SOC management Index, Soil enzymes and Soil fertility

EFFICACY OF PLANT-MEDIATED SYNTHESIZED ZINC NANOPARTICLES AGAINST MUSHROOM FLIES *MEGASELIASCLARIS* (DIPTERA: PHORIDAE) ON MUSHROOM *AGARICUS BISPORUS*

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The purpose of the present study was to investigate the larvicidal activity against the third instar larvae of mushroom fly *Megaseliasclaris* (Diptera: Phoridae) of synthesized zinc nanoparticles (ZnNPs) utilizing aqueous leaf extract from *Melia azedarach*. Throughout the world *M. scalaris* is a significant pest in mushroom production. Damage by phorid fly directly occurs due to the feeding of their larvae on mycelia and fruiting body or indirectly due to the excreta secreted by the larvae which alter the chemical and physical properties of the compost. Control of these flies has focused on insecticides, and the pests have developed resistance against the most frequently used chemicals. However, pesticide resistance problems have been detected, and application of certain pesticides at the casing layer has caused mycotoxic side effects, resulting in yield reductions. The use of nanoparticles has generated an alternative pest control. Biosynthesized nanoparticles have been achieved using environmentally acceptable plant extract and ecofriendly reducing and capping agents. The results recorded from UV-Vis Spectrum, Fourier Transform Infrared (FTIR), X-ray diffraction (XRD), Scanning electron microscopy (SEM), and transmission electron microscopy (TEM) support the biosynthesis and characterization of ZnNPs. In the present study, the percent mortality of ZnNPs of *Melia azedarach* were 88, 99, and 100% observed in the concentration of 30, 40, 50 ppm for 48h. The laboratory research was carried out by direct ZnNPs spraying in liquid medium under a complete randomized design (CRD). Nanoparticles as insecticidal are a novel strategy, however, further investigation is required in field tests to obtain suitable efficacy for use in a pest management system.

EVALUATION OF VARIOUS BIOCHEMICAL AND PHYSIOLOGICAL ATTRIBUTES IN SPINE GOURD (*MOMORDICA DIOICA* ROXB.) GENOTYPES FROM NE REGION, INDIA

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Spine gourd (*Momordica dioica* Roxb.) is an important under-exploited vegetable crop having high nutritional and medicinal values. The crop is generally consumed as a part of integral diet by various ethnic communities residing around the natural forest areas. North-eastern region of India is one of the largest biodiversity hotspots and consists of a wide range of spine gourds which are genetically diverse. Although the crop has high demand in the local markets, it remains underutilized and under-exploited due to its vegetative mode of propagation and dioecious nature. Despite its economic importance and high nutritional value, few attempts have been made for its crop improvement but no known variety of spine gourd has been released from the NE region so far. Therefore, the present investigation was carried out using 18 genotypes of spine gourd, which were collected from different parts of the north-eastern region, along with one check variety, for evaluating various biochemical and physiological characters viz. protein content, total carbohydrate content, crude fibre content, ash content, ascorbic acid content, moisture content, TSS, chlorophyll content and relative leaf water content along with element profiling. The genotypes collected showed a wide range of variance in different biochemical and physiological parameters, among which ascorbic acid and protein content showed a wide range of variability. Considering all the parameters the genotype SG₁ was best performing followed by SG₄, while lowest performance was observed in genotypes SG₁₇ and SG₁₄. Hence, the study concludes that among all the genotypes collected, SG₁ and SG₄ were found superior and thus can be recommended for further crop improvement programmes in future.

Keywords: Spine Gourd, Variability, Genotypes, Biochemical, Crop Improvement

COMPARATIVE ANALYSIS OF HIVE TYPES ON HONEY PRODUCTION: IMPLICATIONS FOR COMMERCIAL BEEKEEPING

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The objective of this study is to investigate the impact of different hive types on honey production in a commercial beekeeping setting. We hypothesize that the choice of hive type will significantly affect honey production, with certain hive designs leading to higher yields compared to others. Three commonly used hive types, namely Langstroth, top-bar, and Warre hives, were selected for comparison. Three separate apiaries were established, each dedicated to one hive type. Apiaries were located in similar environmental conditions to minimize external variables. Equal-sized and equally healthy bee colonies were introduced into each hive type within their respective apiaries. Honey production was monitored over the course of one year. Data on honey yield, colony health, and behaviour were collected monthly. Statistical methods, including ANOVA and post-hoc tests, were used to analyse the data and determine significant differences in honey production among the different hive types. Langstroth Hives showed the highest honey production throughout the year, with consistent and substantial yields. Top-bar Hives demonstrated moderate honey production, with fluctuations in yield depending on seasonal factors. Warre Hives produced the lowest amount of honey, with yields significantly lower than the other hive types across all seasons. All colonies remained healthy throughout the study period, showing no significant differences in disease incidence or queen activity. Beekeepers should consider using Langstroth hives for optimal honey production, especially in commercial settings where maximizing yield is crucial. While top-bar hives can also be viable, beekeepers using Warre hives may need to supplement their colonies' diet or implement additional management strategies to improve honey production. Future studies could analyse deeper into the specific factors within each hive type that contribute to honey production variability, such as brood chamber size, ventilation, or comb construction, to refine beekeeping practices and enhance overall productivity in apiaries.

PERFORMANCE OF UNDER-EXPLOITED POLE TYPE DOLICHOS BEAN [*LABLAB PURPUREUS* (L.)] GENOTYPES TO ENCOURAGE RURAL HEALTH AND NUTRITION

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The field experiment was conducted to investigate the performance about the pole type dolichos bean for various traits of twenty five different genotypes collected from various part of the Karnataka state, among which two were chosen from IIHR, Bengaluru and twenty three were collected locally across the Karnataka. The study was conducted during Late Kharif during 2020-21 at Department of Horticulture, College of Agriculture, Vijayapura. The observations were recorded on pod yield per plant (g) as well as yield contributing characters viz., pod length (cm), pod width (cm), number of seeds per pod, number of clusters per plant, number of pods per cluster, number of pods per plant, pod yield per plot (kg), pod yield per hectare (t) and 100 seed weight (g) while the growth and early parameters like plant height (cm), plant spread (cm), number of primary branches, days to first flowering days to 50 per cent flowering and days to first pod picking. The significant differences were observed for most of the characters studied under the study. The genotype Nippani Local recorded significantly maximum pod length (15.40 cm) and number of seeds per pod (6.22), the genotype Alagavadi Local had maximum pod width (3.05 cm), the genotype Manjari Local recorded highest number of pods per cluster (8.83) whereas; the genotype Holalkere Local recorded maximum clusters per plant (51.00). The genotype Chincholli Local significantly recorded highest pod yield per plant (927.33g), pod yield per plot (9.27 kg), pod yield per hectare (9.24 t), than any other genotypes.

Keywords: Dolichos bean, Local Genotypes, Performance, Pole type, Under-exploited

WHAT CONSERVATION AGRICULTURE CAN DO FOR SUSTAINABLE FARMING?

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Sustainable agriculture means to produce in an ecologically sound manner, which incorporates three main goals, namely environmental health, financial profitability, and social equity (Feenstra, 2012). Sustainable agriculture refers to a way of producing in an environmentally friendly manner. Environmental health in sustainable agriculture ensures that farming practices minimize harm to ecosystems, such as reducing pesticide use and promoting soil conservation. Financial profitability ensures that farmers can sustain their livelihoods and invest in sustainable practices. Social equity focuses on fair and just treatment of farmers, workers, and communities, ensuring access to resources and opportunities for all. A more sustainable cultivation system for the future is conservation agriculture (CA), defined as minimal soil disturbances (no-till, NT) and permanent soil cover (mulch), combined with rotations. In agriculture, cultivation and tillage play an extremely important role in ensuring an abundance of crops. After exploring the benefits of tillage in agriculture, conservation tillage (CT) is introduced. CT was born out of the American dust bowl. By implementing conservation tillage, no till, mulch, and rotations, soil properties and other biotic factors are significantly improved. Conservation Agriculture is a more sustainable and environmentally friendly method of growing crops. India has been developing, refining, and disseminating conservation-based agricultural technologies for nearly two decades,

despite some constraints that hinder their adoption. A considerable amount of effort has been expended on the use of no-till crops in wheat under a rice-wheat rotation in the Indo-Gangetic plains. Using CA technologies can reduce production costs, save water and nutrients, increase yield, increase crop diversification, improve the efficiency of resources use, and benefit the environment. To meet growing population demands, agriculture will need to produce more food with less land and by using natural resources more efficiently and with minimal environmental impact in the next decade. Promoting and adopting Conservation agriculture management systems can help meet this goal. CA technologies can help support sustainable agricultural development and food security by conserving natural resources, improving soil health, and reducing greenhouse gas emissions. They can also be used to create more resilient agricultural systems that can better withstand the effects of climate change.

Keyword: Conservation Agriculture, Sustainability, Profitability

ASSESSING FISH ASSEMBLAGE STRUCTURE USING ENVIRO ASSESSMENT TECHNIQUES IN PONG RESERVOIR OF BEAS RIVER BASIN (H.P.), INDIA

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Environmental factors are crucial in shaping fish communities in aquatic environments. Using advanced environmental assessment techniques and ArcGIS mapping, the research offers valuable insights into how physicochemical factors influence the fish community in the reservoir. A total of 1,211 individuals from 8 orders, 10 families, 15 genera, and 19 species were recorded from the reservoir. The order Cypriniformes had the highest species diversity. On a spatial scale, diversity indices indicated that the lacustrine zone exhibited the lowest fish diversity, while the transitional zone showed greater species richness compared to other riverine and lacustrine zones. Most of the recorded water quality parameters fell within acceptable ranges, as depicted on ArcGIS for enhanced spatial understanding. Canonical Correspondence Analysis (CCA) of physicochemical parameters and fish abundance indicated that dissolved oxygen (DO) and turbidity positively influenced species abundance. These findings not only contribute to our understanding of the ecology of the area but also provide a solid foundation for the development of effective fisheries management strategies in the reservoir.

Keywords: Reservoir, GIS, Fish Diversity, IUCN, CCA, Management

ETHNOBOTANY IN RELATION TO HUMAN WELL-BEING

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Since, the year 1895 when, W.H. Hershberger coined the term ethnobotany, this multidisciplinary science developed in modern times to contribute to development of the wealth of traditional knowledge of the indigenous people concerning their natural systems and environment. It is fact that Ethnobotany concern to herbal medicine has taken paradigm shift in recent years as new methodologies and tools are available to make the studies specific, conclusive and reproducible. The traditional knowledge of the ethnic societies, today has assumed prime significance in as era of increased environmental degradation, biodiversity crisis and sustainably progressing modern development. It is now widely recognized that Traditional knowledge has played and still playing crucial roles in economic, social and cultural life development not only in traditional societies but also in modern societies. Thus an effort has been made to sensitize populace through the deliberation and discussion in this area of research. Tribal knowledge or the knowledge about cultural relationship between human and plants must be propagated in such a way to proliferate the knowledge resource for the better human well-being. Moreover pursuing research in ethnobotanical realm, the knowledge from other disciplines (Chemistry, Geography, Pharmacology and Anthropology etc.) is needed besides the plant science knowledge.

Keyword: Ethnobotany, folklore herbal medicines, human well-being.

APPRAISAL OF GENDER FRIENDLY TECHNOLOGIES IN AGRICULTURAL AND ALLIES SECTORS IN RAJASTHAN

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This study delves into the evaluation of imperative technologies catering to the needs of gender friendly technologies agricultural and allied sectors. Focused on Chittorgarh district in Rajasthan, the research involves surveying 400 farm women to understand their involvement in agricultural production, livestock activities, domestic responsibilities, and decision-making roles. Key findings include a predominantly illiterate respondent group, with 94% being married, and 43.25% belonging to small families of 1-4 members. Agricultural labor activities engaged 17.75% of respondents, while 13.75% owned small businesses. Notably, 78.25% of the surveyed land was irrigated, with 21.75% categorized as dryland. Farm implements ownership stood at 86.75%, with 20.75% utilizing power-operated tools. A significant portion (91.75%) of respondents preferred a cautious approach in adopting innovative practices. The decision-making process was collaborative, with 65% making decisions jointly, especially in farm-related activities (66.12%). Mobile phones emerged as the primary source of information (91.75%), followed by TV (56.05%), and 20% sought guidance from agricultural experts and organizations. Thirty-six percent of respondents were part of Self-Help Groups (SHGs). Land ownership varied, with a majority holding one to two hectares or two to five

hectares. Income distribution revealed that 56.25% earned less than 50,000/- from farming, while 20.5% derived income from alternate sources. Training needs were underscored, particularly in water and soil management, as over 77% expressed concerns about soil conservation. Additionally, 98% of respondents felt the need for training in solar and wind energy technologies. A unanimous demand (100%) was identified for value addition to crop biomass and effective waste management. In the broader context of agriculture and allied sectors, 98% of respondents emphasized the necessity for training, with a specific interest in fruits and vegetables processing technologies (93%). This study highlights the nuanced and gender-friendly technologies imperative for economic empowerment in Chittorgarh, acknowledging the diverse roles of both men and women in agriculture and related activities. Keywords: Agriculture, Educational Qualification, Marital Status, Occupation, Caste, Family Size, Family Type, Value Addition, gender friendly technologies, Agricultural and Allied Sectors.

EFFECT OF ORGANIC FARMING ON GROWTH AND YIELD OF CAULIFLOWER *BRASSICA OLERACEA* VAR. *BOTRYTIS* L NITESHWARI BAGHELE¹, PHD SCHOLAR, HUKUM SINGH PANWAR², SHIKHA TRIPATHI³

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To investigate the effect of organic farming on the growth and yield of cauliflower (*Brassica oleracea* var. *botrytis* L.), an experiment was carried out at the Rajaula Agricultural Farm, Department of Horticulture, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya (MGCGV), Chitrakoot, Satna, Madhya Pradesh, India during the Rabi season of 2020-2021. The experiment was laid out in a Randomized Block Design with fourteen treatments comprising different combinations of organic farming practices compared with conventional farmer practices. Each treatment was replicated three times. The experimental results revealed that the treatment T1 (RDF: NPK 120:80:80), followed by T9 (50% RDF + 50% Vermicompost), was superior to other treatments, influencing the growth and yield of cauliflower. Using more bio-organic pesticides led to larger and heavier plants, resulting in increased yields of marketable cauliflower. Bio-organic fertilizer made from animal waste, such as carabao dung and manure tea, positively impacted growth. The efficiency of bio-organic fertilizer derived from plant extracts on cauliflower production may be influenced by parameters such as dose, timing, and frequency of administration, as well as environmental stress conditions throughout the research.

Keywords: vermicompost, *Brassica oleracea* var *botrytis* L, Organic farming, NPK

POPULATION FLUCTUATION AND ENERGETICS OF *HIFROGLYPHUS NIGROREPLETUS* BOL. (ORTHOPTERA: ACRIDIDAE) L. K. VATSAND KAUSHAL SANGHI

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Population density and biomass of *H. nigrorepletus* were estimated in a tropical deciduous forest Stand at Kurukshetra for a period of two years from August 1980 to August 1982. The density varied from 0.11 per m² to 1.14 m² and the biomass ranged from 4.42 mg/m² to 94.53 mg/m². The secondary production was 83.58 mg/m². The different instars of *H. nigrorepletus* were fed on *P. antidotale* for studying energy values. Food consumption, assimilation, egestion, and tissue growth increased from the first instar to the adult. The assimilation efficiency decreased from the first instar to the adult stage whereas ecological and tissue growth efficiencies increased with age.

NANOTECHNOLOGY'S ROLE IN REDUCING CHEMICAL INPUTS FOR SUSTAINABLE AGRICULTURE AND ENVIRONMENTAL PROTECTION

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The field of nanotechnology is one that is fast developing and has the potential to transform food systems and address the current issue of food security. Multiple health and environmental risks have been identified by increased chemical dosage per hectare. To tackle conventional chemicals related issues, a new field of science called nanotechnology. The use of bio-based nanoparticles synthesized from bottom-up approach and mother protein secondary metabolite, extract, etc. act as stabilizing and capping agent. Nanomaterial delivery systems are to protect, transport and release biologically active compounds at the right time in a safe and reproducible manner, usually at a specific target site. Engineered nano-carriers may be a promising route to address confounding challenges in agriculture that could perhaps lead to an increase in crop production while reducing the environmental impact associated with crop protection and food production. Nutrient losses from conventional fertilizers are one of the challenges being faced in the agricultural sector. Nano-encapsulated conventional fertilizer helps in slow and sustained release of nutrients over an extended period of time. Nano-encapsulation of nutrients is an effective way to improve nutrient efficiency, minimize fertilizer losses by physical, chemical and biological processes, and reduce environmental impact, such as Slow Release Fertilizer and Controlled Release Fertilizer. Integration of nanomaterials into soil amendments, such as nano-composites or nano-hydrogels, to improve soil structure and water retention. Nano-sensors can be used for smaller detection limits, quick response time, high surface-to-volume ratio, and more reliable results. The integration of all these nanomaterials helps in reducing chemical inputs and increases resource use efficiency. The combined efforts of policymakers and scientists should make it easier to reduce health and environmental impacts while also promoting the economic growth of nanotechnologies in the food supply chain.

Keywords: nanotechnology, nano-pesticides, nano-composites, nano-hydrogels, nano-sensors.

NEW EDUCATION POLICY: A MULTIDIMENSIONAL PERSPECTIVE**LAKSHEETA CHAUHAN^{1*} AND RAMESH CHAND BUNKAR²**¹PhD Scholar, Rajasthan College of Agriculture, MPUAT, Udaipur, (Raj.)²PhD Scholar, Division of Dairy Extension, NDRI, Karnal, (HR)

Education is fundamental for achieving full human potential, developing an equitable society and promoting national development. Providing universal access to quality education is the key to India's continued ascent and leadership on the global stage in terms of economic growth, social justice and equality, scientific advancement, national integration and cultural preservation. Universal high-quality education is the best way forward for developing and maximizing our country's rich talents and resources for the good of the individual, the society, the country and the world. India is having the highest population of young people in the world and our ability to provide high-quality educational opportunities to them will determine the future of our country. The New Education Policy (NEP) represents a transformative vision for the education landscape of India. Envisioned as a holistic framework to revitalize the educational ecosystem, the NEP aims to address long-standing challenges while fostering innovation and inclusivity. Key pillars of the NEP include early childhood care and education, a revised curriculum framework emphasizing critical thinking and experiential learning and the integration of technology to enhance access and quality. Furthermore, the NEP emphasizes the importance of vocational education, multilingualism and flexible pathways to cater to diverse learner needs. By promoting autonomy and accountability at all levels of the education system, the NEP seeks to empower stakeholders to adapt and innovate while maintaining rigorous standards. Overall, the NEP represents a bold step towards nurturing a generation of empowered individuals equipped with the skills, knowledge and values necessary to thrive in a rapidly changing world.

Keywords: Education, population, society and NEP.**SHELF STABILITY STUDIES ON STANDARDIZED READY-TO-EAT UNRIPE SNAP MELON INCORPORATED EXTRUDED SNACK****LAKSHMI GANGAL¹, DR. DEEPA TERDAL², DR. BHUVANESHWARI G³, DR. RUDRESH DL⁴, DR. VIRESH HIREMATH⁵, MR. HP HADIMANI⁶**¹MSc Scholar, Department of Postharvest Management, Bagalkot, Karnataka, India²Assistant Professor, Department of Postharvest Management, College of Horticulture, UHS, Bagalkot, Karnataka³Professor and Head, Department of Postharvest Management, College of Horticulture, UHS, Bagalkot, Karnataka⁴Assistant Professor, Department of Microbiology, College of Horticulture, UHS, Bagalkot, Karnataka⁵Assistant Professor, Department of Postharvest Management, College of Horticulture, UHS, Bagalkot, Karnataka⁶Assistant Professor, Department of Vegetable Science, College of Horticulture, UHS, Bagalkot, Karnataka

The aim of this study was to investigate the effect of storage period on the quality attributes of Ready-To-Eat unripe snap melon incorporated extruded snack. The incorporated extruded snacks were packed in aluminium laminated polyethylene and stored for a period of 3 months under ambient condition and were evaluated at initial and final days of storage period. The packaging material as well as storage period had significant effect on moisture content (%), water activity (a_w), peroxide value, non-enzymatic browning reaction (OD value), microbial population (CFU g^{-1}) and organoleptic evaluation. The results indicated that aluminium laminated polyethylene pouches can be utilized to store the unripe snap melon incorporated extruded snack for three months under ambient storage conditions with minimal changes in the quality of snacks.

Keywords: Snap Melon, Incorporated extruded snack, RTE, aluminium laminated polyethylene and Shelf stability**INHERITANCE STUDY OF FIBER COLOUR IN F₂ AND CONFIRMATION IN F₃ GENERATION DERIVED FROM DIVERSE CROSSES OF COLOUR AND WHITE LINTED (*GOSSYPIMUM HIRSUTUM*) GENOTYPES****LAKSHMI GANGAVATI AND MANJULA S. MARALAPPANAVAR^{2*}**^{1&2}Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad

Cotton, naturally colored lint, is being bred to produce textiles free of harmful dyes and pesticides. This requires studying the genetics of the fiber color to track its inheritance over generations. Previous studies have reported simple inheritance with high heritability. The present investigation was aimed towards inheritance study of fiber colour in F₂ and confirmation in F₃ generation derived from crossing dark brown genotype (DDB-106) with white linted genotype (Sahana). The F₁ obtained had intermediate lint colour. The variation observed in the F₂ population was very high, representing different types of lint colour. The colour range observed in the 284 F₂ plants varied from white to orange brown. The colour variation was classified into eight different categories. Out of these eight categories one was pure white and other seven were pigmented. The pigmented categories exhibited wide variation and it ranged from off white to dark brown. The number of plants in the cross had 262 pigmented and 22 non-pigmented plants. Thus, the segregation pattern in F₂ populations indicated the presence of gene interaction which reveals that fiber colour development is controlled by a pair of genes with duplicate epistasis (15:1). Results of segregation pattern for fiber colour in F₃ generation, obtained in the progenies of selected F₂ plants based on fiber colour revealed that few parental F₂ plants selected for darker brown lint colour types bred true to type and some of the darker brown linted parental plants segregated into darker brown types as well as medium brown types. Parental F₂ plants with medium brown lint colour segregated into medium brown and light brown colour types. However, in the F₂ progenies of light brown lint colour, cream linted and offwhite types segregation was not observed in the few lines which were advanced to F₃. Parental F₂ plants selected for pure white types bred true to type. The duplicate epistasis gene interaction can be used for deciding future strategies of breeding for natural color cotton.

Keywords: Color cotton, inheritance, segregation, Duplicate epistasis, brown lint

COMPARATIVE ANALYSIS OF VEGETABLE AMARANTH ACCESSIONS FOR PROXIMATE NUTRITIONAL COMPOSITION AND FRESH GREEN YIELD TRAITS**LAKSHMIDEVAMMA, T.N^A, SANJEEV K. DESHPANDE^B, PATIL, B.R^B, RAJESHWARI R^A AND JAGADEESHA R C^C**^aCollege of Horticulture, Bengaluru^bDepartment of GPB, UAS, Dharwad^cKSNUAHS, Shivamogga

Vegetable amaranth is one of the most popular and highly nutritious leafy vegetables that contribute significantly to nutritional security. A set of eighty vegetable amaranth genotypes from different eco-geographic regions along with five released varieties as checks were evaluated during two consecutive seasons i.e., summer-2018 and *kharif*-2018 for their comparative performance for agro-morphological traits and nutritional traits in augmented block design-II. The accessions viz., VA-16, IC-469579, IC-536713, IC-550145, and IC-551497 revealed higher fresh green yield during summer-2018; whereas in *kharif*-2018 the genotypes, VA-16, IC-469579, IC-469601 and CO-1 were found to be promising. The accessions viz., IC-551486, VA-2, VA-4 and IC-551483 were early to harvest during summer-18 and IC-469694, IC-536698, IC-551462 and VA-2 were early harvesting types in *kharif*-18 season, revealing the differential influence of seasons. The proximate composition of minerals and nutrients revealed considerable higher mean calcium (2502.37 mg100g⁻¹), potassium (1841.24 mg100g⁻¹), iron (109.62 mg 100g⁻¹) and zinc (2.66 mg 100g⁻¹) contents. Multiple-trait analysis indicated promising genotypes for combination of traits viz., IC-551477 for protein and calcium contents; IC-469694 for iron and vitamin A. Genetic parameters of variation for fresh green yield and nutritional parameters indicated higher estimates of GCV, heritability and expected genetic advance for fresh green yield per plant, fresh green yield per hectare as well as yield attributing traits viz., leaf area per plant, leaf weight, stem weight and leaf to stem ratio during both seasons which signified the diverse nature of the germplasm.

Keywords: Comparative assessment, promising genotypes, genetic variability, fresh green yield, nutritional traits.**IMPACT OF MICROBIOMES ON THE EVOLUTIONARY PROCESSES OF INSECTS****LAKSHU PUNGYAMBAM****Department of Entomology, School of Agricultural Sciences, Nagaland University**

As is the nature of all organisms, insects too live in close associations with numerous microorganisms, which fundamentally influence important aspects of the insects encompassing from ecology and evolution to biology and life history traits. Microbiome includes the total of all microbes and their genomes, which is associated with a particular host species and includes bacteria, *Archaea*, fungi, viruses, etc. The insect-microbiome dynamic is ever changing; some of the main drivers are climate change, plant diversity fluctuation and insect host physiology and diet. Initially perceived to be non-genetic environmental factors that influences host phenotypes, microbiomes variation effects have a genetic basis and can evolve, although they are not constantly inherited in the same manner as host gene are. The microbiome impacts the host evolutionary trajectories in two main ways, either by shifting the mean phenotype of the population or by changing the host phenotypic variance. Any changes to insect host biology have the potential to affect the population structure and dynamics. The right combination of microbial partners may support a resilient population, while a shift can result in a population decline or invasion. A better understanding of insect microbiome interaction will improve the protection of insect biodiversity and the management of invasive insects, which will benefit the environment as well as local and regional economies.

Keywords: microbiome, insect, ecology, evolutionary processes, biodiversity**AN OVERVIEW OF THE EVOLVING SITUATION AND TREND OF ORGANIC FARMING IN INDIA****LAL CHAND YADAV, NARENDRA YADAV, RAJA RAM BUNKER****Ph.D. Scholar, Rajasthan College of Agriculture****Maharana Pratap University of Agriculture and Technology –Udaipur, Rajasthan- India**

Agriculture plays a vital role in India's economy. Agriculture sector accounts for 18.8 per cent of GVA in 2021-22 that was 20.2 percent in 2020-21. Agriculture sector was growing 3.0 per cent in 2021-22. In the world food security is not only a question of the ability to produce food but also of the ability to access healthy food. In India nearby 30 sustainable agricultural practices prevalent. Sikkim and Andhra Pradesh are leading the way on sustainable agriculture in India. Organic farming getting popularity in recent time, demand for organic products especially in developing countries has been increasing. Although, history states that the movement of organic way of life recognized in 1905's. Organic farming is practiced in 190 countries. Organic farming has been found to be a solution for healthy food for increasing population. The Government of India provides assistance for promoting organic farming across the country through different schemes. In the second part we compute, Compound Annual Growth Rate (CAGR) for area under organic farming in India for 18 year data from the financial year 2005 to 2022. Linear and semi-log trend equation were tested for calculate annual growth for area, but linear trend equation was best fit for selected data. The model equation was ($Y = -77058.82 + 158111.5 \text{ year}$). The result revealed 11.09 per cent growth in area under organic farming in India. The result was significant at 1 per cent level of significance and coefficient of determination was found 0.73. The result was based on high coefficient of determination (R^2). Finding was reliable and best symbol for achieving healthy food for increasing population through expansion in area under organic farming.

Keywords: Food Security, Sustainable, Organic Farming, Annual Growth Rate

SEAWEED EXTRACT: A POTENTIAL BOON FOR TOMATO PRODUCTION**LALITA LAL¹, DR. VIJAY BAHADUR²****¹Ph.D. Research scholar, ²Associate Professor and Head Department of Horticulture (SHUATS)**

Seaweed extracts have gained traction as sustainable and promising biostimulants in agriculture. This study investigates the impact of seaweed extract on the growth, yield, and quality of sustainable tomato plants. The research explores the influence of seaweed extract application on various growth parameters, including plant height, shoot and root dry weight, and total leaf area. It also examines the effects on yield components like fruit number, weight, and total yield per plant. Additionally, the study delves into the potential improvements in fruit quality attributes, such as sugar content, firmness, and lycopene levels. Through controlled experiments, the study aims to elucidate the optimal application methods and concentrations of seaweed extract for maximizing tomato production. Furthermore, it investigates the underlying mechanisms by which seaweed extract might enhance plant growth and fruit quality. By understanding these mechanisms, researchers can develop targeted approaches to improve the effectiveness of seaweed extract applications in tomato cultivation. This research has the potential to contribute significantly to sustainable and efficient tomato production. By harnessing the potential of seaweed extracts, farmers can potentially increase yields, improve fruit quality, and ultimately achieve greater economic returns while minimizing environmental impact.

Keywords: Seaweed extracts, sustainable, tomato production, quality attributes, cultivation.

IMPACT ASSESSMENT OF KISAN MOBILE SANDESH (KMS) IN TRANSFER OF AGRICULTURAL INFORMATION AMONG BENEFICIARIES AND ALSO THEIR PERCEPTION TOWARDS APPROPRIATENESS OF INFORMATION OF KISAN MOBILE SANDESH (KMS) IN DISTRICT LAKHIMPUR KHERI (UTTAR PRADESH)

LALLA RAM^{1*}, DILEEP VYAS², MANI PRAKASH SHUKLA³, MILIND SAGAR⁴, AND GAVKARE NAYAN⁵**^{1,2,3,4,5}Ph.D. Research Scholar, ^{1,2,3,4,5}Agricultural Extension Education, ⁴Department of Agronomy, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (U.P.)**

Kisan Mobile Sandesh was started in the year 2008 with 74 members has presently 1000 members. About 127 million of farmers have limited access to information about modern agriculture techniques due to lack of access of extension worker support (One extension worker looks after 1000 farmers). The study was carried out in Lakhimpur Kheri district of Uttar Pradesh. 12 villages from Palia Kalan and Nighasan block of the district were selected. From the selected 12 villages, respondents from each village were selected, thus total sample size for the present investigation consist of 117 respondents. Study revealed that there is a decrease in percentage change of the beneficiaries belonging to the low knowledge level group (17%) whereas an increase in the percentage change of the beneficiaries belonging to the medium (8%) and high knowledge level group (9%). Thus, it can be inferred that higher percentage (9.00%) of the Kisan Mobile Sandesh beneficiaries having high impact of KMS in terms of their technical knowledge. The data also indicated that there has been a drastic decrease in the percentage change of the beneficiaries belonging to the low adoption percentage level group (-25%) whereas there has been an increase in the percentage change of the beneficiaries belonging to the medium (14%) and high adoption level group (11%). Thus, it can be inferred that higher percentage (14%) of the Kisan Mobile Sandesh beneficiaries having medium impact of KMS, in terms of adoption of recommended practices. The study indicates that KMS is one of the most useful tools for dissemination of agriculture information to farmer and also can play a greater role in enhancing efficiency of extension service by reaching large number of peoples.

Keywords: KMS, ICT, beneficiaries, etc.

SOCIO- COGNITION DEVELOPMENT AMONG PRESCHOOL CHILDREN**LATAPUJAR AND MUKTASTHAVARMATH****Professor, Department of Human Development & Family Studies, College of Community Science, University of Agricultural Sciences, Dharwad**

Social cognition concerns young children's knowledge of themselves, other people and the groups to which they belongs. It encompasses a variety of interpersonal domains including an individual's knowledge, perception, attitudes, and behavior in relation to social situations. A study was conducted to know the development of social – cognition among urban and rural pre –school children and influence of child factors on social – cognition among pre – school children. Sample comprised of 94 pre-school children from four Anganvadi's from rural area and 86 children from four Anganvadis from urban areas of Dharwad Taluk were selected, so total sample comprised of 180 pre school children. Theory of Mind Inventory was used to assess the social cognition among children and social skills scale by Greshman and Elliot (1990) was used to assess the social skills among children. The results revealed that, urban children had better social cognition as compared to rural children. Children with good social skills and interactive peer play behavior had good social cognition than children with average and disruptive peer play behavior. So there is a need for early intervention program on development of social cognition development among preschool children in rural areas.

DEVELOPMENT OF PROTEIN ENRICHED JAMUN (SYZYGIUMCUMINISKEELS) FRUIT BAR**LAVANYA B., MANASA E., G J SURESH, R B TIWARI, R VENUGOPALAN, K B SURESHA, G K SADANANDA****Department of Postharvest Management, College of Horticulture, Bengaluru, University of Horticultural Sciences, Bagalkot**

Jamun is an important underutilized fruit crop of commercial value. Jamun production is increasing every year due to its nutritive and medicinal values. Fruit bar is a confectionery product prepared by dehydration of fruit pulps with added ingredients. Nutritionally, fruit bar is low in protein content, food enrichment or fortification is the most cost-effective and sustainable strategy to overcome the issue of malnutrition. Whey protein concentrate is a high quality protein source obtained from cow's milk, is being touted as a functional food. The present investigation was carried out with an aim to enrich the jamun fruit bar with whey protein concentrate at different proportions. Physico-chemical parameters and sensory qualities of the fruit bar were performed for one-month storage period. Jamun fruit bar was prepared by mixing jamun pulp with different levels of whey protein concentrate (1, 2 and 3%), pectin (0.8, 1.0 and 1.2%) and sugar (2.5, 5.0 and 7.5 %). Further, the mixture was dried at 60°C for 6h in tray dehydrator. Response surface methodology was used for optimizing the ingredient levels. Sensory evaluation (descriptive and 9-point Hedonic scale) of fruit bar prepared with 3 per cent whey protein concentrate, 1 per cent pectin and 7.5 per cent sugar had recorded maximum sensory scores. The fruit bar with same composition registered 16.41 per cent moisture content, 0.53 water activity, 16.00 mg 100g ascorbic acid, 71.13 per cent total carbohydrates, 44.06 per cent total sugars, 0.19 per cent fat, 9.11 per cent total protein, 172.83 mg 100g¹ total anthocyanin content, 598.08 mg GAE 100g¹ total phenolic content, 87.79 mg AAE 100g total antioxidant activity. Benefit: Cost ratio of protein enriched jamun fruit bar was 2.0:1.0. The product is microbiologically safe after 30 days of storage.

EMPOWERING RESILIENCE: MARKER-ASSISTED PYRAMIDING OF MAJOR AND MINOR GENES FOR ENHANCED DURABILITY IN HIGH-DEMAND VARIETIES**LAVANYA V. M¹., S. A. DESAI*² SUMA S. BIRADAR,² P.V. PATIL³, YASHAVANTHKUMAR K.J.⁴., LALITA JAGGAL⁵, MAHALAXMI K. PATIL⁵, BORANAYAK M. B.⁶, HANCHINAL R.R.⁷, AARATHI YADAWAD⁸, SANJAY KUMAR SINGH⁹, ABHISHEK. K. GOWDA¹⁰, CHETHANA C. K¹¹., SHIVASHANKARGOUDA PATIL¹⁰, VEERESH B.A.¹⁰****Professor, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

Wheat rusts caused cruel losses in the production of this cereals in the history. The leaf rust is of main standing during the world. The resistance founded on solitary chief genes has often not been sturdy. The extent and competence of the rust resistance genes exploited inside a wheat cultivar can be enhanced by pyramiding multiple resistance genes in the identical cultivar. Hence, the examination was approved out to pyramid two operative slow rusting genes, *Lr34* and *Lr68* from the donor EC 693306 into 'BIL-DWR 162' background which carries major genes, *Lr24* and *Lr28* finished marker assisted selection using markers *csgs68*, *wmc313*, *SCS73719* and *cssfr-5* for *Lr34*, *Lr28*, *Lr68* and *Lr24* genes, respectively was carried. BC₁F₁ generation was estimated for leaf rust resistance under insincerely inoculated state along with molecular confirmation. Various combinations of major/minor genes exhibited varied response to leaf rust and agronomic traits. It has been observed that *Lr 28* and *Lr 34* associated with higher yield. The present results envisages that breeders in future, can rely on the major genes like *Lr 24* and *Lr28* together with minor gene like *Lr34* to enhance both yield and durable disease resistance.

SUSTAINABLE SERICULTURE: A GUIDE TO ECO-FRIENDLY SILK PRODUCTION AND ITS SOCIOECONOMIC BENEFITS**LAXMAN SINGH SAINI^{1*} AND MANGAL SUKHI MEENA²**¹**Ph. D Research Scholar, Department of Entomology, SKNAU, Jobner, Jaipur**²**Ph. D Research Scholar, Department of Entomology, RCA, MPUAT, Udaipur**

Sericulture, the art and science of silk production, has been practiced for centuries, with its origins dating back to ancient China. Today, sericulture plays a significant role in various economies worldwide, providing a source of income for millions of individuals and contributing to the textile industry's growth. The first section delves into mulberry cultivation, highlighting the importance of selecting suitable varieties, soil preparation, planting techniques, and proper management practices to ensure optimal growth and yield. Subsequently, silkworm rearing, emphasizing factors such as temperature, humidity, nutrition, and disease management crucial for the healthy development of silkworms. Furthermore, the silk production process, including cocoon harvesting, silk reeling, and post-cocoon processing, is thoroughly examined. The significance of quality control measures at each stage to ensure the production of superior-grade silk is emphasized, along with the utilization of modern technologies to enhance efficiency and productivity. The management aspect of sericulture encompasses various facets such as farm management, financial planning, marketing strategies, and sustainable practices. Strategies for maximizing profitability while minimizing environmental impact are explored, including the adoption of organic farming methods and the implementation of waste management techniques. Socio-economic implications of sericulture, highlighting its role in rural development, employment generation, and women empowerment.

Keywords: Sericulture, Mulberry cultivation, Silkworm rearing, Silk production process, Socioeconomic implications

MAGIC POPULATION: NEW GENETIC RECOURSES FOR CROP IMPROVEMENT**LAXMI KANWAR^{1*}, PRACHI SINGH¹ AND JAGVEER SINGH RATHORE²**¹M.Sc. Scholar, Department of Genetics and Plant Breeding
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Today's scenario involves facing environmental as well as global issues like variation in climate change conditions and a growing global population, which led to an increased demand for food that is healthy and nutritious. So to deal with these problems, we require the use of modern tools and techniques in crop breeding and genetics. Traditionally, breeding and genetic mapping for important economic interest traits rely on bi-parental and natural populations. However, these types of populations offer limited allelic variation and low mapping resolution. In order to address these limitations, MAGIC populations—multi-parent advanced generation inter-cross populations—are created to overcome these constraints. MAGIC population is a collection of RILs (recombinant inbred lines) produced from a complex cross (advanced inter-cross) involving several parental lines that were selected from different geographical areas, and a worldwide germplasm collection. The development of MAGIC populations can be performed using “funnel design” (Arroneset *et al.*, 2020). The development of the MAGIC population involves the following four steps: 1. Founder selection 2. Mixing of parents 3. Advanced intercrossing 4. Inbreeding (Samantara *et al.*, 2021). The increased recombination and diversity of MAGIC give greater precision in QTL (quantitative trait locus) location and greater opportunity to detect more QTLs. It acts as a resource for gene discovery and the deployment of new genes, which plays a key role in crop improvement and may be used directly as a source material for development of breeding lines or variety which provide solution to a range of production constraints (biotic and abiotic). Moreover, the MAGIC population has high potential for multiline variety development and fine mapping. MAGIC populations have proven their worth for standard genetic analysis—linkage map construction and QTLs analysis—but the real test of their longevity will be whether these results can be extended beyond preliminary identification of interesting genomic regions and provide a valuable contribution to our understanding of complex traits into the future (Huang *et al.*, 2015).

Keywords: MAGIC population, quantitative trait loci, fine mapping.**STUDY ON PIGEONPEA (*CAJANUSCAJANL.*) BASED INTERCROPPING SYSTEMS UNDER RAINFED CONDITIONS OF NAGALAND****LENMEM.YOSUNG^{1*}, T. GOHAIN¹, HILLEL. M. CHISHI², PAARDENSHA IVY CHINIR³ AND TAKHELMAYUM MALEMNGANBI⁴**^{1*,1,2,&4}Department of Agronomy, School of Agricultural Sciences, Nagaland University, Medziphema

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Crop diversification through intercropping is necessary to get higher yield, maintain soil health, conserve natural resources, meet daily food requirements, withstand price fluctuation and ensure constant flow of income. A field experiment was carried out during the *kharif* season of 2021 and 2022 in the experimental farm, Department of Agronomy, School of Agricultural Sciences, NU: Medziphema campus to evaluate the “Study on pigeonpea (*CajanuscajanL.*) based intercropping systems under rainfed conditions of Nagaland.” The experiment was carried out with seventeen treatments *viz*; T₁-pigeonpea + rice (1:1), T₂-pigeonpea + rice (1:2), T₃-pigeonpea + rice (1:3), T₄-pigeonpea + sesame (1:1), T₅-pigeonpea + sesame (1:2), T₆-pigeonpea + sesame (1:3), T₇-pigeonpea + greengram (1:1), T₈-pigeonpea + greengram (1:2), T₉-pigeonpea + greengram (1:3), T₁₀ - pigeonpea + soybean (1:1), T₁₁ - pigeonpea + soybean (1:2), T₁₂-pigeonpea + soybean (1:3), T₁₃ – sole pigeonpea, T₁₄ – sole rice, T₁₅ – sole sesame, T₁₆ – sole greengram and T₁₇ – sole soybean, which was replicated thrice in completely randomized block design. The result revealed that sole pigeonpea recorded the highest yield attributes and yield, which was at par with the intercropping system T₁₀ - pigeonpea + soybean (1:1). The results further revealed that significantly higher PEY, LER, gross return, net returns, and B:C ratio was recorded in T₁₀ -pigeonpea + soybean (1:1) intercropping systems. Pigeonpea + soybean (1:1) was the most productive and remunerative intercropping system among all the intercropping systems.

Keywords: Greengram, intercropping, LER, pigeonpea, PEY, rice, sesame and soybean**PHYTOPLASMA EFFECTORS: DIVERSE TARGETS AND ROLE IN DISEASE DEVELOPMENT****¹LIKHITA J., ²ROHINI, ²SHRIGANESH SARJANE**¹Ph. D. Scholar, ²MSc. Student, Dept. of Plant Pathology, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh

Phytoplasmas are unique prokaryotes that cause plant diseases, residing within the phloem sieve elements of infected plants and infecting both plants and insects. They reproduce within cells and utilize effectors, secreted proteins, to enhance their colonization and multiplication in both host organisms. One significant target of these effectors is the TEOSINTE-BRANCHED, CYCLOIDEA, PROLIFERATION FACTOR 1 and 2 (TCP) transcription factors, which play crucial roles in both developmental processes and plant immunity. Pathogenic effectors like SAP11 disrupt the stability of TCP transcription factors, leading to increased proliferation of axillary meristems. This destabilization also affects other transcription factors like CINCINNATA (CIN) TCPs, resulting in decreased expression of genes like LIPOXYGENASE2 (LOX2) and reduced production of Jasmonic Acid (JA), impacting the plant's defense against specific insect vectors such as *Macrostelus quadrilineatus*. Furthermore, MADS-domain transcription factors (MTFs), essential for controlling floral transition and organ development, become targets of phytoplasma effectors like SAP54. Through the 26S proteasome pathway of the host plant, assisted by shuttle proteins like RAD23, these effectors degrade MTFs, leading to the conversion of flowers into leaf-like structures. In addition to these effects on plant development, phytoplasma effectors also induce specific physiological changes. For instance, the effector TENG produced by Onion Yellow (OY) phytoplasma induces sterility in *Arabidopsis thaliana* without causing floral deformities. TENG alters the expression of flower maturation genes and affects the synthesis of phytohormones like JA and auxin, leading to developmental defects that result in

sterility. Studying phytoplasma effectors not only sheds light on their virulence strategies but also reveals novel pathways that affect both reproductive and vegetative growth in plants. This knowledge offers promising avenues for developing eco-friendly control strategies against phytoplasmas and their insect vectors, which could have significant implications for agricultural and environmental sustainability.

ENDOPHYTIC FUNGI ISOLATED FROM BAMBOO SPECIES AND SCREENING FOR ANTIBACTERIAL ACTIVITY. LIPENTHUNG Y EZUNG

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Endophytes are a wide range of microorganisms that coexist under asymptomatic conditions with their host plant. These organisms are primarily fungus and bacteria. They frequently exhibit no symptoms at all of illnesses linked to their host. Endophytes possess the capacity to serve as strong providers of secondary metabolites with antimicrobial qualities. These metabolites can be employed as effective antimicrobial agents, similar to antibiotics, to suppress and prevent the spread of bacterial infections. Of the modern period, endophytes associated with bamboo species, like any host plant, may be a potential source of antibiotic metabolites due to the rise of antibiotic-resistant pathogens like bacteria. As reported in a number of sources and papers, endophytes have the ability to increase the uptake of macronutrients from the soil, such as zinc, iron, and copper, among others, thereby increasing the nutrient uptake for plant growth and development. Endophytes were isolated from bamboo species and were screened for antibacterial property, the fungal endophytic extract were shown to present antibacterial on *E. coli* and *S. aureus* as well. Endophytes thus, with the correct research instruments, could play a significant role in the modern medical field as they have the potential to be an excellent source of antimicrobials and an important metabolite of antibiotics.

Keywords: Endophytes, Bamboo, Antimicrobial

EXPLORING THE ENDOPHYTIC FUNGI OF DOCYNIINDICA: ANTIBACTERIAL POTENTIAL AND PHYTOCHEMICAL SCREENING

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Since time immemorial plants have been in used as traditional medicine for treatment of many different ailments due to their medicinal properties. *Docyniaindica* also known as Indian crab apple or Assam apple is an endemic and underexplored plant rich in nutritional and medicinal properties. There are records of *Docyniaindica* being in used as ethno medicinal plant in the north-eastern part of India. In this study a total of twenty-two endophytic fungi with different morphological characteristics were isolated from different parts of *Docyniaindica*. Maximum number of isolates were obtained from the stem and leaves part. The endophytic fungi exhibiting unique morphological characteristics were cultured to analyze the phytochemical constituents and antibacterial properties. Therefore, antibacterial activity was carried out for crude ethyl acetate extract against two tested pathogenic microorganisms such as *Escherichia coli* and *Staphylococcus aureus* using agar well diffusion method. Out of which some of the sample exhibited antibacterial activity on both the pathogenic microorganism where greater inhibition was observed in *Staphylococcus aureus*. Preliminary qualitative phytochemical screening of fungal metabolites extract showed the presence of alkaloids, carbohydrates and terpenoids. This study shows the presence of endophytic fungi and bioactive compounds in *Docyniaindica* with promising nutritional and antibacterial properties.

Keywords: Docyniaindica, Endophytic fungi, Phytochemical screening, antibacterial activity

ASSESSING LULC, LST, NDVI, AND NDBI DYNAMICS: A STUDY OF ZUNHEBOTO DISTRICT, NAGALAND

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Land use refers to the utilization of land by human activities such as agriculture, urbanization, and wildlife conservation, while land cover denotes the physical characteristics covering the earth's surface, encompassing features like forests, water bodies such as rivers, streams, and ponds. Various human activities like deforestation, industrial activities, agricultural practices cause increase in Land Surface Temperature (LST). On studying parameters such as LST, Land use land cover (LULC), Normalized Difference Vegetation Index (NDVI), and Normalized Difference Built-up Index (NDBI) collectively comprehensive study on changes on environmental, temperature and land use patterns can be studied. No research has been conducted on how these parameters relate to each other in the Zunheboto District of Nagaland. Six classifications of LULC—vegetation, water bodies, urban body, agricultural land, wasteland, and shifting cultivation were analysed. This research explores the connections between LULC, NDVI, NDBI and LST in Zunheboto district across the years 1991, 2001, 2011, and 2021, using data from Landsat-5 TM, Landsat-7 ETM+, and Landsat-8 OLI/TIRS satellites. LULC changes were evaluated through supervised classification using the maximum likelihood technique. Findings reveal a reduction of -44.07, -0.37, -0.24 km² in vegetation, water body and wasteland and an increase of 15.85, 15.18 and 13.65 km² in urban body, agricultural land and shifting cultivation from 1991 to 2021. Kappa coefficient varied from 85.4 to 96.5. The average LST increased from 16.15°C in 1991 to 22.37°C in 2021. Correlation analysis indicates negative LST-NDVI correlations 0.13, 0.44, 0.28 and 0.12 and positive LST-NDBI correlations 0.54, 0.7, 0.61, 0.42 for the years 1991, 2001, 2011 and 2021 respectively. The expansion of urban areas appears to be the primary factor influencing the shifts in LST, NDVI and NDBI. There's a clear correlation suggesting that as built-up areas grow, both NDBI and LST values tend to rise. This study's findings can inform urban planning and land management strategies by highlighting the impact of built-up area expansion on land surface temperature and vegetation indices.

Keywords: LULC, LST, NDVI, NDBI

STANDARDIZATION OF CROP GEOMETRY AND MAJOR NUTRIENTS FOR ENHANCING THE GROWTH, YIELD AND QUALITY OF DAVANA UNDER (ARTEMISIA PALLENSWALL) CV. THENI UNDER NORTHERN DRY ZONE OF KARNATAKA

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The study was conducted for the standardization of crop geometry and major nutrients for enhancing the growth, yield and quality of davana (*Artemisia pallens* Wall.)cv. Theni in northern Karnataka (Zone III) for two consecutive years in rabi 2021 and rabi2022. The research was set out in a factorial RCBD and replicated thrice in nine treatment combinations, that is three levels of spacing (S₁: 15 x 7.5 cm, S₂: 20 x 10 cm and S₃: 30 x 10 cm) and three fertilizer levels (F₁: 60:30:20 N, P₂O₅, K₂O kg ha⁻¹, F₂: 90:30:30 N, P₂O₅, K₂O kg ha⁻¹ and F₃: 120:40:40 N, P₂O₅, K₂O kg ha⁻¹). The pooled data of two years was statistically analyzed using the Fisher's method of "Analysis of variance". Among the spacing levels, 20 x 10 cm spacing was noticed the maximum inflorescences plant⁻¹ (87.40), hundred flower weight (3.83 g), fresh herbage yield (11.29 t ha⁻¹), dry herbage yield (2.83 t ha⁻¹) & essential oil yield (13.23 kg ha⁻¹). Among various fertilizer doses application of F₃ (120:40:40 N, P₂O₅, K₂O kg ha⁻¹) was noticed economically feasible, it has obtained maximal growth and yield parameters. The highest fresh herb yield (12.78 t ha⁻¹), dry herbage yield (3.16 t ha⁻¹) and essential oil yield of (15.46 kg ha⁻¹) were noticed with 120:40:40 N, P₂O₅, K₂O kg ha⁻¹ (F₃) application. Spacing of 20 x 10 cm (S₂) and application of 120:40:40 NN, P₂O₅, K₂O kg ha⁻¹ (F₃) found to be economical with highest benefit cost ratio of 4.08.

Keywords: *Artemisia pallens* Wall, Davana, fertilizer, yield, crop geometry, essential oil.

A STATISTICAL APPROACH FOR THE STUDY OF INSECT PESTS ON PIGEONPEA CROP IN RELATION TO ITS YIELD ATTRIBUTING CHARACTERS

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In order to get evidence about the applicability of theoretical probability distributions, as much data as possible tur pod bug, green stink bug, gram pod borer and tur plume moth population were collected. It was useful in designing efficient sampling programs for population estimation, development of population models and pest management. In brief, a study of the distributions pattern of pigeonpeatur pod bug, green stink borer, gram pod borer and tur plume moth population through suitable models on crop, their estimation of parameters, varieties to be chosen for yield of pigeonpea and the efficacy of different chemical and microbial pesticides against tur pod bug, green stink bug, pod borer and tur plume moth was carried out in this result. The result was introductory, which emphasized about the importance of this problem to be taken under study, population dynamics of insect-pest, and their spatial pattern, analysis of variance using square root transformation and multiple regression technique on pigeonpea yield with specific objectives. The results of tur pod bug, pod fly, pod borer and tur plume moth population on pigeonpea taking the observations on 23 standard weeks. The estimates of the parameters of the distributions were also given in the bottom of the concerned table. In order to understand the fitting of the distribution quickly, their graphical representations based on the method of proportion of zeroth cells, method of moments and maximum likelihood estimates were also given after the results of table. To make the difference among genotypes and efficacy of different insecticides in relation to occurrence of insect pest, the analysis of variance using square root transformation were prepared. The result showed that there were significant difference among the treatments for the occurrence of number of tur pod bug, green stink bug, pod borer and tur plume moth. In the case of multiple regressions, two model were consider and their results were given in the form of ANOVA table including the value of R². It was observed that the second model was proved to be better for predicting the yield of pigeonpea.

Keyword: Pigeonpea, crop, pod bug, yield, statistical

MOLECULAR PROFILING OF FERTILITY RESTORERS AND STERILITY MAINTAINERS FOR WILD ABORTIVE RICE CYTOPLASM USING CANDIDATE GENE DERIVED MARKERS

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Distinguishing fertility restorers and sterility maintainers among wide range of rice germplasm is very crucial for Wild Abortive-Cytoplasmic Male Sterility (WA-CMS) based hybrid rice development. A study was conducted to assess the fertility restorers and sterility maintainers among 24 rice genotypes using PPR9-782(M, I) and SF21 genes based reported, genic SSR, and generic primers. The materials comprised 16 known restorers and 8 known maintainers of WA-CMS system. Targeted genomic regions were amplified using a panel of 9 reported primers, 3 designed genic SSR primers, and 12 designed candidate gene-specific generic primers. Nine reported primers showed polymorphism percent ranging from 0 to 42.9% with PIC values between 0.519 to 0.806 with an average of 0.709. Three genic SSR primers displayed polymorphism percent ranging from 0 to 33.3% and PIC values between 0.660 to 0.771 with an average of 0.721. Furthermore, the

polymorphism per cent for 12 designed generic primers, varied from 0 to 40 with PIC value ranging from 0.684 to 0.861, with an average of 0.775. Hierarchical cluster analysis and principal coordinate analysis accurately classified 8 maintainers and 16 restorers into two distinct groups with high level of accuracy. Using 12 designed generic primers, genotypes were grouped into 3 clusters. Among these 12 primers, 5 selected generic primers effectively distinguished the 16 restorers from the 8 maintainers. The experimental results indicate the genetic importance of a panel of candidate gene-based primers, including previously reported, designed generic, and SSR primers, in efficiently discriminating WA-CMS sterility maintainers and fertility restorers in rice.

Keywords: WA-CMS, fertility restorer, sterility maintainer, hybrid rice

PHYSIOLOGICAL AND BIOCHEMICAL PHENOTYPING OF HORSE GRAM [*MACROTYLOMA UNIFLORUM* (LAM.) VERDC.] GENOTYPES FOR SEED LONGEVITY

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A study was conducted to investigate physiological and biochemical phenotyping of 20 horse gram (*Macrotyloma uniflorum* (Lam.) Verdc.) genotypes with a focus on seed longevity. Genotypes GPM-6, CRIDA-18R, CRHG-22, KGP-14-9, Indira kulthi-1, TCR-1635, 11-SS, IC-100938, LONE-2, AK-12-7, TCR-1690b, TRC-1503, TCR-140, CRHG-17, CRHG-8, GPM-4, HL-1, KBHG-1, PHG-2a and VLG-8 were subjected to storage for six months under ambient conditions. Genotypes were categorized as good, medium and poor storers based on observed physiological and biochemical changes during the storage period. Freshly harvested seeds exhibited higher seed quality parameters, but as the storage period advanced, a progressive decline in seed quality parameters became evident. After six months of storage, higher germination rates, seedling vigour indices and antioxidant levels including superoxide dismutase and catalase activities were observed in the good storers (GPM-6, TCR-1635, TCR-140, Indira kulthi-1 and CRHG-8) as compared to poor storers (CRHG-17, CRIDA-18R, IC-100938, VLG-8, CRHG-22 and KGP-14-9) genotypes. Antioxidant enzymes played a crucial role in seed longevity, and their activities decreased with an increase in the storage period, indicating seed deterioration due to a progressive decline in antioxidant defense mechanisms. Additionally, higher levels of electrical conductivity of seed leachate, volatile aldehyde and malondialdehyde were recorded in the poor storers compared to the medium and good storers. Seed viability and vigour were associated with a reduction in highly reactive free radicals, protected by the activities of antioxidant enzymes, namely superoxide dismutase and catalase. An increase in seed moisture content was observed as the storage period advanced. Notably, the total soluble protein content and test weight of seeds decreased during storage, possibly due to food reserve depletion and pulse beetle infestation, further contributing to the decline in vigour and viability of horse gram genotypes.

Keywords: Horse gram, Seed viability, Seed vigour, Seed deterioration, Free radicals, Antioxidant enzymes

ENSURING SAFETY AND QUALITY OF PUBLIC HEALTH IN INDIA: A COMPREHENSIVE ANALYSIS

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Public health safety and quality are paramount concerns in India, a country with a burgeoning population and diverse healthcare needs. This research paper examines the multifaceted landscape of public health in India, focusing on the measures implemented to ensure safety and quality within the healthcare system. The paper begins by outlining the current state of public health in India, highlighting the challenges posed by inadequate infrastructure, resource constraints, and socio-economic disparities. Despite notable progress in certain areas, such as infectious disease control and maternal healthcare, persistent challenges such as limited access to clean water, sanitation facilities, and healthcare services continue to undermine public health outcomes. A critical analysis of existing policies and regulations reveals the complex regulatory framework governing public health in India. While various laws and guidelines exist to uphold standards of safety and quality in healthcare delivery, enforcement mechanisms often fall short due to bureaucratic inefficiencies, corruption, and lack of public awareness. Furthermore, the fragmented nature of India's healthcare system poses additional challenges to effective regulation and oversight. In addressing these challenges, this paper identifies several key strategies and initiatives aimed at enhancing the safety and quality of public health in India. One such approach involves strengthening regulatory bodies and improving coordination among various stakeholders to ensure compliance with established standards. Additionally, efforts to enhance healthcare infrastructure, expand access to essential services, and promote health education and awareness play a crucial role in improving overall health outcomes. Furthermore, the paper explores the role of technology and innovation in transforming healthcare delivery in India. From telemedicine and electronic health records to mobile health applications and remote monitoring devices, technology holds immense potential to bridge gaps in healthcare access and improve the quality of care. However, challenges such as digital divide and data security must be addressed to realize the full benefits of digital healthcare solutions. Moreover, the paper examines the importance of community engagement and participatory approaches in promoting public health and ensuring accountability. Empowering local communities to actively participate in decision-making processes and healthcare delivery can lead to more sustainable and culturally appropriate solutions. Finally, the paper concludes by highlighting the need for continued research, advocacy, and investment in public health infrastructure and capacity-building initiatives. By adopting a holistic and collaborative approach, India can overcome its public health challenges and achieve the goal of ensuring safety and quality for all its citizens. In summary, this research paper provides a comprehensive overview of the measures needed to ensure safety and quality in India's public health system. By addressing regulatory gaps, leveraging technology, empowering communities, and fostering collaboration, India can make significant strides towards achieving equitable and sustainable healthcare for its population.

Keywords: India, public health, safety, quality, healthcare, policies, regulations, challenges, solutions

EFFECT OF MICRONUTRIENTS AND BIO - CAPSULE ON ECONOMICS OF CAPSICUM (*CAPSICUM ANNUUM* L.) UNDER PROTECTED CONDITIONS**M RAKESH KUMAR¹, VIJAY BAHADUR^{2*}, P K SHUKLA³, SAMIR EBSON TOPNO⁴,****Ph.D. Research scholar¹, Department of Horticulture, NAI, SHUATS, Naini, Prayagraj, Uttar Pradesh****Associate Professor^{2*} & Assistant Professor⁴, Department of Horticulture, NAI, SHUATS, Naini, Prayagraj, Uttar Pradesh****Assistant Professor³, Department of Biological Sciences, NAI, SHUATS, Naini, Prayagraj, Uttar Pradesh**

A Research was showed over two consecutive rabi seasons (2022–23 and 2023–24) at Horticulture Research Field, SHUATS, Naini, Prayagraj, U.P, to assess the effect of micronutrients and bio-capsules on the economics of capsicum cultivation in protected conditions implemented a Completely Randomized Design with 15 treatments and 3 replications. The results indicated that the treatment T₁₄, which involved the application of a mixture of all micronutrients with bio-capsules, significantly influenced the economic aspects of capsicum cultivation, showing the highest net return of ₹1,620,397.95 per hectare, followed by T₇ with ₹1,540,868.59 per hectare. In contrast, the control group (T₀) had the lowest net return of ₹811,556.18 per hectare. The analysis of benefit-cost ratio (B:C) across treatments revealed that T₁₄ had the highest ratio of 4.47, followed by T₇ (4.25) and T₈ (4.03), while the control (T₀) had the lowest B:C ratio of 2.28. These findings suggest that utilizing a combination of micronutrients and bio-capsules in protected conditions can significantly enhance the profitability of capsicum cultivation, providing valuable insights for farmers aiming to maximize their returns.

Keywords: Effect, bio- capsule, micronutrients, net return, B:C Ratio**EFFECT OF MINIMALLY PROCESSING ON QUALITY ATTRIBUTES AND SHELF LIFE OF CUT UNRIPE BREADFRUIT SLICES****M. CHITHRA* AND K. RAMA KRISHNA****Department of Horticulture, School of Life Sciences, Central University of Tamil Nadu, Thiruvarur-610005, Tamil Nadu, India**

The rapid decay of fresh breadfruit, caused by pathogen attacks and water loss, poses challenges for preservation. To address this, an experiment aimed to develop minimally processed breadfruit cut pieces for immediate use. Minimally processing involves minimal alteration of breadfruit to maintain their freshness and nutritional quality. The study focused on assessing the impact of various Generally Recognized as Safe (GRAS) chemical compounds on the quality of these cut slices during cold storage at 4 ± 1 °C and $90 \pm 5\%$ relative humidity over 24 days. Quality changes were evaluated every 4 days. The experiment, following a simple Completely Randomized Design (CRD), included nine treatments replicated three times. Treatments involved pretreatments such as KMS 250ppm (T₁), KMS 350ppm (T₂), CaCl₂ 2% (T₃), CaCl₂ 4% (T₄), Ascorbic acid 0.2% (T₅), Ascorbic acid 0.4% (T₆), Citric acid 2% (T₇), Citric acid 4% (T₈), and a Control (T₉). The treatments successfully preserved the quality of the sliced samples in comparison to the control group. Among the treatments, KMS 350ppm (T₂) retained the highest levels of total soluble solids (TSS) and glucose (5.23 and 2.33 Brix) throughout the entire 24-day storage period, outperforming the control. Conversely, the control group (T₉) deteriorated and had to be discarded by the 12th day of storage. Furthermore, KMS 350ppm demonstrated significantly elevated levels of antioxidant content (509.79 mg/ml), Vitamin C (47.55 mg/ml), and minimal electrolyte leakage (73.96 µs/cm) respectively. Meanwhile, KMS 250ppm (T₁) exhibited particularly high quantities of titrable acidity (0.22%), phenols (120.73 mg/ml), flavonoids (72.05 mg/ml), carbohydrates (92 mg/ml), and the lowest alpha-amylase activity (0.34 µM) compared to both other treatments and the control group. In summary, our experimental findings indicate that treatments with KMS at both 250ppm and 350ppm surpassed others in preserving quality and prolonging the shelf life of sliced breadfruit stored at 4°C for 24 days.

Keywords: Breadfruit, GRAS chemical, minimally processing, fruit quality and cold storage.**EFFECTIVENESS OF KRISHIDARSHAN PROGRAMME OF NAGPUR DOORDARSHAN AS PERCEIVED BY THE TELEVIEWING FARMERS****M.D. LAWANKAR¹ N.R. KOSHTI² S.P.LAMBE³****¹Ph.D. Scholar, Department of Extension Education, PDKV, Akola****²Professor, Department of Extension Education, PDKV, Akola****³Professor (CAS), Department of Extension Education, PDKV, Akola**

The present study on “Effectiveness of Krishidarshan programme of Nagpur Doordarshan as perceived by the televiewing farmers” was conducted in Wardha District of Vidarbha region of Maharashtra state. The exploratory research design of social research was used. In all, 120 respondents were selected by simple random sampling method. The data were collected by personally interviewing the respondents with the help of structured interview schedule. The data collected were carefully examined, classified, quantified and tabulated. Frequencies, percentage, mean, standard deviation was employed for interpreting the results. As regard to different parameters of perceived effectiveness of respondents about Krishidarshan programme, majority (62.50%) of the respondent farmers reported that they understood the information in the programmes to some extent, followed by 63.33 per cent of the televiewers perceived that the programme was useful to them, slightly more than half (54.17%) of the televiewers perceived somewhat gain in new knowledge through programme, while 65.83 per cent of the televiewers were received ‘new’ information through the programme and 58.33 per cent of them perceived that the topics information was completely covered, while 50.83 per cent of the televiewers perceived that the language used in farm telecast was somewhat simple to understand, 52.50 per cent of them perceived that the programme was somewhat interesting, and equal per cent of them (52.50%) perceived that, few Krishidarshan programmes were as per season and 50.83 per cent of them perceived that, the timing of programme telecasting was less than required, while above half of respondents (58.33%) perceived that, information telecasted through the programme

was accurate and 71.67 per cent of them perceived that speed of presentation of farm telecast was normal. It was also observed that 65.00 per cent of the viewers perceived that visuals used in the Krishidarshan programmes were relevant to it, while slightly above half of the respondents (51.67%) perceived that the quality of pictures and sound of Krishidarshan programme of Nagpur Doordarshan was good. In case of perceived effectiveness, 71.67 per cent of Krishidarshan televiewing farmers were having high level perceived effectiveness about Krishidarshan programme of Nagpur Doordarshan channel. The findings indicate that, as the time spent on watching programme increased, it led to increase in perceived effectiveness of it. It means that, respondent's actual time spent on watching KD programme was directly proportional to its perceived effectiveness and they should be having more contact with the extension personnel and organizations help farmers to understand, comprehend and use the agricultural information received through Krishidarshan programme telecast more efficiently and effectively.

Keywords- Perceived effectiveness, Krishidarshan programme of Nagpur Doordarshan, televiewing farmers

SCREENING OF CHICKPEA GENOTYPES/VARIETIES AGAINST SCLEROTINIA ROT OF CHICKPEA CAUSED BY *SCLEROTINIA SCLEROTIUM* (LIB.) DE BARY UNDER NATURAL CONDITIONS

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The present investigation was carried out in field conditions of College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan (India) during the year 2016-17 and 2017-18. Forty genotypes/varieties of chickpea were screened for reactions against Sclerotinia rot, caused by soil-borne *Sclerotinia sclerotiorum* under natural conditions. Out of forty genotypes/varieties, i.e. GNG-1581, RSG-888 and H- 208 were found resistance to Sclerotinia rot disease, five genotypes/varieties i.e. GNG-1969, GNG-1488, GNG-1499, RSG-973 and Radhey were found to be moderately resistant, while 11 entries were moderately susceptible. Sixteen genotypes/varieties were recorded as susceptible. Rests of five genotypes/varieties were recorded as highly susceptible to *S. sclerotiorum* infection in chickpea during Rabi 2016-17 and Rabi 2017-18.

Keywords: Chickpea, Genotypes, Stem rot, Screening, *Sclerotinia sclerotiorum*.

FOOD PROCESSING AND VALUE ADDITION

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Value addition is a strategic approach in post-harvest management that involves enhancing the quality, market value, and economic potential of agricultural products, such as fruits and vegetables. It aims to transform raw produce into value-added products with increased desirability and utility for consumers and markets. Value addition plays a crucial role in modern agriculture, food processing, and marketing. Value Addition in Horticulture is the process in which a high price is realized for the same volume of a primary product, by means of processing, packing, upgrading the quality or other such methods. For example: Making Jam of Pomegranate and Strawberry. Need for value addition in Horticulture for improve the profitability of farmers, empower the farmers and other weaker sections of society especially women through gainful employment opportunities and revitalize rural communities, provide better quality, safe and branded foods to the consumers, emphasize primary and secondary processing, reduce post harvest losses, Reduction of import and meeting export demands, Way of increased foreign exchange, Encourage growth of subsidiary industries, Reduce the economic risk of marketing and Increase opportunities for smaller farms and companies through the development of markets. Importance of Value Addition in Horticulture deals a large group of crops having great medicinal, nutritional, health promoting values. India as second largest producer of fruits and vegetables, only 10 per cent of that horticultural produce is processed, but other developed and developing countries where 40-80 per cent produce is value added. Horticultural crops provide varied type of components, which can be effectively and gainfully utilized for value addition like pigment, amino acids, oleoresins, antioxidants, flavors, aroma etc. Post harvest losses in horticultural produce are 5 to 30 per cent which amounts to more than 8000 crore rupees per annum. If we subject our produce to value addition the losses can be checked. Horticultural crops are right material for value addition because they are more profitable, has high degree of process ability and richness in health promoting compounds and higher potential for export.

Keywords: Horticulture, Antioxidants, Fruit, Vegetables

HORTICULTURE FOR FOOD, PHARMACEUTICALS AND COSMETICS INDUSTRY

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Horticulture specifically, growing fruits and vegetables-provides critical nutrients for a balanced diet. By the middle of the 21st century, the world population will have increased by 30 % to more than 9 billion. Food production will need to increase by 70% to meet increased demands. The horticulture industry embraces the production, processing and shipping of and the market of fruits and vegetables. Fruits and vegetables are important part of our dietary, which are rich source of nutrient. Carbohydrates, Protein and fat are micronutrients, considered as energy sources. ICMR, New Delhi, recommends 125g of leafy vegetables, 100g root and tuber vegetables and 75g of other vegetable and 120g of fruits per capita every day for balanced diet. There are different forms of medicines available in the market like Ayurvedic, Unani, Homeopathic and Allopathic. Many pharmaceutical companies use different raw material for the formulation of the different type of medicines. India is one of the leading exporters of raw material in pharmaceutical sector which is advancing day by day. The increased use

of medicinal plants and herbs has a major impact on raw material collection and therefore they require a sustainable conservation method as well as studies of phytochemistry, ethnobotany and pharmacology. Horticulture offers an increase in aesthetics pleasure that supports psychological well-being. Environmental aesthetic has now become a collective term standing for almost any conceivable subject that relates to the human's appreciation of his physical surroundings.

Keywords: Horticulture, Ethnobotany, Ayurvedic, Micronutrients

ENSURING SAFETY AND QUALITY OF PUBLIC HEALTH IN INDIA: A COMPREHENSIVE ANALYSIS

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Public health safety and quality are paramount concerns in India, a country with a burgeoning population and diverse healthcare needs. This research paper examines the multifaceted landscape of public health in India, focusing on the measures implemented to ensure safety and quality within the healthcare system. The paper begins by outlining the current state of public health in India, highlighting the challenges posed by inadequate infrastructure, resource constraints, and socio-economic disparities. Despite notable progress in certain areas, such as infectious disease control and maternal healthcare, persistent challenges such as limited access to clean water, sanitation facilities, and healthcare services continue to undermine public health outcomes. A critical analysis of existing policies and regulations reveals the complex regulatory framework governing public health in India. While various laws and guidelines exist to uphold standards of safety and quality in healthcare delivery, enforcement mechanisms often fall short due to bureaucratic inefficiencies, corruption, and lack of public awareness. Furthermore, the fragmented nature of India's healthcare system poses additional challenges to effective regulation and oversight. In addressing these challenges, this paper identifies several key strategies and initiatives aimed at enhancing the safety and quality of public health in India. One such approach involves strengthening regulatory bodies and improving coordination among various stakeholders to ensure compliance with established standards. Additionally, efforts to enhance healthcare infrastructure, expand access to essential services, and promote health education and awareness play a crucial role in improving overall health outcomes. Furthermore, the paper explores the role of technology and innovation in transforming healthcare delivery in India. From telemedicine and electronic health records to mobile health applications and remote monitoring devices, technology holds immense potential to bridge gaps in healthcare access and improve the quality of care. However, challenges such as digital divide and data security must be addressed to realize the full benefits of digital healthcare solutions. Moreover, the paper examines the importance of community engagement and participatory approaches in promoting public health and ensuring accountability. Empowering local communities to actively participate in decision-making processes and healthcare delivery can lead to more sustainable and culturally appropriate solutions. Finally, the paper concludes by highlighting the need for continued research, advocacy, and investment in public health infrastructure and capacity-building initiatives. By adopting a holistic and collaborative approach, India can overcome its public health challenges and achieve the goal of ensuring safety and quality for all its citizens. In summary, this research paper provides a comprehensive overview of the measures needed to ensure safety and quality in India's public health system. By addressing regulatory gaps, leveraging technology, empowering communities, and fostering collaboration, India can make significant strides towards achieving equitable and sustainable healthcare for its population.

Keywords: India, public health, safety, quality, healthcare, policies, regulations, challenges, solutions

CHARACTERIZATION OF GENETIC VARIABILITY AMONG GREENGRAM GENOTYPES BY MORPHOLOGICAL DESCRIPTORS ASSOCIATED WITH HIGH SEED YIELD

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Thirty five greengram genotypes were collected and experiment was conducted at SRTC, Rajendranagar, Hyderabad during Rabi 2022. These genotypes were characterized for 24 morphological descriptors as per DUS guidelines such as hypocotyls pigmentation, time of flowering, plant characters, leaf characters and seed characters. Analysis of variance revealed that the genotypes were highly significant for all the characters studied indicating the existence of considerable magnitude of variability. High phenotypic coefficient of variation (>20%) and high genotypic coefficient of variation for seed yield (kg/plot) in the present investigation was noticed and indicating the minimal influence of environment and presence of high genetic variability for the trait in the experimental material. Therefore, selection based on phenotype in these genotypes can also be effective for the improvement of seed yield. High heritability to plant height (cm), days to 50% flowering, days to maturity, pod length, 100 seed weight, protein estimation and medium heritability to seed yield (kg/plot). High GAM to plant height and seed yield demonstrates the presence of additive gene effect indicating effectiveness of selection for the improvement of these traits. The highest contribution of seed output to genetic diversity was indicated by Mahalanobis D² analysis, which was followed by plant height, days to maturity, pod length, days to 50% blooming, dry weight of seedlings, protein content, and 100 seed weight. Twelve clusters were created from all of the genotypes; the largest cluster, cluster I, included seventeen genotypes. The values of the average D² value, or inter-cluster distance, varied from 0.00 to 2334.35. The largest intra-cluster distance (D=2334.35) was found between clusters II and VIII, suggesting that the genotypes that make up these clusters may differ significantly in terms of genetic composition. Cluster II had the lowest inter-cluster distance of 20.05, indicating that the genotypes inside these clusters had a comparable genetic makeup. The most varied cluster was Cluster II.

RELATIONSHIP AMONG PROFILE OF THE TELEVIEWING FARMERS AND THEIR PERCEIVED EFFECTIVENESS TOWARD KRISHIDARSHAN PROGRAMME OF NAGPUR DOORDARSHAN

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The present study on “Relationship among profile of the televiewing farmers and their perceived effectiveness toward Krishidarshan programme of Nagpur Doordarshan” was conducted in Wardha District of Vidarbha region of Maharashtra state. The exploratory research design of social research was used. In all, 120 respondents were selected by simple random sampling method. The data were collected by personally interviewing the respondents with the help of structured interview schedule. The data collected were carefully examined, classified, quantified and tabulated. From the findings of the study, it was reported that, the independent variables namely occupation, land holding, annual income, social participation, and cosmopolitanism were positive and significantly related with perceived effectiveness at 0.05% level of probability, whereas three variables viz., education, time spent on watching Krishidarshan programme and extension contact had positive and highly significant with the perceived effectiveness of Nagpur Doordarshan channel at 0.01% level of probability. While age and farming experience had negatively significant relationship with perceived effectiveness of televiewers, whereas family size had non-significant relation with perceived effectiveness of Krishidarshan programme of Nagpur Doordarshan. The conclusion from findings that, majority of the respondents were comes under high level of perceived effectiveness about Krishidarshan program of Nagpur Doordarshan. It thus indicate that, as the higher education of the respondents, medium level of extension contact with extension agencies and medium level of cosmopolitanism with outside social system, its directly effect on perceived effectiveness of programme regarding to its beneficial level for gaining knowledge about improve technologies and for developing favorable attitude toward farmers

Keywords: Relationship, Perceived effectiveness, Krishidarshan programme of Nagpur Doordarshan, televiewing farmers

STUDY THE CONSTRAINTS FACED BY FARMERS ABOUT KRISHIDARSHAN PROGRAMME AND SUGGESTIONS FOR ITS IMPROVEMENT

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The present study on “Study the Constraints faced by Farmers about Krishidarshan Programme and Suggestions for its Improvement” was conducted in Wardha District of Vidarbha region of Maharashtra state. The exploratory research design of social research was used. In all, 120 respondents were selected by simple random sampling method. The data were collected by personally interviewing the respondents with the help of structured interview schedule. The data collected were carefully examined, classified, quantified and tabulated. From the finding of the study, multiple responses were observed on constraints faced by the respondents. 44.16 per cent of farmers faced problems related to inconvenient timing of Krishidarshan programme telecasting, followed by 24.16 per cent respondent farmers expressed problem related to technical words used by agricultural scientist in programme is not understandable sometimes, 19.16 per cent of the farmers were having problems about programme covering too much information in short time period, 12.50 per cent of farmers expressed problems about insufficient information provided, whereas 09.16 per cent respondents were telling problems that provided information is not need based, 07.50 per cent of respondents express the problem of commercial breaks between the programme which disconnect the topic in understanding and 06.66 per cent farmers showed the problems about less attention of programme toward farming policies & subsidies launched by government of India. With regard to suggestions of the respondent farmers, it was observed that, 39.16 per cent of farmers suggested to telecast the programme as per the convenient timing of farmers, followed by 15.83 per cent of farmers suggested adequate important information related to agriculture should be given for farmers, 15.00 per cent of farmers expressed their opinion that easy language should be used during dissemination of programme, Ten per cent farmers were given opinion about programme that is government policies and welfare schemes, 05.83 per cent respondents were having opinion to increase timing of the programme duration, whereas very few respondents (04.17%) opined that need based information should be provided, and equal per cent of (04.17%) of respondents gave suggestion about commercial breaks should be reduced during programme. The conclusion is most of constraints expressed by televiewers i.e. inconvenient timing, technical words used by agricultural scientist in programme is not understandable sometimes, covering too much information in short period of time

Keywords: Constraints, Suggestions, Perceived effectiveness, Krishidarshan programme of Nagpur Doordarshan, televiewing farmers

STUDY THE PROFILE OF FARMERS WATCHING KRISHIDARSHAN PROGRAMME OF NAGPUR DOORDARSHAN

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The present study on “Study the profile of Farmers watching Krishidarshan Programme of Nagpur Doordarshan” was conducted in Wardha District of Vidarbha region of Maharashtra state. The exploratory research design of social research was used. In all, 120 respondents were selected by simple random sampling method. The data were collected by personally interviewing the respondents with the help of structured interview schedule. The data collected were carefully examined, classified, quantified and tabulated. Frequencies, percentage, mean, standard deviation was employed for interpreting the results. The findings of present study reveal that, 45.33 per cent of respondent farmers and who regularly watched Krishidarshan Programme of Nagpur Doordarshan belong to middle age group i.e. (36 to 50 years), 29.17 per cent of

respondents educated up to higher secondary school/junior college (11th to 12th std), almost two third of respondents (63.33%) were having medium level farming experience, 49.17 per cent of the respondent farmers had come under medium size family (5 to 8 members), slightly above high per cent of the them (51.67%) had Agriculture (farming) as their main occupation, 41.67 per cent of respondent were come under small (1.01 to 2.00 ha) land holding category, 30.00 per cent of them had medium (Rs.1,00,001 to 1,50,000) annual income, 46.67 per cent of respondents were regularly watched Krishidarshan programme of Nagpur Doordarshan up to medium level from 10 min to 20 min, whereas in case of day basis, 49.16 per cent were watched it twice in a week, 57.50 per cent of respondents had medium level of social participation, majority 71.67 per cent of the respondent farmers were having medium level extension contact, and slightly above half of the respondents (55.00%) had medium level of Cosmo politeness respectively.

Keywords – Profile, Krishidarshan programme of Nagpur Doordarshan, Televiewing Farmers

ADVANCING SUSTAINABLE AGRICULTURE: THE ROLE OF MODERN AGRONOMY

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Agronomy is a multidisciplinary field that focuses on the science and practice of agriculture, encompassing soil management, crop production, and sustainable farming techniques. Its core aim is to optimize agricultural productivity while minimizing environmental impact. Key areas of study within agronomy include soil science, crop physiology, genetics, pest management, and agricultural economics. Soil management is fundamental to agronomy, involving the study of soil properties, fertility, and nutrient management. Agronomists work to improve soil health through practices like crop rotation, cover cropping, and precision agriculture, enhancing overall crop yields and sustainability. Crop production is another vital aspect, involving the selection, breeding, and management of crops for optimal performance. Agronomists study plant physiology, genetics, and biotechnology to develop high-yielding and resilient crop varieties. They also focus on efficient irrigation techniques, pest and disease control, and weed management to ensure healthy crop growth. Sustainability is a central theme in modern agronomy, with a focus on reducing environmental impact while maintaining profitability. This includes promoting conservation tillage, integrated pest management, and organic farming practices. Agronomists also explore innovative technologies such as precision farming, drones, and remote sensing to improve resource efficiency and reduce agricultural inputs. Agronomy intersects with other disciplines like environmental science, engineering, and economics to address complex challenges such as climate change, food security, and rural development. Through research, education, and extension services, agronomists play a crucial role in advancing agricultural knowledge and practices for a more resilient and sustainable future.

ALKALINE SOILS

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Alkaline soils: Alkaline soils have pH above 7. Soil alkalinity may be due to high base saturation, particularly with sodium and to the presence of free carbohydrates of calcium and sodium. In soils of arid and semiarid regions, lack of extensive leaching leaves the leaves of bare forming cations quite high. Such soils contain excessive Concentration of soluble salts, or exchange sodium or both. Due to which they are regarded as problem soils or soil affected soils. Depending upon the nature of soluble salt such soils are classified into three groups. 1. Saline soils, 2. Saline-alkali soils (Saline-sodic) 3. Alkali soils (Sodic soils) (non saline alkali). **Saline soils:** Saline soils have electrical conductivity of saturation extract more than 4dSm^{-1} at 250 C and exchangeable sodium percentage is less than 15 and the pH is less than 8.5. These soils correspond to Hilgard's (1906) white alkali soil sand to solonchak's of the Russian soils scientists. The soluble salts are mainly of Na^+ , Ca^{++} and Cl and SO_4^{-2} . **Saline alkali soils:** Saline-alkali soils have the electrical conductivity of saturation. Extract greater than 4dSm^{-1} at 250°C and the exchangeable sodium percentage greater than 15 and the pH of the soil about 8.5, contain neutral soluble salts and Exch. Na ions. The salts are Cl^- Sulphates Ca^{++} , Mg^{++} , Na^+ , K^+ . There can be all Stages with varying degree of dominance of salt content, high pH. **Alkali soils:** Alkali soils have electrical conductivity of saturation paste extract less than 4dSm^{-1} at 250°C and exchangeable sodium percentage more than 15. The pH Ranges between 8.5 to 10. These soils correspond to Hilgard's Black alkali soils and In some cases Solonetz, of the term used by Russian Scientists. High SAR, Presence of large come of sodium carbonate, type salts, and soils may be alkaline but not necessarily alkali. Nature and classification of salt affect soils Formation of Saline Alkali Soils.

DEVELOPMENT, VALIDATION AND ECO-SCALE ASSESSMENT OF MULTI-RESIDUE METHOD FOR QUANTIFICATION OF 103 PESTICIDES IN COOKIES

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A robust multi residue method was developed using QuEChERS coupled with LC-ESI-MS/MS for the detection and quantification of 103 pesticides in cookies. Prior to extraction, pre-soaking enabled the release of the pesticides that had been adsorbed into the matrix. Acceptable recovery for 98 pesticides was obtained using the original QuEChERS with minimal modifications through the use of 25 mg C-18 and 150 mg anhydrous MgSO_4 combination. SANTE specifications (SANTE/11813/2021) were used to validate the method being used. With HorRat values in the range of 0.3 to 1, 95, 80, and 60 pesticides could be recovered adequately at 0.1, 0.05, and 0.01 $\mu\text{g g}^{-1}$ fortifications,

respectively. The method's overall uncertainty ranged from 5.55 to 28.73%, with the majority of cases showing mild to medium matrix effects. When residues were analysed in real samples, they were found to be lower than the recommended Indian MRLs in raw wheat grain. Based on the analytical eco-scale protocol, the method's overall eco-score of 77 indicates that it is significantly greener and environmentally benign, with penalty points of 23 only.

Keywords: Cookies, QuEChERS, LC-MS/MS, pesticides, residue, Eco-Scale, Greenness

COMPARATIVE EVALUATION OF NATURAL FARMING WITH DIFFERENT FARMING PRACTICES IN COTTON MADHUMATI S. PUJERI¹ AND S. A. GADDANAKERI^{*2}

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A field experiment was carried out on a fixed site during *kharif* season for two years at Institute of Organic Farming (AI-NPOF), University of Agricultural Sciences, Dharwad for comparative evaluation natural farming with different farming practices in cotton. The results revealed that, recommended package of practices (RPP) recorded significantly higher growth and yield parameters over natural and organic farming practices and it was found to be on par with Integrated Nutrient Management with Conventional Farming Plant Protection (INM-CFPP). RPP recorded significantly higher seed cotton yield (1047 kg ha⁻¹) and net returns (₹ 35639 ha⁻¹) compared to organic and natural farming practices and it was found to be on par with INM-CFPP (1007 kg ha⁻¹ and ₹ 28992 ha⁻¹, respectively). However, organic farming (895 kg ha⁻¹) and Integrated Nutrient Management with Natural Farming Plant Protection (INM-NFPP) (929 kg ha⁻¹) recorded significantly higher seed cotton yield than Natural Farming: *Beejamrit + Ghanjeevamrit + Jeevamrit + Mulching + Intercropping* (796 kg ha⁻¹). Significantly higher net returns was recorded with NF: B+G+J+M+I (₹ 31022 ha⁻¹) compared to organic farming (₹12865 ha⁻¹) and it was on par with RPP.

Keywords: Natural farming, Organic farming, Integrated Nutrient Management, Cotton

ASSESSMENT OF GROWTH AND YIELD OF RABI SORGHUM UNDER DIFFERENT FARMING PRACTICES MADHUMATI S. PUJERI^{*1} AND S. A. GADDANAKERI²

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An experiment was conducted on a fixed site during *rabi* season for two years (2020-21 & 2021-22) at Institute of Organic Farming (AI-NPOF), University of Agricultural Sciences, Dharwad to assess the effect of different farming practices on growth and yield of *rabi* sorghum (Variety: SPV 2217) under rainfed condition. The mean of two years study revealed that, recommended package of practices (RPP) recorded significantly higher growth parameters viz., plant height (201.4 cm), leaf area (15.26 dm² plant⁻¹), dry matter accumulation in leaf (15.98 g plant⁻¹), stem (56.97 g plant⁻¹) and reproductive parts (66.87 g plant⁻¹) and total dry matter production (139.82 g plant⁻¹) at harvest and yield attributes viz., ear head length (20.0 cm), ear head weight (66.87 g plant⁻¹), grain weight per plant (37.76 g plant⁻¹), test weight (36.06 g) compared to natural farming and organic farming practices. RPP was found to be on par with integrated nutrient management with conventional farming plant protection (INM-CFPP) with respect to growth and yield parameters. Similarly, significantly higher sorghum grain yield (1351 kg ha⁻¹) was recorded with RPP over natural and organic farming practices and INM-CFPP (1284 kg ha⁻¹) was on par with RPP.

Keywords: Sorghum, Growth Parameters, Yield Attributes, Recommended Package of Practices, Natural Farming

PROCESSING AND VALUE ADDITION OF TAMARINDUSINDICA AND LIMONIAACIDISSIMA FRUITS MADHURA M B¹, HANUMANTHA M², ANKITA¹ AND ROOPA S. PATIL³

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Tamarindusindica is a deciduous tree with long, heavy drooping branches, and dense foliage. It belongs to family Fabaceae. Tamarind (*Tamarindusindica*) is found in many countries in Asia, Africa and South America. India is the largest producer (300,000 tons) and exporter of tamarind pulp followed by Thailand (150,000 tons). Tamarind pulp, seed has potential value in nutrition and health and used for preparations of both food, and medicines. Fruit should be harvested when the outer pod colour changes to brown. After harvesting the tamarind fruit, it is dried under the open sun or by mechanical methods, which helps to separate the outer hull and seeds manually or mechanically. Fruit is consumed as fresh fruit snack, or its pulp made into puree or sauce to mix with rice and other cereals, vegetables, fruits, and to make candies, high energy bars, ready to use fresh fruit concentrates, sweet juice beverages or flavoring agent for locally consumed drinks, pickles, as a preservative to store several foods. Shell is also used as absorbent in dye in industry. The fruit is good source of calcium, phosphorus, iron and vitamins and also contains small amounts of vitamin A and C and improving immune system, to control heart rate, blood pressure, cholesterol. Tamarind juice acts as a tonic, carminative, antiseptic, cleaning agent. *Limoniaacidissima* is one of the edible fruit yielding tree belonging to Rutaceae family and commonly known as beladahannu, wood apple. It is native to Indian subcontinent and srilanka. Fruits are used in food and pharmaceutical industry. Fruit should be harvested when they are completely matured. Through processing and by making fruit bar and jams it can be preserved. Pulp of the fruit can be eaten as raw or it can be processed. Jam, fruit bar, wine, chutney, sherbet, pulp powder, pickle, candies, jellies, ice cream, dairy products like burfi, biscuits can be made. Pulp is also used in cosmetics. Fruits are stomachic, stimulant, astringent, cardiotonic, tonic to liver and lungs. Good for asthma, tumours. Seeds are used to treat heart diseases.

IMPACT OF ENVIRONMENT ON HUMAN EVOLUTION**MADHURI YADAV¹, SMRITI KAMAL² ANDRAJNISINGH³**^{1,2}Department of Zoology, D.B.S. P. G. College, CSJM University, Kanpur³Department of Zoology, M. M. H. College, Gaziabad, CCS University, Meerut

Evolution refers to the changes in the genome by living organisms change over time. It is process in which modern organisms come down from their ancestors, with changes in their gene. Human evolution reduced the biodiversity of the ecosystem. Human have evolved as social, empathetic beings in small group sharing common identities. Changing environmental conditions affect which organisms survive and reproduces, which can lead to evolutionary changes in population. Human evolution is the lengthy process of changes by which people arise from ape like ancestors. Evolution is important because it explain how life developed and how different species are connected. It is important for major improvements in living, public welfare, health and security. Human have adopted to their environment, they also modified to themselves. Scientific evidence shows that physical and biological traits over a period approximately six million years ago. Adaptation and natural selection have influenced human population in response to their environment. Different region of the world present ecological challenges, result, and population have adopted genetically and physically for better survive in their environments.

Keywords- Evolution, ancestors, biodiversity, empathetic, genetically**MODULES FOR MANAGING MAJOR PESTS OF TOMATO****PROF. MAHABALESHWARHEGDE**

University of Agricultural Sciences

Aim: In the present study different pest management modules were assessed to determine the most effective one for managing the major pests of tomato under protected cultivation. **Methodology:** Three modules (biointensive, adaptable and recommended package of practices) were evaluated during summer and *kharif* 2021 in tomato under protected cultivation. **Results:** The module-II (Adaptable module) involving treatments neem cake, chlorantraniliprole 8.8 SC + thiamethoxam 17.5 SC @ 1.0 ml/l, azadirachtin 1000 ppm @ 2.0 ml/l, indoxacarb 14.5 SC + acetamiprid 7.7 SC @ 1.0 ml/l, pyriproxyfen 5 EC + fenpropathrin 15 EC @ 1.5 ml/l and spinosad 45 SC @ 0.25 ml/l + buprofezin 25 SC @ 1.0 ml/l was found superior in reducing tomato pinworm, silverleaf whitefly, fruit borer and mite on tomato under protected cultivation which was followed by module-I (Biointensive module) and module-III (Recommended package of practice). **Interpretation:** An effective, economically feasible and eco-friendly pest management module was developed to manage the most notorious pests (tomato pinworm, silverleaf whitefly, fruit borer and mite) on tomato in protected cultivation.

Keywords: module, pinworm, protected cultivation, silverleaf whitefly**EFFECT OF PARAQUAT DICHLORIDE APPLICATION ON NUTRIENT STATUS OF SOIL IN *XANTHIUM STRUMARIUM*****MAHAKHODE R.H.**

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The herbicides control the weeds but when applied to soil also have adverse effect on soil microorganisms whose activities help to render plant nutrients available to plants growing in soil. In the present investigation various concentrations 100, 200, 400 & 600 ppm of paraquat dichloride had been sprayed on *Xanthium strumarium* to study their effect on nutrient status of soil and weed. The soil pH was found to range between 8 to 7.9 and for control 8.0. The soluble salt content of soil in control treatment was 0.15 mmhos/cm and paraquat from 0.16 to 0.18 mmhos/cm. The organic carbon content (O.C.C.) was found to decrease with the application of paraquat dichloride. The available nitrogen content in the soil had showed gradual decline with the increase in herbicidal spray concentration. It was observed that increase in phosphorous and potassium content with the increase in level of paraquat dichloride application. It was revealed that paraquat dichloride at their graded level did not affect the total content of Cu, Zn, Co, Fe and Mg in soil under the *Xanthium strumarium*.

Keywords: *Xanthium strumarium*, paraquat dichloride, soil microorganism, nutrients, organic carbon content.**IMPACT OF FRONT LINE DEMONSTRATION ON YIELD ENHANCEMENT OF ONION****MAHANTESH P. S¹, KUMARA, O.², PRAKASH KERURE³ AND SHRUTI P. GONDI⁴**¹Scientist (Horticulture), ICAR-KVK, Chitradurga, KSNUAHS, Shivamogga²Senior Scientist and Head (Agronomy), ICAR-KVK, Chitradurga, KSNUAHS, Shivamogga³Assistant professor (Horticulture), College of Horticulture, Hiriya, KSNUAHS, Shivamogga⁴Assistant professor (Vegetable Science), College of Horticulture, Hiriya, KSNUAHS, Shivamogga

Onion (*Allium cepa* L.) is one of the important commercial vegetable crops grown in India for both domestic consumption and export. The major constraints identified in onion cultivation include lack of awareness of improved varieties and non-adoption of improved package of practices. Therefore, efforts have been made to demonstrate a high yielding onion variety (Bhima Super) with recommended production technologies to increase productivity. The present front line demonstration (FLDs) was carried out by Krishi Vigyan Kendra, Chitradurga, Karnataka during *Kharif* season in consecutive years, 2021, 2022 and 2023. The mean results of three years revealed that demonstrated technology recorded higher bulb yield of 27.63 t/ha compared to farmers practice (20.63 t/ha). The bulb rot incidence was lowest (10.70%) in demonstrated technology compared to farmer's practice (17.97 %). The demonstrated practice gave higher gross return, net return with a higher benefit cost ratio when compared to farmer's practice. The average extension gap of 7 t/ha was observed during the demonstration period. The average yield of onion increased 33.88 per cent over the farmer's practice. The results of the study indicate the positive effects of frontline demonstration over the existing practices towards enhancing the yield of onion.

Keywords: Onion, FLDs, farmer's practice, yield

BIO-EFFICACY OF ORGANIC TREATMENTS AGAINST MAJOR LEPIDOPTERAN PREDATORS OF LAC INSECT

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Investigation on Bio-efficacy of organic treatments against major lepidopteran predators of lac insect was carried out in the Department of Entomology, Rajasthan college of Agriculture, MPUAT, Udaipur, during 2021 to evaluate the bio-efficacy of organic treatments against major lepidopteran predators of lac insect. Among the treatments, the most effective treatment with the highest mean survival percentage of lac insect was Emamectin benzoate 5 SG @ 0.4 gm/lit (68.89 percent). Among the organic treatments, two applications of Tekha sat @ 10% was the most effective in reducing the predatory population on lac, followed by NSKE @ 5% and Bramhastra @ 5%. Whereas, Neem oil @ 2% and cow urine @ 10% two treatments that were found least effective against *E. amabilis* and *P. pulvereana*.

Keywords : Bio-efficacy, lac insect, *E. amabilis*, *P. pulvereana*, and organic treatments.

EXPLORING THE SYNERGISTIC POTENTIAL OF SALICYLIC ACID AND CHITOSAN IN NANOFORMULATIONS: SYNTHESIS, APPLICATIONS, AND SAFETY EVALUATION

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Salicylic acid (SA) and chitosan have garnered significant attention in recent years due to their diverse applications in various fields including pharmaceuticals, agriculture, and cosmetics. This abstract presents a novel nanoformulation comprising of salicylic acid and chitosan, highlighting its potential applications and benefits. The nanoformulation offers improved solubility, stability, and bioavailability, making it a promising candidate for drug delivery systems, wound healing, and antimicrobial agents. This review discusses the synthesis methods, physicochemical properties, and biological activities of the SA-chitosan nanoformulation, providing insights into its potential mechanisms of action and future directions for research and development. Additionally, the safety profile and biocompatibility of the nanoformulation are evaluated, addressing concerns regarding its potential toxicity and environmental impact. Overall, this abstract underscores the importance of exploring the synergistic effects of SA and chitosan in nanostructured formulations, aiming to harness their full therapeutic potential while mitigating associated challenges.

ORGANIC FARMING: HARNESSING TECHNOLOGY FOR ENVIRONMENTALLY CONSCIOUS AGRICULTURE"

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Healthy soil is the foundation upon which sustainable agriculture is built. Farming practices differ mainly based on soil inputs and crop protection measures. In conventional chemical farming practice, indiscriminate use of chemical fertilizers and pesticides destroy the beneficial soil micro flora change the soil nature and also contribute to the high crop production cost. A resilient and sustainable agriculture system is required to face different environmental challenges. Sustainable agriculture includes different ecofriendly farming techniques that boost crop yield and livestock production without having an adverse effect on the environment. Organic farming is one such approach that should be practiced for attaining the goal of sustainable agriculture. Organically cultivated foodstuffs have become increasingly popular due to their numerous health benefits. India has experienced a significant expansion of organic farming and is presently one of the major organic producers in the world. Though there are some difficulties yet to be overcome in order to ensure that organic farming has a beneficial economic and health impact, it can be argued that it has a better prospect in India.

Keywords: Organic farming, live stock and conventional.

NUTRIENT MANAGEMENT INFLUENCE OF RICE YIELD

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Rice (*Oryza sativa*) is the major food crop in the world. Nearly 40 per cent of the world population consumes rice as the major staple food and 90 per cent of the rice is grown and consumed in Asia. The excessive use of fertilizers and pesticides over the last 50 years has helped make good progress earlier, but in recent decades the decline in the growth and stagnation in crop yields, creating big problems and the chain of many problems, has been addressed. A number of deleterious effects on the soil, water and air have been caused by the indiscriminately used fertilizers. This has declined soil productivity by deteriorating soil health as regards soil fertility and microbial activity. Rice is the major nutrient draining crop, there will be huge deficit in the soil nutrients in rice. To overcome the problem and maintain soil fertility, there is need for integration of nutrients from organic and inorganic sources which can help in obtaining good crop yields as well as the production sustainability (Shankar *et al.*, 2020). Recent advancement in research on crop science focuses on nutrient-saving rice technologies for maximization in crop and sustainability under the backdrop of a shrinking nutrient resource base for ensuring environmental and agricultural

sustainability. Maximum grain, straw and biological yield of rice recorded under application of 100% RDF with 2.5 t ha⁻¹ FYM + 0.75 t ha⁻¹ vermicompost which was found significantly higher over rest of the treatments but at par with 100% RDF with 5.0 t ha⁻¹ FYM, 100% RDF with 1.5 t ha⁻¹ vermicompost and 75% RDF with 2.5 t ha⁻¹ FYM + 0.75 t ha⁻¹ vermicompost.

Keywords: Rice, Yield, Nutrient management

EVALUATION OF SUGARCANE (*SACCHARUM OFFICINARUM* L.) FAMILIES BASED ON THE GERMINATION, SEEDLING ESTABLISHMENT AND PRODUCTIVITY RELATED TRAITS DEVELOPED FROM FUZZ

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Sugarcane, a primary source of sugar, faces constant pressure to increasing productivity amid rising cultivation costs and fluctuating global market prices. In the development of high-yielding varieties, identifying potential parental combinations in advance would enhance the effectiveness of the sugarcane varietal breeding program. During 2021-22, true seeds from 66 sugarcane crosses were evaluated for germination and seedling establishment parameters. An augmented design-II was employed across five blocks to evaluate 25 families during the 2021-22 cropping season. Nine traits were collected from each families and commercial checks: millable canes per stool (NMC), cane girth (CG), cane height (CH), single cane weight (SCW), brix %, pol%, CCS%, cane yield (CY) and commercial cane sugar yield (CCSY) in the progeny populations to identify high-performing families. Overall, 5467 seedlings across diverse crosses exhibited 79.62% survival after 360 days after transplanting. Results indicate significant variability among families for productivity traits. Families such as NB 94-545 × Co 775, CoVC 14062 × Co 1148, CoV 89101 PC, and CoSnk 05103 GC exhibited acceptable variations and high mean values for cane productivity traits. Notably, families viz., Co 10027 GC, Co 09004 GC, and CoN 17071 GC showed superior performance in industrial essential traits in comparison to clonally propagated popular commercial check, Co 86032, along with good fluff germination and better seedling establishment parameters. These results are important for identifying promising families and can be further exploited in sugarcane varietal improvement programmes.

Keywords: Saccharum, Brix%, promising families, productivity traits, fluff germination

IN VITRO EVALUATION OF DIFFERENT BIO-CONTROL AGENTS (DUAL CULTURE) FOR INHIBITING THE GROWTH OF *FUSARIUM OXYSPORUM* F. SP. *CICERIS*

MAMTA

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In vitro fungal and bacterial bio-agents were tested against *Fusarium oxysporum* Schlecht by using dual culture techniques, the results obtained. Revealed that, mycelial growth inhibition of the test pathogen ranged from 75.83 to 33.05 per cent. Among the four bio agent tested *T. viride* recorded the mean maximum inhibition 75.83 per cent followed by *T. harzianum* (50.83%). Minimum mycelial growth was recorded in *P. fluorescens* (33.05 %) and *B. subtilis* (41.66 %). *T. viride* was superior in all other treatments. Among all the bio agents tested fungal bio-agents were found to be effective than bacterial bio agents in inhibiting the mycelial growth of *F. oxysporum*. The use of bio control agents for the management of soil borne diseases involves the application of these agents to soil and planting material.

PHYSICO-CHEMICAL CHARACTERISTICS AND NUTRIENT DYNAMICS IN THE MAIN SOIL TYPES OF BHIMTAL REGION OF KUMAUN, UTTARAKHAND, INDIA

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Bhimtal region of Kumaun, situated in the state of Uttarakhand, are one of the major tourist attractions in northern part of India. The present investigation was carried out to study the physical and chemical nature of the main soil types of Bhimtal Region of Kumaun, Uttarakhand. For this purpose five representative soil samples were collected from different villages of Bhimtal region of Kumaun, were found to be useful and important for the farmers of these regions. These soil samples were analyzed for physico-chemical properties like Soil Temperature, Soil Colour, Soil Texture/Bulk Density (B.D.), and chemical analysis like Soil pH and Electrical Conductivity (E.C), and status of available N, P, K, S, Organic Carbon, Organic Matter, and Micronutrient.

EXPLORING THE POTENTIALS OF *ZIZIPHUSMAURITIANA* LAM. LEAVES AGAINST ANIMAL DISEASES MAMTA NIKUNJ^{1*}, SANTWANA PALAI¹, RITUN PATRA², SK ABDUL RASHID¹&KAUTUK KUMAR SARDAR¹

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Background: Medicinal plants are used for prevention, mitigation, and treatment of majority of animal diseases in traditional practices. Apart from their potential pharmacological properties, medicinal plants are safer and have better quality than their synthetic counterparts. Overprescribing antibiotics has resulted in resistant bacteria, making them more difficult to cure. The new veterinary medicine regulation banned the most effective drug like diclofenac, ketoprofen and aceclofenac in animal due to adverse effect in livestock. **Hypothesis:** *Ziziphus mauritiana* Lam. (Family -Rhamnaceae), often known as the Indian plum is a big, prickly shrub being native to the Indian subcontinent may be containing bioactive compound like polyphenols that can show antioxidant, antimicrobial, anti-inflammatory, analgesic, and wound healing properties. **Objective:** This current work investigated the phytoconstituents present in *Ziziphus mauritiana* leaves contributing its pharmacological activities. **Method:** *Z. mauritiana* leaves were properly washed, shade dried at 37°C and pulverized into powder. Subsequently, soxhlet extraction of dried powder at 40°C with 70 % ethanol was done and concentrated using a rotatory evaporator. The ethanolic extract sample of *Z. mauritiana* was subjected to FTIR-ATR with resolution in the spectral area 4000-450 cm⁻¹. Also, it was scanned using UV-Visible Spectrophotometer (Make-Perkin Elmer, Model -lambda 365) at 250 nm wavelength. **Result:** The yield was 20.5 %. The FTIR analysis showed peaks at that represent OH stretching of phenolic group, stretching vibration of C = C group, respectively, which represent phenols present in the extract. The UV-Visible analysis of *Z. mauritiana* confirmed peak at which proves it as an as natural reducing agent effective against *E. coli* and *S. aureus* making it an effective antibacterial agent naturally. **Implication:** These peaks give us information about the metabolites that are present in the plant with effective response against pathogens, and thus, its leaves can be used to treat a variety of diseases in proper dosage regimen.

Keyword: Antioxidant, Antimicrobial, Analgesic, Phenol, FTIR-ATR Spectroscopy, UV-Vis Spectrophotometer

DEVELOPMENT OF MOSQUITO REPELLENT COTTON USING *NIRGUNDI*

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Global warming is the main cause of distribution of mosquitoes and many dreadful diseases are associated with mosquitoes. In recent years, due to aggravation in health related issues, the collaboration between medical personnel and textile chemistry, technologies has led to the evolution of innovative medico-functional applications for textiles. Even after many decades of research and studies, the production of mosquito repellent fabrics is still a challenging subject. To achieve the objectives of the study, 100% cotton fabric, nirgundi plant material (leaves) having mosquito repellency efficacy, were selected. *Nirgundi* (leaves) methanol extract was used for mosquito repellent finish on woven cotton. Fabric was enzymatically desized, scoured and bleached. For mosquito repellent finishing on fabric two application techniques i.e. direct and resin cross-linking were used through pad-dry-cure method. Mosquito repellent finished samples were tested against mosquitoes through laboratory cage method for evaluating their efficacy and durability to washing and sun-drying. Results interpret that by both application techniques using *nirgundi* plant extract efficacy and durability were affected but are to acceptable level. Direct application technique has better efficacy after treatment of plant extract on fabric but durability to washing and sun-drying was found better with resin cross-linking technique.

Keywords: Nirgundi, extract, mosquito repellent, pad-dry-cure, laboratory cage

IMPORTANCE OF SUPERFOOD IN HUMAN LIFE

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Superfoods are very complete foods, rich in nutrients, bioactive compounds and beneficial to health. In other words, they are foods with high nutritional value. Blueberries, salmon, cabbage and acai are some of them. Foods with a large number of health benefits are called superfoods. In a global arena in which the identification of healthier and cleaner nutrient sources is practically mandatory, superfoods, known as foods of high nutritional and biological value with satisfactory bioavailability and bioactivity within the body due to extraordinary concentrations of nutrients and bioactive ingredients, can play a key role. These products are highly connected with sustainability, which is composed of an economic, environmental, and social balance, mainly translated in meeting nutritional needs. Focusing on the two latter aspects, this article is intended to provide a breakthrough in the knowledge by assessing the nutritional characteristics and environmental performance of superfoods. Firstly, a selection is made by revising the nutritional profile of different products. Secondly, a review of life cycle assessment (LCA) studies aims to establish guidelines for future analyses, based on the current state-of-art and possible recommendations, as well as to provide information on the impacts of these novel products. 40 superfoods are identified, of which only 15 have environmental analysis. Finally, this scientific field is still little explored, so the suitability of superfoods from an environmental perspective cannot be concluded, thus encouraging the use of LCA to fill this scientific gap.

Keywords- Antioxidant, health benefits, fibre, kale, free radicals etc.

EFFECT OF SEED PRIMING ON SEED GERMINATION AND PLANT GROWTH OF OKRA (*ABELMOSCHUSESCULENTUS* L.)**¹MAMTA YADAV, ²M.R. CHOUDHARY AND ³SUNIL KUMAR YADAV****Ph.D Research Scholar, Dept. of Horticulture, SKNAU, Jobner, Jaipur (Rajasthan)****²Professor, Department of Horticulture, SKNAU, Jobner, Jaipur****³M.Sc. Scholar, Division of Agronomy, AMU, Aligarh, (UP)**

A field experiment was conducted to study the “Effect of seed priming on seed germination, plant growth, pod and seed yield of okra (*Abelmoschus esculentus* L.)” during the kharif season 2022 at Horticulture Farm, S.K.N. College of Agriculture, Jobner-Jaipur (Rajasthan). The experiment consisted of four different priming agent (distil water, NaCl @ 2%, PEG @ 5% and GA₃ @ 200 ppm including control) and different durations (6, 12 and 24 hrs) with total of 13 treatments. The experiment was laid out in a randomized block design (RBD) with three replications. The seed of okra variety Pusa A-5 was sown on 6th and 7th July, 2022 at 45 cm x 30 cm spacing. Data were recorded on different growth and yield parameters of okra. The results of the study clearly indicated that soaking seed in GA₃ 200 ppm solution for 24 hrs (T₁₂) significantly enhanced germination percentage (91.20 %), vigour index (3532), plant height (94.45 cm and 166.01 cm at 45 DAS and at first pod harvest respectively), branches per plant (2.20 and 4.94 at 45 DAS and at first pod harvest respectively), leaf area (371.10 cm²) and chlorophyll content (1.62 mg/g) in leaves and seed yield per hectare (458.77 kg) of okra. However, treatment T₁₂ was remained statistically at par to treatment T₁₁ (soaking seed in GA₃ 200 ppm solution for 12 hrs) and T₉ (soaking seed in PEG 5% solution for 24 hrs).

Keywords: Priming, germination, vigour, soaking, treatment**BIOLOGICAL, ENVIRONMENTAL, AND LIFE SCIENCES FOR A SUSTAINABLE FUTURE****DRMAMTA YADAV*, DR. SATISH NAYAK*****Bansal College of Pharmacy**

In the context of escalating environmental challenges and the urgent need for sustainable solutions, this research paper explores the intersections of biological, environmental, and life sciences to address global sustainability. Through an interdisciplinary approach, we examine the roles of biodiversity conservation, ecosystem services, and biotechnological innovations in promoting sustainability. Key areas of focus include sustainable agriculture, climate change mitigation, and the restoration of degraded ecosystems. The integration of ecological principles with cutting-edge biotechnological advancements is emphasized as a pathway to achieve long-term sustainability goals. This paper highlights case studies and experimental research that demonstrate successful implementations of sustainable practices, providing a comprehensive overview of how life sciences can contribute to a sustainable future. The findings underscore the importance of collaboration across scientific disciplines to develop holistic and resilient strategies for environmental stewardship and sustainable development. The imperative of advancing sustainable futures necessitates integrative research across biological, environmental, and life sciences. This paper explores the interconnected roles of these disciplines in fostering sustainability. Biological sciences contribute through advancements in genetic engineering, biodiversity conservation, and ecosystem management. Environmental sciences provide insights into climate change mitigation, pollution control, and sustainable resource management. Life sciences bridge these areas by enhancing our understanding of human health, agricultural sustainability, and ecological balance.

Keywords: Sustainability, Biodiversity Conservation, Ecosystem Services, Biotechnological Innovations, Sustainable Agriculture, Climate Change Mitigation, Ecological Restoration, Interdisciplinary Research.**EFFECT OF SLURRY ICE ON SHELLING TIME AND YIELD OF SHRIMP****MAMUN HAYDER MOLLAH*, SUPRATIM CHOWDHURY, SWARNADYUTI NATH****Department of Fish Processing Technology, West Bengal University of Animal and Fishery Sciences, Kolkata, West Bengal, India**

Shrimps are a nutrient-balanced protein source since they are high in protein, minerals, vital amino acids, polyunsaturated fatty acids, and other important components; and are the most heavily traded aquatic commodities. The economic viability of preserving marine foods with slurry ice has been established over conventional freshwater ice (like flake, tube, and block ice) in terms of lowering temperature, quick chilling due to faster heat exchange, and sustaining less physical damage due to its spherical microscopic particles. Thus, the aim of the present study was to determine the influence of ice and ice-water on shelling time and yield of shrimp. Ice pretreatment dramatically improves shrimp peeling speed. Fresh shrimp took 6.67 minutes to peel, but a 4-hour ice bath reduced it to 5.91 minutes ($P < 0.05$). Even better, a 24-hour ice soak dropped peeling time to 2.21 minutes. This efficiency boost is linked to looser shell-meat connections caused by the pretreatment, similar to the natural improvement in peeling with shrimp maturation. Ice-water mixtures (70:30 and 60:40) were even faster, with peeling times as low as 1.58 minutes. Overall, ice pretreatment offers a valuable and practical method for significantly faster and easier shrimp peeling. Shrimp yield, reflecting the amount of meat after peeling, decreases steadily during ice-water treatment. All three groups (T₁, T₂, T₃) started with an initial yield of 77.17% and finally decreased to 51.79%, 52.08%, and 50.81% respectively after 24 hours. The yield was decreased with increasing soaking time. Therefore, it may be inferred that ice pretreatment offers a valuable and practical method for significantly faster and easier shrimp peeling; the yield was decreased with increasing soaking time. Based on the sensory acceptability of the peeled shrimp a soaking time of 12 hours with a shelling time of 4.27 ± 1.08 minutes and yield of $68.86 \pm 2.35\%$ is suggested to be optimum.

Keyword: Slurry ice, Shelling time, Yield, Shrimp

BIOACTIVITY OF PHYTOCHEMICALS FROM VANGUERIA SPINOSA WITH SPECIAL REFERENCE TO MOSQUITO LARVICIDAL POTENCY**MANAS PARAMANIK*, SUDIP PARAMANIK, SAGARIKA MUKHERJEE, RANJIT KAPURI, SUMAN DASMODAK****Epidemiology, Vector Biology and Environmental monitoring Research Units, Entomology Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, Paschim Bardhaman, West Bengal, India.**

Plants are rich sources of phytochemicals. These phytochemicals, in the form of different preparations, have been used for human health benefits since prehistoric times. The increasing detrimental effect of synthetic chemicals on the environment and human health has led to the current focus on using safer bioactive secondary metabolites derived from plants. *Vangueria spinosa* Roxb. is a thorny bushy shrub under the family Rubiaceae, commonly distributed in India, Nepal, Bangladesh, and Myanmar. Recent molecular phylogenetics have classified the plant into several species under the genus *Meyna*, although several researchers consider these species to be inseparable with very few morphological differences. Traditionally, the plant is used as food and to treat dysentery, indigestion, helminthiasis, kidney stones, diphtheria, etc. in different ethnic communities. Modern methods such as solvent extraction in Soxhlet apparatus, followed by thin-layer chromatography, ultraviolet-visible spectroscopy, gas chromatography-mass spectrometry, Fourier transform infrared spectroscopy, etc. reveal the presence of several useful secondary metabolites. Different parts of the plant are rich in phytochemicals, like tannins, saponins, steroids, terpenoids, alkaloids, etc., and some essential trace elements. Several of these compounds have shown bioactivity. Ethyl acetate extract of *V. spinosa* leaf, which is identified as containing flavonoids, showed bactericidal activity with a minimum inhibitory concentration of 1.56 to 3.12 mg/mL. Chloroform-methanol extract fraction, which is steroidal, showed mosquitocidal potency with an LC_{50} value of 13.34 ppm for third-instar larvae in 24 hours. Other studies demonstrated the antifungal, antiprotozoal, antiviral, and antioxidant properties of the plant. The ethnomedicinal properties of *V. spinosa* should be utilized more.

Keywords: *Vangueria spinosa*, Phytochemicals, Bioactivity, Bactericide, Mosquitocide.

EFFECT OF IRRIGATION FREQUENCY AND ZINC FERTILIZATION ON GROWTH AND YIELD OF INDIAN MUSTARD [BRASSICA JUNCEA(L.) CZERNJ. COSSON]**MANEESH YADAV****Department of Soil Science and Agricultural Chemistry, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan) India**

A field experiment named “Effect of Irrigation Frequency and Zinc Fertilization on Growth and Yield of Indian Mustard [*Brassica juncea*(L.) Czernj. Cosson]” was conducted at Instructional Farm, Agronomy, Rajasthan College of Agriculture, Udaipur during *rabi* 2020. The experiment was laid out in split plot design having 12 treatment combinations replicated four times. The experiment having three levels of irrigation (one irrigation at seedling stage, two irrigations at seedling + pod formation stage and three irrigations at seedling+50% flowering+ pod formation stage) in main plots and four levels of zinc (control, 4 kg Zn ha⁻¹, 8 kg Zn ha⁻¹ and 12 kg Zn ha⁻¹) in sub plots. The results revealed that three irrigations given at seedling, 50% flowering and pod formation stage significantly increased plant height, branches plant⁻¹, leaf area index, dry matter accumulation, silique plant⁻¹, seeds silique⁻¹, test weight, seed yield (2110.82 kg ha⁻¹), stover yield (4936.24 kg ha⁻¹), biological yield (7047.06 kg ha⁻¹), oil content, oil yield and protein yield, as compared to only one irrigation given at seedling stage. The treatments I₂ (two irrigations at seedling and pod formation stage) and I₃ (three irrigations at seedling, 50% flowering and pod formation stage) were remained statistically at par. Water use efficiency of mustard decreased with increasing levels of irrigation. Irrigation frequency had no any significant effect on harvest index, protein content, nutrient (N, P, K and Zn) content in seed and stover as well as soil pH, EC, organic carbon, available nitrogen, phosphorus, potassium, sulphur and zinc after harvest of mustard crop. Plant height, branches plant⁻¹, leaf area index, dry matter accumulation, silique plant⁻¹, seeds silique⁻¹, test weight, seed yield (2129.85 kg ha⁻¹), stover yield (5050.25 kg ha⁻¹), biological yield (7180.10 kg ha⁻¹), oil content, oil yield, protein content and protein yield were increased significantly up to application of 8 kg Zn ha⁻¹. The treatments Zn₈ (8 kg Zn ha⁻¹) and Zn₁₂ (12 kg Zn ha⁻¹) were remained at par. The interaction of treatment I₃ Zn₁₂ gave maximum seed and stover yield. Nitrogen, potassium and zinc content and uptake by seed and stover of mustard as well as available nitrogen, potassium, sulphur and zinc in soil after harvest of crop increased significantly with application of 12 kg Zn ha⁻¹ over control. Phosphorus content in seed and stover and available phosphorus in soil after harvest decreased with increasing levels of zinc. The water use efficiency of mustard was increased significantly with increasing levels of zinc up to 8 kg Zn ha⁻¹.

STUDY THE POPULATION DYNAMICS OF MAJOR INSECT PESTS ON BLACK GRAM**MANEESHA¹*, DR. S.B. DAS², DR. A.K. SAXENA³ AND SHRADHA PARMAR¹**¹PhD. Scholar, Department of Entomology, RVSKVV, Gwalior, (MP) 474001²Head & Professor, Department of Entomology, JNKVV, Jabalpur, (MP) 482004³Professor, Department of Entomology, JNKVV, Jabalpur, (MP) 482004

Present research work on “Study the population dynamics of major insect pests on black gram” was conducted at Adhartal farm, Integrated Farming System unit, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur during kharif season 2022-23. The results revealed that species were observed infesting black gram crops on the T9 variety at various phases of crop growth. The first appearance of whitefly and jassid was recorded during 34th SW with the population 1.14 adult whitefly / plant and 0.56 jassid / 2 leaves respectively. It persisted in the crop till harvest 47th SW with population of 2.08 adult whitefly / plant and 1.72 jassids / 2 leaves. The peak period was observed of whitefly during 41st SW (6.62 adult whitefly / plant) and jassid during 40th SW (6.56 jassids / 2 leaves). Whitefly and jassid was observed as a major insect pest on black gram crop during kharif.

Keyword - Major insect pests, whitefly and jassid

HOLISTIC APPROACHES TO EFFECTIVE BEEKEEPING: STRATEGIES FOR PRODUCTION, MANAGEMENT AND SUSTAINABILITY**MANGAL SUKHI MEENA^{1*} AND LAXMAN SINGH SAINI²**¹Ph. D Research Scholar, Department of Entomology, RCA, MPUAT, Udaipur²Ph. D Research Scholar, Department of Entomology, SKNAU, Jobner, Jaipur

Beekeeping, also known as apiculture, is the practice of managing honeybee colonies for the production of honey, beeswax, royal jelly, pollen, and other hive products. It plays a vital role in agriculture and ecosystem health through pollination services. Effective production and management of beekeeping involve several key aspects. Firstly, hive management is crucial. This includes selecting suitable hive types such as Langstroth, top-bar, or Warre hives, ensuring proper hive placement, monitoring colony health, and managing pests and diseases through integrated pest management (IPM) strategies. Secondly, beekeepers must understand bee biology and behavior to optimize production. This involves knowledge of the honeybee life cycle, seasonal variations, foraging behavior, and mating patterns. Thirdly, maintaining a supportive environment is essential. Providing adequate floral resources through diverse plantings and avoiding pesticide exposure is vital for bee health and productivity. Additionally, proper nutrition supplementation and water sources contribute to colony strength. Fourthly, beekeepers need to employ effective harvesting and processing techniques to ensure high-quality hive products. This involves proper timing of honey extraction, beeswax rendering, and storage conditions to maintain product integrity. Lastly, marketing and business management skills are important for commercial beekeeping operations. Understanding market demand, pricing strategies, and value-added products can enhance profitability and sustainability.

Keywords: Beekeeping, Hive management, Bee biology, Pollination services, Hive products**IMPORTANCE OF GENDER ASPECT IN AGRICULTURE PRODUCTION AND DEVELOPMENT****MANI PRAKASH SHUKLA^{*1}, DILEEP VYAS², LALLA RAM³, MILIND SAGAR⁴**^{1,2&3}Ph.D. Agriculture Extension Education, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur⁴Ph.D. Agronomy, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur

The international community is becoming more and more aware of the need to address gender-related challenges in agriculture through national, regional, and international efforts and collaborations in order to achieve more sustainable and broad-based agricultural growth. However, the underperformance of the agriculture sector in many nations can be attributed, in part, to the limitations that women, who are frequently vital resources in agriculture and the rural economy, suffer, which lower their productivity. From clearing land to selling, women are essential to every aspect of farming. Compared to males, they provide a larger share of the labor in the agricultural industry. Globally and in developing nations, women make up approximately 43% of the agricultural labor force, according to aggregate figures from studies. They don't participate in decision-making, though. It emphasizes the necessity of developing a new agenda for agricultural research and extension that incorporates gender analysis into the creation and transfer of technologies. Increased women's decision-making power over agricultural resources, management and production, and revenue is known as empowerment. Benefits to productivity and health could result from one of two methods: (i) removing gender disparities in things like input access; or (ii) taking advantage of the time, social preferences, and danger that women face in order to allocate resources differently. Time usage surveys offer further information about the significant variation in women's contribution to agriculture within and within countries. Which shows how the amount of time spent by women in agriculture varies according to crop, production cycle, age, and ethnicity? Women's roles vary widely and making unwarranted generalizations compromises the planning and relevance of policies. So, we need a thorough examination of the issues, along with the proper solution to address them. For increase agricultural productivity and empower farm women, appropriate technologies must be provided. Policies need to be grounded on gender analysis and solid facts.

Keywords: Gender, Agricultural growth, Rural Economy, Decision Making, Empowerment.**SCREENING OF WHEAT GERMPLASM FOR STUDYING GRAIN LENGTH VARIATION DURING MATURITY AND GRAIN DEVELOPMENT STAGES****MANINDER KAUR, SATINDER KAUR**^{*}School of Agricultural Biotechnology, College of Agriculture, Punjab Agricultural University, Ludhiana 141004, India

Wheat (*Triticum aestivum* L.) is one of the most important staple food crops in the world. Grain traits are the important breeding objective in wheat, as phenotypically it is the most stable yield component. Large grain has been a key trait selected during wheat domestication and modern wheat breeding. Increasing grain size of wheat continues to be a major breeding target because of its effect on yield. Grain length (GL) has been found to be one of the important traits being neglected in improving grain weight of wheat as compared to rice. Wild germplasm of wheat found to be excellent source of variation in grain length to be exploited in wheat grain improvement. In the present study, wild progenitor of wheat including *Triticum dicoccoides* (AABB), *Triticum monoccoccum* (A^mA^m), *Triticum boeoticum* (A^bA^b) and *Aegilops peltoides* (SS) were understudied accessions as they are found to have great variations for grain length which could be exploited for increasing grain length thus grain yield in wheat. The mature seeds of each of these accessions were evaluated for GL and grain width (GW) for three consecutive years from 2015- 2018. GL varies from 6.5mm to 10.4mm while GW varies from 1.7mm to 3.6 mm in different accessions indicating wide variation of grain size. In long grain accessions maximum gain in GL is between 12 (Days Post Anthesis) DPA to 15DPA while in short grains accessions maximum gain of GL is between 9DPA to 12DPA. The richness in the genetic diversity enables to find the maximum grain size variation in the wild wheat germplasm whose exploitation could be helpful in cultivated ones. This study might enhance the potential for genetic manipulation of grain size in wheat along with understanding of the evolutionary dynamics of wheat which is likely to be useful for future wheat-breeding efforts.

Keywords: Wheat, Grain length, Grain width, Days post anthesis, Genetic diversity

HYPERPRODUCTION OF LACCASE BY AN AUTOCHTHONOUS WHITE ROT FUNGUS *GANODERMA MULTIPILEUM* UNDER SOLID STATE FERMENTATION FOR VARIOUS APPLICATIONS IN TEXTILE INDUSTRY

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White Rot fungi are well known for producing degradatory enzymes especially the laccases with tremendous industrial potential but till date the group has not been explored uniformly for this potential. The available literature reports the work only on few well known established white rot genera only. The diversity of climatic conditions present in the Chandigarh capital region has made it a natural habitat of large number of *Ganoderma* species with enormous potential of producing different enzymes which may find a number of industrial applications if explored and screened properly. The demand of potential laccases to be used in industry especially in textile has increased due to their multifaceted uses in a variety of processes employed in textile industry. Therefore, keeping all these things in mind, the present study was undertaken to explore various autochthonous white-rot fungi for their laccase producing potential and evaluating the application of potential enzyme (laccase) in textile wet processes to reduce the environmental pollution. In present study, *Ganoderma multipileum* was isolated from Lower Shivalik Hills of Chandigarh Capital Region which produced high titre of laccase enzyme. Laccase was found to be active in the temperature and pH range which was suitable for their application in textile wet processes in the industry. Physico-chemical conditions were standardized for the over production of enzyme in solid state fermentation by using classical and statistical methods. Significant results were achieved by employing the enzyme in textile wet processes i.e dye reduction, bleaching, detoxification of textile waste water. Therefore this fungal enzyme is highly suitable for envirosafe alternatives to chemical processes for developing a cleaner and economical process in textile industry to reduce the burden on environment.

Keywords- Laccase, Ganoderma, Textile, Chandigarh, Standardization

NEW NUMERICAL METHODS STUDY OF DIFFERENTIAL EQUATIONS

MANISH

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This research paper explores the latest developments in numerical methods for solving differential equations. Differential equations are fundamental in describing various physical, biological, and engineering phenomena. As computational power continues to grow, researchers are constantly innovating numerical techniques to provide accurate and efficient solutions to these equations. This paper reviews recent studies, compares various methods, and proposes novel approaches to address challenges in solving differential equations numerically.

Keywords: New numerical methods, differential equations.

A COMPREHENSIVE REVIEW OF EXHAUST MUFFLERS FOR NOISE REDUCTION IN AGRICULTURAL TRACTORS

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This review paper explores the role of exhaust mufflers in mitigating sound pressure levels generated by internal combustion engines in agricultural tractors. The introduction outlines the significance of mufflers in reducing engine noise, especially in environments where noise exposure poses health risks. Two main types of mufflers, reactive and dissipative, are discussed along with their design principles and performance characteristics. The selection criteria for mufflers, including measurements of exhaust system backpressure, airflow considerations, and material selection, are also highlighted. The review of literature encompasses various studies assessing muffler design, optimization, and performance evaluation. These studies delve into topics such as operator exposure to noise, health implications of prolonged exposure, and experimental evaluations of different muffler designs. Conclusions drawn from these studies emphasize the importance of efficient muffler design in reducing sound pressure levels while minimizing backpressure and maintaining engine performance.

Keywords: Exhaust mufflers, Noise reduction, Agricultural tractors, Internal combustion engines, Muffler design and performance evaluation

EFFECT OF JEEVAMRUTHA ON GROWTH, YIELD AND QUALITY OF HYBRID TMOH 2361 & TMOH 2366 IN OKRA (*ABELMOSCHUS ESCULENTUS*)**MANISHA****Department of Horticulture, (NAI) Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (Allahabad)**

A field experiment was carried out at Vegetable Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj (U.P.) to evaluate the "Effect of jeevamrutha on Growth, Yield, and Quality of Hybrid TMOH 2361 & TMOH 2366 in Okra (*Abelmoschus esculentus*)" during the period from February to June, 2023. The ten jeevamrutha treatments which were laid out in a factorial randomized design replicated thrice. Analysis of the data revealed that various jeevamrutha treatments significantly affect the growth and yield parameters of okra. Among all the different parameters of growth, yield and quality significantly higher [Germination percentage (80%), Number of days to germination (6.00), Plant height (117.03 cm), Days taken to 50% flowering (53.03), Individual pod weight (14.00 g), number of pods per plant (22.0), fruit yield per plant (285.05 g), Total yield of fruits (170.52 q/h)] were found in the Treatment T4 (jeevamrutha 10%) cv. TMOH 2361].

Keywords: Okra, jeevamrutha, growth, yield**ABIOTIC STRESS MANAGEMENT IN VEGETABLE CROP****MANISHA A. KHARAT^{1*}, R.D. BAGHELE², PRATIKSHA A. SASANE^{3S}**^{1,3}College of Agriculture, V.N.M.K.V., Parbhani²Junior Vegetable Breeder AICRP on Vegetable Crop, VNMKV, Parbhani,

Many environmental stresses are endured by plants, which lowers and limits agricultural crop output. Plants are subject to two types of environmental stresses: biotic and abiotic stressors. Vegetables are highly sensitive in nature thus affected by various biotic and abiotic stress. Any adverse effect of non-living elements on living things in a particular habitat is known as abiotic stress. The extreme events of climate change, such as heat stress, water stress, drought, heavy rainfall, salinity, etc., have a significant impact on the productivity and production of vegetable crops. Most of the vegetables contain more than 90% of water thus highly sensitive to climate change. All phases of plant growth, pollination, blooming, and fruiting are impacted by abrupt changes in climatic conditions, such as temperature, which directly lowers the yields and quality of main crops. At such high temperatures, especially in dry or windy conditions, vegetable crops like beans or tomatoes may lose blossom of their flowers, which will result in a poor fruit set. All phases of plant growth, pollination, blooming, and fruiting are impacted by abrupt changes in climatic conditions, such as temperature, which directly lowers the yields and quality of main crops. Elevated temperatures can disrupt the pollination process of sweet corn, leading to corn ears that are not fully filled. Cucurbits, the family that includes squash and pumpkins, usually develop largely male flowers under high temperatures, therefore few fruits are produced.

Keywords: Abiotic Stress, Vegetable, Effect**VALUE ADDED PRODUCTS OF TOMATO****MANISHA A. KHARAT^{1*}, R.D. BAGHELE², P.A. SASANE³**^{1,3}College of Agriculture, V.N.M.K.V., Parbhani²Junior Vegetable Breeder AICRP on Vegetable Crop, VNMKV, Parbhani, MH

An area of 5.4 lakh hectares is used to produce around 7.1 million tonnes of tomatoes annually in India. The state has 70000 acres dedicated to the cultivation of tomatoes, sometimes known as "poor man's apple," with an average daily yield of 140000 tons. Vitamins, minerals, and other beneficial elements like fibre that are essential for optimal health can be found in tomatoes. Lycopene and beta-carotene pigments are found in tomatoes. One of the most significant ingredients in tomatoes is lycopene, which has been shown to play a critical role in preventing human cancers, including colorectal, prostate, breast, endometrial, and lung cancers. By processing tomatoes, value addition can be achieved by turning them into value-added goods. One method for giving the people access to antioxidant products at a reasonable cost is sun drying. As a result, tomatoes were dried, and dried tomato and dried peel were used to create diverse items.

Keywords: Tomato, Cultivation, Lycopene, Drying**PLANT BIOTECHNOLOGY APPLIED TO THE HORTICULTURE CROP****MANISHA A. KHARAT^{1*}, R.D. BAGHELE², P.A. SASANE³**^{1,2}College of Agriculture, V.N.M.K.V., Parbhani²Junior Vegetable Breeder AICRP on Vegetable Crop, VNMKV, Parbhani,

"Plant biotechnology" could apply to any artificial manipulation of a plant, or only a portion of a plant. We will divide the many plants biotechnology uses into two categories for our review. The first category pertains to tissue culture and includes everything from a single cell or particular tissue to the entire plant. These technologies are based on a very old idea called "cellular totipotency," which was first proposed by Haberlandt in 1902 but wasn't proven until 1958 by Steward. His lab was the first to successfully convert a cell line from carrots into "artificial embryos," which were thereafter referred to as "somatic embryos. The applications of the second group are more recent and derive from an excellent knowledge of the double helical DNA structure proposed in 1953, by James Watson and Francis Crick. They base their strategy on the molecular biology science.

Keywords: Biotechnology, Tissue culture, Somatic embryo

THE PUTATIVE ROLE OF CIRCULATORY MIRNAS IN REGULATING TIME-RESTRICTED EATING IN OLDER ADULTS

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Time-restricted eating (TRE), a well-liked form of intermittent fasting, has been demonstrated to offer several health benefits, including an increased longevity in preclinical models. While the underlying mechanisms are not yet clear, emerging research indicates that one plausible mechanism through which TRE may confer health benefits is by influencing the expression of the epigenetic modulator circulatory miRNAs, which serve as intercellular communicators and are dysregulated in metabolic disorders. In our study, we had examined the effects of a 4-week TRE regimen on global circulatory miRNA from older (≥ 65 years) overweight participants. Pre- and post-TRE regimen serum samples from nine individuals who had a significant weight loss were analyzed. The expressions of 2083 human miRNAs were quantified using HTG molecular whole transcriptome miRNA assay. In silico analyses were performed to determine the target genes and biological pathways associated with differentially expressed miRNAs to predict the metabolic effects of the TRE regimen. Fourteen miRNAs were differentially expressed pre- and post-TRE regimen. Targets of downregulated miRNAs were associated with Ras signaling (cell growth and proliferation), mTOR signaling (cell growth and protein synthesis), insulin signaling (glucose uptake), and autophagy (cellular homeostasis and survival). In conclusion, the TRE regimen downregulated miRNA, which, in turn, could inhibit the pathways of cell growth and activate the pathways of cell survival and might promote healthy aging. Future mechanistic studies are required to understand the functional role of the miRNAs identified in our study.

BROOD STOCK MANAGEMENT AND QUALITY SEED PRODUCTION OF AMUR COMMON CARP (*CYPRINUSCARPIOHAEMATOPTERUS*)

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The fish-seed production industry in India has recorded remarkable growth over the last three decades. The supply of quality fish seed is a key factor to the expansion of fish farming. Fish seed demand at present is strong, unsatisfied and expected to expand and fish seed business in India is profitable. Amur carp (*Cyprinus carpio haematopterus*) is a Hungarian breed common carp that reaches a larger size in a minimum rearing period compared to other common carp species. The species is a result of crossing different common carps around the world. The species can be cultured under a controlled system and in open water bodies. The secret behind successful breeding is proper breeder selection and management. A detailed study was conducted to undertake brood-stock management and breeding of Amur common carp at Fisheries Research and Information Centre (I), Hesaraghatta, Bengaluru, India. The average Fertilization rate varied between 62% to 89% and the average rate of spawn production per kilogram of female varied between 64500 to 84000 numbers. Although technology could address the issue of small-scale farmers at an individual level in their localities, the breeding results could close the gap altogether through the small scale seed producing entrepreneurs the opportunity for the ready market for raising the output and commercial production of Amur seedlings at any time.

Keywords: Amur carp, Brood stock Management, Seed production

ASSESSMENT OF SUBSTRATE BASED CULTURE ON THE GROWTH AND PRODUCTION OF *LABEOFIMBRIATUS*, *BARBODESCARNATICUS* AND *MACROBRACHIUMROSENBERGII*

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Periphyton-based fish culture offers a new direction, especially since periphyton is effectively utilized by many fish species which thrive low in the food chain. Periphyton is an assemblage of organisms like algae and minute animals growing upon the free surfaces of submerged objects of water and covering them with a slimy coating. Substrate based aquatic system provides shelter and increases the periphyton production as food and thereby increases the production. It can bring about major advances in the development of low cost farming in aquaculture with no additional feed and reduction of pollutants. The present study was aimed to assess the growth and production of fish (*Labeo fimbriatus*, *Borbotodescarnaticus*) and shellfish (*Macrobrachium rosenbergii*) in a substrate-based system for a period of seven months. The experiment was carried out by using two substrates (sugar cane bagasse and bamboo poles) for a period of 8 months in five treatments viz., TS₁ (Periphyton+50% feed), TS₂ (Periphyton), TB₁ (Periphyton+50% feed), TB₂ (Periphyton+50% feed) and control (100% feed). At the end of the experiment, the results showed maximum production in TS₁ followed by TB₁, TS₂, TB₂ and control. During experimental period, water pH ranged between 6.70 and 8.30, dissolved oxygen showed increasing trend throughout the experiment and ranged between 5.20 and 7.20mg/l. The highest alkalinity was recorded in substrate tanks compared to control. The highest ammonia concentration was recorded in control tanks compared to substrate tanks. The results of the experiment showed that the use of sugarcane bagasse as a substrate not only helped for enhancement of growth, survival and production of the fish and prawn but lowered the levels of toxic NH₃-N, NO₂-N in water columns. Therefore, this system is eco-friendly as limited water exchange is carried in this system.

Keywords: Substrate, periphyton, fish, shellfish

STANDARDIZATION OF GROWING MEDIUM FOR GROWTH OF AZADIRACHTAINDICA SEEDLINGS IN SEMI-ARID REGION OF RAJASTHAN.**MANJU ATTRI^{1*}, SBS PANDEY¹ AND MANOJ KUMAR YADAV²**¹Department of Silviculture and Agroforestry, College of Horticulture & Forestry, Jhalrapatan, Jhalawar, Rajasthan- 326023, India²Agricultural Research Station, Keshwana, Jalore, Rajasthan, 343001, India

A field experiment comprised of eighteen treatments of four growing medium viz.; soil, sand, FYM and vermicompost in different ratio was conducted to find out the best growing medium for Neem (*Azadirachta indica*) seedlings. Seedlings were raised in the polybags of size 6" x 10" under green shed net (50 % light intensity) nursery conditions. Maximum growth of Neem seedlings was observed in T₁₅ [Soil: Sand: Vermicompost (2:1:2)] treatment as the best height (33.50 cm), collar diameter (5.21 mm), number of leaves (16.42), length of longest tap root (17.55 cm), diameter of longest tap root (2.91 mm), fresh weight of seedlings (59.90 g), dry weight (26.34 g), and root-shoot ratio (1.09). Thus, mixture of Soil: Sand: Vermicompost (2:1:2) can be used to produce quality planting material of Neem in shortest possible time.

Keywords: Growing media, *Azadirachta indica* (Neem), Seedling, Vermicompost and Farmyard manure.**SOIL FERTILITY ASSESSMENT UNDER DIFFERENT LAND COVERS IN HARIDWAR DISTRICT OF UTTARAKHAND, INDIA****MANJU RANI***

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The physicochemical properties of soil including pH, total organic matter, and macro and micronutrients play akeyroleindeterminingsoilfertility. The study was carried out to assess the various parameters of soil like pH, electrical conductivity, Soil Organic Carbon(SOC), available Nitrogen (N), Phosphorus (P), Potassium (K), and other macro and micronutrients. Soil samples were collected from different sites of the Laksar block of Haridwar district to examine the physiochemical parameters of soil under different land covers. The composite soil samples were collected randomly from 0-15 cm depth using the standard procedure of soil collection. Soils were processed and analyzed for pH, electrical conductivity, Soil Organic Carbon (SOC), available macronutrients major (N, P, K) and secondary (Ca, Mg, S), and micronutrients (Fe, Mn, Cu, Zn, B). Mean values for all the nutrients under different land covers were calculated and comparisons were made. Results revealed that soils are saline, and electrical conductivity falls under standard value. SOC was low in all sample. The available nitrogen, phosphorous, and potassium values were also low in each sample. Calcium was found adequate in all samples, and magnesium and sulfur were very low in all soil samples. All the micronutrients (Cu, Zn, Mn, and B) examined were sufficient in all samples except Fe. It may be concluded that soil is saline in nature and deficient in some major macronutrients and few micronutrients. The low soil organic carbon (SOC) indicates continuous and intensive cultivation practices. In order to maintain soil health and fertility, crop rotation should be followed and the relevant chemical fertilizers should be used.

Keywords: Electrical conductivity, Macronutrients, Micronutrients, SOC, Soil fertility.**STUDIES ON EFFECT OF AUXIN ON ROOTING OF STEM CUTTINGS OF CRAPEJASMINE (TABERNAEMONTANACORONARIA)****MANJUNATH D. R., RUDRAGOUDAPATIL, B.C. PATIL, MUKUNDSHIRAGUR, SACHINKUMAR T NANDIMATH, SRIKANTAPRASAD D.****KRCCH, Arabhavi, University of Horticultural Sciences, Bagalkot, Karnataka**

Tabernaemontana coronaria is a glabrous, evergreen, dichotomously branched shrub, belonging to the Family Apocynaceae. Though it can bemultiplied by cuttings, large scale multiplication is not profitable because of it's lowerrootingpercentage. The experiment was carried out during the year of 2020-2021 in the mist house of Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture, Arabhavi. The experiment was laid out in Factorial Completely Randomized Design (FCRD) with 10 treatments and replicated thrice. Cuttings of 12-15 cm were dipped in various concentrations of auxins. Minimum days for shoot initiation (8.07 days), Longest shoot (14.11 cm), maximum fresh weight (6.18 g) and dry weight (1.02g) of shoot, early rooting (12.60 days), longest root (9.34 cm), maximum percentage of rooting (96.33%) and survival percentage (99.87%) of rooted cuttings was observed in semi-hardwood cuttings ofcrape jasminetreated with IBA+NAA @ 2000 ppm.

Keywords: Semi-hardwood cuttings, hardwood cuttings, auxins, rooting percentage and survival percentage.

A SURVEY OF THE BIODIVERSITY OF CAMPUS AND ADJOINING AREAS OF SHRI SHIVAJI COLLEGE AKOLA, WITH REFERENCE TO THE VERTEBRATES

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Life probably began on this planet about 3.5 thousand million years ago; it was not until about 450 million years ago that the first organisms colonized land gradually resulting in the present day biodiversity. According to Goldin Quadros (2009) the studies of biodiversity have now assumed greater significance as ecologists try desperately to document global biodiversity in the face of unprecedented perturbations, habitat loss and extinction rates. The vertebrates - mammals, birds, reptiles, frogs and fish make up the major group of animal kingdom. Therefore, all the vertebrates put together are only a tiny proportion of the species of animals on earth. All the rest, well over 90%, are invertebrates. It is not known precisely how many invertebrate species exist on Earth or how many of them are at risk of extinction, though IUCN's 2014 Red List puts the global total at about 1.2 million species and the percentage at risk of extinction at about 41 percent of species evaluated. There are about 2546 species of fish (about 11% of the world species) found in Indian waters. 197 species of amphibians (4.4% of the world total) and more than 408 reptile species (6% of the world total) are found in India. Among these groups, the highest levels of endemism are found in the amphibians. There are about 1250 species of birds from India with some variations depending on taxonomic treatments accounting for about 12% of the world species there are about 410 species of mammals known from India that is about 8.86% of the world species. The Vertebrate thus form an important component in terms of conservation of habitats and ecosystems. Their existence and abundance could indicate the health of the ecosystem. In addition it also plays a significant role in planning conservation measures and the economy of a country. The need to document and conserve the biodiversity of the campus prompted; hence, this is an important study for biodiversity conservation and planning in and around the college campus. The study area Shri Shivaji College Campus in Akola city lies in Akola District occupies in the western parts of the Amravati Division of Maharashtra State and is surrounded by Amravati district in the north and northeast, Yeotmal in the southeast, Washim in the south and Buldhana in the west. The district lies between 19° 51', 21° 16' latitude, 76° 38', and 77° 44' longitude. The Vertebrate form an important component in terms of conservation of habitats and ecosystems. Their existence and abundance could indicate the health of the ecosystem. In addition, it also plays a significant role in planning conservation measures and the economy of a country. Documentation of fauna in and around the college campus is vital as most of the faunal species restricted to ever fragmenting habitats. Table 1 shows the summary of vertebrate diversity in the study areas. According to the checklist of vertebrates (see Appendix) 85 vertebrate faunal species, occur in the studied area during the survey period. Of which 18 (21.17%) are mammals, 39 (45.8%) birds, 17 (20%) reptiles, and 11 (12.9%) amphibians. Most of these vertebrates are the frequent visitors in the study area as per the need. In addition, some of the habitats in the study areas can be used for biodiversity perpetuation and conservation. However, a detailed study on such urbanized bio diversity habitat has to be carried out for further conservation. There is need to plan conservation strategies to increase urban biodiversity.

Keywords: Biodiversity, Shri Shivaji College Akola, Vertebrates

INFLUENCE OF PHOSPHORUS AND SULPHUR FERTILIZATION ON NUTRIENT CONTENT AND QUALITY OF SOYBEAN [GLYCINE MAX (L.) MERRILL]

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An experiment conducted during *kharif*, 2021 at Instructional Farm, College of Agriculture, Ummedganj, Kota (Rajasthan). The experiment was laid out in factorial randomized block design with three replications. The twelve treatment combinations were comprised of four levels of phosphorus viz., 0, 20, 40 and 60 kg ha⁻¹ and three levels of sulphur viz., 15, 30 and 45 kg ha⁻¹. The soil of the experimental site was clay loam in texture, medium in available nitrogen, phosphorus, and sulphur while and high in potassium and sufficient in DTPA extractable micronutrients with pH (7.61). Results showed that application of 60 kg phosphorus ha⁻¹ had a significant effect on nitrogen (6.63 %), phosphorus (0.632 %) and sulphur (0.463 %) concentration in seed, phosphorus (0.190 %) and sulphur (0.265 %) concentration in straw over application of 20 kg phosphorus ha⁻¹ and control. However, it was found at par with application of 40 kg phosphorus ha⁻¹. Significant increases in protein (41.41 %) and oil (20.53 %) content in soybean seed were recorded with the application of 60 kg phosphorus ha⁻¹ over 20 kg phosphorus ha⁻¹ and control. Significantly higher concentrations of nitrogen (6.51%), phosphorus (0.626%) and sulphur (0.446 %) in seed, phosphorus (0.189 %) and sulphur (0.258 %) were recorded under application of 45 kg sulphur ha⁻¹, but it was found at par with 30 kg sulphur ha⁻¹ over application of 15 kg sulphur ha⁻¹. Significantly higher protein (40.70 %) and oil (20.53 %) content in soybean seed were recorded with the application of 45 kg sulphur ha⁻¹ over 15 kg sulphur ha⁻¹. It is concluded that the application of 40 kg phosphorus ha⁻¹ and 30 kg sulphur ha⁻¹ is the suitable dose for obtaining higher nutrient content, uptake and quality of soybean crop. Hence this dose of phosphorus and sulphur is proved as beneficial for good soil health in clay loam soils.

Keywords: Phosphorus, Sulphur, Nutrient, Soil health, Fertilization

LIVESTOCK WASTE UTILIZATION IN INDIA: CURRENT STATUS AND FUTURE PERSPECTIVES**MANOJ BAGHEL¹, MUKESH SINGH¹, AYON TARAFDAR¹, GYANENDRA KUMAR GAUR¹****Livestock Production & Management Section, ICAR – Indian Veterinary Research Institute, Izatnagar, Bareilly, U.P.**

Livestock waste, if left unattended can cause a serious threat to the health of the environment and its inhabitants. Therefore, it is important that the generated waste be dispensed in a responsible and sustainable manner. In the past decade, it has been established that livestock waste serves as a rich reserve of industrially important chemicals and can be utilized as an essential ingredient for the development of various other value-added products. According to the 20th livestock census, the total livestock population of India is 535.78 million, ranking it first in the global livestock population. Due to a large livestock population, India's total dung availability has been estimated at 2600 million tons per annum. This accounts for 6.93% of the gross output from the livestock sector of India. Livestock waste utilization is a new and emerging livestock production industry which utilizes livestock waste for the preparation of soil-rejuvenators (such as compost, vermicompost and slow release fertilizers, etc.), biogas, bioelectricity, biodiesel, biochar, integrated fish farming, cardboard, paper, paint, textiles, pharmaceuticals, Panchgavy, etc. These valuable products have huge potential to generate annual revenues of approximately INR 10.4 trillion, 6592.55 million and 25.9011 trillion from fertilizers, biogas and electricity generation, respectively. In bid to fulfill its long standing promise of doubling farmers' income, the Indian government has launched National Biogas and manure management Programme, Khadi-Pratik paints (khadi and village commission), Gobar Dhan scheme, etc. Among the different livestock waste utilization strategies discussed, the bioenergy and biofertilizer sector has now gained tremendous popularity. Emerging sectors such as the production of biochar, biopaints and pharmaceuticals, among other industrially important products, are now appealing the research community and show potential for future growth of the livestock sector.

INFLUENCE OF WEATHER PARAMETERS ON THE POPULATION DYNAMICS OF MAJOR INSECT PESTS OF BRINJAL AND THEIR NATURAL ENEMIES**MANOJ K. S.,¹ R. VEERANNA^{2*}, BABU P³ AND K. P. GUNDANAVAR⁴**¹M.Sc. (Agri.), Department of Entomology, College of Agriculture, Dharwad, UAS, Dharwad, Karnataka, India^{2,4}Assistant Professor (Entomology), Dept. of Entomology, College of Agriculture, Hanumanamatti, Ranebennur Taluk, Haveri³Professor (Horticulture), Department of Horticulture, College of Agriculture, Hanumanamatti, Ranebennur Taluk, Haveri District,

A field experiment was carried out at MARS, UAS, Dharwad to study the seasonal occurrence of major insect pests of brinjal during *rabi* 2022-23. Observations on per cent shoot and fruit infestation of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee and number of nymphs and adults per three leaves for whitefly, *Bemisia tabaci* (Gennadius): leafhopper, *Amarascabiguttula* (Ishida) and aphids, *Aphis gossypii* Glover were recorded at weekly intervals. The study revealed that the highest infestation of sucking pests such as aphid, whitefly and leafhopper were observed during the 7th, 10th and 11th Standard Meteorological Week (SMW), respectively. Furthermore, the highest occurrence of shoot and borer infestation on shoots was noted in the 9th SMW, while the peak infestation on fruits was observed during the 13th SMW. The peak population of natural predators such as coccinellids and chrysopids occurred in the 10th SMW, while spiders reached their highest population levels during the 11th SMW. The correlation studies indicated that, maximum relative humidity had significant negative correlation with whiteflies, leafhoppers, aphids and per cent shoot damage ($r = -0.604^{**}$, -0.474^* , -0.791^{**} and -0.645^{**} , respectively) and non-significant positive correlation with per cent fruit damage ($r = 0.220$). Maximum temperature showed non-significant positive correlation with whiteflies, leafhoppers, aphids and per cent shoot damage ($r = 0.281$, 0.383 , 0.059 and 0.217 , respectively) and significant positive correlation with per cent fruit damage ($r = 0.841^{**}$). Conversely, rainfall displayed a non-significant negative correlation with whiteflies, leafhoppers, aphids and per cent shoot damage ($r = -0.224$, -0.132 , -0.304 and -0.154 , respectively) and non-significant positive correlation with per cent fruit damage ($r = 0.352$).

Keywords: Brinjal, Seasonal occurrence, Shoot and fruit borer, weather parameters**PROFILE-WISE ENRICHMENT OF METALLIC POLLUTANTS (PB, CR AND CD) IN VARIOUS SEWAGE AND NON-SEWAGE IRRIGATED SOILS OF PRAYAGRAJ****MANOJ KUMAR^{1*}, DINESH MANI², VIPIN SAHU¹, DEVI PRASAD SHUKLA¹, HIMANCHAL VISHWAKARMA¹, JEETENDRA VERMA¹, RUPESH KUMAR OJHA¹ AND SURAJ PATEL¹****1-Research Scholar & 2- Professor, Sheila Dhar Institute of Soil Science (SDISS), Department of Chemistry, University of Allahabad, Prayagraj (U. P.), India**

The study examined the profile-wise enrichment of metallic pollutants (Pb, Cr and Cd) at different sites, i.e., Naini, Draupadi Ghat, Phaphamau and Beligaon in Prayagraj (U.P.), India. The soil samples were collected from different soil profile depths: 0-15, 15-30, 30-45 and 45-60 cm. It was observed that maximum enrichment of Pb, Cr and Cd was found at the (0-15 cm) depth of sewage and non-sewage irrigated soil (5.12 ± 0.42 , 4.08 ± 0.38 and 3.58 ± 0.31 mg kg⁻¹) and (1.58 ± 0.09 , 1.08 ± 0.09 and 1.02 ± 0.08 mg kg⁻¹) and minimum enrichment was found at the (45-60 cm) depth (2.18 , 0.56 and 0.48 mg kg⁻¹) and (0.69 ± 0.04 , 0.56 ± 0.04 and 0.47 ± 0.03 mg kg⁻¹) in Naini, respectively. Maximum enrichment of Pb, Cr and Cd was found at the (0-15 cm) depth of sewage and non-sewage irrigated soil (2.44 ± 0.22 , 2.19 ± 0.14 and 2.08 ± 0.16 mg kg⁻¹) and (1.09 ± 0.07 , 0.97 ± 0.06 and 0.84 ± 0.07 mg kg⁻¹) and minimum enrichment was found at the (45-60 cm) depth (1.01 ± 0.06 , 0.98 ± 0.05 and 0.71 ± 0.06 mg kg⁻¹) and (0.19 ± 0.02 , 0.15 ± 0.01 and 0.11 ± 0.01 mg kg⁻¹) in Beligaon, respectively. To find the maximum enrichment of heavy metals in Naini and the minimum enrichment in Beligaon. The enrichment of metallic pollution decreased with increasing soil depth in both sewage and non-sewage irrigated soils. Metallic contamination in soil can persist for a long time and create serious problems; therefore, proper monitoring of sewage irrigated soils is required to reduce metallic pollution.

Keywords: Enrichment, Sewage irrigated soils, Profile-depths, Metallic pollutants.

PRECISION FARMING: ENHANCING SUSTAINABILITY IN AGRICULTURE**MANOJ KUMAR*¹, SHUBHAM SINGH¹, MOHIT KUMAR PANDEY¹, SUNEEL KUMAR²**¹Ph.D. Scholar, Department of Agricultural Extension and Communication, SVPUAT, Meerut (UP)¹Ph.D. Scholar, Department of Soil Science and Agricultural Chemistry, SVPUAT, Meerut(UP)

Precision farming is like having a super-smart helper on the farm. Precision farming revolutionizes traditional agricultural practices by integrating cutting-edge technology to optimize resource management, boost productivity, and foster sustainability. Through the utilization of advanced tools such as satellite imagery, drones, sensors, and data analytics, farmers gain unprecedented insights into their crops' health, soil conditions, and environmental factors. The wealth of information enables precise decision-making tailored to the specific needs of each field, allowing for targeted interventions that maximize efficiency while minimizing waste. By fine-tuning irrigation schedules, fertilizer applications, and pesticide usage based on real-time data, precision farming not only enhances crop yields but also reduces environmental impact by conserving water, minimizing chemical runoff, and promoting soil health. Adoption of precision farming practices contributes to economic resilience by optimizing input costs and mitigating risks associated with unpredictable weather patterns and market fluctuations. Despite its potential benefits, widespread adoption of precision farming still faces challenges such as access to technology, data privacy concerns, and knowledge gaps. Addressing the barriers and fostering policy support, capacity-building initiatives, and public-private partnerships, stakeholders can unlock the full potential of precision farming to enhance sustainability, profitability, and resilience in agriculture, paving the way for a more sustainable and prosperous future for agricultural systems and the planet.

Keywords: Precision Farming, Technology, Information, Decision Making, Sustainable**STUDIES ON MEDICINAL DIVERSITY AND ETHNO MEDICINAL WEEDS USED BY TRIBAL OF BALRAMPUR, UTTAR PRADESH****MANOJ KUMAR, SANJEET KUMAR****KrishiVigyan Kendra, Ballia (ANDUAT, Kumarganj, Ayodhya) UP, India**

These people have enormous knowledge about the medicinal uses of plants since long. India, as a subcontinent harbour greater number of weeds as compared to any other Country. This due to vast array of ecological habitats, climatic, edaphic and topographical factors. Stated that weed grow in places, where they are not desired. No plant is useless in nature. In fact, weeds are important from the stand point of medicinal, allelopathic and food values (Oudhia and Tripathi, 1999). Most of traditional medicinal herbs usually grow as weed. The world health organization estimated that 80% of the world population still believes in traditional medicine along with folklore system which is based on phytotherapy (WHO2002). The present study revealed that the studied area rich in invasive weeds and ruderals has been variously utilized medicinally by the tharu tribal for their health related problems, particularly for wounds, ulcers, dysentery etc. *Doturastramonium*, *Ecliptaalba* and *Argimonamaxicana* were most popularly utilized wild plants.

Keywords: Ethno medicinal, Latitude, Weeds, Phytotherapy and Tharu Tribal**ORGANIC FARMING PRACTICES AND THEIR APPLICATION IN BRINJAL CULTIVATION*****MANOJ KUMAR AHIRWAR¹, SHUBHAM AHIRWAR², ABHISHEK SHARMA³, PRAGYA UIKEY⁴**¹I/c Senior Scientist and Head, KrishiVigyan Kendra, Damoh Madhya Pradesh^{2,3}Ph.D Scholar, Department of Horticulture, College of Agriculture, Jawaharlal Nehru KrishiVishwaVidyalaya, Jabalpur, Madhya Pradesh⁴Ph.D Scholar, Department of Vegetable Science, OUAT, Bhubaneswar, Odisha

Organic farming is a method of agricultural production that emphasizes the use of natural and sustainable practices to grow crops and raise livestock. Organic farming practices have emerged as sustainable alternatives in modern agriculture, aiming to promote soil health, biodiversity, and human health while reducing reliance on synthetic inputs. This abstract delves into the application of organic farming practices specifically in brinjal (eggplant) cultivation, showcasing examples of successful implementation. Through a synthesis of literature and research findings, the abstract highlights various organic farming techniques such as composting, crop rotation, and biological pest control, tailored to brinjal production. For instance, the use of composted organic matter improves soil structure and fertility, while crop rotation minimizes pest and disease buildup. Study of effects of organic manures on the yield of brinjal and found that the application of mustard oil cake/poultry manure alone gave better performance compared to any chemical fertiliser. Furthermore, examples of natural pest control methods like introducing beneficial insects or using botanical extracts demonstrate effective pest management in organic brinjal farms. Additionally, the abstract discusses the importance of organic certification standards in ensuring product integrity and consumer trust. Organic certifications serve as a robust guarantee of the absence of synthetic pesticides and fertilizers in agricultural practices. To obtain certification, farmers must adhere to strict standards that prohibit the use of synthetic chemicals. By providing concrete examples of organic farming practices and their application in brinjal cultivation, this abstract aims to inspire and guide farmers, researchers, and policymakers in adopting sustainable agriculture practices for improved brinjal production and environmental stewardship.

Keywords: Organic farming, Sustainable agriculture, Human health, Soil health, Organic certification Biodiversity, Brinjal cultivation, Crop rotation, Biological pest control.

EFFECT OF ENVIRONMENTAL FACTORS IN THE HEALTHCARE SYSTEMS**MANOJ KUMAR KALWANIYA¹, DEEPIKA GOKLANEY², MANOHARLAL SAIN² AND UDIT JAIN³****1**Department of Veterinary Public Health & Epidemiology, Arawali Veterinary College, Sikar, Rajasthan, India; **2**Department of Veterinary Public Health & Epidemiology, College of Veterinary and Animal sciences, (RAJUVAS), Bikaner, Rajasthan, India; **3**Department of Veterinary Public Health, DUVASU, Mathura (UP)-281001

The Environmental factors has strongly altered healthcare systems and the economy worldwide. The lack of proper knowledge of these factors has led to the implementation of uncertain strategies and measures to high the pandemic. Here, we review environmental factors that control microbial transmission, such as air, temperature, humidity, food, water and sewage, insects, inanimate surfaces, hand hygiene, and social distancing. The main route of the microorganism transmission from the environment is the respiratory tract through aerosols. Masks and social distancing are effective in ceasing air transmission. Proper cleaning of surfaces and hand disinfection are required, especially in healthcare units. Food should be handled properly, and food handlers should work based on hygienic protocols. Water and sewage transmission, and transmission through insects appear less important than other environmental factors.

Keywords: Environmental factors, Temperature, Humidity, Insects**CHEMICAL SIGNALLING AND RECOGNITION IN PLANTS TO DEVELOP CLIMATE-RESILIENT SMART BREEDING STRATEGIES REGULATING ABIOTIC STRESSES FOR SUSTAINABLE DEVELOPMENT****MANOJ KUMAR SAINI¹ AND HARISH BM²****Department of Genetics and Plant Breeding, Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur 176062 (HP), India****Department of Vegetable Science and Floriculture, Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur 176062 (HP), India**

In recent times, abiotic stresses have posed significant challenges in agriculture, making the development of stress-tolerant crop varieties a laborious task for scientists aiming to create climate-resilient crops for sustainable development. These stresses, such as cold, heat, drought, and salinity, can lead to a substantial decrease in crop yield and biomass, up to 70%, thereby posing a global threat to food security. Plant desiccation, primarily induced by salt, drought, and heat stress, stands as a crucial factor impacting plant growth, development, and productivity. Proteins involved in stress signalling regulation play vital roles in ion and water transport, metabolic activities, and gene expression reprogramming to maintain ionic and water balance and cellular stability under stressful conditions. Certain chemicals act as key mediators in coordinating stress signalling pathways, regulating gene expression, and controlling essential processes like transporter function and biochemical reactions. These chemicals encompass reactive oxygen species (ROS), calcium (Ca²⁺), cyclic nucleotides, polyphosphoinositides, nitric oxide (NO), sugars, abscisic acid (ABA), jasmonates (JA), salicylic acid (SA), polyamines, and other phytohormones that aid in plant physiology adaptation to changing environments by influencing growth, development, nutrient distribution, and source/sink transitions. The integration of genes related to osmoprotectant biosynthesis from one plant to another through genetic engineering represents an innovative strategy that bypasses the time-consuming traditional breeding methods. This approach enhances stress resistance in crops, contributing to agricultural sustainability and ensuring food security for the expanding global population.

INTEGRATED PEST MANAGEMENT PRACTICES IN SERICULTURE SECTOR**MANOJ SINGH BHATI¹, SUNIL KUMAR DHABHAI¹, GAURANG CHHANGANI² AND TARA YADAV²****¹Research Scholar, Department of Entomology, CoA, Agriculture University, Jodhpur (Raj.)****²Assistant Professor, Department of Entomology, CoA, AU, Jodhpur (Raj.)**

Silkworms are reared in sericulture for the purpose to produce raw silk, which is then further processed and used to make textiles. Sericulture is an agro-based business that requires less capital investment and is well suited to small and marginal farm holdings. The production of food plants, the spinning and reeling of silk cocoons to release the silk thread, and their weaving into textile products are the main activities of sericulture. Grasserie is one of the most common diseases in silkworms, and it is responsible for up to 30–40% of output losses. There are numerous scientific methods and labor-intensive laboratory procedures available worldwide to identify diseases in silkworms. In the process of raising silkworms, diseases and pests frequently occur and occasionally result to complete crop loss. Several insect pests, including ants, earwigs, dermestid beetles, and uziflies (*Exoristabombycis* Louis), possess a harmful effect on mulberry silkworms. Mulberry leaf production, which serves as the only source of food for silkworms, and silkworm rearing are the two separate processes involved in the manufacturing of cocoons. Several pests infest both mulberries and silkworms, reducing the yield and quality of the cocoon and losing farmers money. IPM methods that include chemical, biological, and physical controls have been developed and made widely available to manage silkworm and mulberry pests. Managing pest control in relation to overall economic, social, and environmental values is the goal of integrated pest management (IPM).

Keywords: Silkworms, Sericulture, IPM, Insect Pests, Grasserie, Uzifly.

ANTICANCER ACTIVITY OF GREEN SYNTHESIZED SILVER NANOPARTICLES FROM LEAVES OF COLOCASIAESCULENTA**MANOJKUMAR Z. CHOPDA, SANYUJA S. TAKALKAR, SANDHYA C.BOROLE AND NAMRATA G. MAHAJAN****Department of Zoology, M. J. College (Autonomous), Jalgaon, (M.S.) India.**

Cancer is a dangerous disease of uncontrollable cell fission in malignant tumor that invade the normal human body systems. In medical science the methods available to treat a cancer patient mainly includes surgery, chemotherapy and radiotherapy etc. As these known methods are very costly and have side effects with limitations of their use, there is need for effective and acceptable cancer therapeutics agents that would be non-toxic, highly efficacious against multiple cancers, palatable, cost effective. Medical plants have created great interest among researchers as they proved to possess anticancer activity (Gaidhani, 2013) and have no side effects. *Colocasia esculenta* (C. esculenta) is a tropical plant and widely distributed throughout Southern India and Southeast Asia. *Colocasia esculenta* Linn, (Family: Araceae) is an annual herbaceous plant with a long history of usage in traditional medicine in several countries across the world, especially in the tropical and subtropical regions. Nanoparticles of C. esculenta has not been used by any previous researcher for their anticancer activity, so far. This information gave us an impetus to synthesize the silver nanoparticles and evaluate its anticancer activity. Fresh leaves juice of *Colocasia esculenta* (5ml) mixed with 1 ml of Silver nitrate (AgNO₃) solution having concentration 1M for reduction into Ag⁺ ions. Determination of cytotoxicity by MTT assay carried out on Prostate cancer cell line (PC3). IC₅₀ value of Vincristine (standard) is 277.51 ± 30.05 µg/ml and IC₅₀ value of juice of leaves is 28.57 ± 0.0 µg/ml.

Keywords: Anti-prostate cancer activity, *Colocasia esculenta*, Silver Nanoparticles, MTT Assay**PRODUCTIVITY AND ECONOMIC FEASIBILITY OF LINSEED AND BUCKWHEAT INTER CROPPING SYSTEMS DURING RABISEASON****MANOJKUMAR. S¹, R. BASAVARAJAPPA^{2*}, B.S.YENAGI³ AND NAGAPPA B. G.⁴****Department of Agronomy, College of Agriculture, Dharwad****University of Agricultural Sciences, Dharwad, Karnataka, India**

A field experiment was conducted to study the productivity and economic feasibility of linseed and buckwheat intercropping systems during rabi season at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, Karnataka during rabi 2021. The research was laid out in randomized complete block design with three replications consisting of eight treatments under different row ratios. The treatment includes six different row ratios of linseed + buckwheat viz., linseed + buckwheat at 1:1, 2:1, 3:1, 2:2, 4:2 and 4:4 with sole linseed and sole buckwheat. The results indicated that sole buckwheat produced a grain yield that was noticeably higher (5.90 q ha⁻¹). Among the intercropping systems grain yield of buckwheat was higher (3.73 q ha⁻¹) with 2:2 row ratio of linseed + buckwheat which was on par with 2:2 and 4:4 row ratio. The sole linseed treatment produced a much greater grain yield of linseed (7.04 q ha⁻¹) than any of the other treatments. Linseed + buckwheat intercropping systems with 3:1 row ratio yielded significantly greater linseed grain yield (4.93 q ha⁻¹), which was comparable to linseed + buckwheat systems with 4:2 and 2:1 row ratio. There was no significant difference with respect to linseed equivalent yield. Buckwheat equivalent yield was higher (771 kg ha⁻¹) with 2:2 row ratio of linseed + buckwheat. Net returns and B-C ratio was higher (₹ 17920 ha⁻¹ and 1.63) with 2:2 row ratio of linseed + buckwheat which was on par with 4:2, 2:1, 4:2 row ratio and sole linseed.

Keywords: buckwheat, linseed, grain yield, linseed equivalent yield, buckwheat equivalent yield**MIKANIAMICRANTHA LEAF EXTRACT MEDIATED BIOSYNTHESIS OF SILVER NANOPARTICLES FOR ITS EFFICIENT APPLICATIONS IN BIGINELLI REACTION AND ANTIOXIDANT CAPACITY****MANTHA C. PHOM¹, TOVISHE PHUCHO¹****¹Department of Chemistry, Nagaland University, Lumami –India**

The current study focuses on the environmentally friendly green synthesis and characterization of silver nanoparticles (AgNPs), utilizing an aqueous extract of *Mikania micrantha*. A thorough analysis was conducted to determine the effects of several operational parameters on the synthesis of AgNPs, including temperature, contact duration, pH solution, and dosage of leaf extract. The results showed that the ideal conditions for nanoparticle production are 5% v/v *Mikania micrantha* leaf extract, pH value 9.0, temperature 80°C, and reaction incubation duration of 60 minutes. The synthesized AgNPs were examined using UV-Vis, FT-IR, X-ray diffraction (XRD), TEM, and SEM/EDX. The FT-IR study proved that phytochemicals were used in the AgNPs production process and its spherical morphologies with average particle sizes of 25 nm were apparent in the TEM images. The face-centered cubic structure of AgNPs was validated by the XRD spectrum. Silver nanoparticles were revealed as a greener heterogeneous catalytic proficiency for acid-free benign conditions of Biginelli reactions and at a high yield. Moreover, DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical antioxidant capacity was used to assess the biological efficiency.

Keywords: *Mikania micrantha*, AgNPs, Green synthesis, Biginelli reaction, Antioxidant capacity

IMPACT OF M.S.P. IN INDIAN AGRICULTURAL FARMING AND FARMERS INCOME & ECONOMY**MANVAR V.S.¹, HIWARALE A.S.² AND GOHADE G.R.³**¹Assistant Professor, Department of Community Extension and Communication Management, College of Community Science, V.N.M.K.V., Parbhani^{2,3}Ph.D. Scholar, Department of Agricultural Extension Education, V.N.M.K.V., Parbhani

The Minimum Support Price (MSP) mechanism plays a crucial role in Indian agricultural farming, farmers' income, and the overall economy. MSP serves as a price floor set by the government to protect farmers from market fluctuations and ensure them a minimum level of income for their produce. The impact of MSP on Indian agriculture and the economy is multifaceted. Firstly, MSP provides farmers with price stability and income security, thereby incentivizing agricultural production. By assuring farmers of a minimum price for their crops, MSP encourages them to invest in inputs, adopt modern farming techniques, and increase productivity. This leads to higher agricultural output, contributing to food security and economic growth. Secondly, MSP influences farmers' income levels by providing them with a guaranteed minimum income for their produce. This stability in income helps alleviate poverty, reduce rural-urban migration, and improve living standards in rural areas. Moreover, higher incomes among farmers stimulate rural consumption, which in turn boosts demand for goods and services, thereby driving economic growth. Critics argue that MSP distorts market prices, leading to inefficiencies in resource allocation and disincentivizing private sector investment in agriculture. Additionally, the implementation of MSP has been uneven across regions and crops, leading to disparities in benefits among farmers. Moreover, the rising cost of MSP procurement and storage poses fiscal challenges for the government. Despite these challenges, MSP remains a critical policy tool for supporting farmers and ensuring agricultural sustainability in India. Efforts to reform and strengthen the MSP mechanism, such as increasing procurement efficiency, diversifying crops covered under MSP, and promoting value addition, can further enhance its positive impact on Indian agriculture and the economy. In conclusion, MSP plays a significant role in Indian agricultural farming by providing price stability, income security, and economic stimulus to farmers and the overall economy.

Keywords: MSP, Economy, Farmers income, Agricultural Farming.**APPLICATION OF PRECISION TECHNIQUE IN CHICKPEA CULTIVATION WITH EXPERIMENT MODE – FARMERS FIELD**¹MARADDI G. N., ²HIEMATH G. M. & ³PATIL S.L.¹Professor & Nodal officer (RAWE), Department of Agricultural Extension²Associate Professor, Department of Agribusiness Management,³Professor of Agricultural Extension & Head, ARS, Gadag

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The Research study was conducted in order to assess the performance technologies through experiment mode with participatory approach. The extension methodology of Result demonstration is being used to execute the implementation of seed to seed technologies with willingness of contact farmers to share 0.25gunt plot to conduct Result demonstration on Chickpea. The standardized schedule used to investigate the information from farmers. Sphersmans simple correlation test was used to know the relationship between selected variables. Chickpea (*cicer arietinum* L.) is one of the important pulse of the country & globe. Chickpea belongs to the genus cicer under leguminoseae family. Which is a protein-rich (20.00-22.00%) supplement to cereal based diets, especially to the poor in developing countries, where people cannot afford animal protein. The pulse protein are rich in lysine and have low sulphur containing amino acids. It offers the most practical means of eradicating protein malnutrition among vegetarian children and nursing mothers. It was observed that enrichment of knowledge & skills of student & contact farmer is being noticed in application of technologies like seed treatment with Bio-agent, optimum spacing, nutrient management, pest & disease management. The dibbling method is being used, which facilitates proper spacing along with above technological interventions noticed encouraging results are compare to conventional practice of higher seed rate at farmers' field. This really helps for higher resource use efficiency & Marginal return. It was also observed that 29 per cent of higher productivity gained compare to farmers cultivation coupled with lesser cost is being incurred in operational management along with pest management.

Keywords: Precision technique, Result Demonstration & Experiment mode**HARNESSING DNA FINGERPRINTING FOR CROP IMPROVEMENT AND TRACEABILITY****MARRI KEERTHANA^{1*}, SHASHANK D. U.¹, PRIYA¹ & RISHABH KUMAR²**¹Department of Entomology, PGCA, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India²Department of Entomology, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

In the realm of agriculture and crop science, DNA fingerprinting has emerged as a powerful tool for genetic characterization, varietal identification, and traceability. This molecular technique exploits the unique DNA profiles of crop varieties, enabling a comprehensive assessment of genetic diversity, purity, and authenticity. DNA fingerprinting in crops relies on analyzing specific genomic regions that exhibit high variability between cultivars or accessions. By examining these variable markers, such as microsatellites or single nucleotide polymorphisms (SNPs), distinct DNA profiles are generated, serving as molecular fingerprints for each crop variety. The assessment of DNA fingerprinting in crops encompasses various applications, including germplasm characterization, variety registration, seed purity testing, and traceability systems. It plays a pivotal role in plant breeding programs, facilitating the identification of desirable traits and the development of improved crop varieties. Additionally, it aids in monitoring genetic erosion, protecting plant breeder's rights, and preventing seed

adulteration. However, the implementation of DNA fingerprinting in crops requires careful consideration of factors such as marker selection, analytical protocols, and data interpretation. Standardized procedures and robust databases are essential for accurate and reliable results. As the demand for sustainable agriculture and food traceability increases, DNA fingerprinting offers a powerful tool for crop improvement, quality control, and supply chain transparency. By assessing its potential and challenges, this technique can contribute to enhancing crop productivity, ensuring genetic purity, and promoting agricultural sustainability.

Keywords: Genetic Diversity, Microsatellites, Single Nucleotide Polymorphisms (SNPs), Genetic Erosion

WASTE MANAGEMENT: ALTERNATIVE WAYS TO PROTECT ENVIRONMENT

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“Nothing in this World is waste”-A Japanese Philosophy. Waste can be defined as the material that are not prime products, and for the initial user, it has no further use in terms of his/her own purpose of production, transformation or consumption and the user wants to dispose it off. Wastes may be generated during the extraction of raw material, the processing of raw materials into intermediate and final products, the consumption of final products and other human activities. In nut shell, waste is the term used for unwanted materials. For example -municipal waste, waste water, waste milk in temples, radioactive waste, industrial waste etc. All types of waste can be broadly divided into two groups, i.e. dry waste and wet waste. Infact the impact of waste in our life is manifold. It affects our environmental, social and economical life, so there is a need to educate people and create awareness in society so that waste management can be done effectively, and we can make this world a beautiful and better place to live in.

Keywords: Waste management, Environment, Human activities and Waste water.

SOIL AND WATER CONSERVATION & IRRIGATION

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Soil and water conservation, along with efficient irrigation practices, are critical components of sustainable agriculture, ensuring the long-term viability of food production while minimizing environmental impact. Conservation methods focus on preserving soil health and preventing erosion, while irrigation techniques aim to optimize water usage and distribution. Conservation practices such as terracing, contour plowing, and cover cropping help to mitigate soil erosion, which is a significant threat to agricultural productivity. Terracing involves constructing leveled platforms on hilly terrain to slow down water runoff and prevent soil erosion. Contour plowing follows the natural contours of the land, reducing the speed of water flow and minimizing erosion. Cover cropping involves planting vegetation during fallow periods to protect soil from erosion, enhance fertility, and improve water retention. Additionally, crop rotation and conservation tillage practices help maintain soil health and structure, reducing erosion and enhancing nutrient cycling. By alternating crops and minimizing soil disturbance during planting, farmers can preserve soil integrity and promote sustainable agricultural practices. Efficient irrigation techniques play a crucial role in water conservation and crop productivity. Traditional methods such as surface irrigation and sprinkler systems have been widely used but are often associated with water wastage due to evaporation and runoff. In contrast, modern irrigation methods like drip and subsurface irrigation deliver water directly to the root zone, minimizing losses and maximizing water use efficiency. Drip irrigation, in particular, is highly efficient, reducing water usage by delivering precise amounts of water directly to the plant roots. Combining soil conservation practices with efficient irrigation techniques allows farmers to optimize crop yields while minimizing environmental degradation. These sustainable approaches not only ensure food security but also contribute to the preservation of natural resources and the mitigation of climate change impacts on agriculture. As global populations continue to grow, the adoption of these practices becomes increasingly essential for the future of farming and food production.

Keyword: Soil, Water, Erosion, Irrigation

ENHANCING FOOD PROCESSING AND VALUE-ADDITION IN HORTICULTURAL CROPS

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Horticulture is one of the fastest-growing sectors of agriculture in India. Horticultural crops give more income and employment per unit area than field crops. Horticultural crops have a vast scope of value-addition which not only provides additional employment to families but also to landless households. Value-addition in horticultural crops is the process of enhancing the shelf-life of horticultural produce and turning them into value-added eco-friendly products for improving the economic value by deriving changes in genetics and through processing as well as using innovative methods (Mebakerlin *et al*, 2015). Fruits, vegetables and flowers being highly perishable make it challenging to promote in the market following inadequate post-harvest management for the growers. Mango seed kernel (a by-product of processed mango) can be used to generate innumerable value, great-quality products including mango kernel oils, butter, flour, biodegradable films and bakery products. Tomato can be processed into pulp, paste, puree, juice, ketchup and sauce. Potatoes with high dry matter (more

than 20%) are preferred for potato chips, French fries, and dehydrated products, whereas, those with low dry matter content are best for canning. In flower crops, fresh flower products, dried flower products and processed flower products. Marigold is a rich source of carotenoids like lutein which have antioxidant properties and also intake of lutein helps in curing age-related macular diseases. It's commercially used in food colouring industries and poultry feed has been shown to increase egg yolk color as well as decrease egg cholesterol levels. Chrysanthemum petals can be used as substitute for synthetic dyes for dyeing cotton and silk fabrics (Das *et al.*, 2016).

Keyword: Canning, Dyeing, Horticulture, Processing, and Value-addition.

CONSERVATION AGRICULTURE AND ITS IMPACT ON SOIL HEALTH AND CROP PRODUCTION

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Degradation of land due to continuous erosion by water, wind, intensive monocropping systems and bare soil surface have impoverished the soil, resulted in declined soil fertility, stress bearing capacity and crop productivity. Hence, more concentration was focused to develop sustainable agriculture production systems for efficient soil and natural resource management without affecting the environment. Conservation agriculture has emerged as an effective strategy to achieve goals of sustainable agriculture worldwide. It has the potential to address increasing concerns of serious and widespread problems of natural resource degradation and environmental pollution, while enhancing system productivity. It seeks to conserve, improve and make more efficient use of natural resources through integrated management of soil, water, crops and other biological resources in combination with selected external inputs like fertilizers and organic manures. Such a technological package which is resource conserving and contributes for better environment and at the same time enhances production on sustainable basis. Conservation agriculture is based on the three principles mainly minimum soil disturbance, maintenance of crop residues on the soil surface and crop diversification. Other elements of conservation agriculture include improved on-farm rain water management, organic soil cover, direct seeding through the crop residues and appropriate crop rotations to avoid disease and pest problems. When crop residues are retained on the soil surface in combination with no tillage or reduced tillage, it initiates processes that lead to improved soil quality and overall resource enhancement through greater ecological services.

Keywords: Agriculture Conservation, soil health and crop production

EFFECT OF BIOTIC AND ABIOTIC STRESS ON CHICKPEA CROP AND THEIR MANAGEMENT

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Where the live present, there must be present disease. A plant disease is an abnormality in the structure or function of the host plant cells and tissue as a result of a continuous irritation caused by a pathogenic agent or an environmental factor. Mainly plants are affected by two factors Biotic & abiotic. The biotic factors are referred to living organisms such as bacteria, virus, fungi, nematode etc. And abiotic factors are referred to non-living things such as temperature, moisture, minerals, wind flow, polluted air etc. Chickpea crop affected by various type of fungal bacterial and viral diseases, and also affected by abiotic factors like temperature and soil moisture. Dry root rot disease in chickpea enhances due to high temperature and low soil moisture. Abiotic affect the productivity of agricultural crops as well as the microbial activity in soil. Extreme conditions such as prolonged drought, intense rains flooding, high temperature, frost and low temperature, which are expected to intensify in the future due to climate changes, will significantly affect plants and soil microorganisms. Plant physiological disorder also an abiotic factor, range from suitable symptoms not visibly apparent to severely stunted and malformed growth. In some cases, the effect can be severe enough to limit the effective use of controlled environment facilities for research and commercial production of some species. The solution for manage biotic stress for the plant to have an internal defense mechanism that can be activated at the minute sign of danger. This defense mechanism becomes a part of the plant's genetic configuration. The climatic factors of a region decide what type of biotic stress the crop plant might have to face.

Keywords: Biotic, abiotic, climate, chickpea, dry root rot etc.

TO STUDY THE EFFECT OF NOISE POLLUTION AT DIFFERENT LOCATION IN ALIGARH CITY UTTAR PRADESH

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The word noise is known as "wrong sound in wrong place at the wrong time" so the noise pollution is one of the most major concerned in some countries. In recent year the environmental pollution are very critical due to use of more and more different technology. Because of these higher exposed to noise level can cause feeling of annoyance, irritation, damage to metabolism, number of health related problems like physiological disorders psychological disorders, disturbance in different field of the life, so many diseases coming now a days, High level of noise expose is cause deafness temporary hearing problem, hypertension heart disease etc. During this study the people of Aligarh district reported that traffic noise is main cause of headache, high BP and heart problems. Present study was carried out three different places with Sound Level Metre to study the noise level. This study revealed the fact that noise levels have reached an alarming level. It was observed that in selected areas the level of noise was observed to be above prescribed noise standard level of Central Pollution Control Board. It was also

noted that during the study period these selected areas with high traffic conditions, narrow roads, heavy constructional activity due to development of smart City by State government policy, and number of running factories on road sides are vulnerable to high levels. The maximum noise level was noted 98.5 dB in railway road market at 1500hrs, while the minimum noise level was noted 45.9 dB in AMU campus Aligarh at 2400hrs.

ROSE LEAVES DISEASES PREDICTION USING MACHINE LEARNING TECHNIQUE

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Rose plants may have a wide range of illnesses, some of which will stunt their development and others that can kill them outright. The only way to effectively treat and stop the spread of these diseases is to find them early and diagnose them thoroughly. The use of machine learning for agricultural disease prediction and detection has demonstrated encouraging outcomes in the last several years. A prediction model for the classification of common illnesses affecting rose leaves using machine learning techniques is the goal of this project. Powdery mildew, black spot, and rust are some of the diseases that can harm rose leaves. The suggested model uses a dataset that includes both healthy and diseased leaves. To improve the dataset's quality and variety, image pre-processing procedures including resizing, standardisation, and augmentation are used. To begin, we use feature extraction methods to extract useful information from the photos. Then, we use tools like principal component analysis (PCA) or feature importance analysis to choose the best features. K-Mean clustering and support vector machines (SVM) are only two of the many machine learning approaches that get insight from the processed information. Measures of performance including F1 score, recall, accuracy, and precision are used to assess the models' efficacy in illness prediction. The experimental findings demonstrate that the proposed technique successfully predicts the presence of various illnesses in rose leaves. An agricultural system or an easy-to-use software can use the proposed prediction model to detect rose leaf illnesses early and monitor them in real-time. Timely management methods may be implemented to avoid crop losses and promote sustainable rose production practices.

Keywords: Machine Learning, K-Mean clustering, Feature Extension, SVM.

SPACING AND NUTRITION REQUIREMENT TO MAXIMIZE THE GROWTH AND SEED YIELD OF HEMP

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An experiment was carried out at the College of Horticulture, UHS Campus, Bangalore, during *kharif* season of 2019-20 to investigate the spacing and nutrition requirement to maximize the growth and seed yield of hemp. Twenty-four treatments with two replications were adopted in a factorial randomized complete block design involving six spacings (10 cm × 5 cm, 10 cm × 10 cm, 15 cm × 5 cm, 15 cm × 10 cm, 20 cm × 5 cm and 20 cm × 10 cm) each combined with four nutrition levels (75 per cent RDF with PGPR consortia, 100 per cent RDF with PGPR consortia, 125 per cent RDF with PGPR consortia and 100 per cent RDF). Among the spacings, at harvest plants spaced at 20 cm × 10 cm recorded highest plant height (215.08 cm), stem diameter (15.52 mm), number of branches (19.05 plant⁻¹) and seed yield (40.83 g plant⁻¹). However, it accommodated less number of plants per unit area leading to less seed yield from hectare hence, spacing of 10 cm × 10 cm was best in obtaining maximum seed yield (61.10 q ha⁻¹). Among the nutrition, plants supplemented with 10 tonnes FYM and supplied with 125 per cent RDF (250:125:250 kg NPK ha⁻¹) plus PGPR consortia (5 g m⁻²) resulted in maximum and seed yield (68.28 q ha⁻¹). The same is also followed in interactions effects, where plants grown in treatment combination of 10 cm × 10 cm spacing and applied with 250:125:250 kg NPK ha⁻¹ plus PGPR consortia recorded maximum seed yield (83.88 q ha⁻¹).

EXPLORING THE RICHNESS OF FISH DIVERSITY IN THE HIMALAYAN REGION: A COMPREHENSIVE REVIEW

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The Himalayan region, famous for its grandiose summits and varied ecosystems, contains a wonderful assortment of water organisms, specifically fish species. This report presents a detailed summary of the fish diversity in the Himalayan region, emphasising its ecological importance, difficulties, and possibilities for conservation. The Himalayan region consists of a wide range of environments, including high-altitude Rivers and subtropical streams, which are home to a distinct variety of fish species. These aquatic ecosystems play a crucial role by providing essential water resources for a large population and supporting a wide range of plant and animal species. The fish fauna in the Himalayan region is known for its high biodiversity and the presence of many species that are unique to this area. These species have evolved to thrive in distinct ecological niches. Nevertheless, this region of high biodiversity is currently experiencing unparalleled dangers as a result of human activities, such as the deterioration of habitats, pollution, over exploitation, and climate change. These factors have caused the decrease of numerous fish species, disturbed the fragile equilibrium of aquatic ecosystems and endangered the livelihoods of local communities reliant on fishing. Conservation efforts are currently being made in the Himalayan region to preserve fish diversity. These efforts include tactics such as restoring habitats, creating protected areas, and implementing community-based conservation projects. Furthermore, research efforts focused on comprehending the ecological needs and conservation status of fish species are crucial for making well-informed management choices. Ultimately, the fish variety found in the Himalayan region is a significant natural asset that needs immediate attention and collaborative conservation endeavours. By protecting these aquatic habitats and their inhabitants, we can guarantee the durability and long-term viability of this ecologically crucial region for future generations.

Keywords: Fish Biodiversity, Endemic Fish Species, Freshwater Ecosystems, Himalayan Region, Conservation Status

A REVIEW ON CARBON NANOTUBES AS VERSATILE ELECTRODE MATERIALS FOR ADVANCED ENERGY STORAGE DEVICES**MEHAK PARASHAR, D.BANERJEE****Thin Film and Nano Technology Laboratory, Faculty of Engineering, TeerthankerMahaveer University, Moradabad, U.P.**

Carbon nanotubes (CNTs) possess unique qualities such as high surface area, remarkable mechanical strength, and outstanding electrical conductivity, which have made them attractive candidates for use as electrode materials in energy storage devices. Keeping this mind this work has represented an extensive review of the use of carbon nanotubes as electrode materials for the development of energy storage devices mainly in form of supercapacitor. The current work recalls the different physical as well as chemical top-down and bottom-up technique of synthesizing CNT and how with synthesis condition the morphology as well as different basic properties of CNTs get changed. The synthesis techniques include laser ablation, arc discharge, and chemical vapor deposition, solid state reaction, spray pyrolysis and many others. The work also serves as an authentic literature regarding the use of CNT as supercapacitor materials and shows how suitable modifications of pure CNTs like doping, functionalization, composite formation etc. can drastically enhance the charge storage parameters such as specific capacitance, energy density, power density, capacitive retention etc. and other. It clarifies how CNTs function inside the electrolyte matrix as ion channels and conductive pathways that promote effective charge transfer and quick ion diffusion. In addition, the effect of surface area and porosity on charge storage performance has also been reviewed. Galvanostatic charge-discharge characteristics as well as EIS spectra/Nyquist plot are another major topic of discussion of the current work. CNT-based electrode with other materials in order to improve their capacitance, ion selectivity, and long-term stability. Concerns around environmental sustainability, cost-effectiveness, and scalability related to the large-scale manufacturing of CNT-based electrodes are also covered.

Keywords: Carbon nanotubes, Super capacitors, Electrolyte film, energy storage devices.**AN EFFORT TO USE SOLAR ENERGY TO FABRICATE COOLER BOX FOR FISH PRESERVATION – A GREEN RESOURCE MANAGEMENT****MEHEDI MIM*, OLIPRIYA BISWAS, N A TALWAR, B GIRI, A ANKURIA****Fishery Engineering, Faculty of Fishery Sciences, Wbuafs, Chakgaria, Panchasayar, Kol**

Refrigerated fish preservation is commonly used across the world; nevertheless, in many regions, unsteady power supplies provide significant challenges to refrigeration energy. Solar energy provides a feasible option in such areas, with solar thermoelectric refrigeration emerging as a complimentary solution to vapour compression freezers. Unlike previous techniques, it does not use liquid refrigerants, requires little electricity, and is portable, durable, and quick thermal response. Ideal for outdoor usage with solar cells, it is used in mini-refrigerators to store perishable item, fish product and vaccinations in distant areas. The increasing demand for solar thermal refrigeration, driven by the need to preserve perishable items in areas with intermittent power supply, underscores its importance. This eco friendly way of cooling and preservation is gaining popularity, with possible applications including marine fish harvesting and sale, particularly for sellers in off-grid coastal locations. This innovative solution to portable solar cooling offers great prospects in the fish business, meeting the demands of market vendors and shore-based fish-product dealers in remote areas.

EXPLORING RICE DIVERSITY IN NAGALAND: ASSESSING ADAPTABILITY TO CHANGING CLIMATE CONDITIONS**MERENTOSHI^{1*}, RANJAN DAS², SANGITA DAS² AND PRAKASH KALITA²**¹**Department of Genetics and Plant Breeding, School of Agricultural Sciences, Nagaland University, Medziphema, Nagaland**²**Department of Crop Physiology, Assam Agricultural University, Jorhat, Assam, India**

A study was conducted to assess the performance of rice genotypes from Nagaland under different CO₂ and temperature conditions in the Department of Crop Physiology, AAU, Jorhat-13, Assam. Utilizing fully automated bioreactors, three treatments were established: a control/field condition, elevated CO₂ with increased temperature and higher CO₂ with even higher temperature. Initial screening of 75 genotypes identified seven for further study, comparing them with the national check variety N22. Treatment II, with elevated CO₂ and moderate temperature increase, showed positive effects on various morpho-physiological parameters across all genotypes. However, Treatment III, with both high CO₂ and high temperature, resulted in detrimental effects on these parameters. Photosynthesis and related parameters were significantly affected under both treatments compared to field conditions, impacting growth efficiency and yield. Notably, Kohima Special and N22 demonstrated superior tolerance, maintaining higher plant water status and showing increased levels of compatible solutes like proline. Molecular analysis using SCoT markers revealed significant polymorphism among genotypes. Yield parameters such as 1000-grain weight, spikelets per panicle, and total grain weight per plant were significantly higher under Treatment II due to maintained photosynthetic rates and superior defense mechanisms, while they decreased under Treatment III due to negative influences on all processes. Overall, the study underscores the importance of understanding rice genotype responses to changing climate conditions for effective crop management and breeding strategies in Nagaland.

Keywords: Climate change, Elevated carbon dioxide, High temperature, rice, tolerance index.

EVALUATING DIFFERENT AMOUNTS OF NUTRIENTS SUITABLE FOR DIFFERENT GREENGRAM [*VIGNA RADIATA*(L.)] VARIETIES CULTIVATION TO OPTIMIZE AND CONSERVE FERTILIZER NUTRIENTS FOR HIGHER GROWTH & YIELD

UNDER INDIAN AGRO-CLIMATIC CONDITIONS

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Greengram [*Vignaradiata*(L.)] is the most important and extensively grown crop in India. It fits well in our existing crop rotation and can be grown twice a year, both in the spring and autumn seasons, in irrigated and rainfed areas (Ahmad *et al.*, 2003). It is a good source of carbohydrates (60-62%), proteins (20-24%), fibers (4.0%), fats (1.0%), riboflavin, thiamine, and vitamins C (Ascorbic acid) (Source: Wikipedia, 2022) but deficient in methionine and cysteine. Due to its unique property of atmospheric nitrogen fixation, it also plays a crucial role in maintaining a balance of nutrients inside the soil profile through its symbiotic relationship with *rhizobium*. An experiment was conducted at the University Research Farm, Banda University of Agriculture and Technology, Banda (U.P.) during Kharif 2022. The main aim of this experiment is to find out the best-performing greengram variety, the most suitable dose of fertilizer and to know that their interaction can lead to the conservation and optimization of resources. The observation was taken among growth attributes viz., Plant height (cm), plant dry matter (g plant⁻¹), number of branches (plant⁻¹), LAI and yield attributing parameters viz., Number of pods (plant⁻¹), length of pods (cm), test weight (g), straw yield (q ha⁻¹) and biological yield (qha⁻¹). Economically, 100% recommended dose of fertilizer of NPK was significantly higher in gross return, net return and B:C ratio. Based on the experimental observations, it was concluded that farmers can cultivate greengram variety "IPM 02-3" with 100% (25:50:30 NPK Kg ha⁻¹) recommended dose of fertilizer for achieving maximum growth, yield and economical benefits which overall helps in achieving nutrient conservation.

Keywords: *Rhizobium*, Greengram, Conservation, IPM 02-3 etc.

STUDY ON LONAR CRATER THE UNIQUE ECOSYSTEM

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The Lonar Crater the unique name among the world's largest crater ever and the peculiarity about this world famous Lonar crater are diversified with respect to its origin and existence of life in and around periphery. The prime intention of this investigation is to bring attentions of investigators about Lonar crater as it is the great "House of Knowledge and wealth treasury". It is the only Crater where unique flora and fauna can be observed because of high salinity lovers only, During this particular investigation recent change of water body in to pink color due to high growth of haloarchae pink color pigmented bacteria were found and also toxicity is studied which shows uniqueness about the ecosystem itself.

Keywords: Toxicity, Lonar Crater, "House of Knowledge and wealth treasury"

ASSESSMENT OF MOISTURE, ASH, AND CRUDE OIL IN RAINBOW TROUT: IMPLICATIONS FOR DIETARY PROFILE

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Rainbow trout is an excellent source of high-quality protein, containing all essential amino acids necessary for human health. It serves as a complete protein source, aiding in tissue repair, muscle development, and overall growth, besides being rich in various vitamins and minerals essential for maintaining optimal health. The study utilized well-established analytical techniques to accurately measure the moisture, ash, and crude oil levels in Rainbow trout. Moisture content was determined through a drying process, ash content by incineration, and crude oil content through Soxhlet extraction. The findings revealed significant variations in moisture, ash, and crude oil content among the sampled Rainbow trout populations, with moisture content being 76.7%, ash content being 5.6%, and crude oil content, crucial for assessing the lipid profile, being 8%. This comprehensive analysis provides valuable insights into the nutritional composition and quality characteristics of Rainbow trout. The results emphasize the significance of examining various factors in evaluating the nutritional worth of aquaculture items, aiding informed choices for stakeholders within the seafood sector. Therefore, this study is crucial for enhancing aquaculture methods, guiding dietary suggestions, and raising awareness among consumers about the health advantages linked with consuming Rainbow trout.

Keywords: Rainbow trout, Nutritional composition, Moisture content, ash content, crude oil

IMPACT OF MODIFIERS ON ALKALOID BIOSYNTHESIS & STRESS TOLERANCE IN MEDICINAL PLANTS: UNVEILING THE EPIGENETIC REGULATION**MINI DEVI AND * NIDARSHANA CHATURVEDI PARASHAR****Department of Biosciences and Technology****Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala (Haryana) India**

The study's exploration into the intricate relationship between epigenetic regulators and alkaloid production in *Tinospora cordifolia* and *Catharanthus roseus* delves deeply into the mechanisms of epigenetic regulation. Through comprehensive analyses of DNA methylation, histone modifications, and small RNA-mediated gene regulation in *Tinospora cordifolia*, the research aims to uncover pivotal modifiers influencing alkaloid synthesis, offering insights for finely tuning its genomic and epigenomic landscape with precision. Simultaneously, investigations into *Catharanthus roseus* aim to decode how epigenetic regulators influence alkaloid biosynthesis under environmental stresses, such as those encountered during cultivation. By conducting controlled stress experiments and physiological assessments, the research endeavors to untangle the intricate mechanisms governing stress resilience and the production of bioactive compounds in *Catharanthus roseus*. The integration of findings from both plant species fosters a comparative framework, enhancing our understanding of shared and distinct epigenetic regulatory patterns in medicinal plants. Understanding the epigenetic factors influencing alkaloid biosynthesis could lead to the development of strategies to optimize the yield of specific alkaloids. This has practical implications for industries involved in the production of pharmaceuticals from these plants. Additionally, understanding the epigenetic regulation of alkaloid biosynthesis may have implications for sustainable agriculture. It could lead to the development of cultivation practices that optimize alkaloid production in a way that is environmentally friendly and economically viable. These expected results unveil fresh perspectives on how alkaloid biosynthesis can be fine-tuned through epigenetic mechanisms, laying the groundwork for precise interventions in plant-based medicine. Such insights transcend academic boundaries, bearing relevance for sustainable farming practices and pharmaceutical innovation. Harnessing the potential of epigenetic regulation in medicinal plants presents opportunities to engineer genetically optimized strains with amplified production of bioactive compounds. Ultimately, this research drive propels forward the field of precision medicine, offering tailored solutions across healthcare and agriculture, where the combined influence of genetic and epigenetic modulation promises revolutionary outcomes.

Keywords: Epigenetic regulators, Alkaloid production, Stress resilience, pharmaceutical innovation, Controlled stress experiments, Genetic engineering

UTILIZING ZINC OXIDE NANOPARTICLES DERIVED FROM WALNUTS: A SUSTAINABLE STRATEGY TO COMBAT THE DISEASE COMBINATION OF *MELOIDOGYNEARENARIA* AND *MACROPHOMINAPHASEOLINA* IN COWPEA**MIR AKHTAR HUSSAIN, GHAZALA PARVEEN,****Department of Botany, Aligarh Muslim University, Aligarh, India**

The development of biosynthesized nanoparticles for effective management of plant diseases is a game changer in agriculture. This study focused on the nematocidal and antifungal capabilities of walnut leaf-based biosynthesized Copper oxide nanoparticles (CuO NPs) as sustainable choices for farmers while minimizing their environmental footprint. Due to their unique structure and properties, Copper oxide nanoparticles exhibit diverse applications, including antimicrobial, UV-blocking, and catalytic properties. The biosynthesized CuO NPs were characterized and applied to mitigate the impact of simultaneous infection by *Meloidogyne arenaria* (root-knot nematode) and *Macrophomina phaseolina* (root-rot fungus) in cowpea plants. The characterization of CuO NPs was carried out through various analytical techniques, including UV-visible spectrophotometry, powder-X ray diffraction analysis (XRD), Fourier-transform infrared spectroscopy (FT-IR), and scanning electron microscopy (SEM) with energy dispersive X-ray analysis (EDX). The study confirmed the successful synthesis of CuO NPs with a hexagonal wurtzite structure and exceptional purity. During in vitro treatment, CuO NPs showed significant nematocidal and antifungal action. The mortality rate of *M. arenaria* juveniles and mycelial growth inhibition of *M. phaseolina* increased with rising CuO NP concentration. SEM studies revealed physical damage to nematodes and structural distortions in fungal hyphae due to CuO NP treatment. In infected cowpea plants, CuO NPs significantly improved plant growth parameters, including plant length, fresh mass, and dry mass, especially at higher concentrations (80 mgL⁻¹ and above). Leghemoglobin content and the number of root nodules also increased after CuO NP treatment. Additionally, CuO NPs reduced gall formation and egg mass production by *M. arenaria* nematodes and effectively inhibited the growth of *M. phaseolina* in the roots. Furthermore, histochemical analyses demonstrated a reduction in oxidative stress, as indicated by decreased reactive oxygen species (ROS) and lipid peroxidation levels in CuO NP-treated plants. These findings highlight the potential of green-synthesized CuO NPs to manage disease complex in cowpea caused by simultaneous nematode and fungal infections.

Keywords: Nanoparticles, Sustainable agriculture, Root-knot nematode, Root-rot fungus, CuO

FIRST REPORTING OF HAMMER HEADED WORMS IN CHITTORGARH DISTRICT, SOUTH RAJASTHAN WITH SPECIAL REFERENCE TO TETRODOTOXIN BEING FATAL FOR HUMAN

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World's deadly invasive species are spreading in the district, increasing problem for environment and health. One of the adverse consequences of globalization is the unintentional spread of foreign invasive plant and animal species, which is the second biggest threat to biodiversity and is slowly taking its toll on local species. Land flatworms have invaded the entire world, primarily through plant trade. Chittorgarh district is also not untouched by this effect. Out of the world's 100 deadliest alien species declared by the IUCN, 26 plant and 4 animal species are being seen in dire straits in Chittorgarh district. Hammerhead worms are spreading in Chittorgarh district which is a serious problem for soil biodiversity and ecology. Originating in Southeast Asia, the hammerhead probably entered India along with landscaping materials, plants imported from Southeast Asia in the early 20th century. It is a terrestrial flatworm, which is usually metallic black in color and has a linear body. This insect gets its name because of its shape. The shape of its head is like a hammer. Its main diet is earthworms but along with it it also eats other invertebrates living in the soil. Earthworms are considered environmentally friendly, as they are beneficial for soil health. It is because of these that the healthy growth and development of trees and plants occurs very fast. The entire ecosystem depends on plants. If hammerheads keep eating earthworms, the food chain will be affected. By eating earthworms, hammerhead flatworms can reduce soil quality. Experts say that without earthworms, plants, crops and trees would not be able to get the nutrients they need to grow healthily. This is how hammerheads hunt earthworms: It is horrifying how hammerhead worms convert their prey into a liquid and drink it. Hammerheads start releasing a sticky liquid called near their prey i.e. earthworms. It is caused by a chemical known as tetrodotoxin. When hammerheads release this chemical, earthworms stick to them, after which the hammerheads catch their prey.

Keywords: Environment , health, hammer headed worm , Invasive species, tetrodotoxin. .

CORRELATION COEFFICIENTS AND PATH ANALYSIS FOR GRAIN YIELD AND YIELD CONTRIBUTING TRAITS IN BROWN MIDRIB SORGHUM [*SORGHUM BICOLOR* (L.) MOENCH]

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The current investigation was carried out during 2022-23 at Sorghum Research Station, VNMKV, Parbhani. The experiment was laid out in Randomized Block Design with two replications using twenty eight genotypes. The analysis of trait relationships is critical for determining the efficiency of combined selection for two or more attributes. Further, path coefficient analysis allows for more efficient selection by splitting the correlation coefficient into direct and indirect contributions from various variables to the dependent variable. The results of the correlation analysis revealed that there was an inherent relationship between the several traits under study indicating that genotypic correlation often being stronger than phenotypic correlation. The characters viz. plant height, number of leaves, number of primaries per panicle, panicle width, stem girth, 100-seed weight revealed significant and positive correlation with grain yield per plant. Among the 11 characteristics studied as causative variables, a path co-efficient analysis revealed that the traits, number of primaries/panicle, number of leaves, width of panicle, and fodder yield per plant all had a direct and positive effect upon grain yield per plant as responsive variable. Therefore, direct selection for the above mentioned positively correlated traits will indirectly bring in improvement in grain yield.

Keywords: Correlation, Path co-efficient, Brown Midrib Sorghum, Grain yield.

POTENTIAL OF CONSERVATION TILLAGE ON SOIL QUALITY, CARBON SEQUESTRATION, AND PRODUCTIVITY OF RAINFED AREAS

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Intensive cropping, traditional tillage practices, and crop residue removal are the major factors of soil organic carbon (SOC) depletion. Restoration of SOC levels would improve the soil's aggregate ability, physical, chemical, and biological properties, low greenhouse gas emission, and environmental sustainability. The importance of rainfed farming in India is increasing continuously with the increasing demand for feed, fodder, and fiber. It is technologically estimated that at any point in time, 50% of cropped area in India will remain under the rainfed system. The major challenges include water scarcity, climate variability, and the lack of suitable technologies and practices resulting in half of SOC being present in arid soils than in moist environments. That's why the carbon sequestration in these soils requires a wide range of management practices to restore SOC levels. Conservation agriculture practices such as minimum tillage (MT), reduced tillage (RT), and zero tillage (ZT). The results revealed that CT, ZT, and RT recorded higher total organic carbon (TOC), microbial biomass carbon (MBC), and particulate organic carbon (POC) as compared with conventional tillage (CT) and now established methods for promoting carbon sequestration and reducing greenhouse gas emissions in soils. The continuous tillage practices are a major threat to soil health, productivity, and fertility in dry areas. The tillage technology showed direct and indirect benefits in resource-saving ability and carbon sequestration. Long-term conservation tillage, judicious nutrient, and residue management practices increase the soil SOC content and enhance soil aggregation, hydraulic conductivity, soil porosity, and moisture retention capacity. Generally, the soil quality index (SQI) is used as a

quantitative parameter to measure the effect of crop management practices on soil health. In tropical areas, the changes in different tillage practices, input, and residue management technologies offer a conclusive statement regarding the feasibility and sustainability of CA cropping systems. The SQI indicators are highly location and purpose-specific, as directly correlated with an ecosystem, physical, chemical, and biological processes, crop management variations, and properties of soil. This review aims to highlight the impact of conservation tillage practices that have potential possibilities for carbon sequestration in soils of rainfed areas.

Keywords: Soil organic carbon, minimum tillage, reduced tillage, zero tillage

IMPORTANCE OF SERICULTURE IN INDIA

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Silk is the most elegant textile in the world with unparalleled grandeur, natural sheen, and inherent affinity for dyes, high absorbance, light weight, soft touch, and high durability and known as the “Queen of Textiles” the world over. India has the unique distinction of being the only country producing all the four known commercial silks, namely, Mulberry, Tasar (Tropical, Oak), Eri and Muga, of which Muga which is produced only in India with its golden yellow glitter is a prerogative of India. The Brahmaputra valley of Assam is only place in the world where Muga rearers have been rearing Muga silkworm traditionally since time in memorial (Bonnia, 2020). India is the second largest producer of silk in the world. Among the four varieties of silk produced in 2018-19, Mulberry accounted for 71.45 per cent (25,345 MT), Taser 8.4 per cent (2,981 MT), Eri 19.48 per cent (6,910 MT) and Muga 0.66 per cent (233 MT) of the total raw silk production of 35,468 MT. (CSB, 2019). Types of silk produced are classified as four including both Oak and Tropical as Tasar silk. Karnataka is the leading silk producing state which contributes around 50 per cent of the total silk production in India (Annual Report, Central Silk Board (CSB, 2019). Almost 88 per cent of Karnataka sericulture is spread in southern part of Karnataka, which is fast modernizing by factors like urbanization, industrialization, accessibility of markets and sericulture Technical Service Centres (TSC). Mulberry sericulture is predominant in southern states of the country viz. Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Telangana, Madhya Pradesh, and Kerala which together contribute to around 86 per cent of the total mulberry silk produced. It is the only cash crop that provides attractive incomes to the farming community especially small and marginal farmers (Jagannath, 1995). Sericulture is one of the prominent enterprises, which provided full time employment to the entire family. One hectare of mulberry creates employment of 13-16 persons per year. The sericulture industry is based on rural on-farm and off-farm activities with enormous employment generation potential as one of the most appropriate avenues for socio-economic development. It improves the standard of living and life style of the people in rural area by providing sufficient employment and income opportunities and hence it is also called as the ‘Kalpavriksha’ or the ‘Kamadhenu’ of the poor. It is one of the instruments for controlling the migration of people from rural areas to urban areas for employment (Marella, 2013). Sericulture industry provides employment to approximately 9.18 million persons in rural and semiurban areas in India. Of these, a sizeable number of workers belong to the economically weaker sections of the society, including women (CSB 2019).

EFFECT OF FOLIAR APPLICATION OF CALCIUM, ZINC AND BORON ON QUALITY AND YIELD OF AONLA (*EMBLICA OFFICINALIS* GAERTN.)

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An experiment entitled “Effect of foliar application of calcium, zinc and boron on quality and yield of aonla (*Emblica officinalis* Gaertn.)” was carried out during 2021-22 at Experimental Farm, Department of Fruit Science, Faculty of Horticulture, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The experiment was laid out in Randomized Block Design (RBD) with nine treatments and three replications. The different treatments viz., T₁ - (Calcium chloride 1 %), T₂ - (Calcium chloride 1.5 %), T₃ - (Zinc sulphate 0.4 %), T₄ - (Zinc sulphate 0.6 %), T₅ - (Borax 0.4 %), T₆ - (Borax 0.6 %) T₇ - (Calcium chloride 1.0 % + Zinc sulphate 0.4 % + Borax 0.4 %), T₈ - (Calcium chloride 1.5 % + Zinc sulphate 0.6 % + Borax 0.6 %), T₉ - (Control), were used in research programme. Two sprays of each treatment were given at the pea stage and thirty days intervals after the first spray. The results of the present investigation indicated that, treatment T₈ (Calcium chloride 1.5 % + Zinc sulphate 0.6 % + Borax 0.6 %) was found to be the best among all as it gives the maximum fruit weight (34.96 gm), fruit width (4.15 cm), fruit height (3.91 cm), fruit volume (33.09 cc), specific gravity (1.10 gm/cm³), pulp weight (33.41 gm), pulp stone ratio (21.74) with less stone weight (1.54 gm) compared with control and thus the yield per tree (64.60 kg), fruit yield per hectare (17.90 t) and benefit-cost ratio (3.36).

Keywords: Aonla Quality Enhancement, Foliar Nutrient Application, Calcium in Horticulture, Zinc Foliar Spray, Boron and Fruit Yield, Yield Improvement Strategies.

HETEROSIS, INBREEDING DEPRESSION, AND NORMALIZED CUMULATIVE RANKS FOR WHEATBREEDING MOHITYADAVAND SHRINIWAS SINGH*

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Ten wheat lines, their F_{1s} and F_{2s} were evaluated on fourteen parameters viz., plantheight, effective tillers, flag leaf area, days to flowering, spike length, spikelets per spike, peduncle length, days to maturity, grains per spike, grain weight per spike, grain yield per plant, test weight, biological yield per plant and harvest index. Heterosis, inbreeding depression, and normalized cumulative ranks for parental lines, their F_{1s} and F_{2s} were calculated. Crosses with high heterosis (>15% e.g., AAIDUWL-12XAAIDUWL-4, AAIDUWL-10XAAIDUWL-4, AAIDUWL-12XAAIDUWL-6, AAIDUWL-10XAAIDUWL-1, AAIDUWL-12XHD-2967, AAIDUWL-12XAAIDUWL-1, HD-3086XHD-2967, HD-3086XWHEAT303, AAIDUWL-10XWHEAT303, AAIDUWL-10XAAIDUWL-6 and AAIDUWL-12XHD-3086) and negative inbreeding depression (like AAIDUWL-6XWB-02, AAIDUWL-1XHD-2967, AAIDUWL-6XAKASH-3003, AAIDUWL-4XWHEAT303, AAIDUWL-1XWHEAT303, AAIDUWL-6XWHEAT303, HD-3086XWHEAT303, AAIDUWL-12XWHEAT303, AAIDUWL-1XAKASH-3003, HD-2967XWB-02, AAIDUWL-12XAAIDUWL-10, AAIDUWL-1XHD-3086, HD-2967XWHEAT303, HD-3086XHD-2967 and AAIDUWL-1XWB-02) could be further explored for heterosis breeding. From normalized cumulative ranks analysis, a preference order of tested lines, their F_{1s} and F_{2s} is obtained that validates the conclusions arrived through calculations of heterosis and inbreeding depressions. The majority of F_{1s} and F_{2s} are better than parental lines. F_{2s} showing better performance than F_{1s} and or parental lines, and no negative inbreeding depression could be advanced to further segregating generations in hope of finding transgressive segregants.

Keywords: Crop ideotype, Heterosis, Inbreeding depression, Normalized cumulative ranks, and Transgressive segregants.

ECO-FRIENDLY FARMING PRACTICES: A SYSTEMATIC REVIEW OF ORGANIC AGRICULTURE'S IMPACT ON SUSTAINABILITY

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In the contemporary landscape of agricultural discourse, the paradigm of organic agriculture emerges as a beacon of hope amidst the tumultuous seas of environmental degradation and socio-economic inequity. This abstract embarks upon an odyssey into the realms of organic agriculture and sustainability, weaving together disparate threads of empirical inquiry and theoretical insight to illuminate pathways towards a more just, equitable, and sustainable future for generations to come. Drawing upon a corpus of 60 meticulously curated studies spanning diverse disciplinary domains, our synthesis unveils a tapestry of insights into the multifaceted contributions of organic agriculture to the noble pursuit of sustainability. Through a judicious melding of empirical rigor and interpretive nuance, we discern patterns, trends, and causal mechanisms that underscore the symbiotic relationship between organic farming practices and the overarching imperatives of ecological integrity, economic viability, and social equity. At the heart of our synthesis lies a constellation of key findings, each shimmering with the iridescence of empirical rigor and interpretive nuance. From the verdant pastures of environmental stewardship to the fertile fields of economic resilience and social equity, our analysis reveals the myriad ways in which organic agriculture serves as a vanguard in the hallowed pursuit of sustainability. Metaphorically speaking, organic farms metamorphose into sanctuaries of biodiversity, where the symphonic interplay between flora and fauna orchestrates the delicate harmonies of thriving ecosystems. Yet, amidst the verdant pastures of our inquiry, we encounter a labyrinthine landscape of challenges and opportunities that beset the path towards a more sustainable agricultural paradigm. From the constraints of resource availability and technological innovation to the imperatives of policy reform and market dynamics, our synthesis grapples with the complexities inherent in the pursuit of organic agriculture and sustainability. Through introspective reflexivity and scholarly inquiry, we navigate the epistemological quagmire with humility and transparency, engendering a candid dialogue that enriches scholarly discourse and fosters intellectual growth.

In the annals of scholarly endeavor, our synthesis stands as a testament to the collective pursuit of knowledge and understanding, a testament to the indomitable spirit of inquiry that propels us towards new horizons of discovery and enlightenment. Through our synthesis, we contribute not only to the corpus of academic knowledge but to the broader tapestry of human understanding, illuminating pathways towards a more just, equitable, and sustainable future for generations to come. As we draw the curtains on this chapter of inquiry, it behooves us to reflect upon the manifold contributions wrought by our endeavor. Our synthesis serves not only as a compendium of empirical findings but as a clarion call to action, inspiring policymakers, practitioners, and scholars alike to embrace the principles of organic agriculture and sustainability as guiding beacons in the tumultuous seas of environmental degradation and social inequity. Through collective endeavor and scholarly inquiry, we forge a narrative of transformation, catalyzing change and inspiring hope in the hallowed pursuit of a regenerative agricultural paradigm.

Keywords- Organic farming, Sustainable agriculture, Environmental stewardship, Economic viability, Social equity

EFFECT OF BIOPESTICIDES ON DURATION OF EGGS AND PUPA OF *CHRYSOPERLAZASTROWISILLEMI* IN THE SUBSEQUENT GENERATION**MOIRANGTHEMMONALISA DEVI¹, DR. S.K. MUKHERJEE²**¹Ph.D scholar, Department of Entomology, College of Agriculture, CAU, Imphal, Manipur²Former Professor and Head, Department of Entomology, College of Agriculture, OUAT, Bhubaneswar, Odisha,

Efficacy of biopesticides *Bacillus thuringiensis*, *Lecanicillium lecani*, *Beauveria bassiana*, *Metarhiziumanisopliae*, Azadirachtin and synthetic insecticide fipronil were recorded on the duration of eggs and pupa of *Chrysoperla zastrowisillemi* in the subsequent generation after one round treatment of larvae in the previous generation by two different methods: residue deposit method and diet contamination method under laboratory condition. In residue deposit method and diet contamination method, the duration of egg varied from 3.27 to 3.33 days and 3.20 to 3.27 days respectively. In residue deposit method, maximum egg duration was observed in *Bacillus thuringiensis* treatment which is at par with the untreated control while minimum duration was observed in fipronil treatment followed by Azadirachtin. In diet contamination method, treatments *Lecanicillium lecani*, and *Metarhiziumanisopliae* were statistically at par with the untreated control while the lowest can be seen in fipronil treatment followed by Azadirachtin. In case of pupal duration, in residue deposit method, the duration was ranged from 6.19 to 6.83 days and the maximum duration was observed in *Bacillus thuringiensis*. In case of diet contamination method, duration of pupa ranged from 6.07 to 6.65 days in which the maximum was observed in *Lecanicillium lecani*. In both the method minimum pupal duration was observed in Fipronil treatment.

Keywords: *Chrysoperla zastrowisillemi*, residue deposit method, diet contamination method, egg duration, pupal duration.**IDENTIFICATION OF MONOGENIC VARIANTS IN THE MODY AFFECTED POPULATION OF JAMMU REGION****MONIKA AND NISHA KAPOOR*****School of Biotechnology, University of Jammu**

Maturity-Onset Diabetes of the Young (MODY) is a monogenic disorder that results from heterozygous mutations in various transcription factors acting in the development and maturation of pancreatic β -cells. Its prevalence and characteristics have been well-studied in some populations, while other ethnicities, like African, Asians, Latino, need much more studies. It is characterized by autosomal dominantly inherited non-insulin dependent form of diabetes, classically presenting in adolescence or young adults in between the age of 25-35 years. It is a rare cause of diabetes (1-5% of all diabetes cases) and is frequently misdiagnosed as Type 1 diabetes (T1DM) or Type 2 diabetes (T2DM). Till date there are 14 different genes known to be associated with MODY and *HNF1 β* (Hepatocyte nuclear factor- 1 β) is one of them. *HNF1 β* is expressed in the early phase of embryonic development in the pancreas, kidneys, liver, and genital tract, and developmental abnormalities may therefore be encountered in all of these organs in individuals with *HNF1 β* mutations. Renal diseases are most typically seen; the most commonly observed renal abnormality is renal cystic disease, followed by collecting-system abnormalities. The Exome sequencing was performed for one nuclear family with the clinical suspicion of MODY, recruited from a tertiary care hospital. We confirmed monogenic diabetes in a proband with 4 nonsynonymous gene mutation, one of them is *HNF1 β* . The proband lacks typical diabetic features and his diabetes phenotype overlapped with non-syndromic monogenic diabetic patients. We found a missense variant (rs776195231) within *HNF1 β* gene in two individuals of the recruited family. *HNF1 β* is also found to be associated with various populations worldwide. So, aim of this study is to investigate the association of (rs776195231) with MODY in population of Jammu region.

Keywords: Maturity-Onset Diabetes of the Young (MODY), Hepatocyte nuclear factor- 1 β (HNF1 β), Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM).**OPTIMIZATION, CHARACTERIZATION AND KINETIC STUDY OF COLD PRESSED LINSEED OIL EXTRACTED USING NOVEL FREEZE THAW PRETREATMENT****MONIKA CHAND¹, RAJNI CHOPRA², ANUPAMA SINGH³**¹PhD Scholar, Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana, India²Professor and Head, Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana, India³Professor and Head, Department of Food Engineering, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana, India

Conventional extraction methods reliant on harsh temperature, and chemical treatments diminish the oxidative and stability of oils. Conversely, emerging non-thermal techniques are usually expensive, demand expertise, and lack large-scale sustainable production. To address this challenge, our research seeks innovative solution by investigating impact of freeze-thaw (FT) pretreatment on the yield and quality of cold-pressed linseed oil. Employing statistical methodologies Taguchi design for pre-screening factors and Response Surface Methodology for optimization, we identified optimal FT conditions to maximize oil yield, thermal diffusivity, total phenolic content, and DPPH activity. The FT pretreatment significantly increases oil yield by 1.5 times, phenolic compounds by 13.6%, DPPH activity by 20%, and ABTS inhibition activity by 11% in FT optimized oil (FTO) as compared to control (CLO). SEM results showed cracks in cell wall, explaining the enhanced oil yield and oxidative property of FTO. Thermal analysis using TPS500 revealed significant increase of thermal conductivity, thermal diffusivity and decrease of specific heat in the FTO. Physicochemical parameters, such as acid values, peroxide value, p-anisidine value, total oxidant value, viscosity, refractive index, and color values, showed no significant differences in CLO and FTO. Fatty Acid

Methyl Ester (FAME) analysis revealed that linseed oil was rich in alpha-linolenic acid (52%), oleic acid (21%), and linoleic acid (13%), comprising 65.98% PUFA in CLO and 65.77% in (FTO) depicting no significant difference. The OSI index of (FTO) across temperatures of 90 °C, 100 °C, and 110 °C showed no significant difference in oil rancidity than CLO. Additionally, the kinetic approach including activation energy, activation enthalpies and entropies were found to be non-significantly different, highlighting the process's ability to maintain oil stability due to low temperature processing. This study presents an optimized extraction method that is easily scalable for industrial use, indicating its sustainability while boosting oil yield, antioxidant properties, and stability parameters.

Keyword: Freeze Thaw, linseed, extraction, antioxidant, stability, Taguchi, RSM,

SYNERGISTIC EFFECTS OF *SERENDIPITA INDICA* AND *AZOTOBACTER CHROOCOCCUM* ON RICE YIELD AND ROOT COLONIZATION: IMPLICATIONS FOR SUSTAINABLE CROP PRODUCTION

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Approximately 58% of India's population earns their livelihood from farming, making the country's agricultural economy a cornerstone. But with a growing world population and a finite amount of arable land, there is immense pressure on agriculture to increase food production in a sustainable manner. In this endeavour, microbial populations prove to be invaluable friends, providing creative ways to maintain soil health and increase crop yields. Among them, the root endophytic fungus *Serendipita indica* stands out as a major contributor, offering a variety of advantages from bio-fertilization to disease resistance and stress reduction. Research demonstrates its effectiveness in boosting proline content, antioxidant capacity, root and shoot development, and gene expression in crops such as rice, signaling a paradigm change towards sustainable agriculture. The symbiotic interaction between *Serendipita indica* and plant roots goes beyond simple nutrition intake and includes immunomodulation and resistance against environmental challenges. Its flexibility to culture techniques promises diversity and scalability in its application, enabling larger investigation in the biotechnological and agricultural realms. Co-inoculation experiments with the well-known rhizospheric bacteria *Azotobacter chroococcum* revealed synergistic interactions that enhanced nutrient uptake, supporting the vegetative and reproductive development phases, and enhanced the NPK content in plants. Furthermore, the broad host range of *S. indica* highlights the ecological value of the species as well as its versatility in a variety of agricultural systems. Its capacity to flourish without the support of host roots creates opportunities for pure in vitro cultures, streamlining procedures related to both research and commercialization. *S. indica* and *A. chroococcum* together have a profound effect on agriculture that goes beyond simple yield enhancement. Using microbial communities to their full capacity is essential to guaranteeing food security and reducing environmental damage as the world's agricultural needs rise. In addition to providing the solution to the current agricultural problems, embracing these microbial companions opens the door to a more robust and peaceful cohabitation between humans and the natural environment.

Keywords: *S. indica*, *Azotobacter chroococcum*, rhizosphere, sustainability

ORGANIC MANURES IMPROVE HEALTH OF SOIL AFTER HARVEST OF Kharif CROP

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Nowadays practice modern agriculture that included high yielding varieties require more nutrients and used the chemical fertilizers like Urea, DAP, SSP and MOP that are not much suitable for soil health and sustainable crop production. Most of the chemical fertilizers influence the soil health and change the soil fertility parameter and also influence the microbial properties of soil ecosystem. Chemical fertilizer produced higher nutrients and beside change soil ecosystem. Different organic manures like FYM, vermicompost and neem cake increase production and also maintain soil fertility long term basis (Arbadet *al.*, 2014) organic manures are good sources of plant available nutrients. The organic manures increase the microbial activity, enzymatic activity and also increases the mineralization process (Saiyadet *al.*, 2014). Thus judicious use of organic and inorganic nutrient sources helps in sustain production of wheat. Thus, a field experiment was conducted at Udaipur and found that application of 100% RDN through compost, vermicompost and neem cake each in equal proportion significantly increased soil health as well as microbial population after crop harvest as compared to control.

Keywords: Soil health, Sustainability and Organic manure

CONSTRAINTS FACED BY DAIRY FARM WOMEN IN MANAGING THEIR DAIRY ENTERPRISE IN UTTARAKHAND**MONIKA KHOLIYA¹ AND NEELAM BHARDWAJ²**¹Ph.D. Scholar, Department of Agricultural Communication, GBPUAT, Pantnagar, Uttarakhand²Professor (Retd.), Department of Agricultural Communication, GBPUAT, Pantnagar, Uttarakhand

In rural India, dairy farming has been practiced along with agriculture as they both are intertwined with each other. Dairy farming is main activity and source of livelihood of livestock-dependent farming communities in Uttarakhand. It involves with natural resources base-forest/rangelands, croplands, livestock breeds, feeding, health management, marketing, and consumption of the product. Smallholder dairy farming has enormous potential as they can contribute to family income, generate gainful employment especially for women, elevate living standards of the producer, fight malnutrition especially amongst children and enhances sustainable agriculture. But dairy farm women face many difficulties while doing dairy farming. With the advancement of involving technology into agriculture and allied sectors, women face many constraints while managing their dairy enterprise. The present study was conducted in Nainital district of Uttarakhand to analyze the constraints perceived by the dairy farm women while managing the dairy enterprise. Total 120 respondents were selected from five villages of Haldwani block that have maximum milk production. Regarding infrastructural constraints, 90 percent farm women had lack of improved equipments and 72.5 percent had low average milk yield of the milch animals. In economic constraints, nearly eighty percent expressed low price of milk offered and 74 percent faced high cost of cross-bred cow. As regards to marketing constraints, 65.83 percent had irregular sale of milk and 70.83 per cent had less knowledge about marketing techniques. In technical constraints, majority i.e. 82.5 per cent farm women had lack of technical guidance and 98.33 per cent expressed lack of training facilities in dairy sector while 91.67 percent farm women expressed inadequate information about government schemes related to dairy sector.

DECIPHERING THE GENETIC ARCHITECTURE AND ASSESSING PHENOTYPIC STABILITY OF SOYBEAN VIA MULTITRAIT STABILITY INDEX (MTSI): AN INNOVATIVE AND NOBLE APPROACH**MONIKA SONI^{1*}, MANOJ KUMAR SHRIVASTAVA¹, PAWAN K. AMRATE¹, STUTI SHARMA¹, YOGENDRA SINGH¹ AND VIKRANT KHARE²**¹Department of Plant Breeding and Genetics, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur²Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, Mumbai

Over three cropping season, using a randomized complete block design, phenotypic evaluations were conducted on advanced soybean breeding lines to assess genetic variability, associations, directional trends, multiple regression analysis, and the multi-trait stability index (MTSI). Phenotypic coefficient of variation (PCV) exceeded genotypic coefficient of variation (GCV) across all traits and environments, indicating environmental influence. High heritability (h^2) was observed for all traits. Significant heritability, combined with substantial genetic advance, was noted for pods per plant, seeds per plant, seed weight, biological yield, and seed yield across diverse environments. Correlation and regression analyses revealed consistent positive associations of biological yield and harvest index with seed yield. Path analysis identified biological yield as having the highest direct effect on seed yield, followed by other traits. MTSI identified JS 22-101 is the most stable and superior genotypes for central India. This study underscores the importance of refining selection criteria for optimizing soybean breeding programs, contributing to agricultural genetic enhancement.

Keywords Soybean, Multi-Environments, Genetic variability, Selection, and Stability**NANOENCAPSULATED *ILICIIUM VERUM* HOOK.F. ESSENTIAL OIL AS GREEN PRESERVATIVE TO ENHANCE THE SHELF LIFE OF CUSTARD APPLES****MONISH SONI AND ABHISHEK KUMAR DWIVEDI****Laboratory of Herbal Pesticides, Centre of Advanced Study (CAS) in Botany, Banaras Hindu University, Varanasi**

The investigation deals with encapsulation of *Illicium verum* Hook. f. essential oil into chitosan matrix (Ne-IVEO) showing enhanced antifungal and anti-aflatoxigenic activity against *Aspergillus flavus* (AFLHPC-3) and aflatoxin B₁ in stored custard apples. Chemical characterization of IVEO was done using GC-MS analysis that reveals (E)-Anethole (74.86%) as the major component followed by limonene (6.38%), and estragole (3.75%). IVEO completely inhibited the growth of AFLHPC-3 and aflatoxin B₁ secretion at 0.6 μ L/mL and 0.5 μ L/mL concentration respectively while, Ne-IVEO completely inhibited growth of AFLHPC-3 and aflatoxin B₁ secretion at 0.1 μ L/mL and 0.08 μ L/mL concentration respectively. Both IVEO and Ne-IVEO inhibited ergosterol biosynthesis, increased the cellular ions leakage (Ca^{2+} , Mg^{2+} and K^+) and 260 nm and 280 nm absorbing materials from cells in dose dependent manner. Moreover, IVEO and Ne-IVEO reduced the cellular methylglyoxal (aflatoxin B₁ inducer) in AFLHPC-3 cells. During *in vivo* analysis, coating with Ne-IVEO protected custard apple from fungal deterioration and enhanced the shelf life of custard apple. The finding indicates that encapsulation of IVEO into chitosan biopolymer enhanced the efficacy of essential oil against *A. flavus* and aflatoxin B₁. Therefore, Ne-IVEO may be recommended as nanosmart green preservative to extend the shelf life of custard apples.

Keyword: *Illicium verum* Hook. f. essential oil; nanoencapsulation; Antifungal; Aflatoxin B₁; Custard apple; Shelf-life

**BIODEGRADATION OF AZO DYES WITH THE HELP OF BACTERIAL ISOLATES FROM THE LIQUID MEDIUM
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Azo dyes, which are synthetic organic chemicals, are extensively employed in the food, textile, and pharmaceutical sectors. The textile industry is the primary cause of azo dye pollution in water. These dyes can potentially cause major ecological and health issues when released into the environment. The application of physico-chemical treatments has been impeded by significant energy and financial expenses, elevated sludge generation, and chemical handling. In contrast, the bioremediation process is a cost-effective, removal-efficient, and environmentally friendly way to address the issue brought on by physical and chemical methods. This study studied the effect of different process parameters like pH, initial dye concentration, agitating and non-agitating conditions, inoculum size, and nutrient availability (various nitrogen and carbon sources) on the degradation of Acid Red 9 and Acid Orange 7 by different bacterial isolates. Result showed that the maximum degradation of Acid Red 9 (97.53%) was shown by bacterial isolate BAR1 at an initial concentration (800ppm), pH 6, inoculum size (1%), incubation time (168h), glucose (0.5%) as carbon source, and Yeast Extract (1%) as nitrogen source. In contrast, in the case of Acid Orange 7, maximum degradation (90.57%) was shown by bacterial isolate BOD2 at an initial concentration (800ppm) at pH 6, inoculum size (1%), incubation time (168h), glucose (0.5%) as carbon source and peptone (1%) as nitrogen source. These efficient bacterial isolates can be exploited for the degradation of azo dyes from industrial effluents at the commercial level.

Keywords: Azo dyes, synthetic dyes, physico-chemical treatment, Bioremediation, Acid Red 9, Acid Orange 7.

URBAN GREEN SITES IN MITIGATING CLIMATE CHANGE: A CASE STUDY AT FOOTHILLS OF INDIAN EASTERN HIMALAYAS**MOUMITA KHAN, RICKY PRADHAN, MENDUP TAMANG, MANENDRA SINGH, GOPAL SHUKLA AND SUMIT CHAKRAVARTY****Department of Forestry, Horticulture faculty, Uttar Banga Krishi Viswavidyalaya, Pundibari- 736 165, Cooch Behar, West Bengal,**

Green areas within cities offer numerous advantages to the environment and contribute to improving human well-being. Unfortunately, these services are largely undervalued, and urban areas' potential to mitigate climate change has received little attention. In this study, biomass, carbon stock, carbon offset, offset price and soil nutrient status were quantified at four urban green sites in Cooch Behar, West Bengal, India. Stratified random quadrat sampling with the line transect process was used for this case study. Soil samples were also analysed at different depths. An indirect approach was used for biomass estimation. The study revealed that overall estimated plant biomass, biomass carbon, soil carbon and total ecosystem carbon were 869.46 Mg ha⁻¹, 434.78 Mg ha⁻¹, 50.82 Mg ha⁻¹ and 485.55 Mg ha⁻¹, respectively. The estimated carbon offset and offset price were 1781.98 Mg CO₂e and 4454.94 US \$, respectively. The study revealed that the green areas in the town, like parks and institutional spaces, have contributed to the improvement of the biophysical components of the region. Additionally, green spaces have played a role in reducing carbon emissions by storing it through tree biomass. Urban parks and gardens can offer employment opportunities for the urban poor through various initiatives. These areas can help combat climate change by storing carbon and improving local climates while conserving natural resources. These areas can help maintain species diversity and reduce pressure on natural forests by participating in ventures that partner with REDD+ projects. Local government policy initiatives and benefit-sharing strategies can enable conditions for REDD+ benefits. Urban sites with trees, such as parks, can gain carbon credit incentives for mitigating global climate change.

Keywords: Urban green spaces, Climate change, Biomass, Carbon offset

**EFFECT OF POPLAR AND EUCALYPTUS BASED AGROFORESTRY SYSTEM ON SOIL BIOCHEMISTRY
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Eucalyptus and poplar are among the most rewarding tree species when concerning the agroforestry systems of India. Intercropping with short rotation higher density tree species like eucalyptus is taken to fulfill the demand for food and industrial raw matter for the same specified piece of land. Whereas, poplar is an incredible timber producing tree in northern India. The field experiment was conducted during the winter season of 2016-17 at the experimental site of the Agroforestry Research Centre, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. Poplar and eucalyptus were intercropped with different wheat varieties (UP-2526, UP-2565, UP-2628, and DPW-621-50). After harvesting the wheat crop, soil sampling was performed to determine the soil parameters like electrical conductivity (EC), organic carbon and minerals content. Nitrogen, phosphorus and potassium content and other biochemical constituents were higher in the agroforestry system as compared to the open farming system. A high soil pH (7.53) was found in an open farming system and lower pH in an agroforestry system. Soil EC in the agroforestry system was slightly higher than the open farming system. Organic carbon was maximum (1.33%) under the poplar agroforestry system compared to the eucalyptus based agroforestry system. Overall, this study determines the effect of poplar and eucalyptus based agroforestry systems on soil biochemistry.

CHILD REARING KNOWLEDGE AND PRACTICES: INSIGHTS FROM WOMEN IN MIGRANT FAMILIES OF SUGARCANE HARVESTING COMMUNITIES**MOUNESHWARIKAMMAR, MANJULAPATIL AND PREMAPATIL****Department of Human Development, College of community Science, University of Agricultural Sciences, Dharwad**

Objectives: To assess the Knowledge and practice on child rearing practices in migrant families in sugarcane harvesting pockets of Bagalkote. **Methods:** Purposive of sampling was employed to select women who were willing to participate and in the reproductive age and had given birth to atleast one child. A sequential explanatory mixed method study design was used where quantitative (cross-sectional survey) followed the qualitative (grounded theory) phase. The survey was undertaken among the representative sample in sugarcane harvesting area comprising of 42 mothers from migrant families who stayed in two villages namely Benakatti of Bagalkot taluka and Huvanur of Hunagund taluka during sugarcane harvesting season 2021-22. Quantitative Data was collected by using Child rearing knowledge scale (Saramma and Thomas, 2010) and Child rearing practice scale (Saramma and Thomas, 2010), while qualitative data was elicited by conducting an in-depth interview. **Results:** Data on child rearing practices of mother revealed that, about 90.24 per cent had checked the weight of the baby, 96.68 percent were sleeping with baby in the same bed. About 70.73 per cent were not able to feed the baby with first milk (Colostrum), while 90.24 per cent did not start complementary feeding at 6 months. The data pertaining to knowledge on child rearing practices depicted that, 98.6 per cent mothers expressed breast milk is most helpful for mental development of baby, 98.6 per cent did not know that baby's clothes need to be washed separately, and 96.7 per cent mothers knew that baby explores the world through interacting with other family members. Qualitative data on child rearing practices revealed a need for inclusion of these families in public distribution system (PDS), health care facilities, access to drinking water and electricity, safe environment for their children, as basic essentials for the healthy child outcomes.

PERSISTENCE OF PESTICIDE TOXICITY AMONG OFFSPRING'S OF A NON-TARGET MODEL INSECT DROSOPHILA MELANOGASTER**MOUTUSHIMANDI*, KANCHANA DAS****Toxicology Research Unit, Department of Zoology, The University of Burdwan, Burdwan, West Bengal**

Drosophila melanogaster popularly known as "Cinderella of genetics" has also emerged as an excellent model organism in the field of toxicology. Higher degree of genetic similarity between *Drosophila* and other higher vertebrates including human allows researchers to get in depth insights about toxicological impacts on common biological processes. Acephate, a popularly used organophosphate pesticide applied on crops, fruits and vegetables across the globe. Chronic sub-lethal toxicity of Acephate has already been established in parent generation using *D. melanogaster* as model organism. Current study aims to explore the persistence of parental toxic effects in their next generation. Results of biochemical assays demonstrated significantly increased activity in endogenous antioxidant enzyme in Acephate unexposed F1 generation larva of *D. melanogaster*. Up regulated lipid peroxidation and protein carbonylation confirms generation of oxidative stress in them. Additionally altered nuclear morphology and presence of micronuclei in their digestive tract was also found when compared to their control counterparts. Therefore, results of this study confirm the transmission of Acephate induced parental toxicity in subsequent generations of *D. melanogaster* and the observations of this study can be extrapolated to other non-target organisms including human.

Keywords: Acephate, *Drosophila melanogaster*, Oxidative stress, Micronuclei, Trans-generational transmission.**OPTIMIZATION OF FINGER MILLET (*ELEUSINE CORACANA*) CAKE FOR POST- MENOPAUSAL WOMEN****MRIDULAPANDEY*, SADHNA SINGH**, PRATIBHA SINGH***, NAMITA JOSHI****, MANISH KUMAR**********Ph.D. Scholar, Department of food Science and Nutrition, ANDUA&T, Kumarganj, Ayodhya******Department of food Science and Nutrition, ANDUA&T, Kumarganj, Ayodhya,*******Department of Agril. Biochemistry, ANDUA&T, Kumarganj, Ayodhya,********Department of Vet. Public Health and Epidemiology, ANDUA&T, Kumarganj, Ayodhya,*********Department of Agril. Statistics ANDUA&T, Kumarganj, Ayodhya,**

Menopause is associated with a decline in estrogen levels, which can lead to a decrease in bone density and increase the risk of osteoporosis. Adequate intake of calcium and vitamins are vital to maintain bone health and reduce the risk of fractures. 300 postmenopausal women, aged 45 to 65 years were selected from rural and urban areas of Ayodhya districts of eastern u.p. The aim of the study was to standardize cake from finger millet (*Eleusine coracana*). Optimizations of cake was done using finger millet flour and wheat flour. Four distinct cake formulations were tried with different percentages of wheat and finger millet flour, (Finger millet flour: Wheat flour, i.e., 100:0, 75:25, 50:50, 00:100. 100% wheat flour was considered as control. The sensory acceptability of finger millet cake 75:25 was found best then further studies were conducted on optimization of cake containing finger millet flour: wheat flour, 75:25 with different sources of sweetness prepared from dates, jaggery, sugar free and table sugar. Subjective and objective evaluation were done using standard methods. Sensory evaluations were conducted with semi-trained panel participants. Significant variation was observed to the sensory score texture, appearance and colour. Containing dates as a source of sweetness found highest score. The findings showed that there were significant variations between these items in terms of visual puffiness, appearance, texture, moistness and overall acceptability. To generate an optimal formulation range, the optimal areas with a score greater than 6.0 from each attribute were superimposed. Based on the panel's sensory assessments of the products using a 9-point hedonic rating scale, every product received a score higher than 6, indicating that the panel found all sensory aspects to be at least somewhat pleasing. The panel's overall assessment of the samples' appeal suggested that all of the goods were respectable, with Sample

T2 (Dates flavour) being the most favoured. The proximate analysis of the formulations indicated an improvement in the nutritional content (Protein, carbohydrate, fat, ash, energy) with mean increases of $2.3 \pm 0.2\%$ for ash and $25.05 \pm 2.32\%$ for fat compared to 5.53% and 30.96% for the control sample, respectively. There was no discernible variation in the protein composition ($7.1 \pm 0.92\%$ versus 7.25%). In contrast to the control sample, which had a carbohydrate content of 76.43% , there was a decrease ($74.1 \pm 7.38\%$).

Keywords: Post-menopause, millets, ragi cake, sensory evaluation, proximate analysis

COMPARATIVE ANALYSIS OF UREA-REDUCED GRAPHENE OXIDE VERSUS ORDINARY UREA APPLICATION ON WHEAT NUTRIENT UPTAKE AND YIELD

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Nitrogen is the one of the most important essential element being mainly supplied through urea fertilizer. The efficacy of urea is low and it causes environmental pollution. Urea nanocomposite can be prepared to provide nitrogen to plants. Reduced graphene oxide can be used as controlled release vectors for raising smart fertilizer as new address to improve NUE. Synthesis of nanocomposite, characterization and pot culture studies were conducted to evaluate reduced graphene oxide (rGO) based nanocomposite of urea on wheat crop on foot hill alluvial soils. This greenhouse experiment includes nine treatments with the graded levels of ordinary urea and urea-rGO nanocomposites (30, 60, 90 and 120 kg N/ha) in completely randomized block design (CRD) with three replications. Synthesis and characterization of nanocomposites conducted in Nanotechnology unit, GBPUA&T, Pantnagar and IIT, Bombay respectively. The characterization revealed successful synthesis of nanocomposites with average particle size ranging between 20-50nm. Seed germination study showed that different exposure levels of urea nanocomposite recorded remarkable increase in seed germination. In green house experiment, application of 60 kg N/ha through urea-rGO showed maximum yield and nutrient uptake by wheat. Yield and nutrient uptake of wheat were significantly higher with application of urea-rGO @ 30 and 60 kg N/ha over conventional fertilization (120 kg N/ha through urea). Application of 60 kg N/ha through urea-rGO recorded 17 % and 15 % increase in grain and straw yield of wheat, respectively as compared to conventional fertilizer application of urea. Significant increase in soil available nitrogen and soil microbial population were observed with application of urea-rGO @ 30 and 60 kg N/ha compared to conventional urea fertilization. In contrast, higher doses of nitrogen @ 90 and 120 kg N/ha applied through urea-rGO resulted in poor seed germination, crop yield, nutrient uptake, microbial population and dehydrogenase activity in soil. Application of urea-rGO @ 60 kg N/ha recorded statically at par grain and straw yield with 120 kg N/ha applied through urea. Thus use of nanomaterials for making nanocomposites of urea is helpful to increase crop productivity and soil quality. Application of 60 kg N through nanocomposites can replace the urea application for 120 kg N/ha in wheat crops.

Keywords: Nanocomposites, reduced graphene oxide (rGO), Characterization, Yields

EFFECT OF VARYING LEVELS OF HUMIC ACID AND SALICYLIC ACID ON GROWTH AND BIOCHEMICAL PARAMETERS OF COWPEA (VIGNA UNGUICULATA)

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An investigation was carried out at Narendra Deva University of Agriculture & Technology, Faizabad (U.P.) during Kharif season of 2013 to find out the effect of different levels of humic acid and salicylic acid on growth and biochemical parameters of cowpea. At maturity stage the maximum plant height was recorded with the foliar application of humic acid @ 26 ml/litre water and 0.2% salicylic acid @ 35, 55 and 65 DAS (T5). Maximum increase in total dry weight was observed with T5 over all the crop growth period. The maximum increase in total chlorophyll content and nitrate reductase activity was recorded with treatment T5, whereas, minimum increase was recorded with treatment T4 (foliar spray of humic acid @ (26 ml/liter water) and 0.2% salicylic acid at 25, 55, and 65 DAS). The maximum increase in Nitrogen, Phosphorus and Potassium content was observed with the treatment T5, followed by T4, and minimum with T2, over control. Highest protein content was reported in T5, followed by T4. While lowest protein content was found with the foliar application of humic acid @ 26 ml/liter water at 35 DAS and 0.2% salicylic acid at 55 DAS.

Keywords: Humic acid, cowpea

ANALYSIS OF POSTURE AND CARRYING LOADS IN AGRICULTURAL ACTIVITIES PERFORMED BY FARM WOMEN MUGDHABA DABHI¹ AND SURABHI SINGH²

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Women are major workforce of Indian agriculture. Women are involved in various types of agricultural and allied activities. While performing these activities, women adopt awkward posture which may lead to musculoskeletal disease. Hence, the present study was planned to analyze posture of farm women during performing various agricultural and allied activities. Present study was conducted in villages of Dantiwada Taluka in Banaskantha district, Gujarat. A representative sample of 200 farm women was selected randomly from four villages. Personal and socioeconomic characteristics of farm women, activities performed by farm women and posture were studied as

independent variables and prevalence of musculoskeletal disorder/disease and pain amongst farm women was considered as dependent variable. An interview schedule was formed which comprised questions related to background information, personal and socio-economic variables and type of activities performed by farm women. OWAS technique was used to analyze posture of farm women. Body part discomfort scale was used to study pain or discomfort perceived by farm women during performing various agricultural and allied activities. Data were collected by personal interview technique. Descriptive type statistical tools were used such as percentage, frequency and chi-square value. Body part discomfort scale shows pain in lower back and knees amongst maximum farm women during performing weeding activity. In milking activity, palm, fingers and shoulders were affected the most. As far as cleaning of animal shed is concerned, seven and half per cent farm women had severe and very severe pain in their knees after the activity. Results of OWAS technique showed that farm women adopted poor posture while agricultural and livestock activities.

Keywords: Musculoskeletal disorder/disease, Posture, OWAS

EFFECT OF NPK LEVELS ON GROWTH, YIELD AND QUALITY OF CONFECTIONERY GROUNDNUT (*ARACHIS HYPOGAEA* L.) UNDER RAINFED CONDITION IN A *VERTISOL* OF NORTHERN TRANSITIONAL ZONE OF KARNATAKA

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A field experiment was conducted during *kharif* season of 2022 at the Main Agricultural Research Station, Dharwad to study “Effect of NPK levels on growth, yield and quality of confectionery groundnut (*Arachishypogaea* L.) under rainfed condition in a *Vertisol*”. The experiment was laid out in split plot design consisting of three varieties as main plot treatments viz., ICGV 16698, TGLPS 3 and Dh 256 and four fertilizer levels as subplot treatments viz., absolute control, 100 % RDNPK, 125% RDNPK and 150 % RDNPK. The results indicated that among different varieties, ICGV 16698 (M₁) recorded significantly higher growth parameters viz., plant height (30.72 cm), number of branches (9.90) and yield parameters viz., dry pod yield (2291.92 kg ha⁻¹), kernel yield (1586.44 kg ha⁻¹) and haulm yield (3346.02 kg ha⁻¹). This treatment was on par with M₃ (Dh 256). Among different fertilizer levels, significantly higher growth parameters viz., plant height (32.05 cm), number of branches (10.64), yield parameters viz., dry pod yield (2570.11 kg ha⁻¹), kernel yield (1808.94 kg ha⁻¹) and haulm yield (3547.50 kg ha⁻¹) and quality parameters viz., protein content (24.01 %) were recorded in 150 % RDNPK (S₄) and this was on par with 125 % RDNPK (S₃). Interaction effect was found significant in case of yield.

Keywords: Confectionery groundnut, yield, quality, fertilizer levels, varieties

EFFECT OF ORGANIC AND BIO-FERTILIZER ON SOIL ENZYMATIC ACTIVITY AND YIELD OF PEARL MILLET UNDER BUNDELKHAND REGION

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An experiment was conducted to observe the effect of organic and biofertilizer on soil enzymatic activity, soil microbial population, or growth and yield of pearl millet during season, 2023-2024 in Lateritic soil with an objective “Effect of organic and Bio-fertilizer on soil enzymatic activity and yield of pearl millet under Bundelkhand region” at Organic Research Farm Karguaji, Department of Soil science and agricultural chemistry, Institute of Agricultural science, Bundelkhand University, Jhansi (Uttar Pradesh). The experiment was laid out in Randomized block design with three replications. The experiment comprised eight treatments of sources (T0-control(RDF), T1=50% FYM+50% VC+PSB, T2=50% VC+50% PM+PSB, T3=50% PM+50% FYM+PSB, T4=100% FYM+PSB, T5=100% VC+P S, T6=100% PM+PSB, T7=33% FYM+33% VC+33% PM+PSB) From the findings of this study, it can be concluded that application of bio-fertilizer and organic manure alone or in combination could improve pearl millet production in low-input agriculture. Results also showed that bio-fertilizer tended to reduce by half the application rates of organic manure. Bio-fertilizer in combination with ha-1 of PM could be recommended for millet production in the study area.

Keywords: organic fertilizers (Farmyard manure, Vermicompost, Poultry manure,) Bio-fertilizers (Phosphate solubilizing bacteria (PSB).

ECO-FRIENDLY MANAGEMENT OF CITRUS NEMATODE (*TYLENCHULUS SEMIPENETRANS* COBB.) BY USING BIO-AGENTS INFECTING LEMON (*CITRUS LIMON* L.)

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Citrus nematode, *Tylenchulus semipenetrans* (Cobb, 1913) is considered to be the most important nematode pest of lemon and causes severe losses in India due to favourable soil and environmental conditions. *T. semipenetrans* cause slow decline disease in citrus. Looking to the economic importance of citrus nematode, an eco-friendly management practice was carried out in pot experiments from the month of July to December 2022 in district Udaipur, Rajasthan on *Tylenchulus semipenetrans* infecting lemon. Different vermicompost fortified bio agents viz., *Glomus fasciculatum*, *Purpureocillium lilacinum* and *Metarhizium anisopliae* were used at two different doses each of 5 g/kg soil and 10 g/kg soil against an untreated check. Every combination was statistically superior over untreated control in promoting the plant vigour as well as yield along with decreasing the nematode population. Furthermore, maximum per cent decrease observed 69.50%, 59.07% and

49.43% in final nematode population per 200 cc soil was seen with the application of *P. lilacinum* at 10.00 g/kg soil followed by *G. fasciculatum* at 10.00 g/kg soil and *M. anisopliae* at 10.00 g/kg soil, respectively. Organic amendments improve soil condition and increase beneficial soil microbes while bio-agents parasitize nematode egg and kill them, compete in space & nutrition, secrete allelochemicals which are toxic for nematode. This type, organic amendments and bio-agents when use in combination they overall enhance the effect and decline nematode population, surprisingly.

Keyword: Citrus nematode, Eco-friendly management, Bio-agent, Lemon.

ROLE OF NANO-MATERIALS, NANO-SENSOR, NANO-PESTICIDES, NANO-UREA, BIO-SENSOR FOR REAL-TIME CROPS ASSESSMENT

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Nano materials, nano-sensors, nano-pesticides, nano-urea, and bio-sensors are revolutionizing agriculture, enabling real-time crop assessment and management. Nano materials, with their unique properties at the nanoscale, offer enhanced functionalities for various agricultural applications. Nano-sensors play a crucial role in monitoring soil conditions, nutrient levels, and environmental parameters in real-time, providing farmers with valuable data for precision farming. Nano-pesticides, formulated using nanotechnology, exhibit improved efficacy in pest control while minimizing environmental impact and reducing the need for conventional chemical pesticides. Nano-urea, a nanoscale version of urea fertilizer, enhances nutrient uptake efficiency, reducing fertilizer usage and minimizing nitrogen leaching into the environment. Bio-sensors integrated with nanomaterials offer sensitive and selective detection of biomolecules, pathogens, and contaminants in crops and soil. These sensors provide rapid and accurate assessment of crop health, disease presence, and quality parameters, enabling timely interventions to optimize yield and minimize losses. Real-time crop assessment using these nano-enabled technologies facilitates data-driven decision-making for farmers, allowing for precise and timely interventions such as irrigation scheduling, fertilization adjustments, and pest management strategies.

Keywords: Nano, Crops, Pest, Nutrients, Environment and Bio-sensor

LONG-TERM INTEGRATED NUTRIENT MANAGEMENT ENHANCES YIELD AND NUTRIENT UPTAKE IN RICE-WHEAT CROPPING SYSTEM

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This study investigates the effects of long-term integrated nutrient management on yield and nutrient uptake in a rice-wheat cropping system conducted at the research farm of the Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, since 1985-1986. The field experiment, conducted during the Rabi season of 2016-17, utilized 12 treatments replicated three times employing a Randomized Block Design. The treatments included combinations of organic and inorganic fertilizers, along with farmer's practices and a control. Organic sources such as Farm Yard Manure (FYM), Green manure (GM) *Sesbaniaaculeata* (*dhaincha*), and Crop residues (CR) (i.e., wheat straw) were integrated with chemical sources of nutrients such as urea, DAP, and muriate of potash. The study observed that the plots receiving 50% NPK+50% through FYM recorded the highest N, P, K, and S content and uptake in grain and straw. Furthermore, treatments combining organic matter with chemical fertilizers exhibited higher concentrations and uptake of nutrients (N, P, K, and S). The inclusion of organic matter led to increased concentrations of nutrient elements in straw and grain, particularly for N, P, and K. However, the concentration of S remained relatively unchanged. Importantly, all organic sources were comparable in terms of grain yield of wheat. The study underscores the importance of continued use of organics with inorganic fertilizers in an integrated manner for sustaining wheat yields and ensuring adequate nutrient supply.

Keywords Long-term, Integrated Nutrient Management, Rice-Wheat Cropping System, Organic Fertilizers, Inorganic Fertilizers, Nutrient Uptake, Farm Yard Manure, Green Manure, Crop Residues, NPK, FYM, DAP, Muriate of Potash, Nutrient Concentration, Sustainable Agriculture.

JUGLONE: A PROMISING PHYTOCHEMICAL FOR BREAST CANCER THERAPY USING *INSILICO* APPROACH

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Breast cancer remains a significant global health concern, necessitating the exploration of novel therapeutic agents. Juglone, a natural phytochemical found in various plant species including *Juglans regia* L. (Walnut), has gained attention for its potential anticancer properties. Juglone indeed has interesting properties that make it potentially useful in cancer therapy. Network pharmacology and molecular docking studies provides valuable insights into its mechanisms of action and potential interactions with biological targets. This paper aims to elucidate the therapeutic potential of juglone in breast cancer treatment through the integration of network pharmacology and molecular docking studies. Network pharmacology approaches provides a holistic view of drug action by analyzing complex interactions between drugs, targets, and biological pathways. Molecular docking complements this approach by predicting the binding affinity and mode of interaction between

juglone and key biomolecular targets involved in breast cancer progression. Key findings from network pharmacology analyses reveal the multitarget nature of juglone, targeting pathways implicated in cell proliferation, apoptosis, angiogenesis, and metastasis. Molecular docking simulations further corroborate these findings, demonstrating favorable binding interactions between juglone and crucial proteins such as estrogen receptor alpha (ER α), human epidermal growth factor receptor 2 (HER2), and vascular endothelial growth factor receptor (VEGFR). Moreover, the synergistic effects of juglone with conventional chemotherapeutic agents are explored, highlighting potential combination therapies for enhanced efficacy and reduced drug resistance. Overall, this research underscores the promising role of juglone as a phytochemical candidate for breast cancer therapy, emphasizing the importance of integrative approaches like network pharmacology and molecular docking in drug discovery and development.

Keywords: Walnut, *Juglans regia*, breast cancer therapy, network pharmacology, molecular docking, phytochemicals, drug discovery.

A REIMAGINED PERSPECTIVE ON SAFETY AND PUBLIC HEALTH

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The significance of preventative measures, the function of public policies, community engagement, and the influence of environmental factors could be discussed in the abstract of a study on safety in public health. It might emphasize how important it is for different stakeholders to work together to ensure public health safety and suggest tactics for reducing health risks and fostering community well-being. Protecting community health and averting disease outbreaks depend heavily on public health safety. The abstract delves into the intricate aspects of public health safety, underscoring the crucial function of pre-emptive measures and regulations in reducing health hazards. It explores how socioeconomic variables, the environment, and access to healthcare services are all interrelated and influence public health outcomes. It also emphasizes how crucial community empowerment and engagement are to building resilient and healthy cultures. This abstract provides a thorough analysis that highlights the necessity of cooperative efforts between communities, governments, and healthcare organizations in order to effectively address new health issues and advance fair access to safe and healthy surroundings.

Keywords: Community engagement, Health risks, health hazards , pre-emptive, Public policies

TO EFFICACY PRODUCTION AND MANAGEMENT OF BEE KEEPING IN INDIA

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Beekeeping is the rearing of honey bee for honey and other by products. Honey is an essential element of food of human being. This study examines the management practices of beekeeping in India, focusing on key factors such as hive maintenance, bee health, honey production, and economic viability. Through a comprehensive review of literature and interviews with experienced beekeepers, the research elucidates various management strategies employed by beekeepers across different regions of India. The study highlights the importance of proper hive construction, regular inspection for disease prevention, and the use of sustainable beekeeping techniques. Additionally, the research explores the role of government policies and support initiatives in promoting the growth of the beekeeping industry in India. Findings suggest that effective management practices are essential for maximizing honey yield, ensuring bee health, and enhancing the livelihoods of beekeepers in India. Beekeeping in India has emerged as a significant agricultural practice, contributing to both rural livelihoods and national economic growth. This abstract explores the production aspects of beekeeping in India, focusing on key factors such as honey yield, bee species, and regional variations. India is home to diverse bee species, with the *Apis cerana indica* and *Apis mellifera* being the most commonly utilized for honey production. The country's rich biodiversity and varied climatic conditions provide favorable environments for beekeeping across different regions. However, the predominant species vary by geography, with *A. cerana indica* being more prevalent in the subtropical and tropical regions, while *A. mellifera* is mainly found in the temperate zones.

Keywords: beekeeping, honey, equipment, sustainable

CLIMATE CHANGE IMPACTS ON FRUIT CROP PRODUCTION AND ADAPTATION STRATEGIES

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Climate change poses significant challenges to fruit crop production worldwide, impacting various aspects such as yield, quality, phenology, and geographic distribution. This review paper explores the current scientific understanding of climate change impacts on fruit crops, focusing on key factors such as temperature, precipitation, extreme weather events, and their implications for different fruit species. Additionally, adaptation strategies to mitigate these impacts are discussed, including breeding for climate resilience, agronomic practices, and technological innovations. By synthesizing existing research findings, this paper aims to provide insights into the complex interactions between climate change and fruit crop production and offer guidance for sustainable adaptation measures.

Keywords: Climate change, fruit crops, adaptation strategies, temperature, precipitation, phenology, resilience.

IN VITRO AND IN VIVO EXPLORATION OF FUNGICIDES AND BIOAGENTS AGAINST ANTHRACNOSE DISEASE OF MANGO CAUSED BY COLLETOTRICHUM GLOEOSPORIOIDES**N. V. CHAURE*, P. R. ADSUL, R. R. RATHOD AND M. S. JOSHI****NV Chaure¹: PhD student, department of plant pathology, PR Adsul²: M.Sc. Student, Department of pathology, RR Rathod³: Associate professor, Department of plant pathology and MS Joshi⁴: professor, Department of plant pathology**

Mangos are a highly popular fruit among the general public because of its great nutritional worth, vast diversity, exquisite taste, and exceptional flavour. Mango anthracnose, mostly affecting foliage, flowers, and immature fruits, is a dangerous disease that is most common and is caused by *Colletotrichum gloeosporioides*. The *in vitro* efficacy of three fungicides viz; Thiophanatemethyl 70% WP @ 0.05%, 0.075%, 0.1%, 0.125, 0.2%, and Azoxystrobin 23% SC @ 0.1% and Carbendazium 12% + Mancozeb 63% WP @ 0.15%, while three *Trichoderma* species viz. *T. harzianum*, *T. longibrachiatum* and *T. koningii* was evaluated against *C. gloeosporioides*. The results showed that (T6)- Carbendazium + Mancozeb at 0.15% concentration was the most effective as it completely inhibited the mycelial growth of *C. gloeosporioides*. The least per cent growth inhibition was found in Thiophanate methyl (T1-75.92% and T2-68.52%) at 0.05% and 0.075% concentration. The antagonistic activity of bio-control agents against the test pathogen was determined by dual culture technique. Among the three species of *Trichoderma*, *T. harzianum* caused maximum inhibition 37.41% and it was followed by *T. koningii* (33.88%) and *T. longibrachiatum* (29.81%). *In vivo* efficacy of three different fungicides with three different *Trichoderma* spp. under field conditions resulted in reduced preharvest rot of mango. After 15 days of spraying, it was noticed that the trees sprayed with Thiophanatemethyl 70% WP at 0.2% obtained superior per cent disease control 76.13% but statistically at par with (T4), (T3) and (T7) with 75.09%, 74.59% and 73.11% at 0.125%, 0.1% and 0.1% respectively. Also, the result indicates that treatment with *T. harzianum* and *T. longibrachiatum* at 10% concentration obtained per cent disease control of 65.12% and 64.44%, while Thiophanatemethyl 70% WP at 0.075% and *T. koningii* at 10% obtained per cent disease control 63.21% and 63.00%. The least per cent disease control of the pathogen 62.53% and 59.64% was caused by the systemic and contact fungicide Thiophanatemethyl 70% WP at 0.05% and Carbendazium 12% + Mancozeb 63% WP at 0.15% concentration.

Keywords: *C. gloeosporioides*, anthracnose, mango, *Trichoderma* spp.**EXPLORING THE IMPACT OF NANO-SiO₂ ON SEED GERMINATION****DR. N. VINOTHINI¹ AND DR. S. KAVITHA²****Assistant Professor (SST), SRM College of Agricultural Sciences, SRM Institute of Science and Technology, Tamil Nadu, India****Associate Professor (SST), Department of Seed Science and Technology, Tamil Nadu Agricultural University, Tamil Nadu, India**

The application of nanotechnology in agriculture has garnered significant attention due to its potential to enhance various aspects of crop production. Among the emerging nanomaterials, nano-silicon dioxide (nano-SiO₂) stands out for its diverse applications in promoting plant growth and development. This abstract explores the role of nano-SiO₂ specifically in the context of seed germination. Research suggests that nano-SiO₂ can positively influence germination processes by modulating physiological and biochemical pathways in seeds. Nano-SiO₂ nanoparticles exhibit unique properties such as high surface area, reactivity, and biocompatibility, allowing for efficient delivery and interaction with seed tissues. Upon application, nano-SiO₂ may enhance seed water uptake, promote enzyme activity, and mitigate oxidative stress, thereby facilitating germination under adverse environmental conditions. Furthermore, nano-SiO₂ treatments have been reported to enhance seedling vigor, root development, and overall plant performance post-germination. However, the mechanisms underlying these effects are still under investigation, warranting further research to elucidate the precise pathways involved. Understanding the role of nano-SiO₂ in seed germination is crucial for harnessing its potential in sustainable agriculture. By optimizing nano-SiO₂ formulations and application methods, it may be possible to enhance seed germination efficiency, improve crop establishment, and mitigate environmental stressors. Nevertheless, careful consideration of potential risks and environmental implications associated with nano-SiO₂ use is essential to ensure its safe and responsible deployment in agricultural systems. This abstract highlights the promising role of nano-SiO₂ in seed germination and underscores the need for continued research to unlock its full potential as a sustainable agronomic tool.

UNDERSTANDING THE INFLUENCE OF ELEVATED CARBON DIOXIDE AND TEMPERATURE ON SEED QUALITY AND GERMINATION**DR. N. VINOTHINI¹ AND DR. V. MANONMANI²****Assistant Professor (SST), SRM College of Agricultural Sciences, SRM Institute of Science and Technology, Tamil Nadu, India****Professor & Head (SST), Department of Seed Science and Technology, Tamil Nadu Agricultural University, Tamil Nadu, India**

Research indicates that elevated CO₂ levels can influence seed development, altering biochemical composition, nutrient content, and seed coat characteristics. Concurrently, rising temperatures exacerbate these effects, amplifying physiological stresses and metabolic processes within seeds. Together, these environmental factors pose significant challenges to seed quality, impacting traits such as viability, vigor, and storability. Moreover, elevated CO₂ concentrations and elevated temperatures can disrupt seed germination processes, affecting dormancy release, germination rates, and seedling establishment. Changes in temperature regimes may also interact with CO₂ levels to modulate the responses of seeds to environmental cues, potentially altering germination behaviors and timing. Understanding the complex interactions between elevated CO₂ and temperature effects on seed quality and germination is essential for anticipating and mitigating the impacts of climate change on agricultural productivity and food security. Developing resilient crop varieties, implementing adaptive management strategies, and exploring innovative seed technologies are critical avenues for enhancing seed quality and germination under changing environmental conditions. This abstract underscores the insistence of addressing the combined impacts of elevated CO₂ and temperature on seed physiology and germination dynamics to inform sustainable agricultural practices and ensure resilient crop production in a changing climate.

EFFICACY OF BIO-PESTICIDES AGAINST MAJOR INSECT PESTS INFESTING *CURCUMA CAESIA* IN MILD TROPICAL HILL ZONE, ARUNACHAL PRADESH**N.Y. CHANU^{1*}, HELEN SOIBAM¹, NANCY LEGO¹, T.S. MEHRA³, N. SURMINA DEVI³, ROMILA AKOIJAM², DENISHA RAJKHOWA², AJAYKUMARA, K.M.³, A.K. MEENA⁴**¹AICRP on MAP&B, College of Agriculture, Central Agricultural University (Imphal), Pasighat, Arunachal Pradesh²College of Agriculture, Central Agricultural University (Imphal), Pasighat, Arunachal Pradesh³College of Horticulture and Forestry, Central Agricultural University (Imphal), Pasighat, Arunachal Pradesh⁴College of Agriculture, Barmer, Jodhpur Agriculture University, Jodhpur, Rajasthan, India

Curcuma caesia is a potential medicinal plant used by the traditional healers in ethno medicinal practices and this crop is majorly infested by two lepidopteran insects viz., shoot borer (*Conogethessp.*) and leaf folder (*Udaspepp.*) in Arunachal Pradesh. Field experiments were conducted for evaluating the efficacy of bio-pesticides against these two major insect pests of *C. caesia* for two consecutive cropping seasons (2021 and 2022) and the results depicted that chlorpyrifos 20 EC @ 2.5 ml/L and spinosad 45SC @ 0.4 ml/L are comparably effective in reducing the shoot borer infestation over control (56.19% and 62.33% reduction over control) followed by *Bacillus thuringiensis* @ 2g/L. Spinosad 45SC @ 0.4 ml/L could efficiently manage leaf folder (24.19% and 39.52% reduction over control) followed the chemical check. However, among all the treatments, spinosad 45SC @ 0.4 ml/L resulted in high fresh rhizome yield (17.31t/ha and 22.46t/ha) and cost benefit ratio (1:3.36 and 1: 2.19) during 2021 and 2022 respectively which is comparable with chlorpyrifos 20 EC @ 2.5 ml/L; followed by the treatment *Bacillus thuringiensis* @ 2g/L recording fresh rhizome yield of 12.8t/ha and 16.22t/ha and cost benefit ratio 1: 1.37 and 1:2.19 during 2021 and 2022 respectively.

Keywords: *Curcuma caesia*, *Conogethessp.*, *Udaspepp.*, biopesticides, efficacy**MICROBIAL ECOLOGY AND SUSTAINABLE AQUACULTURE****NA I SABET DOHTDONG^{1*}, AYUSHI BHARDWAJ¹, ASHUTOSH DANVE¹, HARINI G¹, BANLAMJINGSHAI MARBANIANG¹ AND VENERABILITY DHAR²**¹ICAR- Central Institute of Fisheries Education, Versova, Andheri (W), Mumbai, Maharashtra, India²College of Fisheries, Central Agricultural University (I) W. Tripura-Tripura, India

Intensification of aquaculture is being criticized for causing serious threats to the environment and has potentially led to disease outbreaks, deterioration of water quality, nutrient discharge, eutrophication, etc. Therefore, potential alternative technological interventions are requisite to make the aquaculture industry responsible with minimal environmental impacts. One of the aspects of such technological interventions is the application of microbial ecology for the sustainable advancements of intensive aquaculture. Microorganisms are an important part of aquaculture and are well-developed and can even be added artificially. Thus safeguarding natural resources and sustainable development has become one of the major concerns. The beneficial as well, as harmful microbes, need to be studied so that they can be manipulated and used beneficially in aquaculture. Understanding the complex interactions between microorganisms and the aquatic environment is critical for the sustainable growth of aquaculture. Decomposition of organic matter, nutrient cycling, biomonitoring, bioaugmentation, and bioremediation are some of the pivotal roles of microorganisms that significantly contribute to the sustainable management of aquaculture. The quorum sensing signaling system plays a role in biofilm formation in biofilters including microbial attachment, detachment, and colonization. Coordination of certain physiological attributes of microcolonies in biofilm such as stress resistance, toxin production and virulence are controlled by genes that are altered by quorum sensing signaling. Therefore, only by a thorough understanding of how the microbes function in an aquatic ecosystem, we can precisely recognize their importance for the forefront advances in aquaculture.

Keywords: microorganisms, sustainable aquaculture, microbial ecology, quorum sensing, quorum quenching.**MICROBIAL ECOLOGY AND SUSTAINABLE AQUACULTURE****NA I SABET DOHTDONG^{1*}, AYUSHI BHARDWAJ¹, ASHUTOSH DANVE¹, HARINI G¹, BANLAMJINGSHAI MARBANIANG¹ AND VENERABILITY DHAR²**¹ICAR- Central Institute of Fisheries Education, Versova, Andheri (W), Mumbai, Maharashtra, India²College of Fisheries, Central Agricultural University (I) W. Tripura, Tripura, India

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Keywords: microorganisms, sustainable aquaculture, microbial ecology, quorum sensing, quorum quenching.

DNA BARCODING OF *DROSOPHILAMELANOGASTER* FROM KHANDESH REGION BY COX 1 GENE METHODNADEEM Z. SHAIKH¹, DINESH NALAGE³ AND MANOJKUMAR Z. CHOPDA²¹Department of Zoology, DrUlhasPatil College of Science, Jalgaon²Department of Zoology, Moolji Jaitha (Autonomous) College, Jalgaon, Maharashtra, India³Paul Hebert Centre for DNA Barcoding & Biodiversity Studies, Dr. BabasahebAmbedkarMarathwada University, Aurangabad,

The gene technology had tremendously gain in today's era for solving the mysteries of life on this planet. The small creatures like *Drosophila* Species were collected from natural habitat of Moolji Jaitha College Campus, Jalgaon with the help of Banana as bait. These species were reared and culture in laboratory conditions in BOD incubator at 23°C fixed temperature on food named *Drosophila* diet (Hi-media). The Species were isolated and subjected to DNA bar-coding for identification at molecular level. The DNA bar-coding solves the unsolved mysteries of species identification through Cox 1 Method at molecular level. The nucleotides obtain in Fastaformat were put in Blast search engine of NCBI to obtain the percent similarity for the species confirmation as *Drosophila melanogaster*. The DNA barcode were generated in Bold System and got its barcode Id.

Keywords: Bar-coding, Identification, Nucleotide, Molecular level.**GENETIC STUDY ON VARIABILITY, GENETIC GAIN AND HERITABILITY OF YIELD AND YIELD RELATED TRAITS OF FOXTAIL MILLET (*SETARIAITALICA*)**NAGAPPA GOVNAKOPPA¹, ANILKUMAR, H². U. K. SHANWAD³ AND B. D. BIRADAR⁴¹Head, Fodder Research and Production Unit, University of Agricultural Sciences, Dharawd, Karnataka, India²Assistant grade-III, Food Storage Depot, Food Corporation of India, Koppal, Karnataka, India³Scientist (Agronomy), ICAR- KVK, University of Agricultural Sciences, Dharawd, Karnataka, India⁴Director of Research, University of Agricultural Sciences, Dharawd, Karnataka, India

The present work comprised of 40 foxtail millet advanced breeding lines obtained from small millet scheme, MARS, Dharwad. These lines with checks viz., DHFT-109-3 and HMT-100-1 were evaluated in replicated yield trial at millet scheme, MARS, Dharwad, during *rabi*2020-21 for assessing genetic variability, heritability, and genetic gain among 17 traits. Wide range of variation provides an ample scope for selection of superior and desired advanced breeding lines by the plant breeders for further improvement of these characters. The phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) for all the traits under study. In the present study foxtail millet advanced breeding lines exhibited moderate PCV and GCV for the most important economic traits viz., panicle length(15.85% and 18.01 %), panicle girth(15.25% and 15.45%), productive tiller per plant (18.44% and 19.40%) and straw yield per hectare and (19.92% and 21.39 %). The high phenotypic coefficient of variation and genotypic coefficient of variation were observed for characters viz., specific leaf area (21.08% and 22.44%), specific leaf weight (20.52% and 26.72%), grain yield per plant(9.32% and 10.99 %), grain yield per plot (8.85 % and 10.49%), and straw yield per ha (19.92 and 21.39), Moderate to high heritability coupled with higher magnitude of expected genetic advance for a particular trait indicates the additive gene action. On the contrary higher heritability coupled with low genetic advance is observed for any given trait, indicates the presence of non additive gene action. Most of the traits viz., plant height(79 %), flag leaf length(98%), flag leaf width (80%), number of productive tillers per plant (90%), panicle length(98%), panicle girth (97 %), SPAD at 50 per cent flowering (92%), test weight (63%), specific leaf area (88%), specific leaf weight (87%), grain yield per plant(71%) and straw yield per hectare (87%) showed the high estimates of broad sense heritability (h^2 b) indicating the reliability of the estimates for variation between advanced breeding lines and effectiveness of selection.

Keywords: Foxtail millet, genetic variability, heritability, PCV, GCV, phenotypic CV, genotypic CV, heritability**IMPACT OF NATURAL, ORGANIC AND CONVENTIONAL FARMING PRACTICES ON SOIL MESOFAUNA POPULATION IN REDGRAM ECOSYSTEM**NAGARAJU M C^{*1}., GOPI S². NIKITHA, L. T²., BALAJI B. N¹. AND SANJAY M T³.¹Department of Agricultural Entomology, UAS, GKVK, Bengaluru, ²Department of Entomology, College of Horticulture, Bengaluru³Department of Agronomy, UAS, Bengaluru, Karnataka-65

Arthropods have an important role in maintaining soil fertility. The major contribution of arthropods to soil is through decomposition and humification of all organic matter. In the soil, arthropods function as litter transformers, ecosystem engineers, and pulverizers. As much as 20 % of total animal litter input is processed by the activity of collembolans alone. Arthropods also stimulate mineralization of nutrients in soil. Soil practices in cultivated ecosystems significantly alter arthropod community which in turn has significant effect on soil productivity. Hence, understanding soil arthropod communities will prove useful in developing management plans for both wild and cultivated ecosystems. So A comparative study was conducted to know the variations in soil mesofauna population in red gram ecosystem grown under different farming practices viz., natural farming, organic farming, combination of organic + natural farming and conventional/ farmers practice/ chemical method of farming was carried out during *Kharif* 2020 and 2021 at, UAS, GKVK. The pooled data (two year) results revealed that highest soil mesofauna population in 500g soil of redgram ecosystem was noticed in organic farming practice followed by combination of organic + natural farming practice, natural farming practice and absolute control treatments. However, least number of soil mesofauna was recorded in chemical /farmer's practice and UAS (B) package of practice respectively. Application of chemical fertilizers and plant protection measures disturb the soil mesofauna resulting in the reduced activity of soil arthropods in UAS (B) recommended package of practice and farmer's practice. Application of organic amendments like vermicompost, paddy/ finger millet straw mulch and incorporation of previous crop i.e., cowpea haulm after harvest, application of Ghana jeevamrutha and jeevamrutha has contributed to increased activity of soil arthropods in organic and natural farming system.

Keywords: Natural farming, organic farming, farmers practice, soil mesofauna, redgram

A STUDY ON KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING MILLETS ON COLLEGE -GOING STUDENTS IN URBAN PATNA

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A major food crop grown throughout the world, millet has a big economic impact on poorer nations. Millets are regarded as wholesome, low-energy foods that aid in the prevention of malnutrition. Foods containing millet are thought to include probiotics and prebiotics that may be beneficial to health. As a result, a research study was carried out among college going adolescent to find out about their knowledge, attitudes, and millets behaviours. A mixed methods approach was used to collect information sources and attitude towards millets. 200 young adults between 18-29 years of age who pursued their under-graduation, post-graduation and Ph.D in the various disciplines. Information on their preferences and views on the objectives of Knowledge, Attitudes and Practices Regarding Millets were collected using the Google questionnaire through WhatsApp and interview Schedule. According to the study's findings, 70 percent of the participants in this session were in the 18–29 age range. toward 80 percent of people had good attitudes, knowledge, and practices toward millets, while 30 percent had low KAP levels. The finding was analyzed and discussed on basis of data obtained.

Keyword: Millets, Millets Product, Knowledge, Nutrition

EXPLORING BIOCHAR'S POTENTIAL IN ADVANCING SUSTAINABILITY: A COMPREHENSIVE OVERVIEW FOR ITS APPLICATION IN THE LITHIUM-ION BATTERY AND CONSTRUCTION INDUSTRIES

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The increasing demand for consumer goods and services is putting a strain on natural resources as companies prioritize short-term production goals over long-term sustainability. To implement a circular economy system, it's essential to explore and implement waste recovery methods that support environmental sustainability. Unfortunately, due to a lack of awareness and low economic return, a significant amount of organic waste is produced in the country, which is not utilized efficiently. A sustainable and cost-effective waste management method that can be used to convert organic waste into biochar through slow pyrolysis. Biochar is commonly used in agriculture to improve soil health, but it also has potential applications in the commercial sector. Recent research suggests that it can be used as a composite material, providing a sustainable alternative to conventional materials in many applications. However, to evaluate its potential use in modern scenarios, it's essential to have a deep understanding of recent advances and challenges. Unfortunately, there are not many reviews available describing the emerging applications of biochar in the industrial sector. Therefore, this paper provides an overview of two potential industrial applications of biochar, including battery electrodes for lithium-ion batteries and construction materials, particularly thermal insulation.

Keywords: Agricultural crop residues, Biochar, Pyrolysis, lithium-ion batteries, cementitious composites

GREEN ADEPTNESS IN THE SYNTHESIS OF SILVER NANOPARTICLES FROM TUBER OF *COLOCASIA ESCULENTA* AND ITS ANTICANCER ACTIVITY

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Cancer is a dangerous disease of uncontrollable cell fission in malignant tumor that invade the normal human body systems. In medical science the methods available to treat a cancer patient mainly includes surgery, chemotherapy and radiotherapy etc. As these known methods are very costly and have side effects with limitations of their use, there is need for effective and acceptable cancer therapeutics agents that would be non-toxic, highly efficacious against multiple cancers, palatable, cost effective. Medical plants have created great interest among researchers as they have been proved to possess anticancer activity (Gaidhani, 2013) and have no side effects. *Colocasia esculenta* (C. esculenta) is a tropical plant and widely distributed throughout Southern India and Southeast Asia. *Colocasia esculenta* Linn, (Family: Araceae) is an annual herbaceous plant with a long history of usage in traditional medicine in several countries across the world, especially in the tropical and subtropical regions. Nanoparticles of C. esculenta has not been used by any previous researcher for their anticancer activity, so far. This information gave us an impetus to synthesize the silver nanoparticles and evaluate its anticancer activity. Fresh tuber juice of *Colocasia esculenta* (5ml) is mixed with 1 ml of Silver nitrate (AgNO₃) solution having concentration 1M for reduction into Ag⁺ ions. Determination of cytotoxicity by MTT assay was carried out on Prostate cancer cell line (PC3). IC₅₀ value of Vincristine (standard) is 277.51 ± 30.05 µg/ml and IC₅₀ value of juice of tuber is 112.97 ± 71.60 µg/ml.

Key words: Anti-prostate cancer activity, *Colocasia esculenta*, Silver Nanoparticles, MTT Assay

AN ASSESSMENT OF ETHNOMEDICINAL PLANT DIVERSITY OF KANGRA AND HAMIRPUR DISTRICT OF HIMACHAL PRADESH, INDIA***NANCY, *NAVEEN DADWAL, ¹MUNIT SHARMA AND**OJASVI DOGRA*****Research Scholar, Department of Botany, Thakur PG College of education, Dhaliara H.P.****¹Assistant Professor, Department of Botany Thakur PG College of Education, Dhaliara H.P.**

The North-western Himalayan region is endowed with significant variety of Medicinal and Aromatic plants which boosts a wealth of expertise regarding plant based medicine. Himachal Pradesh is a mountainous region with an abundance of plants including a rich legacy of wild food plants and ethno medicinal flora. There is an abundance of medicinal plants and traditional medicinal expertise in Himachal Pradesh. Ethno medicinal plants are those plants which are used by humans as medicines. Local peoples of Hamirpur district use native herbs to treat a variety of illness. Therapeutic plants are rich in bioactive chemicals or naturally occurring substances having biological activity. Tribes and local communities of Kangra employ plant roots and flower stands to prevent and treat illness. The use of plant resources in their daily life has been an old practice of the people inhabiting in this district. The people living in remote areas of Hamirpur and Kangra district throws the light on the use of 50 medicinal plants of the region with their part/ parts used to treat various diseases and disorders in human as well as their livestock. The current study mainly focussed on gathering indigenous information about the plants used by local peoples in traditional medicine, to highlights the description of medicinal plants including local name, the parts used, the preparation methods as well as traditional uses to treat human diseases.

Keywords: Ethnomedicinal plant, Bioactive compounds, Human health care, Indigenous people**MOLECULE 2-AMINO-N-(2-CHLORO-6-METHYLPHENYL) THIAZOLE-5-CARBOXAMIDE (ANMC) IS A CORE OF ANTICANCER DRUG DASATINIB (LEUKEMIA)****NAND LAL VERMA****RESEARCH SCHOLAR, DEPARTMENT OF CHEMISTRY, K. R. (PG) COLLEGE, MATHURA,**

The titled molecule 2-Amino-N-(2-chloro-6-methylphenyl)thiazole-5-carboxamide (ANMC) is a core of anticancer drug Dasatinib (leukemia), its derivatives exhibited bioactivity against breast cancer, Experimentally, titled compound described by NMR (¹H NMR and ¹³C NMR), FTIR and UV visible spectroscopy and compared with the theoretical results with the good agreement. Hirshfeld surface analysis well described the secondary internal and external interactions. Comparing UV-visible spectra obtained in various solvents with the calculated TD-DFT results revealed minimal solvent effects. Molecular electrostatic potential (MEP) map and Fukui function are employed which indicated reactive sites of the molecule. The bioactivity profile probability of ANMC is theoretically explored by calculation of electrophilicity index and drug-likeness. Molecular docking of the ANMC molecule performed with ten receptors to obtained the best ligand-protein interaction, minimum binding energy achieved -8.0 Kcal/mol. Biomolecular stability of ANMC was investigated by Molecular Dynamic Simulation (MDS). Free energies also analysed and showed great interactions between ligand and protein.

ASSESSING SEED FALL AND SOIL SEED BANK DENSITY OF TREELINE SPECIES IN THE WESTERN INDIAN HIMALAYAN REGION**NANDAN SINGH****Department of Forestry and Environmental Science, D.S.B. Campus, Kumaun University, Nainital, Uttarakhand, India**

Seed fall density and seed banks are an essential component where favorable conditions for seed germination and seedling establishment are quite unpredictable and provide important information as to what species may have existed in the standing vegetation of the past and/or represent a pool of regenerative potential. The present study aims to assess the seed fall density and soil seed bank density of important treeline species in the Indian Himalayan region (IHR). The study was conducted in treeline areas of the western Himalayan region of Uttarakhand. The mean annual temperature of the sites varied from -8.91 and 25.6°C. The seed fall density was assessed by placing a 1m² wooden seed trap. The total tree density was 590 and 760 ind ha⁻¹. The tree density of *A. spectabilis* and *Q. semecarpifolia* ranged from 160 to 170 ind ha⁻¹ and 6 to 100 ind ha⁻¹. Across the collection and sites, the mean seed fall density of *A. spectabilis* and *Q. semecarpifolia* varied from 3.75 to 7.85 seed m⁻² and 1.58 to 6.12 seed m⁻² in different seed traps while the mean number of viable seeds of all studied species declined with increasing soil depth. The total seed density across all depths and sites ranged between 0.67 to 6.33 m⁻². Local variation imposed by elevation, aspect, and exposure affect the seed production and at higher elevations, the seed yield is more irregular compared to lower elevations. Climatic conditions at high-altitude regions and weak regional trends affect the seed production in treeline areas and heavy anthropogenic pressure in the form of grazing animals appears to be one of the major factors responsible for low regeneration.

Keywords: Treeline, Seed Fall Density, Seed bank, Viable seed, Soil depths

CRISPR/CAS9 TECHNOLOGY FOR INSECT CONTROL**NANDINI SINGH^{1*} AND BIPIN VERMA²**¹Department of Entomology, Banda University of Agriculture & Technology, Banda-²Department of Plant Pathology, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur

Phytophagous insects pose a significant threat to global crop yield and food security. It's essential to develop innovative approaches that boost agricultural productivity while minimizing the use of harmful synthetic insecticides. Clustered regularly interspaced short palindromic repeats (CRISPR) and the CRISPR-associated gene Cas9 represent an invaluable system for the precise editing of genes in diverse species. Using the revolutionary CRISPR/Cas9 technology to develop insect-resistant plants appears to be highly efficient at lowering production costs and increasing farm profitability. This novel technique possesses the capacity to modify an insect's DNA, enabling the introduction of a gene drive or overcoming an insect's resistance to specific insecticides. CRISPR/Cas9 technology has proven effective in the genetic modification of numerous insect pest species. The rapid progress in the methodologies of CRISPR/Cas9 technology and their diverse applications show a high promise in the development of insect-resistant plant varieties or other strategies for the sustainable management of insect pests to ensure food security.

Keywords: CRISPR/Cas9, insect-resistant, sustainable management, food security**DEVELOPMENT OF AN ELECTRONIC DEVICE FOR COLOR ANALYSIS OF LAC: QUALITY ASSURANCE FOR SUSTAINABLE FARMING AND TRADE****NANDKISHORE THOMBARE^{*1}, SAURAV KUMAR², AP BHONDEKAR², AMAN UPADHYAY², LUBHAN CHERWOO², ANUPMA SHARMA², ARTI MAHTO¹, RITESH KUMAR², SUDESHNA BAGCHI², MF ANSARI¹ AND ABHIJIT KAR¹**¹ICAR-National Institute of Secondary Agriculture, Namkum, Ranchi, India²CSIR- Central Scientific Instrument Organization, Chandigarh, India

Lac is the natural resin of insect origin having a huge commercial value. It is cultivated on specific host trees and India is the first ranker followed by others countries like Thailand, China, Bangladesh, Myanmar, Sri Lanka, Cambodia and Vietnam. It is exported mostly to USA and European countries from for food, pharmaceutical, cosmeceutical and other applications, and its quality plays a key role in its export and valuation. Color index is an important parameter deciding quality and subsequently deciding prices of the lac samples. The conventional method of lac color estimation is manual and has chances for human errors, hence a novel device Lac Color Index Analyser (LaCilyser) has been developed for the precise measurement of the color index of lac. The developed LaCilyser is a portable, electronic, and hand-held device for lac color index analysis, based on the principle of calorimetry. The device offers accurate results across a wide range of lac color index values with its pre- calibrated system and resolution of color index ± 1.0 . Operating on a user-friendly interface, the device incorporates data acquisition and processing capabilities, providing quick and reliable measurements in just 30 seconds. The LaCilyser is a valuable tool for industries requiring precise color evaluation contributing to its quality control. Funding acknowledgement: NABARD, ICAR and CSIR.

Keywords: Lac, Shellac, Colour Index Estimation, Make in India, Calorimetry**EVALUATION OF GENETIC VARIABILITY, HERITABILITY AND GENETIC PROGRESS FOR YIELD AND FRUIT CHARACTERISTICS IN ARECANUT (*ARECA CATECHU* L.)****NARAYANASWAMY M^{1*}, VIRUPAKSHI HIREMATA^{1,2}**¹Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga²University of Agricultural Sciences, GKVK, Bengaluru, Karnataka

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Arecanut (*Areca catechu* L.) is a high-value commercial crop predominantly grown in the coastal and Malnad regions of India, where it holds the top position in both area and production. Besides its widespread use for chewing, arecanut also has applications in Ayurveda and veterinary medicine. This study aimed to partition genetic variability into various components to better understand the genetic basis of yield and its contributing factors. Conducted at the Agricultural and Horticultural Research Station in Sringeri, Karnataka, India, the experiment utilized a randomized block design with 10 cultivars to examine the pattern and degree of genetic variability. The analysis of variance revealed significant variation among genotypes for all assessed traits. The genotype Sringeri Local exhibited superior mean values for several key characteristics, including fruit length, fruit breadth, husk thickness, fresh weight of husk, fresh nut yield, bunch weight, fresh weight of kernel, dry weight of kernel, fresh weight of husk per palm, dry weight of husk per palm, and number of inflorescences. High estimates of phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability, and genetic advance as a percentage of the mean were observed for these traits. Notably, the highest PCV and GCV values were recorded for yield (81.26% and 79.74%, respectively), dry husk weight (69.93% and 67.78%, respectively), and fresh kernel weight (65.05% and 64.03%, respectively). Heritability estimates ranged from 13.23% to 99.0%. These findings indicate that the traits are predominantly influenced by additive gene action, suggesting that genetic improvement through direct selection is feasible and effective. This study underscores the potential for utilizing these genetic variations to enhance arecanut yield and quality through targeted breeding programs.

Keywords: Arecanut, GAM, GCV, heritability, PCV, variability

BIOEFFICACY OF DIFFERENT BIO-PESTICIDES AGAINST BRINJAL SHOOT AND FRUIT BORER, (LEUCINODES ORBONALIS GUENEE)**NANU RAM SHARMA* AND BABLU SHARMA*******Department of Entomology, Swami Keshwanand Rajasthan Agricultural University, Bikaner - 334 006, Rajasthan, India******Department of Entomology, Rajasthan Agriculture Research Institute, Durgapura, Jaipur-302018, Rajasthan, India**

All the treatments were found effective and significantly superior over the control. Based on per cent fruit infestation on brinjal, T4 *Bt*. 2.0 kg/ha, T1 *Beauveria bassiana* 2.0 kg/ha, T3 Neem oil 5%, T2 NSKE 5%, T5 Panchagavya 0.01%, T7 Castor oil 5%, T6 Garlic extract 5% and T8 *Tagetes* 5% as compare to T9 control as compare to T9 control. All the treatments were found effective and significantly superior over the control. Same trend of effectiveness of treatments was found in both the cases i.e. in shoot infestation as well as in fruit infestation. Among the treatment studied, the best and most economical treatment was T4 *Bt*. (1:2.53), followed by T1 (1:2.38), T3 (1:2.37), T2 (1:2.19), T5 (1:2.16), T7 (1:2.17), T6 (1:2.15), T8 (1:2.05) as compared to control T9 (1:1.06).

Keywords: Brinjal, *Bt.*, infestation, shoot and fruit borer, yield.**UTILISATION OF RECIPROCAL RECURRENT SELECTION IN TOMATO (SOLANUM LYCOPERSICUM) WITH MODIFICATIONS FOR ENHANCING COMBINING ABILITY AND YIELD****NARAYANA BHAT DEVATE² AND O. SRIDEVI¹*****¹Department of Genetics and Plant Breeding, University of Agricultural Sciences Dharwad-05, India****²International Center for Agricultural Research in the Dry Areas, Food Legume Research Platform, Amlaha, India**

Being a most popular vegetable crop, tomato has been bred extensively to produce promising cultivars, which intern led to the reduction in genetic diversity. Research on utilization of reciprocal recurrent selection principle in tomato to enhance combining ability and heterosis is conducted here. Eight commercial single cross hybrids (SCH) were crossed in diallel fashion and among them two SCH (*viz.* Nirupama and Sankranti) which produced superior double crosses were advanced by continuous selfing and selection to generate two F₆ populations with 50 lines each. Based on the yield performance, eight lines from each population were selected and crossed in all possible combination to generate 64 derived hybrids and they were evaluated along with the parents, commercial check and bench mark checks (from which the populations were derived). Combining ability analysis revealed the presence of higher magnitude of SCA than GCA variance for the studied character. A total of 17 hybrids exhibited superiority over superior bench mark check 'Nirupama' for fruit yield per plot. The hybrids DTH-1808 (83.42 %) exhibited highest superiority over commercial check (AS-95), for fruit yield per plot indicating practical utility of improvement through reciprocal recurrent selection.

ANALYSIS OF THE DISTRIBUTION AND DIVERSITY OF BUTTERFLIES IN DIFFERENT HABITAT TYPES NEAR CAPITAL CITY ITANAGAR, ARUNACHAL PRADESH, INDIA**NARENDER SHARMA****Zoological Survey of India, Northern Regional Centre, 218 Kaulagarh Road Dehradun-248195, U.K.**

The Eastern Himalayan region of the Indian Himalaya is represented by the state Arunachal Pradesh. The latter state is less explored region for insect diversity and is the largest state amongst the North-Eastern states of India sharing international boundaries with Bhutan, China, Tibet and Myanmar. The total geographical area of the state is 83,743 sq. km. and lies between latitude 26°28" and 29°30" N and longitude 91°30" and 97°30" E. About 82% of the state is under forest cover. The state, Arunachal Pradesh is a biodiversity hotspot of India which is mostly covered by sub-tropical wet forest. Butterflies are generally regarded as one of the best taxonomically studied group of insects. Worldwide, there are more than 18768 species of butterflies, with about 80 percent found in tropical regions. The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1392 species of butterflies. Butterflies enable sustenance of ecosystem services through their role in pollination and serving as important food chain components. Being potential pollinating agents of their nectar plants as well as indicators of the health and quality of their host plants and the ecosystem as a whole, exploration of butterfly fauna thus becomes important in identifying and preserving potential habitats under threat. During the course of present studies, three habitats i.e., Wetland, Riverine and Terrestrial habitat present near capital city Itanagar, Eastern Himalaya were surveyed every month to record butterfly diversity w.e.f. December, 2019 to November, 2021. Total 164 species referable to 98 genera and 5 families *viz.*, Papilionidae, Nymphalidae, Pieridae, Lycaenidae and Hesperidae were recorded from all the 3 habitats. Family wise analysis of the number of butterflies species indicates that the family Nymphalidae was with maximum number of species (81 species, 49%), followed by Lycaenidae (33 species, 20%), Hesperidae (23 species, 14%), Pieridae (16 species, 10%), and Papilionidae (11 species, 7%). Observations on relative abundance of butterfly diversity revealed that of these 164 species, 54 species (33%), were found to be common, 65 species (40%) uncommon, and remaining 45 species (27%) less common. Highest number of species were recorded from Wetland habitat (128 species), Terrestrial habitat (111 species) and least from Riverine habitat (76 species). During presentation, the role of different habitats in the conservation of butterflies will be discussed.

DEVELOPMENT AND PERFORMANCE EVALUATION OF AN ELECTRO-MECHANIC SEED-METERING UNIT OF SWEET CORN PLANTER***ER. NARENDRA KUMAR YADAV¹ AND DR. SANWAL SINGH MEENA²****¹Phd Research Scholar, ²Associate Professor and Head, Department of Farm Machinery and Power, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan**

Sustainable development in Precision agriculture is a farming technique that uses agricultural technology to increase farm production while minimizing environmental impact with enhanced crop performance. There are various types of planters which have different types of seed metering mechanisms which are working by attached with ground wheel; these mechanisms are of mechanical type and they use drive through gears, chains or belts from the ground wheel and while transmitting power, there exists some transmission losses. Due to continuous friction between moving parts, these components are subjected to wear and tear. The sensor system in the machine helps in proper metering of seeds and thus further reduces the losses. The metering unit would be synchronized with the D.C motor with the help of proximity sensor and micro controller. Thus, the precision farming can be achieved with the help of smart metering mechanism by avoiding multiple seed dropping and missing voids, keeping row to row and seed to seed distance constant. By keeping the above points in view, an effort is made to develop a battery-operated corn planter based on electronic sensor metering mechanism. A photo electronic sensor based instrumentation system was developed to Battery operated seed planters to quickly assess the seed metering rotor performance. The data thus collected and logged using instrumentation system without manual interference while in operation could quickly subjected to analysis, to identify defects in critical components, so that such machine components be redesigned to improve precision. Inclined and horizontal rotor plate metering mechanisms were test using a grease belt test rig in laboratory conditions fitted with the instrument system. The developed electronic sensor based instrument seed counting accuracy ranged between 96.88 to 99.55 percent of the actual seeds metered. The mean number of seeds counted by the sensor at different forward speeds from 257.54 to 253.88, 267.45 to 265.82 for incline and horizontal rotor plates respectively, Seeding rate obtained for horizontal and inclined plate at forward speed of 3.5 km h were 11.13 and 11.18 seeds Seed spacing interval observed for horizontal rotor at the forward speed of 3.5 km h- was 201.33 mm for maize and Horizontal metering plate recorded more consistent seed to seed spacing interval when compared with the other mechanism. Sensing the seeds flowing through the seed tubes helps the operator to observe functioning of the planter

Keywords: photo electronic sensor, horizontal plate, inclined plate, seed tubes, planter**NITROGEN FRACTIONS IN SOIL AND THEIR RELATIONSHIP UNDER DIFFERENT CROPPING & MANAGEMENT SYSTEM IN NAVSARI DISTRICT OF SOUTH GUJARAT****NARENDRA SINGH¹, SONAL TRIPATHI², PATEL V. A.³, BHAVESH B. PATEL⁴, J. B. VASAVE⁵ AND BALAJI M. MOTE⁶****^{1,2}Department of Soil Science, Navsari Agricultural University, Navsari****³Soil & Water Management Research Unit, Danti, NAU, Navsari****^{4,6}Directorate of Research, NAU, Navsari****⁵Polytechnic in Agriculture, NAU, Vyara**

To study the nitrogen fraction under different cropping and management system, the present investigation was carried out at NAU, Navsari (Gujarat) during year 2022-2023. From each taluka of Navsari district, ten soil samples were collected randomly from 0-15 cm and 15-30 cm depth by using different cropping and management systems by GIS base grid sampling method. Soil samples were subjected to preliminary analysis for pH, EC, SOC, CEC, CaCO₃ and soil texture and then analysis of different N-fractions was carried out. Nitrogen is one of the main limiting factors of crop productivity and many studies have sought possibilities to reduce the need for N application and extend the period of availability to plants. Organic N forms constitute up to 90% of the total N in the plow layer of mineral soils and only about 1–4% is mineralized as plant- available N (NH₄-N and NO₃-N). Plant-available N released from soil organic N (SON) or applied in fertilizer is highly susceptible to loss from the soil– plant system through leaching and denitrification. The overall distribution of avail. N, NO₃-N, NH₄-N and total N in Navsari district was ranged from 72.80 to 375.20 mg kg⁻¹, 5.60 to 92.40 mg kg⁻¹, 30.80 to 114.80 mg kg⁻¹ and 140.00 to 1036.00 mg kg⁻¹, respectively for surface soils while, 61.60 to 364.00 mg kg⁻¹, 8.40 to 72.80 mg kg⁻¹, 25.20 to 100.80 mg kg⁻¹ and 140.00 to 924.00 mg kg⁻¹ for sub-surface soils, respectively. At surface layer, total N was correlated significantly and positively with SOC, CEC and it was negatively correlated with pH and EC. However, total N showed similar correlation with SOC and EC at sub-surface layer. NH₄-N and NO₃-N were positively and significantly correlated with each other at the same depth. The result also revealed that the N fractions were significantly decreased with increasing depth of soil. Overall, our findings suggest that vegetation restoration improved the soil N availability.

Keywords: GIS, N-fractions, Organic N, NH₄-N, NO₃-N.

DOUBLING OF FARMERS INCOME BY 2022: STATUS**NARENDRAYADAV, LAL CHAND YADAV, HEMANT KUMAR LAMBA****Ph.D. Scholar, Department of Agriculture Economics****Rajasthan College of Agriculture****Maharana Pratap University of Agriculture and Technology –Udaipur, Rajasthan- India**

India is an agrarian economy and a single bad monsoon takes toll on entire economy. Agriculture plays a vital role in India's economy by contributing 18.8 % GVA. For strengthening the farmer, the Committee set the time frame for achieving the doubling of farmer income from 2016-17 to 2022-23, with 2015-16 as the base year. Three fundamental ways in which income of farmers may be enhanced, viz. increasing the gross income, reducing the costs, and stabilizing the income. Enhance in the gross income can be achieved through diversification of high value crop and the cost can be reduced by using household inputs. NSSO's Situation Survey 2002-03 and 2012-13 are the main sources of data on farmers' income. The Consumer Price Index for Agricultural Labourers (CPIAL), the most relevant index, was used to compute the actual income of farmers. It was discovered that the real income growth rate for farmers drops to 3.5% annually. Based on the NSSO projections from 2012-2013, the average national farmer's income in 2015-16 was estimated to be Rs 96,703, or roughly Rs 8,058 per month for a farm household. The Committee estimated that the desired national farmers' income in 2022-2023 would be Rs 2, 71,378 at current prices, or Rs 22,610 per month. The Committee noted in its report that a 10.40 per cent annual growth rate in farm revenue was necessary to meet this aim. Progress towards this goal varied across regions and states due to disparities in agricultural practices, landholding patterns, and government policies. While some regions showed promising growth in agricultural income, others faced challenges such as climate change, water scarcity, and market volatility.

Keywords: - Gross income, Farmer, Index, Diversification**PUSASRIJAN: A BIO-FORTIFIED WHEAT GENOTYPE AS AN ALTERNATIVE OF STEM TO MINIMIZE PLASTIC USE****NARESH KUMAR BAINSLA¹, INDU CHOPRA², PRASHANTH BABU¹, KIRAN GAIKWAD¹, MANJEET KHOKHAR¹, SANJAY SINGH¹, ANJUMAHENDRU SINGH³ AND RAJBIR YADAV¹**¹**Division of Genetics, ICAR- Indian Agricultural Research Institute, New Delhi-110012**²**Division of Soil Science and Agricultural Chemistry, Indian Agricultural Research Institute, New Delhi-**³**National Bureau of Plant Genetic Resources, New Delhi-110012**

Wheat is grown as a major staple food grain crop and is known for its diverse end uses by the food industry. Besides, its stem or residue is limited to livestock fodder in India. Pusa Srijan is a genotype developed by intermating transgressive segregants selected from F₂ plants from NW6049/HD3059 and NW6049/HD2329 followed by subsequent selections in the next generations until F₈. This genotype has combined nutritional quality traits having protein content (13.9%), wet gluten (39.87%), wet gluten (14.55%), Fe (38.4ppm), Zn (58 ppm), TGW (51.4g). This genotype is lodging resistant despite an average height of 140cm with a sturdy stem, longer peduncle, and subsequent internode with wider diameter compared to other semi-dwarf varieties. The unique architecture of the plant makes its stem ideal for simply cutting the internodes and making marketable drinking straws. More than 500 million plastic straws are used daily causing severe concern to the marine and land ecosystem and making it one of the significant plastic pollutants on the planet. The straws made from the stem of Pusa Srijan can be stored at ambient conditions for more than 12 months. These straws were found to have no undesirable colour, odour when used in different beverages and drinks (Milk, coconut water, cold drinks, fruit juices, buttermilk, etc.) at different temperatures and pH ranges. The straws were found better in terms of flexibility and consumer perception compared to other biodegradable alternatives such as paper and bamboo straws. These straws have the potential to provide a cost-effective replacement for plastic and other single-use straws. It has the possibility of generating extra income for farmers through value addition in wheat crop residue which is otherwise burnt or has very little economic value as livestock fodder. Thus, Pusa Srijan is an excellent designer genotype with high bio-fortified nutritional value making it suitable as a donor for these traits besides minimising plastic use and generating eco-friendly income to stakeholders.

Keywords: End-use traits, Bio-fortification, Biodegradable straws, Eco-friendly, Value addition**EVALUATING SPATIAL VARIABILITY OF AVAILABLE BORON STOCK IN THE SOILS OF SAURASHTRA REGION BY USING ARC GIS****NAVDEEP SINGH BHATI¹*, CHIRAG A. GORASIYA¹ AND TITIKSHA BOHARA²**¹**Department of Soil Science and Agricultural Chemistry, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat)**²**Department of Fruit Science, College of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat)**

An attempt has been made in the present investigation to study the evaluation of boron status in the soils of Saurashtra region of Gujarat by collecting 760 surface soil samples from the farmer's cultivated field across ten districts during the year of 2021. In order, to study the soil chemical properties (EC_{2.5} and pH_{2.5}) and available boron (mg kg⁻¹). The status of available boron (mg kg⁻¹) in the soils of overall Saurashtra were observed with mean value of 0.41 mg kg⁻¹ and varied from 0.03 to 3.09 mg kg⁻¹. To a greater extent the lowest mean value of 0.26 mg kg⁻¹ was obtained from Bhavnagar district. However, the highest value of 0.83 mg kg⁻¹ was observed in Porbandar district. Based on six tier percent classification of available boron in the soils of Saurashtra region falls into following order, Deficient (53.87) > Acute Deficient (20.40) > Latent Deficient (12.93) > Marginal Sufficient (6.27) > High (4.40) > Adequate (2.13). The available boron categorizes into low, medium and high classes, about 2.13, 72.25 and 25.62 per cent samples as per these three tier categorization. Overall, the soils of Saurashtra

region had nutrient index value of 2.23 for available boron, which indicated medium status. As per correlation analysis, the $EC_{2.5}$ in soils of the region was positively correlated with available boron like in districts of Jamnagar ($r = 0.267^*$), Bhavnagar ($r = 0.478^{**}$) and Junagadh ($r = 0.403^{**}$). However, $pH_{2.5}$ correlated negatively with available boron, the trend was found in Rajkot ($r = -0.974^{**}$) and Girsomnath ($r = -0.803^{**}$) districts. Whereas, the Amreli ($r = 0.476^{**}$) district correlated positively with it. On the basis of analyzed data of soil samples, collected from different districts of Saurashtra region, it can be concluded that soil chemical properties viz., $EC_{2.5}$ ($dS\ m^{-1}$) were distributed normal to become tending to saline in range, $pH_{2.5}$ were alkaline in reaction and available boron ($mg\ kg^{-1}$) was deficient to acute deficient in nature. The $EC_{2.5}$ varied widely ranged from 0.01 to 5.14 $dS\ m^{-1}$ with an average value of 0.48 $dS\ m^{-1}$ across the Saurashtra region. As the data revealed further, the minimum $EC_{2.5}$ was found in the district of Morbi (0.24 $dS\ m^{-1}$), whereas the maximum value was detected in Porbandar (1.15 $dS\ m^{-1}$) district. Additionally, the distribution of soil samples in different salinity class showed that order of salinity classes likewise 58.93 per cent (Tending to become saline) > 26 per cent (Normal) > 14.13 per cent (Saline) > 0.93 per cent (Highly saline). Soils of this region revealed varied $pH_{2.5}$ range from 6.74 to 9.18 with mean value of 8.03. As the data unveiled, lowest and highest mean value of soil $pH_{2.5}$ were observed in Porbandar (7.87) and Amreli (8.16), respectively. As per percent distribution of alkalinity classes, the soil samples of entire region were distributed into alkaline (47.33 per cent), normal (44.53 per cent), alkali (7.60 per cent) and highly alkali (0.53 per cent) classes.

Keywords: Available boron, Soil $EC_{2.5}$, Soil $pH_{2.5}$, Saurashtra region, Boron index, Correlation, Percent distribution

INTEGRATION OF MEDICINAL PLANTS IN LIVESTOCK FEED FOR IMPROVED ANIMAL HEALTH AND PRODUCTIVITY

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The livestock industry faces ongoing challenges in maintaining animal health and enhancing productivity while minimizing the reliance on synthetic additives. This study delves into the promising avenue of integrating medicinal plants into livestock feed as a sustainable and holistic approach. The objective is to explore the impact of incorporating selected medicinal plants known for their health-promoting properties into the diets of livestock. Our research focuses on identifying key medicinal plant species rich in bioactive compounds such as polyphenols, flavonoids, and essential oils. We investigate their potential effects on the overall health, immune function, and growth performance of livestock. Through a series of controlled feeding trials with different animal species, we aim to quantify the improvements in parameters like weight gain, feed conversion efficiency, and disease resistance. In addition to assessing the physiological benefits, our study evaluates the economic feasibility and practical implications of incorporating medicinal plants into large-scale livestock operations. We discuss potential challenges and propose practical guidelines for farmers seeking to implement such integrations into their feeding regimens. This abstract highlights our commitment to advancing sustainable and natural approaches within the livestock industry. The integration of medicinal plants into feed not only has the potential to enhance animal health and productivity but also aligns with the global movement towards eco-friendly and ethical agricultural practices. Our findings contribute valuable insights to the ongoing dialogue on optimizing livestock nutrition for a healthier and more sustainable future.

Keywords: Disease, Essential Oils, Medicinal Plants, Polyphenols

SEASONAL INCIDENCE OF ECTOPARASITIC MITES AND GREATER WAX MOTH IN APIS MELLIFERA L. COLONIES IN CHAMBAL REGION OF MADHYA PRADESH

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Honey bees are one of the eusocial and foremost fascinating and beneficial creatures in the kingdom Animalia. Apiculture has occupied an important economic status and contributes substantially to the national income. Presently this field is facing many challenges throughout the world including the depredation of a large number of insect pests, diseases, and enemies. In the present study, the incidence of ectoparasitic mites *Varroa destructor* (Anderson and Trueman), *Tropilaelaps clareae* (Delfinado and Baker) and greater wax moth *Galleria mellonella* (L.) on the *Apis mellifera* L. honey bee was assessed during 2019-20 at the Krishi Vigyan Kendra, Morena, Madhya Pradesh. The results revealed that *V. destructor* infestation was at minimum (4%) in the first fortnight of July 2019 and maximum (14%) in the first fortnight of September 2019 with the visual examination method. There existed a negative correlation with the brood area. *Tropilaelaps clareae* infestation was minimum (6 mites/ colony) in the second fortnight of November 2019 and maximum (22 mites/ colony) during the first

fortnight of October 2019, as assessed by the sugar dusting method. The infestation revealed a negative correlation with colony strength. *Galleria mellonella* incidence was at maximum (176 larvae, 72 pupae, and 17 adults/ colony) in the second fortnight of September 2019 and minimum (5 larvae, 5 pupae, and 2 adults/ colony) in the first fortnight of September, August and August 2019, respectively. The number of pupae and brood area was found significantly negatively correlated ($r = -0.534$); while the number of adults vs. colony strength and brood area were significantly negatively correlated ($r = -0.499$ and $r = -0.607$, respectively).

Keywords: *Apis mellifera*, *Tropilaelaps clareae*, *Varroa destructor*, *Galleria mellonella*, seasonal incidence, brood area, colony strength, correlation coefficients, honey store, pollen area

UNDERSTANDING DURUM WHEAT (*TRITICUM TURGIDUM* L. SUBSP. DURUM) RESPONSES TO HEAT STRESS: MULTIVARIATE ANALYSIS OF YIELD AND ATTRIBUTES

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Economic significance of Durum wheat (*Triticum durum* Desf.) is underscored by its distinct features, end products, and notable resilience to abiotic stress compared to other wheat varieties. In heat stress breeding programs, multivariate analysis techniques like principal component analysis (PCA) and cluster analysis prove instrumental in dissecting the diversity among wheat genotypes, elucidating the underlying variations. A total of 217 genotypes including lines from ICARDA and indigenous collections of NBPGR in New Delhi, were assessed in an augmented block design at the AICRP on Wheat, UAS, Dharwad under stress conditions and the comprehensive genetic variability was analyzed, revealing 24 distinct factors. Notably, the initial eight components elucidated over 69 per cent of the overall variation. The first two principal components predominantly correlated with morphological and yield-related traits, while the third and fourth principal components were chiefly associated with agronomic and physiological characteristics. The strategic selection of representative genotypes from these specific groups could serve as a targeted approach in hybridization programs, aimed at augmenting heat tolerance mechanisms and fostering the development of exceptionally heat-resistant varieties. According to the stress tolerance index (STI), 95 genotypes were classified as tolerant, while the stress susceptibility index (SSI) identified 71 genotypes as tolerant. Taking into consideration the SSI, STI, and stress tolerance evaluation (STE) indices, the following genotypes emerged as the most heat stress-tolerant: UAS_5, UAS_14, UAS_15, UAS_28, UAS_42, UAS_53, IC138843, IC0536356, IC0535726, IC0535812, IC265331, and UAS DW-31138. The principal component analysis (PCA) biplot analysis affirmed the extent of trait variation, with traits such as grain yield, productive tillers, and biomass deemed significant. Additionally, physiological traits like leaf waxiness, NDVI II, SPAD I, and SPAD II were identified as associated with grain yield, underscoring their importance in conferring heat stress tolerance. These traits merit prioritization in the selection of heat-tolerant genotypes.

COMPARATIVE ANALYSIS OF IMPACT OF BENZOPHENONE-3 AND MALACHITE GREEN ON THE BRAIN OF *CYPRINUS CARPIO*

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Benzophenone-3 (BP-3) is a widely employed UV filter, extensively used to address concerns regarding sunburns, premature skin aging, and skin cancer. As per US EPA, it has been acknowledged as an emerging pollutant, due to its environmental persistence, potential bioaccumulation, and endocrine disrupting effects. In contrast, malachite green (MG) is a member of tri-aryl methane dye family, extensively employed in various dyeing processes including textiles, leather, paper, fur, vegetables and confectionaries. Despite well-documented toxicity, its illicit employment persists in several Asian nations for treating *Saprolegniasis* and *Ichthyophthirius multifiliis* infections in aquaculture settings. The present study investigates the comparative effects of BP-3 and MG on the brain of *Cyprinus carpio*. The fish (6.83±0.13 cm, 3.89±0.14 g) were exposed to sub-lethal concentrations of BP-3 (0.389 mg/l; 1/10th of 96h LC₅₀) and MG (0.087 mg/l; 1/5th of 96h LC₅₀) for 15 and 30 days. Histoarchitectural profile of the fish brain was evaluated. The general histological structure of *Cyprinus carpio* brain encompasses olfactory lobe, cerebrum, diencephalon, optic tectum, optic tegmentum, and medulla oblongata. The layers of optic tectum comprise stratum marginale, stratum opticum, stratum fibroreticulare, stratum album central, stratum griseum central and stratum periventriculae. Microscopic examination of the exposed groups, BP-3 and MG showed histological alterations including vacuolization, pyknotic nuclei, loss of cytoplasm, while layers of optic tectum exhibited congestion, necrosis, detachment and degranulation of mononuclear cells. These alterations significantly impede visual and sensory responses, and motor coordination in fish. Consequently the study suggests urgent need for stringent regulatory measures.

Keywords: BP-3; brain; fish; MG.

FOOD PROCESSING AND VALUE ADDITION**NAVEN KUMAR MEENA¹ AND DR. HEMLATA SHARMA²**¹Ph. D. Scholar, GPB, RCA, MPUAT, Udaipur²Asso. Prof & Head of Department, RCA, MPUAT, Udaipur, (RAJ.)

Food processing and value addition play pivotal roles in enhancing the nutritional quality, safety, and economic value of food products. This paper explores the significance of value addition in food processing and its impact on improving nutrition and fostering economic growth. Through various techniques such as fortification, preservation, and flavor enhancement, food processors add value to raw agricultural products, thereby extending shelf life, enhancing taste, and increasing marketability. Value addition in food processing not only contributes to improved consumer satisfaction but also addresses nutritional deficiencies by fortifying products with essential vitamins, minerals, and micronutrients. Additionally, value-added food products often command higher prices in the market, leading to increased income for farmers and processors, thus contributing to economic growth and poverty alleviation. This paper reviews key studies and research findings on the importance of value addition in food processing, citing examples from both developed and developing countries. Through a comprehensive analysis of the literature, this paper highlights the potential of value addition in food processing to drive sustainable development goals, including improved food security, enhanced nutrition, and increased economic prosperity. By investing in value addition technologies and promoting entrepreneurship in the food processing sector, policymakers can create an enabling environment for innovation and growth in the agri-food industry.

Keywords: Value addition, shelf life, entrepreneurship, food processing**ETHNOMEDICINAL STUDY OF ANGIOSPERMS OF SHAMLI REGION, UTTAR PRADESH****NAVYAKAUSHIK¹ AND ANJU RANI****Department of Botany, KeralVermaSubharti College of Science, Swami VivekanandSubharti University, Meerut**

Plants are essential to our life as they provide us with food and, through photosynthesis, release oxygen into the atmosphere. Historical accounts about plants demonstrate their importance to all living things and their assistance to humans. Forests and agricultural plants are being destroyed as a result of fast industrialization, the growth of civilization, and population exploitation. Raising awareness of the value of plants for sustainable development is necessary. The phytodiversity of angiosperms from Uttar Pradesh's Shamli region and their potential medical benefits for humans are the main topics of this study. Near the Ganga River, on the eastern side of the Yamuna River, lies Shamli at an elevation of 248 metres above sea level. This region's ideal temperature is between 13.8°C and 33.2°C. Shamli flora contains many herbs, shrubs and trees. Collection of the plants from this area and its critical study has been done along with the documentation of 60 plant species belonging to different genera and families of angiosperms, with this work all the collected plants were examined for their ethnomedicinal value by local people of Shamli region. Many plants are shown to be highly effective in treating various human diseases. For example, a number of plants including *Abelmoschus esculentes*, *Aloevera*, *Annona squamosa*, *Azadirachta indica*, *Memordicacharantia*, *Psidium guajava*, *Syzygium cumini*, *Tinospora cordifolia*, *Morus alba*, and *Catharanthus roseus*, have been shown to help lower the level of diabetes. *Aegle marmelos*, *Aloe vera*, *Azadirachta indica*, and *Curcuma longa* are examples of plants that have both antimicrobial and anti-inflammatory properties. *Cassia fistula*, *Eclipta prostrata*, *Lagerstroemia speciosa*, *Moringa oleifera*, and numerous other species have antimicrobial properties. The ethnomedicinal value of the collected plants was documented by interacting with local people of Shamli region. According to data gathered over the course of COVID-19, numerous plant types are still used to boost immunity.

Keywords: Plants, Sustainable development, Angiosperms, Shamli, Ethnomedicinal value, COVID-19.**UNVEILING THE THERAPEUTIC POTENTIAL OF MEDICINAL PLANTS IN BREAST CANCER MANAGEMENT****NAVYA RANA*, RAKESH KUMAR, AND SUNIL KUMAR****Department of Animal Sciences, Central University of Himachal Pradesh**

Breast cancer is one of the leading cancers responsible for a very high number of deaths among women worldwide. An animal model that can replicate the early markers of the disease's onset and progression is necessary to comprehend and aid in the early detection of breast cancer. This study investigates the therapeutic efficacy of a synergistic *Curcuma longa* and *Ocimum sanctum* administration in a DMBA-induced breast cancer mouse model. Following DMBA induction and confirmation of breast cancer. Treatment with *Curcuma longa* and *Ocimum sanctum* for 6 weeks led to a notable improvement in the examined factors, including histopathological investigation, biochemical, tumor, and hormonal markers. The results of the study demonstrated a substantial difference in parameters between the DMBA-treated (breast cancer) and treated groups. Parameters including histopathology, biochemical tests, hormonal analysis, and tumor marker assays were evaluated. Histopathological analysis revealed reduced tumor size and cellular abnormalities post-treatment. Biochemical tests, hormonal analysis, and tumor marker assays reflected a decrease in tumor burden. These findings underscore the promising therapeutic potential of medicinal plants in breast cancer management and suggest extended dosing regimens for optimised efficacy.

Keywords: Breast Cancer, *Curcuma longa*, *Ocimum sanctum*, Histopathology, Protein.

ATMOSPHERIC CHEMISTRY OF VOCs: THEIR ROLE IN THE FORMATION TROPOSPHERIC OZONE AND HEALTH RISK ASSESSMENT OF AT SUB-URBAN SITE OF AGRA**NEELAMBAGHEL, KIRTI SINGH, ANITA LAKHANI, APARNA SATSANGI AND K. MAHARAJKUMARI*****Department of Chemistry, Faculty of Science, Dayalbagh Educational Institute, Dayalbagh, Agra, 282005, India**

Air pollution has become a matter of concern due to elevated concentrations of aerosols, Volatile Organic Compounds (VOCs) and Trace Gases. VOCs are precursors for most of the atmospheric processes and also results the formation of tropospheric O₃ and Secondary Organic Aerosol (SOA), they greatly harm human health and significantly affect the Earth's climate. In the present study, the diurnal variation of VOCs, ozone forming potential and health risk assessment of VOCs is shown from January, 2021 to December, 2021 in the ambient air of Dayalbagh Agra. Average concentration of VOCs was ranged from 28.5-145 µg/m³. VOCs concentration during the sampling period was dominated by toluene range from 3.5-49.8 µg/m³ with an average of 35.2 ± 9.3 µg/m³. The diurnal pattern of VOCs was highly influenced by vehicular emissions and photochemical oxidation. VOCs, showed the maximum concentration in the morning and evening and lower during the midday period due to the photochemical reaction. To determine the amount of formation of tropospheric O₃, VOCs concentrations were correlated with other atmospheric pollutants and meteorological parameters and with maximum incremental reactivity. Statistically significant correlation was observed and indicates that aromatic VOCs contribute maximum in the formation of O₃. Amongst all the VOCs, toluene and xylene contributed maximum in the formation of O₃. The formation of ozone per unit of VOCs emission was affected by emission sources like biomass burning and vehicular emission. This study reported the carcinogenic effect by Integrated lifetime cancer risk (ILCR) and non- carcinogenic effect by hazard quotient (HQ) of VOCs. ILCR values for benzene was higher for all categories (children, women and men) than acceptable value and for ethylbenzene, formaldehyde and acetaldehyde it was in permissible limit (1.0 × 10⁻⁶). HQ values was under the limit but HI was higher than the acceptable limit (HI < 1).

EFFECT OF BACTERIAL INOCULANT AND ENZYMATIC ADDITIVE ON THE FERMENTATION PROCESS AND IN VITRO DIGESTIBILITY OF MAIZE SILAGE**NEELAM KUMARI, NUTAN CHAUHAN AND NITIN TYAGI****ICAR-National Dairy Research Institute Karnal, Haryana**

Ensiling is inherently an uncontrolled process that depends on the epiphytic microflora. Silage additives can control the course of the ensiling process and improve fermentation quality. The objective of the study was to assess the impact of bacterial inoculants, enzymatic additive and their combinations on the fermentation process, *In Sacco* degradability and *In Vitro* digestibility of maize silage. Maize fodder was harvested at one-third to half milk line stage (average 30.62 % DM). The treatments were control (no additive), *Lactiplantibacillus plantarum* (LP@1×10⁶ CFU g⁻¹), *Limosilactobacillus fermentum* (LF @2×10⁶ CFU g⁻¹), Cellulase (6000 NCU/kg) and Xylanase (1500 IU/Kg), LP+C, LP+X, LF+C and LF+X. Silage fermentation parameters, *In Sacco* degradability and *In vitro* digestibility were evaluated after 30 days of ensiling. The pH value significantly (p<0.05) decreased and lactic acid concentration was increased in all treatment groups compared to the control. Total volatile fatty acid, acetate and propionate were significantly (P<0.05) higher in additive-treated silage than the control. Methane production was significantly (P<0.05) lower whereas IVDMD and IVOMD were higher in additive-treated silage as compared to the control. *In Sacco* study revealed that dry matter, organic matter and crude protein degradability were significantly (P<0.05) higher in additive-treated silage than in the control. It is concluded from this experiment that the additives effectively improved the maize silage quality parameters *In Sacco* degradability and *In Vitro* digestibility of silage.

Keywords-Bacterial inoculant, fermentation process, *In Vitro* digestibility, maize silage**TRICHOGRAMMA JAPONICUM; ECOFRIENDLY APPROACH FOR TOP BORER (SCIROPOPHAGA EXCERPTALIS) MANAGEMENT****NEELAM KUREELAND SURAJ PAL****Division of Entomology, U.P. Council of Sugarcane Research Institute, Shahjahanpur (U.P.) India**

Sugarcane borers, particularly Top borer (*Scirpophaga excerptalis*) stand out as the predominant and highly damaging insect pest affecting the sugarcane in cane growing country globally due to its distractive nature leading to reductions in stalk height, Wightjucie quality sugar recovery and yield. Specially it's third brood cause "Bunchy top" in sugarcane *Trichogramma japonicum* with its cosmopolitan existence and rich diversity present a sustainable solution towards integrated top borer management programs. These *T. japonicum* due to their eco-friendly & bio-persistence nature, are preferred to parasitize egg stage of top borer (*Scirpophaga excerptalis*). The most important *T. japonicum* that has been commercially produced as "Trichocard". These are classified in to Lepidopteron. These has parasitize mode of action, usually attach to the external surface of egg mass of top borer, under the favourable environmental condition. The *T. japonicum* moth penetrate top borer egg mass by their long ovipositor sharp parts and laid their eggs in the top borer egg mass, then the *T. japonicum* eggs proliferate the egg mass of top borer after sometime hatching of *T. japonicum* eggs is starts and top borer egg parasitoid by them. It should be possible that the best use of biological control by *T. japonicum* and objective of this publication is wide range of eradicate chemicals insecticides which are used in huge amount and large scale.

Keywords:-Sugarcane, Environmental condition, Top borer, Bunchy top, *Scirpophaga excerptalis*, *Trichogramma japonicum* and Trichocard.

SURVIVING THE SUFFOCATING DEPTHS: EXPLORING IMPACT OF HYPOXIA ON STEROID HORMONE LEVELS IN *HETEROPNEUSTES FOSSILIS* FOR SUSTAINABLE AQUACULTURE**NEELAM SHARMA, BULBULALI, ROHIT KUMAR GAUTAM, ABHAMISHRA*****Department of Zoology, School of Life Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow-226025, Uttar Pradesh, India**

The reproductive success of freshwater fish species is severely hampered by hypoxia, a frequent environmental stressor in aquatic environments. Being a crucial component for aquatic life, dissolved oxygen (DO) fluctuates constantly as a result of global temperature changes brought by climate change. This is a worrying area of research. Hypoxia shows multifaceted impacts on fish neurobiology, endocrine regulation, and reproductive dynamics, where oxygen depletion triggers a cascade of physiological responses. Further evidence also revealed that hypoxia affects specific hormones, neurotransmitters, and receptors along the hypothalamus-pituitary-gonad axis as well as certain enzymes controlling steroidogenesis and vitellogenesis, rather than generally downregulating metabolism and reproductive functions. This study investigates the effect of hypoxia on reproductive hormone levels in *Heteropneustes fossilis*, a resilient freshwater fish species. Experimental conditions included exposure to 2mg/L DO for 8h & 12h, <0.5mg/L DO for another 8h & 12h, and control groups at 25-30°C. Significant changes in the profiles of reproductive hormones in response to hypoxia will be studied. Additionally, variations in sex steroid hormone levels such as progesterone, estrogen, and testosterone can be observed, suggesting potential effects on gametogenesis and gonadal function which would certainly create a huge impact on the population growth. These results clarify the complex relationship between hypoxia and reproductive physiology in *H. fossilis* and offer important understanding of the adaptive strategies used by this species to deal with environmental stressors. The understanding of the hormone responses to hypoxia is necessary to predict the reproductive success and population dynamics of *H. fossilis* in oxygen-depleted aquatic environments and it would help to reduce the risk to food security and sustainable aquaculture in the future.

Keywords: Hypoxia, Hormone, *H. fossilis*, Dissolved Oxygen**IMPACT OF INTEGRATED WEED CONTROL TECHNIQUES ON VEGETABLE PEA QUALITY MEASUREMENTS**
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At the Vegetable Research Centre of G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar (Uttarakhand), a field experiment named "Impact of integrated weed control techniques on vegetable pea quality measurements" was conducted in the 2022 rabi season. Pre-emergence application of a randomized block design with nine treatments that were replicated three times was the experimental design employed for the investigation. The treatments were Metribuzin WP @ 0.75 kg a.i./ha (T₁), Metribuzin 70WP @ 1.00 kg a.i./ha (T₂), Pendimethalin 30 EC @ 0.75 kg a.i./ha + 1 hand weeding (40 DAS) (T₃), Pendimethalin 30 EC @ 1.00 kg a.i./ha (T₄), Pinoxadin 5.1 EC @ 70ml/ha (T₅), Pinoxadin 5.1 EC @ 100ml/ha (T₆), Weed free (T₇), Hand weeding at 20 and 40 DAS (T₈) and weedy check (T₉). During this research, the major weed species that were observed in the experimental plot were grassy weeds viz., *Eleusine indica* L., *Cynodon dactylon* L., *Sorghum halepense* L. and *Digitaria sanguinalis* L., broad-leaved weeds viz., *Capsella bursa-pastoris* L. and *Angallis arvensis* L. and sedges like *Cyperus rotundus* L.. Observations during the study included quality parameters viz., TSS, Sugar content and Protein. Among all treatments, Pre emergence application of Pendimethalin 30 EC @ 0.75 kg a.i./ha + 1 hand weeding (40 DAS) i.e. treatment (T₃) was found to be the best with respect to quality parameters.

Keywords: Herbicide, Vegetable pea, Weed**ANCIENT WISDOM FOR MODERN SUSTAINABILITY: INTEGRATING TRIBAL CULTURE AND VEDIC SCIENCES INTO CONTEMPORARY APPROACHES TO AGRICULTURE, AND ENVIRONMENTAL CONSERVATION****¹DR. NEELURAWAT AND ²NIDHI DINKER****¹Associate Professor, Department of Sociology, Central University of Punjab, Bathinda, Punjab, India****²Research Scholar, Department of Sociology, Central University of Punjab, Punjab, India**

The combination of ancient wisdom and modern methods offers a compelling way to solve modern difficulties in the face of growing environmental crises and the necessity of sustainable development. In order to clarify a sound research technique and ideas, this study explores how tribal culture and Vedic sciences might be incorporated into modern agricultural and environmental conservation practices. A thorough assessment of the literature on indigenous knowledge systems, Vedic sciences, sustainable agriculture, and environmental protection is a key component of our research technique. We identify the fundamental ideas and procedures that support ancient practices and their applicability to contemporary sustainability initiatives through qualitative study and synthesis of a variety of sources. Researcher will also use old text and case studies to demonstrate the effectiveness of combining Vedic ideas with tribal wisdom and Vedic principles into contemporary agricultural and environmental initiatives. The clarity of concepts pertaining to the interplay between tradition and innovation is central to our research. The fundamental ideas of tribal culture and the Vedic sciences, highlighting their ecological care and holistic approach to agriculture has been clarified in this research. We also discuss the consequences of including indigenous viewpoints in community-based conservation efforts, crop diversification, and land management. By means of a careful analysis of case studies and professional opinions, we outline workable routes for incorporating traditional knowledge into contemporary sustainability models. This study advances our understanding of environmentally friendly conservation tactics and sustainable agriculture operations by fusing traditional knowledge with modern research techniques. Our goal is to stimulate discussion and action towards a more harmonious connection between humans and the natural world through the clear articulation of concepts and rigorous research methods.

Keywords: Tribal Culture, Vedic Sciences, Agriculture, Environment Conservation, Traditional

CLIMATE SMART TECHNIQUE (HYDROPONICS) FOR CULTIVATION OF MEDICINAL PLANTS**NEELU SINGH, NIKITA RAI, HARSHIT SHARMA AND PRADEEP SONDHIYA****Silviculture, Forest Management and Agroforestry Division, ICFRE-Tropical Forest Research Institute, P.O. RFRC, Mandla Road, Jabalpur**

The increasing demand for plant based medicinal products has led to a quantum jump in herbs marketed in India and abroad, increased demand is posing pressure on the existing natural resources. It is recorded that several important medicinal plants are listed by IUCN under RET category. More than 90% of the medicinal plant species used in trade continue to be sourced from the wild of which about 2/3rd are harvested by destructive means. Only a few species are under cultivation in open field in different states on a commercial scale to satisfy the demand for herbal products/remedies. However, cultivation in open field, affects biomass quantity and quantity of biologically active ingredients/ principles. Further, increased population, climate changes, sub urbanization of forest, improper agro practices like excessive use of pesticides and fertilizers have lead to the decrease in fertility of the soil and unpredictable rainfall which are found to affect the quantity of biologically active ingredients as well as bioactivities of medicinal plants. Keeping in view, the adverse effects of synthetic chemical based drugs, mass cultivation of medicinal plants is need of the hour. This paper focuses on growing medicinal plants *Bacopa monnieri* in different hydroponic systems with different nutrient solutions and soilless growing media. Growth kinetics of plants under different treatments revealed manifold production of herbage in comparison to cultivation in soil. Significant variation in total poly phenolic contents and bioactive ingredient Bacoside in different systems were also observed.

Keywords-Medicinal plants, Cultivation, Growth kinetics, *Bacopa monnieri*, Poly phenolic contents and Bacoside**ISOLATION AND HISTOPATHOLOGICAL EXAMINATION OF *P. MULTOCIDA* IN PNEUMONIC CASES OF BUFFALO****NEETEESH KUMAR¹, D. NIYOGI², DHARAM PRAKASH SHRIVASTAVA^{*3}, ARUNIMA SINGH⁴, AKSHIT TYAGI⁴, K.K. TRIPATHI⁵ AND VIBHA YADAV⁶****¹PhD Scholar, ²Professor & Head, ⁴M.V.Sc Scholar, ⁵Assistant Professor Department of Veterinary Pathology, ³SMS KVK PG College Ghazipur, ⁶Assistant Professor Department of Veterinary Microbiology, College of Veterinary Science and A.H. Kumarganj, Ayodhya**

A total 180 cases of buffaloes slaughtered in the slaughter house of Unnao and Barabanki district of Eastern Uttar Pradesh was surveyed during the month October, 2022 to March, 2023. The lungs exhibiting gross pathological lesions was put into 10 % neutral formalin for histopathological studies and other part of lung for bacteriological studies. On Gross examination maximum cases of congestion and hemorrhages in lung were observed followed by emphysematous conditions and pulmonary oedema in the slaughtered animal in both the districts. Microscopic sections of lungs were examined and the major histologic findings are vascular and bronchiolar congestion along with severe emphysema seen in some cases. Some of the Emphysematous lung showed hyperplasia of the bronchiolar wall and peribronchial lymphoid tissue and exudates in the alveoli. In the bacteriological study, a total samples which showed gross lesions in slaughtered buffaloes in both the districts were collected. Among the tested samples (34 and 26 samples from Unnao and Barabanki districts respectively), were identified as *Pasteurella* spp. depending on their cultural/colony characters, morphology and biochemical properties viz Indole, Methyl red, Catalase production, Urea hydrolysis and Citrate utilization. Out of 34 isolates, 32 showed positive results for Indole test, 24 positive for catalase, 24 isolates, were positive for Urea hydrolysis, 23 isolates considered as positive for Methyl red. All isolates tested negative for gelatin liquefaction but 30 isolates were found positive for citrate utilization. Hence, so many unhealthy/diseased buffaloes are being slaughtered in the slaughter houses for human consumption and that meat should not be consumed or may be condemned as not fit for human consumption due to infections.

Keywords: Buffalo, Histopathology, *Pasteurella*, Isolation**EXPLORING AN ECONOMICAL ADSORBENT FOR REMOVING SYNTHETIC DYE FROM AQUEOUS SOLUTION****NEETU TOMAR & DHEERAJ KUMAR****Department of Chemistry, K.R. (P.G.) College, Mathura, U.P., India.**

The textile industry's reliance on dyeing processes presents a persistent challenge in environmental stewardship, as the incomplete fixing of dyes often leads to the discharge of pigments into surrounding ecosystems. By harnessing the natural adsorption capabilities of certain materials, such as plant-based biosorbents, biosorption presents a viable alternative to conventional chemical treatments that may have adverse environmental impacts. This study delves into the potential of Semal leaf powder as a biosorbent, capitalizing on the abundance and accessibility of this natural resource to address the contamination of water bodies by crystal violet dye, a common dye pollutant in textile wastewater. Through meticulous batch adsorption experiments, various operational parameters were systematically varied to optimize the efficiency of the biosorption process, including adsorbent dosage, initial dye concentration, and contact time. The analysis, employing well-established models such as Freundlich and Langmuir isotherms, provided insights into the surface characteristics and affinity of the biosorbent for crystal violet molecules. Additionally, the kinetic study favored pseudo second-order kinetics, suggesting a significant role of chemisorption in the adsorption mechanism. Thermodynamic analysis indicated an exothermic nature, collectively highlighting the promising potential of Semal leaf powder as a sustainable solution for mitigating crystal violet dye contamination in aqueous environments.

Keywords :- Biosorption, Crystal violet, Pseudo second order

MINIMUM SUPPORT PRICE FOR AGRICULTURAL COMMODITIES IN INDIA: A REVIEW STUDY**DR. NEHA****Associate Professor****Swami Vivekanand Subharti University, Meerut, India**

Most of the agro products are available based on season. At the time of harvesting, the product prices are very low and at the time of seedling, the product prices are very high. Both producers and consumers faced problems. For overall stabilizing the economy, price policy is necessary. The study aims to explore the benefit of the farmers through the price policy in the Indian economy. This study is descriptive type by nature based on secondary sources like various Government reports, books, articles, websites and web-based journals. Need for Agricultural Price Policy and minimum support prices with findings, appraisal, its advantages and disadvantages and suggestions are discussed here. The basic motive behind the Agriculture policy of the Government of India is to save the interests of both farmers and consumers. The prices of the food grains should be decided very wisely so that neither farmers nor consumers get to suffer.

Keywords: Agro Products, Prices, Farmers, Consumers, Harvesting, Seedling, Economy

UNRAVELING THE BIOCHEMICAL MOSAIC AND NUTRITIONAL BOUNTY OF HIMALAYAN SCHIZOTHORAX PLAGIOSTOMUS**NEHA, TITIKSHA SHARMA, MADHU BALA AND RAKESH KUMAR*****Department of Animal Sciences, Central University of Himachal Pradesh, Shahpur, Kangra 176206, Himachal Pradesh**

Schizothorax plagiostomus, commonly known as the snow trout, is a key species inhabiting the high-altitude freshwater bodies of the Himalayan region. *Schizothorax plagiostomus* is known for its high protein content, making it an excellent source of essential amino acids necessary for muscle growth, repair, and overall body function. Furthermore, *Schizothorax plagiostomus* is rich in omega-3 fatty acids. In this study we tried to investigate the biochemical composition of *Schizothorax plagiostomus*, focusing on ash content, moisture content, and crude oil estimation. The ash content, provides insights into the inorganic residue present in the fish tissue. An average ash content of 2.79% was found from the *Schizothorax plagiostomus*, using muffle furnace. Additionally, the moisture content of the *Schizothorax plagiostomus* was analyzed using the oven drying method and the mean moisture content of the fish sample was 79.833%. This moisture content analysis shed light on the water content, a vital parameter affecting the fish's freshness and storage stability. Furthermore, crude oil estimation elucidated the lipid composition, essential for understanding the nutritional value and lipid metabolism of *Schizothorax plagiostomus*. The crude oil content was determined using Soxhlet extraction, where the average crude oil content in *Schizothorax plagiostomus* was 7.16% on dry weight basis. Our findings contribute to the understanding of the biochemical profile of *Schizothorax plagiostomus*, aiding in its potential utilization in aquaculture and nutrition-related food industries.

Keywords: Nutritional composition, food fish species, human consumption, *Schizothorax plagiostomus*.

A STUDY OF MACROBENTHOS FAUNA AFTER DRAIN EFFLUENTS AT DIFFERENT GHATS OF YAMUNA RIVER AT MATHURA DISTRICT**¹NEHA AGRAWAL, ²RAJVIR SINGH OJHA AND ³PRAVEEN KUMAR OJHA****^{1&2}Department of Zoology, R.B.S. College, Dr. Bhimrao Ambedkar University, Agra.(U.P.)****³Department of Zoology, K.R. College, Dr. Bhimrao Ambedkar University, Mathura.(U.P.)**

A macrobenthic study was carried out at different ghats of Yamuna river at Mathura after falling down Drain effluents. 7 Ghats (Gaughat, Swami ghat, Askundaghat, Vishramghat, Bangalighat, Dhruvghat, Mahadevghat) were used as sampling stations for sampling of Macrobenthos from (March 2021 to April 2022). Macrobenthos from three types of phylum Arthropoda, Annelida, Mollusca were recorded. Among these three phylum, Maximum species of phylum Arthropoda were recorded at every station in summer. Maximum species density of Molluscs and Annelids were recorded at Gaughat & Dhruvghat may be due to shallow clean water and river soil having highest organic carbon and Minimum at Mahadevghat and Askundaghat may be due to dirty water, because of falling drain effluents. Annelid's species *Namalyastis* sp. and Mollusc's species *Pila* sp. were present at maximum stations from others. Arthropoda communities were observed dominated from Annelids and Molluscs. Arthropodal species *Caenis* sp. and Chironomid sp. were dominant at maximum stations from others. Following results were determined as species richness from classes - Insecta - Arthropoda at polluted ghats (station -3,7) Oligochaeta & Hirudinea - Annelida at (station-1,6) and Gastropoda & Bivalvia - Mollusca at less polluted site (station-1,2,6).

Keywords: Macrobenthos, Drain effluents, Gastropods, Species richness.

INCREASE IN YIELD OF CHILLI BY INSTALLATION OF DIFFERENT COLOR STICKYTRAPS AGAINST SUCKING PESTS OF CHILLI

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The experiment was conducted at experimental farm of Department of Entomology, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani, during the Kharif season 2022-23 to study the Increase in yield of chilli by installation of different color sticky traps against sucking pests of chilli. The experiment was laid out in a randomized block design with 8 treatments and 3 replicated times. Using different color of sticky traps of red, yellow, green, blue, white, pink and orange was prepared and installed at 15 days after transplanting of the crop.

It was observed that all the plots in which different colored sticky traps were installed recorded significantly higher chilli yield than the plot without trap. The average marketable fruit yield among different treatments ranged from 40.67 to 78.00 q/ha. The highest yield was recorded in plots with yellow colored sticky traps (78.00 q/ha) which was found significantly superior over rest of the treatments.

Keywords: Colour sticky traps, yield, significantly superior.

RESPONSE OF ZINC APPLICATION ON PRODUCTIVITY OF WHEAT (*TRITICUM AESTIVUM* L.) IN SOUTH-WEST RAJASTHAN

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Zinc is widely recognized as the most crucial micronutrient for ensuring optimal and healthy plant growth. There is a crucial need to identify zinc fertilizers with higher use efficiency and minimal environmental impacts. Therefore, the aim of the present investigation is to study the effect of different source and method of zinc application on yield and yield attributes wheat (*Triticum aestivum* L.) in South-West Rajasthan. The field experiment was conducted in Rabi 2022-2023 at the Instructional Farm of Agronomy, Rajasthan College of Agriculture, MPUAT, Udaipur, which is located in Rajasthan's agro-climatic zone IV-a. The study used a randomized block design (RBD) with 9 treatments that were replicated three times. The treatments were comprised of various combinations of two sources of zinc i.e., Zn-EDTA and ZnSO₄.7H₂O and two methods i.e., soil and foliar method of application. The results revealed that the significantly highest number of effective tillers, grain yield and straw yield of wheat was recorded with combined soil and foliar application of Zn-EDTA and ZnSO₄.7H₂O fertilizers i.e., T₉ (1.25 kg Zn ha⁻¹ through ZnSO₄.7H₂O as SA + 1.25 kg Zn ha⁻¹ through Zn-EDTA as SA + 0.5% ZnSO₄.7H₂O foliar spray at 45 DAS + 0.5% Zn-EDTA foliar spray at 75 DAS + ZSB as seed treatment) over soil application of ZnSO₄.7H₂O alone and control.

Keywords: Grain yield, Straw yield, Zinc, Zn-EDTA, ZnSO₄.7H₂O, ZSB

CROP RESIDUES TO SOIL PROSPERITY: A COMPREHENSIVE STUDY ON PUSA DECOMPOSER FOR SUSTAINABLE AGRICULTURE

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The introduction of rice to traditional wheat-growing regions and vice versa in India led to the development of the Rice-Wheat (RW) cropping system. Parts of the plants that remain in the field after crops have been harvested and threshed are generally referred to as crop residues. Because there is less time between rice harvest and wheat sowing as well as inadequate equipment for recycling, managing rice straw is a major issue. The farmers found a very cheap option for residue management is burning which not only degrades the fertility of soil through nutrient losses but also pollutes the environment. Instead of burning, the retention and incorporation of rice residue found to increase soil productivity and crop productivity as well. Rice residue can be organically degraded through enzymatic activity using the PUSA decomposer (microbial consortium) which is cost effective and an ecologically sound technology. Residue incorporation increases growth and yield, soil properties i.e. physical, chemical and biological. The result shows that carbon, nitrogen, phosphorus, potassium, calcium, magnesium, Sulphur and micronutrient (Fe, Cu, Mn, Zn) content increases in soil during residue incorporation along with Pusa decomposer. Enzymatic activity including β -glucosidase, phosphatase, glomalin, protease, dehydrogenase and FDA also increases during residue incorporation. So we can easily manage the rice residue by PUSA decomposer and avoid the residue burning.

Keywords – Rice-Wheat cropping system, Rice residue, Burning, Residue management, Pusa decomposer, Soil health

APITHERAPY: A REVIEW OF RECENT CLINICAL RESEARCH IN BEEKEEPING**NEHA NEGI, JAG MOHAN, BHARTI GAUTAM AND BABITA BHARTI,****Affiliation: Department of Agriculture, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala, Haryana, India**

Honey bees are highly valued socially and commercially due to their honey production and pollination activities. Honey bees produce honey, bee wax, royal jelly, pollen, propolis, and venom. Different honey bee products comprising a variety of sugars, proteins, free amino acids, minerals, trace elements, enzymes, and vitamins with a relatively high caloric value. Natural product research has become increasingly popular in recent years as a means of preventing or treating a variety of medical conditions. Apitherapy is the use of bees or their products as therapeutic or preventative treatments to prevent disease or slow its course. Recent research on the pharmacological action of bee products has revealed a wide range of biological features. Different investigations and clinical trials have demonstrated that bee products can be used to cure a variety of ailments, as well as to maintain healthy balance and equilibrium. Furthermore, bee products are frequently employed in food, cosmetics, and by the pharmaceutical industry in its search for new medications. Apitherapy is now included in several countries alternative and integrative medicine programs. Different recommendations for the use of bee products have been established, and people consume varying amounts of bee products once or multiple times each day. Although we have made significant advances in our understanding of bee products, it is critical that we capitalize on their potential and standardize their use.

Keywords: Honeybee, propolis, bee wax, venom**SOY PROTEIN MODIFICATION THROUGH MICROWAVE GLYCATION WITH SODIUM ALGINATE****NEHA PANDEY AND ASHUTOSH UPADHYAY****Department of food science and technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Sonapat, Haryana, India**

Conjugation, the covalent modification of the protein, was exploited to improve soy protein's physical, structural, and functional properties. The present research study aimed to compare the effects of microwave treatment (160 W-10 min, 320 W-4min) and water bath treatment (90°C-1h) on the degree of conjugation of soy protein isolate (SPI) and sodium alginate (SA) suspension with emphasis on its effect on functional and structural attributes. Microwave heating had a faster conjugation rate than the water bath treatment, as the degree of conjugation (DC) increased from 14.7% to 32.6%. Maillard reaction products (MRPs) were higher in SPI-SA-320 than in other samples. The results of FTIR showed that the absorbance peak shifted in conjugation after microwave treatment compared to water bath treatment. Thermal analysis revealed increased peak temperature, indicating higher thermal stability after microwave conjugation than water bath treatment. The functional properties, including foaming capacity (75.05%), water-holding capacity (7.17 g/g), viscosity (248 cp), and emulsification activity (314.67), also increased significantly after microwave treatment. The effect of the SPI-SA weight ratio (1:1, 1:2, and 2:1) was also studied. The highest degree of conjugation, Maillard reaction products, stability (zeta potential), and emulsifying activity were found with samples at 1:2 (SPI: SA) compared to 1:1 and 2:1 ratios of SPI: SA. However, the water holding capacity was higher for SPI-SA (2:1). The prepared conjugates may have potential applications in emulsion-based food preparations like beverages and low-fat mayonnaise.

Keywords: Microwave treatment, Water bath treatment, Conjugation; Soy Protein; Sodium Alginate; Maillard Reaction; Functional Properties**UNVEILING THE FUNGAL DIVERSITY IN *T. CONTORTA* ROOTS THROUGH NEXT-GENERATION SEQUENCING****NEHA SHARMA* AND ASHWANI TAPWAL****ICFRE-Himalayan Forest Research Institute, Shimla, Himachal Pradesh, India**

Taxus contorta Griff, commonly known as the West Himalayan yew, stands as a significant conifer species in the Taxaceae family, valued for its medicinal attributes. It is a vital source of anticancer drug paclitaxel, commercially known as Taxol, underscoring its importance. However, the relentless harvesting for Taxol extraction has precipitated a decline in its population. Compounded by excessive exploitation for timber, fuelwood, and fodder, coupled with habitat loss, overgrazing, and poor natural regeneration, worsen the situation. The species has been classified as endangered by the IUCN. The intricate fungal communities residing within the roots of plants play pivotal roles in enhancing plant nutrition and shielding against various biotic and abiotic stresses. To explore this relationship, composite root samples of *T. contorta* were collected from three locations in Himachal Pradesh. Illumina MiSeq metabarcoding targeting the ITS region of fungal rDNA was employed to characterize the fungal community within *T. contorta* roots. The metabarcoding yielded 1368 raw sequences, identifying 36 operational taxonomic units (OTUs) belonging to 26 genera, 21 families, 14 orders, and 2 phyla. The dominant fungi were endophytes, followed by saprophytes and pathogens. *Aspergillus* emerged as the most abundant genus, comprising 23.68% of the fungal community, followed by *Cladosporium* at 12.43%. Diversity analysis revealed Shannon Weiner index of 3.02, indicating considerable diversity, and Simpsons index of 0.92, suggesting a high level of evenness among the fungal taxa observed. This comprehensive analysis through next-generation sequencing sheds light on the intricate fungal community associated with *T. contorta* roots. Furthermore, strategically integrating native endophytic fungi into reforestation initiatives could significantly contribute to the conservation and restoration of *T. contorta* populations in Himalaya.

Keywords: *Taxus contorta*, Metabarcoding, Mycobiota, Endophytes, Fungal community

UNVEILING SPOT BLOTCH RESISTANCE: A COMPREHENSIVE STUDY OF DICOCCUM WHEAT GERMPLASM THROUGH MORPHOLOGICAL AND SSR MARKER CHARACTERIZATION**NEHAA D. R., ABHISHEK. K. GOWDA^{1*}, SHIVASHANKARAGOUDA PATIL², S. A. DESAI³, SUMA. S. BIRADAR⁴, I. K. KALAPPAVAR^{5,6}****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

Genetic resources are crucial for bolstering crop resilience against environmental and biological stresses, notably Spot blotch (SB), a destructive leaf disease in wheat, prevalent in warm, humid regions like eastern South Asia. Our study aimed to validate SB resistance in 127 *dicoccum* wheat germplasm accessions, sourced from institutions globally. Field evaluations during 2020–21 and 2021–22 seasons identified forty resistant accessions using observable traits and the genetic marker Xgwm120. Notably, four accessions - Acc. GPM Dicoccom-IR-76, Acc. GPM Dicoccom-IR-98, Acc. GPM Dicoccom-IR-102, and ICARDA-14-127687 - exhibited higher resistance than the established SB-resistant genotype, Chirya-3. These findings highlight promising lines for wheat breeders aiming to develop SB-resistant varieties. By leveraging genetic diversity, particularly from global repositories like CIMMYT and ICARDA, we can enhance the resilience of wheat crops against SB and other prevalent diseases, ensuring food security in vulnerable regions. This underscores the importance of collaborative efforts in germplasm conservation and utilization for sustainable agricultural development.

DECIPHERING PHOTOPERIOD SENSITIVITY AND INHERITANCE STUDIES OF EARLY MATURITY IN SOYBEAN (*GLYCINE MAX* L. MERRILL) IN INDIA**NENAVATH KRISHNA KUMAR RATHOD, MENIARITAKU, NOOR E MUJJASSIM, RAHUL SHAH, O RESHMA, MANISHA SAINI, AMBIKARAJENDRAN, S.K LAL, AKSHAYTALUKDAR****ICAR-Indian Agriculture Research Institute, New Delhi**

Flowering time in soybean (*Glycine max* L. Merrill) is a complex trait, controlled by multiple genes related to photoperiod response and maturity. The short growing season of India in contrast to late maturity and photoperiod sensitivity of Indian soybean varieties leads to terminal heat, drought stress and yield loss and further delays planting of rabi crops. To decipher photoperiod sensitivity, early genotype (SKAF148) and late genotypes (DS9712, PUSA12-13) were grown in growth chamber (short day condition), in glasshouse (under *kharif* and off-season-2022), and in field condition at IARI, New Delhi-2022. The early genotype SKAF148 matured in 68 to 70 days constantly, across all the growth conditions representing the high photoperiod insensitivity. DS9712 flowering time varied from 28 (growth chamber) to 45 days (field condition). Similarly, PUSA12-13 flowering time varied from 34 (growth chamber) to 50 days (field condition). Thus, both the late genotypes showed significant difference for flowering time suggesting high sensitivity to photoperiod. In population-1 (SKAF148×DS9712) the F₁s showed co-dominance for both flowering and maturity time in glasshouse under *kharif* season (day length varied from 11-14hrs/day). However, in growth chamber (10hrs/day) F₁s showed dominance for earliness. The continuous variation in segregation data of F₂ indicated flowering time in soybean was governed by polygenes with complementary gene action and earliness was dominant over lateness (day length varied from 11-12hrs/day). Whereas, maturity time also under polygenes control showing duplicate gene action. Similarly, in population-2 (SKAF148×PUSA12-13) F₁s showed co-dominance for both flowering and maturity time in glasshouse under *kharif* season (day length varied from 11-14hrs/day) as in the case of population-1. However, in growth chamber under short day condition F₁s showed dominance for earliness to lateness. The continuous variation in segregation data of F₂ indicated both flowering time and maturity time in soybean were governed by polygenes with duplicate gene action and earliness was dominant over lateness (Day length varied from 11-12hrs/day). This information can be used to formulate the most efficient breeding strategy for improvement of time to flowering in soybean in short-season environments.

Keywords: Maturity, Short Duration, Gene action.**UNDERSTANDING THE ROLE OF FEO NANOPARTICLES IN BIOFORTIFICATION OF GROUNDNUT SEEDS (*ARACHIS HYPOGAEA* L) THROUGH MOLECULAR APPROACHES****NETHRA.P^{1*}, YAMUNA.V², AND ASHWINI M³**¹Assistant Professor, Department of Crop Physiology, College of Agriculture, UAS, Dharwad, Karnataka, 580005, India.²Research Scholar, Department of Crop Physiology, College of Agriculture, UAS, Dharwad, Karnataka, 580005, India³Assistant Professor, Department of Agricultural Microbiology, College of Agriculture, UAS, Dharwad, Karnataka, 580005, India.

The pot experiment was carried out for seed priming and foliar application of iron oxide nanoparticle (FeO Np) in groundnut. Five different groundnut cultivars were seed primed with 100 ppm of FeONps and sown in the pots. After 30 DAS, at the time of flowering, foliar application of FeONps was done and all the physiological and biochemical observations were recorded. There was significant increase in the total chlorophyll content, oil content and protein content in the kernels of all the cultivars treated with 100 ppm FeO as compared to control. The total Fe content in the kernels of groundnut increased by 8% over control. The Ferric chelate reductase activity was reduced in the leaves of groundnut which are seed primed and foliar sprayed with 100 ppm FeO nanoparticle as compared to control. The Real Time RT-PCR studies showed the increased expression of the membrane transporters IRT1 and AhAHA4 in the FeO Np treated plants as compared to control. This study indicates that the seed priming and foliar application of FeO Np increases the efficiency of membrane transporters in uptake, translocation and remobilization of FeO nanoparticles which gets partitioned into the kernels and there by enriches the iron in the kernels of groundnut.

Keywords: Iron oxide nanoparticle, *Aspergillus niger*, biofortification, kernels, Particle size analyzer, Scanning Electron Microscope.

Abbreviations: FeO Np: iron oxide nanoparticle, DAS: days after sowing, FRA: Ferric chelate reductase activity

EXPLORING THE EFFICACY OF POST-HARVEST DIP TREATMENTS IN MAINTAINING QUALITY ATTRIBUTES OF MANGO FRUITS CV. ALPHONSO DURING STORAGE

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The study investigated storage challenges of mango fruits, particularly focusing on the Alphonso variety prized for its taste and economic value. Due to issues like rapid browning and susceptibility to pathogens, mangoes have limited storability. The research aimed to assess how treatments, such as hot water treatment, coating polymers, bio-agents, plant extracts, and safe chemicals, influence Alphonso mango storage behavior. After post-harvest dip treatments, fruits underwent a four-week cold storage period ($13\pm1^{\circ}\text{C}$), followed by an additional week under ambient condition. Dipping fruits in 10% Nipro Fresh wax (T_3) and 1% Chitosan (T_4) for 1 minute significantly reduced physiological weight loss. Moreover, the overall minimum mean respiration rate was observed in T_4 (81.04 ml $\text{CO}_2/\text{kg/h}$) and T_1 (control) (85.98 mg $\text{CO}_2/\text{kg/h}$). The lowest mean L^* value for peel color was found in T_3 (54.40), T_5 (Salicylic acid @ 0.2% for 10 minutes) (54.40), and T_8 (Aloe vera gel 1:6 - Gel: Distilled water for 5 minutes) (54.28), with lower a^* , b^* , and C^* values in T_4 (1.91, 44.40, and 45.74 respectively), and the highest h° value in T_2 (Hot water dip $50-55^{\circ}\text{C}$ for 5 minutes) (89.81). Maximum fruit firmness (1432.70g) was observed in T_6 (1% Boric acid for 5 minutes), while the lowest total soluble solids (TSS) were in T_3 (15.63°B) and T_2 (15.60°B), and the highest titratable acidity was noticed in T_{10} (*Trichoderma harzianum* @ 10g/l for 5 minutes) (1.38%). The lowest total, reducing, and non-reducing sugars were observed in T_3 (11.10, 4.32, and 6.79% respectively). Minimal anthracnose disease intensity was seen in T_4 (17.07) and T_7 (Azoxystrobin @ 0.1% for 5 minutes) (13.87). Higher organoleptic scores and β -carotene (124.73 mg/kg) were recorded in T_7 . In summary, fruits treated with post-harvest dip T_7 exhibited lower anthracnose intensity and improved physico-chemical and organoleptic properties, indicating superior performance.

Keywords: Alphonso mango, postharvest treatment, physico-chemical properties, anthracnose disease, azoxystrobin

HEMP CONCRETE: A SUSTAINABLE APPROACH TO CONSTRUCTION

NIDHI PARMAR

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With increased worry about global warming, climate change, and the depletion of Earth's resources, a renewed emphasis on environmental sustainability has evolved around the world. Sustainable building materials are gaining popularity due to their good environmental impact and usefulness in disaster relief. Hempcrete is a bio composite made up of a hardwood core of hemp stem (known as Shiv/Hurd) and hydrated lime. Hemp crop grows faster than trees, has a similar composition to timber, and hempcrete made with hemp and lime as a binder has a negative carbon footprint, which means it removes CO_2 from the atmosphere rather than emitting carbon pollutants during its lifetime. One of the main advantages of building with hempcrete is good thermal insulation which will subsequently reduce energy related GHGs emissions in residential and commercial buildings. Hemp is traditionally grown in hilly region of Uttarakhand, primarily for production of seed and fiber. For promoting industrial hemp in the state, In December, 2016 Uttarakhand developed a policy under Section 14 of the NDPS (Narcotic Drugs and Psychotropic Substances) Act, 1985 for allowing industrial or horticulture cultivation of the hemp plant. And in India it is the first state to do so. The present investigation deals with the utilization of industrial hemp in building materials. Due to its good thermal properties and lightweight characteristics, it is gaining popularity among civil engineers, researchers, and academicians. For the present study, hemp hurd was collected from GohempAgroventures Pvt. Ltd., Haridwar, Uttarakhand, and quick lime was used as a binder. Five concrete mixes of hemp hurd and lime were prepared in order to produce lightweight building materials. To test the compressive strength of concrete mixes, 10 cm cubes were cast and tested after 30, 60, and 90 days of hardening. The bulk density of concrete at 30 days of hardening was reported at 443 kg/m^3 , which falls under grade A of **IS:6598**. Further the water absorption capacity of the material was examined. The moisture content and chemical analysis of hemp hurd were also tested. Thus, the current study deals with the use of alternative building materials, such as hemp (plant-based), which are environmentally friendly, abundant, and renewable.

Keywords: Hempcrete, environmental sustainability, thermal insulation, lightweight building material

THERAPEUTIC APPLICATIONS OF PROBIOTIC BACTERIAL STRAINS ON HUMAN HEALTH**NIDHI SINGH¹ AND ENA GUPTA^{1*}**¹**Department of Family and Community Sciences, University of Allahabad, India**

Probiotics are a vivacious group of live microbial strains that together, forms the host microbiome as a superorganism. Probiotics confer a beneficial role in the host's internal environment. Specifically, these strains modify the immunological response and impact the brain-gut metabolism. However, drug efficacy has declined due to the emergence of a microbiota that is resistant to antibiotics. Therefore, supplements of probiotics with prebiotic strains show a symbiotic effect against certain enteric pathogens, and furthermore, they stimulate and regulate immune responses by activating specific genes in the host intestine tract. As per research, probiotic functional foods are linked with the prevention of lactose intolerance, irritable bowel syndrome, and gastroenteritis. These strains also counteract the deleterious effects of several degenerative diseases, such as dyslipidemia, diabetes mellitus, obesity, and hypertension. This review highlights the role of various probiotic strains and their multifactorial benefits, including their mechanisms of action in host health.

Keywords: Immunological response, symbiotic effect, functional foods, degenerative diseases, lactose intolerance, microbiome.

BIOGENIC SELENIUM NANOPARTICLES AND THEIR IMPACTS ON THE GROWTH AND DEVELOPMENT OF ZEA MAYS L.**NIHARIKA KOCH* AND RAM PRASAD******Department of Botany, Mahatma Gandhi Central University, Motihari, Bihar, India**

Greensynthesis of nanoparticles (NPs) is a great initiative to tackle the environmental problems associated with other physicochemical modes of synthesis. Biogenic NPs are eco-friendly and cost-effective alternatives with less synthesis time. The use of biogenic selenium nanoparticles (BSeNPs) can enhance plant growth and productivity. It also possesses properties like antioxidant, antibacterial, and photochemical degradation activity. Our research finding highlights to study of the synthesis of BSeNPs using *Calotropis procera* leaf extract which biologically reduces the salt of sodium selenite. The synthesized NPs were characterized (UV-vis spectroscopy, DLS, SEM, TEM, FTIR, XRD) and their potential role in the growth of *Zea mays* L. (maize) was investigated. Seed germination and plant biomass (fresh and dry) and biochemical assay (chlorophyll, carotenoid, phenol, protein, and antioxidant) of plants were evaluated under different concentrations of synthesized biogenic and chemically selenium nanoparticles (CSeNPs). Furthermore, the photochemical degradation of organic dyes of the BSeNPs/ CSeNPs was also observed to elucidate its potential impacts.

RECIPROCAL SELECTION FOR COMBINING ABILITY IN COTTON (GOSSYPIMUM HIRSUTUM L.)**NIKHILA¹ AND S. S. PATIL²**¹**Ph.D. (Scholar), University of Agricultural Sciences, Dharwad, Department of Genetics and Plant Breeding**²**Emeritus scientist, University of Agricultural Sciences, Dharwad, Department of Genetics and Plant Breeding**

The development of hybrid-oriented heterotic populations and the application of schemes for improving combining ability is an integral part of hybrid breeding in maize and other cross-pollinated crops (Hallauer and Miranda, 1981). In maize, heterotic populations are developed and exploited through population improvement schemes meant for improving combining ability. Once the genetically diverse groups are identified attempt can be made in the second phase to enhance the genetic distance further by following different population improvement schemes like recurrent selection for GCA helps in improving the combining ability of a population with respect to broad based tester. In recurrent selection for SCA, the ability of the population to combine with a specific single selected homozygous line is assessed. As compared to this in reciprocal recurrent selection, two opposite populations are used as base populations whose ability to combine with the opposite population is put to test. This process of assessing the combining ability of two populations against each other is repeated over some cycles of reciprocal selection till satisfactory improvement is achieved by way of improvement in the performance of the derived F₁s. Once the populations have become sufficiently diverse/complementary, the inbreds of these improved perfectly complementing opposite populations are used for assessing reciprocal improvement in combining ability. As a result of this, the hybrids between such inbreds of opposite groups are expected to be more potential (Allard, 1960). These steps or procedures are engaged in enhancing the genetic distance and increases the level of heterosis. Studies have shown that even in cotton it is possible to adopt these concepts with suitable modifications in the procedure to suit the mating system of self-pollinated crops as reciprocal selection for combining ability (Patil and Patil, 2003 and Patil *et al.*, 2007). In Dharwad continuous efforts were made to understand in general the complementation pattern of parents contributing to heterosis.

Keywords: Homozygous, inbreds, reciprocal selection for combining ability, recurrent selection for GCA, recurrent selection for SCA

COMPATIBILITY ASSESSMENT OF INDIGENOUS *TRICHODERMA* STRAINS WITH FUNGICIDE MOLECULES THROUGH *IN VITRO* ANALYSISNIKITA¹, SANJEEV KUMAR¹, ERAYYA^{2*}, KALMESH. M³., MD. SHAMIM⁴ AND C. S. AZAD¹¹Department of Plant Pathology, Bihar Agricultural University, Sabour, Bhagalpur (Bihar) India²Department of Plant Pathology, Dr Kalam Agricultural College, Kishanganj (Bihar) India³Department of Entomology, Dr Kalam Agricultural College, Kishanganj (Bihar) India⁴Department of Molecular Biology & Genetic Engineering, Dr Kalam Agricultural College, Kishanganj (Bihar) India

A study on compatibility of native strains of *Trichoderma* sp. with fungicides was ascertained at the Department of Plant Pathology, Dr Kalam Agricultural College, Kishanganj (under BAU, Sabour, Bhagalpur) during 2022-23. The compatibility studies revealed that among the eight fungicides tested (each @ 100, 250, and 500 ppm), carbendazim 50% WP, Propiconazole 25 EC, and Tebuconazole 25.9% EC were incompatible to all *Trichoderma* isolates. However, only three fungicides viz., Metalaxyl 4% + Mancozeb 64% WP, Mancozeb 75% WP and Copper oxychloride 50 % WP were found to be compatible and Azoxystrobin 250 EC, Azoxystrobin 18.2% W/W + Difenoconazole 11.4% W/W was moderately compatible with all the test *Trichoderma* isolates. The compatible fungicides and doses of the test fungicides may be recommended for the farmers to manage plant diseases under integrated disease management practices.

Keywords: Biological control, Compatibility, Pesticides, Disease management.**IN VITRO MUTAGENESIS: A NOVEL TECHNIQUE FOR ENHANCING CLIMATE RESILIENCE IN BANANA**

NIKITA DILIP DAPURKAR*, K. M. NAIK

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In present investigation the shoot tip of banana cv. Grand Naine were exposed to 60 Co gamma rays doses ranging from 0, 10, 20, 30, 40, 50 and 60 Gy @ 20 Gy/min. at BARC, Mumbai. The irradiated explants underwent sub-culturing up to the M1V4 generation. Survival rate and shoot tip culture regeneration were highest in control treatments, declining with increasing radiation doses. Days required for greening increased with higher radiation doses, reaching 12.2 days at 60 Gy compared to 3.9 days in the control. The LD50 value for Grand Naine was determined as 42.56 Gy. In field conditions, control treatments exhibited superior growth parameters including plant height, stem girth, suckers, leaves, leaf area, and leaf area index. Conversely, treatment T7 showed reduced growth attributes. Control treatments also demonstrated favorable flowering and fruiting characteristics, with significantly higher bunch and finger attributes compared to irradiated treatments. Quality attributes such as total soluble solids, total sugar, and reducing sugar were also highest in control treatments. Treatment with 40 Gy exhibited maximum variability in field conditions and yielded seven useful putative mutants, including early maturing and dwarf types.

Keywords: Climate Change, In-Vitro Mutagenesis, Banana, Sustainability, Dwarf Mutants**AN OVERVIEW ON *AGARICUS BISPORUS* WITH SPECIAL REFERENCE TO ITS CULTIVATION, POST HARVESTING TECHNIQUE, MEDICINAL AND NUTRITIVE VALUE**

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Agaricus bisporus is an edible mushroom which belongs to kingdom fungi and phylum basidiomycota. Button Mushroom also known as Cremini, Portbello and table mushroom in other countries like USA, Europe, etc. making up 92% of mushroom production. Mushrooms are considered to be a fungi but not all fungi are mushrooms. The word mushroom refers to the fruiting body of certain fungi that can be seen through naked eye picked up by hand and have different shape, colour and morphological character. Mycelium is the main part of mushroom which grows in multiple directions as mycelium is what cultivators need to grow before fruiting mushrooms. Any good apple grower knows they need to grow healthy plants to produce beautiful apples likewise a mushroom farmer must cultivate healthy mycelium first and then create a favorable environment for mushrooms to fruit. Button mushroom is one of the most commonly widely consumed mushrooms in the world having very good nutritive and medicinal value. It contains low carbohydrate and fat content so that it has low caloric value which is helpful in various purposes such as diet purpose, fitness purpose and good for heart patients. Nature gives us many sources of medicinal agents from where natural drugs are isolated based on their traditional use as well as modern use. Since ancient times there is a very great relationship between plants and fungi having medicinal compounds which play a dominant role in maintenance of human health. So, the *A. bisporus* is used to extract the drug and play an important role in drug development in pharmaceutical industry.

Keywords: Agaricus, Cultivation, Post harvesting technique, Drug development

MOLYBDENUM-MICROBE SYNERGY: BOOSTING SUSTAINABILITY THROUGH MO-N₂ FIXING ORGANISMS INTERACTION**NIKITA LAISHRAM****PhD. Research Scholar, Department of Soil Science and Agricultural Chemistry, Central Agricultural University, CAU, Imphal**

Molybdenum is an essential micronutrient and its requirement for plant growth was first demonstrated by Arnon and Stout (1939) using hydroponically grown tomato. It plays an integral part in N₂ fixation. In agricultural settings, perhaps 80% of this biologically fixed N₂ comes from symbiosis involving leguminous plants and α -proteobacteria. The progression to the symbiotic state by two initially independent, free-living partners is governed by reciprocal signal generation and perception, which has been described as “molecular dialogue” (De’nari et al., 1993). The nitrogenase enzyme is responsible for the reduction of atmospheric N into ammonium. Nitrogenase is a complex oxygen-sensitive metalloenzyme with three isoforms: Fe–Mo nitrogenase (encoded by nif gene cluster), Fe–V nitrogenase (encoded by vnf gene cluster), and Fe–Fe nitrogenase (encoded by anf gene cluster). Among them, Mo–Fe nitrogenase plays a dominant role in nitrogen fixation, while others act as alternative nitrogenases. Higher yield including all growth parameters and greater economic benefit can be obtained under Faisalabad conditions when the mungbean seed is treated with the Mo at the rate 4 g/kg of seed + inoculated with Rhizobium (Tahir et al., 2011). Symbiotic effectiveness of Mesorhizobium ciceri strain improved by co-inoculation with helper bacteria Bacillus subtilis and Mo nanoparticles (Shcherbakova et al., 2017). In Indian context, Das et al. (2012) concluded that treatment with both Rhizobium and seed treatment with 1.0 kg Na₂MoO₄/ha was found optimum for chickpea growth, yield, residual soil fertility under Tarai conditions. Therefore, a self-sufficient legume-rhizobium symbiosis improved the physiological status of the plant, increasing structural diversity of the microbial community of the rhizosphere through changes in the activity of microbial diversity in the plant rhizosphere and thus proved to be of economical and ecological importance.

Keywords: Molybdenum, N₂ fixation, Rhizobiaceae, Nitrogenase**STUDIES ON SEASONAL INCIDENCE OF INSECT PEST OF MARIGOLD (TAGETES SP.)****NIKITA LOKAPPA TOSUR^{*1}, S GOPI¹, NAGRAJU M. C¹ AND MANJULA², SUPREETH GOWDA³, SHRADDHA KESHETTI¹ AND POOJA D. V¹**¹**Department of Entomology, College of Horticulture, Bengaluru, Karnataka**²**Department of Entomology, College of Agriculture, UAS, GKVK, Bengaluru, Karnataka**³**Department of Plant pathology, College of Horticulture, Bengaluru, Karnataka**

Marigold (*Tagetes* sp.) is a commercially exploited flower crop and is having a prominent place in ornamental horticulture. The genus *Tagetes* has 33 species. In India, the African Marigold (*Tagetes erecta*) and French marigold (*Tagetes patula*) are grown commercially for adorning garlands, performing religious offerings, decoration and bedding purposes. Studies on seasonal incidence against pest complex of marigold var. Benz tall was carried out at College of Horticulture, Bengaluru during 2020-21. The taxonomic identification results revealed that insect and mite species such as *Microcephalothrips abdominalis* (Crawford), *Thrips palmi* Karny, *Tetranychus urticae* Koch were identified respectively. The other insect pests which have been recorded on the crop during experimental period were *Helicoverpa armigera* (Hubner), *Aphis gossypii* Glover, *Amrasca bigutulla bigutulla* (Ishida), *Bemisia tabaci* (Gennadius), *Liriomyza trifolii* (Burgess) and their natural enemies as *Coccinella transversalis* Fabricius, *Cheilomenes sexmaculata* (Fabricius), *Illeis cincta* Fabricius, *Chrysoperla zastrowi* (Sillemi), *Eocanthecona furcellata* (Wolff) and spiders. The highest mean population of thrips was 9.20 thrips per leaf and 24.60 thrips per flower, mites (33.40 mites/leaf), borer (1.80 borer/plant), aphids (36.60 aphids/ 5 cm shoot), leafhopper (1.70 hopper/leaf), whiteflies (3.50 flies/leaf), and leafminer (2.50 mines/leaf). The highest mean of coccinellid beetles was 1.50 beetles per plant, green lacewing (0.90 lacewing/plant), pentatomid bug (0.90 bug/plant) and spiders (1.10 spiders/plant). The correlation studies results showed that the thrips was positive and significantly correlated with maximum and average temperature (r= 0.91 and 0.79, resp.), mites (r= 0.78 and 0.89, resp.), *H. armigera* (r= 0.85 and 0.84, resp.), aphids (r=0.80 and 0.84, resp.), leafhopper (r= 0.65 and 0.71 resp.), whitefly (r= 0.70 and 0.76, resp.) and leafminer (r= 0.76 and 0.67, resp.). While the correlation of natural enemies was positive and significant with minimum and average temperature.

Keywords: Correlation, Incidence, Insect-pests and Marigold**QUALITY ASSESSMENT OF MENTHA CULTIVATED UNDER AGROFORESTRY SYSTEM****NIKITA RAI*, NANITA BERRY, NEELU SINGH, AND HARSHIT SHARMA****Silviculture, Forest Management and Agroforestry Division, ICFRE-Tropical Forest Research Institute, P.O.-RFRC Mandla Road**

Mentha, an aromatic crop of the Lamiaceae family, has applications in various industries such as perfumery, confectionery, flavoring, and medicine. Traditional herbal medicine has long utilized mint species for their tonic properties, aiding digestion, calming the stomach, relieving spasms, and reducing inflammation. Due to the presence of abundant polyphenolic compounds, many are renowned for their antioxidative characteristics. An extensive field survey was carried out to document the agroforestry system existing in farmers fields in the Bundelkhand region of Madhya Pradesh and noticed that mentha is cultivated in Silvi-Medicinal System (T-1, Acacia nilotica+ Mentha, T-2, Bamboo spp. + Mentha) by a few farmers. In the present study, samples of mentha crops were collected from open and understorey (shady) areas in Silvi-Medicinal System and recorded their effect on secondary metabolites, including total phenol and total flavonoid contents in Mentha crop. The results show that there were variations in the total phenol content and total flavonoid content between shady and open areas, In Treatment 1 (T-1), the variations were 6.19% and 5.43% for total phenol content, and 2.35% and 2.01% for total flavonoid content, respectively. In Treatment 2 (T-2), the variations were 5.43% and 4.63% for total phenol content, and 5.42% and 3.85% for total flavonoid content, respectively. These findings suggest that secondary metabolites, i.e., total phenol and total flavonoid content, were significantly affected in different Silvi-medicinal systems as per canopy expansion and growing conditions.

Keywords- Silvi-Medicinal System, Mentha, Phenol, Flavonoid and Secondary metabolites.

A STUDY ON EATING BEHAVIOUR OF COLLEGE GOING GIRLS DURING ONLINE CLASSES IN PATNA CITY**NIKKI KUMARI, DR. VIJAY LAKSHMI****PhD Research Scholar, Home Science, Session, J.D. Women's College Patna, Patliputra University, Patna, Bihar, India****Associate professor, P.G. Department of Home science, J.D. women's college Patna****Patliputra University, (Bihar) India**

Online classes started a few years ago in 2020 during the Covid-19 outbreak. In some colleges, even today, online classes are taken for two to three hours keeping in view the convenience of teachers and students. The main objective of this study was to examine the eating behaviours and nutrition of students during online classes. 500 girl students were selected on the basis of purposeful sampling technique from the following 3 colleges of Patna region. Keeping in mind the subject, those students were selected for this study who had taken online classes for a long period of at least one or two months and at maximum 2 years. As per the objective of this research, the results of analysing the data collected by preparing the questionnaire showed that most students used to miss one meal in their daily diet, whether it is breakfast or lunch. Apart from this, in between online classes, they consumed snacks and junk food like tea 62.9%, milk 35.2%, chocolate milkshake 56.3%, fruits juice 28.8%, biscuit 44.7%, Maggi 73.1%, packed chips 81.4%, fruits 47.2%, sandwich 24.3%, bread 50.1% and apart from this, many students used to order junk food and snacks from online apps like Zomato and Swiggy and enjoy them two-three times a week. At the end of the results, keeping in mind the dietary habits of all the students, the nutritional value of all the snacks and junk food was calculated, out of which most of the students consumed high calorie and high fat and consumed other nutrients like high protein, vitamins and mineral salts in low quantity.

Keywords- Online Class, Eating Behaviour, College Students**HIGH-THROUGHPUT PHENOTYPING FOR CROP IMPROVEMENT****NINGOMBAM SONIA DEVI,****Ph.D Research scholar, Department of Genetics and Plant Breeding, College of Agriculture, Central Agricultural University, Imphal.**

With the rapid expansion in human population, there is a scarcity of food; therefore, effective food production is necessary to meet the demand for food. Enhancing crop management and creating better crop types are essential for boosting crop productivity, which is required to fulfil the 21st century's growing food demand. One such rapid and effective method for any kind of genetic study is plant phenotyping. In recent years, high throughput phenotyping has garnered a lot of attention. It is a valuable tool for phenotyping for identifying biotic and abiotic stresses. In general, these responses tend to limit the development and yield potential of a variety. A variety of physiological and anatomical changes occur in response to stress, which can impact plants' ability to endure stress. Effective approaches are therefore required to identify the physiological characteristics and corresponding reactions that increase stress tolerance while optimizing commercially significant characteristics like yield and quality. Real-time study of physiological changes in plants has been made possible by the growing availability of various imaging techniques. These imaging approaches hold considerable promise for non-destructive pre-symptomatic monitoring of plant stress through high-throughput screening of plant populations. High-throughput phenotyping makes it possible to precisely monitor plant organs, field plots, and entire fields. This aids in the identification and access of plant features that are important breeding targets for improving agricultural performance in challenging conditions. The whole genome sequencing of numerous crops paved the way for the big data and high-throughput era in crop functional genomics research. Yet, obtaining large-scale phenotypic data has emerged as one of the main bottlenecks to functional genomics studies and crop breeding. Without a doubt, precise high-throughput phenotyping will spur the next green revolution in agricultural breeding and enhance plant genetic improvements.

Keywords: High- throughput, phenotyping, genome, breeding.**EFFECT OF PLANT GROWTH REGULATORS ON GROWTH, YIELD, AND QUALITY OF BROCCOLI****NIRAJ KUMAR PRAJAPATI****Department of Horticulture, School of Agricultural Sciences and Technology, BabasahebBhimraoAmbedkar University (A Central University), Lucknow (U.P.) – 226025, India**

Broccoli (*Brassica oleraceavar.italica*) is a cruciferous vegetable widely cultivated for its nutritional value and health-promoting properties. Enhancing broccoli production and quality is a major goal for growers and researchers. Plant growth regulators (PGRs) have emerged as promising tools to improve various aspects of broccoli cultivation. This review comprehensively examines the effects of different PGRs, including auxins, gibberellins, cytokinins, abscisic acid, ethylene, and brassinosteroids, on the growth, yield, and quality of broccoli. The modes of action, application methods, and potential benefits and drawbacks of each PGR are discussed. The review also explores the influence of PGRs on morphological traits, head formation, nutritional composition, and biotic and abiotic stress responses in broccoli. Additionally, the article highlights current research trends, challenges, and future perspectives in the utilization of PGRs for enhanced broccoli production and quality.

Keywords: Growth enhancer, promotors, stimulators, factors, synthesizers, hormones.

NUTRITIONAL FACTS OF BROCCOLI**NIRAJ KUMAR PRAJAPATI^{1*}, VISHAL SINGH¹, DINESH KU.MEENA¹ AND HIMANSHU KU. GUPTA²**¹Department of Horticulture, SAST, BabasahebBhimraoAmbedkar University, Lucknow, (U.P.) India²Department of Plant Pathology, Post Graduate college, Ghazipur, (U.P.) India

Broccoli, a cruciferous vegetable, has long been hailed as a nutritional powerhouse, offering a diverse array of essential vitamins, minerals, and bioactive compounds. Cruciferous vegetables like broccoli are known for their high content of glucosinolates, which are sulfur-containing compounds that have been extensively studied for their anti-inflammatory and anticancer properties. Furthermore, broccoli is an excellent source of vitamin C, providing over 135% of the recommended daily intake in a single cup. Vitamin C is a potent antioxidant that supports immune function and contributes to the body's ability to absorb iron. Broccoli is also rich in folate, a B-vitamin essential for cell growth and development, particularly during pregnancy. Additionally, it contains substantial amounts of vitamin K, which plays a crucial role in blood clotting and bone health. The high fiber content in broccoli promotes healthy digestion and may contribute to a reduced risk of chronic diseases such as heart disease and certain types of cancer. Notably, broccoli is an excellent source of carotenoids, including lutein and zeaxanthin, which are vital for maintaining optimal eye health and preventing age-related macular degeneration. Furthermore, the presence of indole-3-carbinol, a compound found in broccoli, has been linked to potential anti-carcinogenic properties, making this vegetable a valuable addition to a cancer-preventive diet. While broccoli boasts an impressive nutritional profile, it is essential to consider the preparation methods to maximize its nutritional benefits. Steaming or lightly cooking broccoli is recommended to preserve its nutrient content and bioavailability.

Keywords: Glucosinolates, Vitamin-C, -K, Folate, Fiber, Carotenoids, Anti-carcinogenic.**LOW COST HYDROPONIC SYSTEM FOR LEAFY VEGETABLE PRODUCTION****NIRAJ SHELKANDE¹, SONALI DEORE², PRATIK MURTADAK³, KANCHAN GUPTA⁴, PRANJALI PAWAR⁵ & DR. DIPAK KUMAR AHIRE⁶**^{1,2,3,4,5}TYB.Sc (Hons.) Agriculture, Students, College of Agriculture, Nandurbar, Maharashtra (India)⁶ Assistant Professor of Horticulture, College of Agriculture, Nandurbar, Maharashtra (India)

The modernized method of hydroponics is showing a new way of strategy to cope up with the existing problems. Using locally available cheap substrates for soilless culture, farmers can improve the quality and yield of the produces. College of Agriculture, Nandurbar students designed low cost hydroponic structure & which was found suitable for cultivation of leafy vegetables. The study showed that, the significant increasing the plant height, leaf number, fresh weight, and shoot-root ratio & vegetative growth of leafy vegetables (Fenugreek, lettuce & Coriander) crop. India has huge scope to spread this technique throughout the country to ensure food security in the near future. Not only it will increase the income but it will also generate the employment rate of youngsters, so this method becomes a great scope of experiment and research in both indoor and outdoor condition. We should keep in mind that, hydroponics cannot replace the traditional farming, but it can be alternative approach.

Keywords- Low cost hydroponics, vegetative growth, lettuce, fenugreek, coriander**ANTIBACTERIAL ACTIVITY OF *PLATANUS ORIENTALIS* (CHINAR) INDIFFERENT SOLVENTS AGAINST PATHOGENIC BACTERIA****NIRMALA DHAR AND UTTAMKUMAR****Alpine Institute of Management and Technology, Dehradun**

In traditional medicine, Chinar (*Platanus orientalis* L.) is used to treat wounds, inflammation, stomach discomfort and other illness due to its antimicrobial properties. The plant has a considerable bioactive potential that allows it to exhibit a wide range of favourable pharmacological and physiological effects for humans against a variety of microorganisms. Therefore, the aim of this study to investigate the antibacterial potential of Chinar against pathogenic strains of *Staphylococcus aureus*, *Bacillus cereus*, *Bacillus subtilis*, *Bacillus thuringiensis*, *Alcaligenes faecalis* and *Salmonella typhi*. To evaluate the antibacterial potential of bioactive compounds, petroleum extract of leaf and stem were taken and methodologies includes phytochemical examination using Gas Chromatography-Mass Spectrometry (GC-MS). Disk diffusion method was followed for screening of microorganisms using Ampicillin and Streptomycin (30mg/disk). Minimum inhibitory concentration (MIC) was estimated using standard protocols (Drummond & Weigh, 2000) by a resazurin assay. Phytochemistry of *Platanus orientalis* revealed the existence of potent bioactive components. The findings of this research suggest that *Platanus orientalis* is a highly efficacious antiseptic against pathogenic bacteria, rendering it a perfect remedy for illnesses resulting from these microorganisms.

Keywords: antimicrobial activity, Gas Chromatography, Mass-Spectrometry Bioactive Compound, Disk Diffusion

BIOTIC AND ABIOTIC STRESS MANAGEMENT¹NIRMALA MEENA, ²DR. RAJEEV BAIRATHI AND ³VIKASH KUMAR MEENA

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A multitude of biotic and abiotic stress factors do harm to plants by bringing about diseases and inhibiting normal growth and development. As a pivotal signaling molecule, salicylic acid (SA) plays crucial roles in plant tolerance responses to both biotic and abiotic stresses, thereby maintaining plant normal growth and improving yields under stress. In view of this, this paper mainly discusses the role of SA in both biotic and abiotic stresses of plants. SA regulates the expression of genes involved in defense signaling pathways, thus enhancing plant immunity. In addition, SA mitigates the negative effects of abiotic stresses, and acts as a signaling molecule to induce the expression of stress-responsive genes and the synthesis of stress-related proteins. In addition, SA also improves certain yield-related photosynthetic indexes, thereby enhancing crop yield under stress. On the other hand, SA acts with other signaling molecules, such as jasmonic acid (JA), auxin, ethylene (ETH), and so on, in regulating plant growth and improving tolerance under stress. This paper reviews recent advances in SA's roles in plant stress tolerance, so as to provide theoretical references for further studies concerning the decryption of molecular mechanisms for SA's roles and the improvement of crop management under stress.

Keywords: salicylic acid, biotic stresses, abiotic stresses, tolerance, immunity and yield**TO EVALUATE IN VITRO OF COMBINATION PRODUCTS OF FUNGICIDES AGAINST CORYNESPORA LEAF SPOT DISEASE OF COTTON UNDER SOUTH GUJARAT OF INDIA**NIRVA PATEL¹, PRASHANT B. SANDIPAN², TWINKLE MANAVADRIA³, PAYALKODVALA⁴ AND NISHI SAINI⁵ P. S. PATEL⁵ AND R. K. PATEL⁶^{1,2,4&5}PG Student Department of Plant Pathology, N. M. College of Agriculture, Navsari Agricultural University (NAU), Navsari (Gujarat), India³Main Cotton Research Station (MCRS), Navsari Agricultural University (NAU), Surat 395 007 (Gujarat), India

Cotton (*Gossypium hirsutum* L.) is one of the most important fiber crops playing a key role in the economic and social scenario of the globe. It is the oldest among all the commercial crops of the world, providing fiber for the clothing of mankind. Target spot of cotton caused by *Corynespora cassiicola* is one of the most important disease of cotton causing significant yield losses. The *C. cassiicola* is a cosmopolitan fungal plant pathogen that infects 530 plant species from 380 genera, including cotton and soybean. It has a large geographical distribution from Japan, the tropics of Brazil to North America and can be found on leaves, stems, roots and within nematode cysts, among monocots, dicots and on one species of cycad. The fungus is ubiquitous in nature and can act as an endotroph or saprotroph means it can act as a pathogen or present on the plant material with no pathogenic effect. Here, in this experiment, out of five combination products of the fungicides tested, efficacy of a carbendazim 12% + mancozeb 63% WP and fluxapyroxad 167g/ L + pyraclostrobin 333g/ L SC was the best with cent per cent growth inhibition of *C. cassiicola* at all the three concentrations inhibited cent per cent growth of the *C. cassiicola* and proved extremely fungitoxic.

Keywords: *Gossypium hirsutum*, *Corynespora cassiicola*, Target spot, Combi Fungicide, Cotton**STUDY ON CHEMICAL MUTAGENESIS THROUGH DIETHYL SULPHATE IN COWPEA (VIGNAUNGUICULATA L.)**NISHA PANDWALA¹, DR. H.L. BAIRWA²¹Ph.D. Research Scholar Department of Horticulture(Vegetable Science) College of Agriculture SKRAU-Bikaner,²Associate Professor and Head Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan

The present study entitled “Study on chemical mutagenesis through Diethyl Sulphate in Cowpea (*Vigna unguiculata* L.)” was carried out at Horticulture Farm, Department of Horticulture, Rajasthan College of Agriculture, Udaipur during Zaid season, 2022-23. The experiment was made up of eleven treatments of various concentration of diethyl sulphate and these were replicated thrice before applied randomly in 33 plots under Randomized Block Design (RBD). The recommended dose of chemical mutagen diethyl sulphate for cowpea is 0.4%. The result revealed that among various concentration of diethyl sulphate of treatment DES₄ (0.4%) was recorded with significantly maximum number of pods per plant (39.00), weight of pod per plant (221.40 g), number of seed per pod (12.00), 100-seed weight (11.43 g), seed yield per plant (46.27 g), chlorophyll content (1519.00 mg g⁻¹) was found in treatment DES₄ (0.4%). Somewhere, treatments DES₃ (0.3%), DES₂ (0.2%) and DES₁ (0.1%) were observed at par with treatment DES₄ (0.4%). While, minimum number of pod per plant (35.22), weight of pod per plant (152.27 g), seed per pod (9.80), 100-seed weight (9.60 g), seed yield per plant (35.93 g) and minimum chlorophyll content i.e. (1426.33 mg g⁻¹) was observed in treatment DES₁₀ (1.0%).

Keywords- *Vigna unguiculata*, Mutagenesis, Concentration, Pod yield, Seed yield, Chlorophyll content.

PRIORITIZATION OF SUB-WATERSHEDS OF JAJMAU BASIN, KANPUR USING DRAINAGE MORPHOMETRYNISHA SAHU^{1*}, J. K. SAHA¹, RAHUL MISHRA¹, NISHANT SINHA¹, MRUNALINI KANCHETI² AND H. BISWAS³¹ICAR-Indian Institute of Soil Science, Bhopal²ICAR-Indian Institute of Pulse Research, Kanpur³ICAR-National Bureau of Soil Survey and Land Use Planning, Nagpur

Advanced, reliable, and cost-effective tools like GIS and remote sensing play a very important role in the prioritization and extraction of drainage in basins. In the present study, thirty-two morphometric aspects, including linear, aerial, and relief parameters with standard formulae, are considered and computed to prioritize the sub-watersheds. The toposheet (1:50,000 scale) downloaded from SOI and SRTM DEM (30 m resolution) from Earth Explorer are used to extract drainage and delineate the watershed and sub-watersheds of the basin using ArcGIS 10.8 software (Spatial Analyst tools). The results observed that drainage is dendritic to sub-dendritic, which shows that the study area has homogeneous and uniform soil. The Jajmau basin is divided into four sub-watersheds and prioritized using the compound value and ranking method. The sub-watershed SW-1 needs high priority and immediate attention for management aspects, whereas SW-4 needs the least. Hence, the study would be beneficial and attract decision-makers and management planners for effective planning of resources at the parcel level.

Keywords: Watershed, Morphometric analysis, GIS, Remote sensing, DEM**CANARIUM STRICTUM: AN COMMERCIALLY IMPORTANT NON-TIMBER FOREST PRODUCE**NISHMADECHAMMA T. M¹, HANUMANTHA M², SAHANA S¹ AND KARTHIK H N²¹Dept. of SAF, College of Forestry, Sirsi, Uttara Kannada, Karnataka²Dept. of FPU, College of Forestry, Sirsi, Uttara Kannada, Karnataka

Canarium strictum is a gigantic evergreen tree, belonging to the family Burseraceae. It is commonly known as black dammar, black dhoopa. It is found in the moist deciduous to semi evergreen forests at an altitude of 750m-1400m. It is distributed in the states of Kerala, Karnataka, Tamil Nadu, Maharashtra, Assam, Sikkim, Meghalaya. Apart from India it is also found in Myanmar and parts of China. This tree falls under IUCN red list and has a vulnerable to near threatened status. *C. strictum* is one of various tree species commercially harvested for 'dammar' or 'sambrani' throughout South and Southeast Asia. Dammar is a term applied to a variety of hard resins that are soluble in turpentine and other organic solvents and having small amount of essential oils. Black dammar has been used traditionally to cure numerous ailments, including rheumatism, coughs, asthma, epilepsy, syphilis, hernia, fever, chronic skin diseases, and haemorrhage. It is also used as fumigation and as incense in various religious ceremonies. Matchsticks wax, dammar oil (used in aromatherapy), varnish, paint, lacquers are some of the value added products of this species. The domestic share of dammar is 18,000 million tons annually and 1100-1200 tonnes are used as binding agents in agarbatti industries. The Virudhnagar (Tamil Nadu) producers are major procurers of dammar from traders and importers. The dammar is sold online at an average of Rs. 360/kg. Dammar worth of \$10 has been exported (August 2016). Italy was the only importer of black dammar from India during 2016. *Canarium strictum* is a medicinally important species with a myriad of uses; but is under the IUCN red list, so the tree should be planted out and some trees should be retained without tapping to promote natural regeneration. As the tribal people are the primary collectors they should be made aware about the importance of the species and alternative source of income should be generated who solely depend on resin collection.

Keywords: Black dammar, Value addition, IUCN, Aromatherapy, Resin**PHYTOCHEMICAL INVESTIGATION OF TECOMA CAPENSIS FLOWER AQUEOUS EXTRACT AND IN VITRO BIOLOGICAL STUDIES: ANTIBACTERIAL AND ANTI-PROLIFERATIVE ACTIVITIES OF ITS SILVER NANOPARTICLES***¹NISHITHA & ²BHAVITA LAMBA^{1&2}Department of Biosciences, UIBT, Chandigarh University, Mohali, Punjab, India

The present study focused on the synthesis of silver nanoparticles (AgNPs) from *Tecoma capensis* flower aqueous extract (TcAqFE). The impact of AgNPs on microstructural, optical, antibacterial, and antiproliferative properties has been investigated through UV-visible spectroscopy, X-ray diffraction, transmission electron microscopy (TEM), Fourier infrared spectroscopy (FTIR), agar well diffusion technique assay and MTT. The particle size estimated from TEM and XRD is in the range of 1–10 nm. The XRD pattern reveals that the *Tecoma capensis* silver nanoparticles (TcAgNPs) have a cubic crystal structure. FTIR spectra showed band positions at 1071, 1358, 1620, 1962, 2150, 2920, and 3361 cm. Surface plasmon resonance (SPR) in AgNPs became evident with an absorption peak at 407 nm. GC-MS analysis of ethanolic flower extract revealed the presence of major phytochemical constituents, including Butanal (57.14%), Propanol (20.23%), Ethanone (4.88%), Mesitylene (3.70%), Hexanal (3.33%), 4-Cyclopentene-1,3-diol, trans (3.16%), Furan (2.94%), 5-Hepten-2-one (2.58%), and Acetic acid (1.68%). The antibacterial assay results indicate that the TcAgNPs exhibited the maximum activity against *Salmonella typhi*, with inhibition zone (IZ) values of (40±1.4 mm), followed by *Bacillus subtilis* (35.66±2.0 mm), *Staphylococcus aureus* (32.6±0.64 mm), *Escherichia coli* (29.66±2.05 mm), *Listeria monocytogenes* (27±1.63 mm), and *Klebsiella pneumoniae* exhibiting the least IZ values (23±1.6 mm). Minimum inhibitory concentration (MIC) values ranged from 0.20 to 2.81 mg/mL. The highest MIC value 2.81 mg/mL was observed in case of *Salmonella typhi*, while *Staphylococcus aureus* (0.20 mg/mL), displayed the lowest MIC values. The MIC of Gentamycin also ranged from 0.012 to 0.024 mg/mL. MTT assay demonstrated that the aqueous extract was potent against the cancer cell line A549, with a GI₅₀ of 71.79 µg/mL. These results suggest that TcAgNPs have therapeutic potential and can serve as antibacterial and antiproliferative agents to protect against several ailments.

INNOVATIVE APPROACHES TO MITIGATE THE FOOD AND WATER CRISIS: A WATER ACCOUNTING PLUS FRAMEWORK (WA+)NISHTHA SHARNAGAT¹, ANUPAM KUMAR NEMA¹, P. K. MISHRA²¹Department of Farm Engineering, Institute of Agricultural Sciences, BHU, Varanasi-221005²National Institute of Hydrology, Roorkee, Uttarakhand

The impending food and water crisis can be avoided by focusing on 'Water Productivity (WP)' in the agricultural sector. Agriculture is the major user of water worldwide, and even more so in India. This shows the necessity for efficient agricultural water management practises in order to put more land under irrigation and shift excess water for other use such as domestic, industrial, and environmental. This study presents the water accounting plus framework for assessing the water productivity and land productivity to identify the bright-spots and hot-spots at the river basin level. The main aim of the analysis is to identify the possibilities of efficient water resource management for sustaining the future demand of food and water. The water accounting plus framework (WA+) utilises the remote sensing and open access datasets and provides systematic quantitative assessment of the status and trends in water consumption patterns from the various domains. This framework applies the "green" and "blue" water accounting theories based on the Budyko hypothesis. Results indicates that WA+ framework provides independent estimates of water consumption patterns for trans-boundary basins and ungauged basin where observed datasets are not available. It provides the identification of evapotranspiration (ET) with special and temporal variation by different land use classes and water groups throughout the basin. Also offers information on both beneficial and non-beneficial uses of water consumption as well as the impact of human activity on evapotranspiration by segregating ET into evaporation, transpiration and an interception. The findings point to opportunities for improving irrigation water management and conserving water in agriculture.

Keywords: Water productivity, water accounting, evapotranspiration, food security**FORTIFYING GLOBAL FOOD SYSTEMS: A HOLISTIC FRAMEWORK INTEGRATING SUSTAINABLE AGRICULTURE, TECHNOLOGICAL INNOVATION, AND COMMUNITY ENGAGEMENT**

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This study addresses the critical nexus between sustainable agriculture and food security, presenting innovative ideas and concepts to fortify global food systems. The scope of this study encompasses the development and implementation of a holistic framework that integrates ecological resilience, technological advancements, and community engagement. Our methodology involves a multidisciplinary approach, combining agroecological practices, precision farming technologies, and social inclusivity to create a symbiotic relationship between agriculture and the environment. The principal findings reveal that by adopting regenerative farming techniques, such as agroforestry and organic farming, we can enhance soil health, mitigate climate change impacts, and promote biodiversity. Concurrently, the integration of precision farming technologies, including IoT sensors and AI-driven analytics, optimizes resource utilization, minimizes waste, and boosts overall productivity. Moreover, our study underscores the significance of empowering local communities through knowledge-sharing, capacity building, and fostering sustainable livelihoods, thereby promoting food sovereignty. This research advances the understanding of sustainable agriculture as a critical factor for achieving global food security. The proposed framework serves as a blueprint for policymakers, farmers, and stakeholders to collaborate in building resilient and self-sufficient food systems. By embracing this innovative approach, we can overcome current challenges, ensuring food security for present and future generations while safeguarding the planet's ecosystems.

Keywords: Sustainable agriculture, global food security, IoT sensors, AI-driven analytics, precision farming,**EFFECT OF ORGANIC FARMING ON GROWTH AND YIELD OF CAULIFLOWER *BRASSICA OLERACEA* VAR. *BOTRYTIS* L.**

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In order to investigate the effect of organic farming on growth and yield of Cauliflower *Brassica oleracea* var. *botrytis* L., an experiment was carried out at the Rajaula Agricultural Farm, Department of Horticulture, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya (MGCGV), Chitrakoot, Satna, Madhya Pradesh, India during the Rabi season of 2020-2021. The experiment was laid out in Randomized Block Design with fourteen treatments comprising of different combinations of organic farming practices and compared with farmer practices. Each treatment was replicated three times. In accordance to the experimental results obtained during the present investigation and the average performance of the treatments revealed that the treatment T₁ RDF (NPK 120:80:80) followed by T₉: 50% RDF + 50% Vermicompost found superior over other treatments and influenced growth and yield of the cauliflower. Using more bio-organic pesticides led to larger and heavier plants, resulting in increased yields of marketable cauliflower. Bio-organic fertilizer made from animal waste, such as carabao dung and manure tea, has been shown to positively impact growth. The efficiency of bio-organic fertilizer derived from plant extracts on cauliflower production may be influenced by parameters like as dose, timing, and frequency of administration, as well as stress caused by environmental conditions throughout the research.

Keywords: vermicompost, *Brassica oleracea* var *botrytis* L, Organic farming, NPK

SOURCE VARIATION FOR GROWTH, LEAF AND BARK RECOVERY PROPERTIES IN *TERMINALIA ARJUNA* NITINKUMAR BAJAKKUNAVAR¹, HANUMANTHA M², GIRISH B. SHAHAPURMATH AND RAMANA P⁴

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Terminalia arjuna (Roxb.) Wight & Arn. (Arjuna) is a handsome tree, distributed along riverbanks and streams of moist deciduous and evergreen forests and its bark is valued for medicinal, tannin and dyeing properties. It also provides various ecological benefits, including preventing soil erosion on river banks and reclaiming saline and alkaline soils in agroforestry, deep ravines and other areas. Many value added products such as arjuna chhal powder, pills, herbal tea and health supplement products are made from bark of *Terminalia arjuna* tree, which have a good value in markets. In the year 2006-07 around 2000 tonnes of bark was consumed, and the present annual demand of *Terminalia arjuna* bark is around 5000 tonnes per annum. Its bark powder costs around 400 Rs/kg. Ninety five per cent of its bark is being harvested from the natural forests without adopting any sustainable harvesting methods. Present investigation was carried out to assess the variation for the growth, leaf and bark recovery of *T.arjuna* among four different girth classes among four different sources of Uttara Kannada. Significant variation for growth, leaf and bark properties was observed among the girth classes and sources. Trees of Hosakambi source recorded maximum tree height (13.80 m), crown length (6.90 m) and leaf area (70.90 cm²); whereas, Mundgod source recorded highest bark thickness (1.68 cm). Among the girth classes, the highest tree height (19.00 m), crown length (10.53 m) and crown width (8.60 m) were recorded for the trees of G₄ (> 150 cm) girth class, but higher leaf parameters recorded for younger trees (G₁: 0-50 cm). Significant variation among the sources, girth classes and post harvesting treatments was recorded for bark recovery. Among the girth classes, G₃ girth class recorded the highest bark recovery (52.37%) and lowest recorded for G₄ girth class (37.78%) trees. Between the patches, narrow strip patch (P1) recorded higher bark recovery (45.58%) compared to broad patch (P2: 38.34%). Among the different post-bark harvest treatments NSKE + cover (T6) recorded the highest bark recovery and least in control (T1). Between the sources, trees of Hosakambi recorded higher bark recovery (44.28%) compared to the Yellapura (36.12%).

ASSESSING THE FEASIBILITY OF RENEWABLE ENERGY GENERATION FROM MUNICIPAL SOLID WASTE IN LUCKNOW CITY, UTTAR PRADESH, INDIA

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The continuous growth in population, economic expansion, and urban development is expected to further escalate the generation of municipal solid waste (MSW). This highlights the critical need for implementing sustainable approaches to manage and exploit MSW resources. Lucknow, the capital city of Uttar Pradesh State, with a population of 3.88 million, produces about 1946 tonnes of MSW daily. This study was undertaken to characterize Lucknow's MSW during summer and evaluate its potential as a renewable energy source, aligning the city with sustainability goals and promoting a circular economy framework for development. Following American Society for Testing and Materials (ASTM) standards, collected samples underwent proximate and ultimate analysis. The results showed that MSW from the city's eight administrative zones had an average organic content of 49.5% and a moisture content of 46.46%. The calorific value was determined to be 3296.7 calories per gram (13.80 MJ/kg), and the carbon-to-nitrogen ratio was 28.26:1, favorable for biogas production. Physical characterization revealed that 81% (paper, plastic, organic material, and textiles) of the MSW in the city could be thermochemically converted into energy, with 49.5% (organic fraction) suitable for biogas production. The organic fraction's thermochemical conversion was estimated to have an energy potential of 1900 MWh and an electrical power potential of 23.8 MW, compared to 870 MWh and 10.9 MW, respectively, through biochemical conversion. This data highlights the suitability of Lucknow's MSW as an energy source to meet various energy demands and reduce the reliance on landfilling, consequently mitigating the adverse environmental impacts associated with landfilling.

Keywords: Sustainability, Circular Economy, Energy, Biochemical, Thermochemical.

STUDIES ON FREQUENCY DISTRIBUTION AND MULTIVARIATE ANALYSIS IN DOUBLED HAPLOID POPULATION OF MAIZE (*ZEA MAYS* L.)

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The present study was performed to quantify the amount of variation present in 275 doubled haploid lines developed from the cross CV-29073758 × CV-29073679 and also to understand the distribution pattern for seven yield related traits in maize. Analysis of variance revealed mean squares attributable among and between the DHs and the checks were significant for all the traits. These results suggested significant differences among the maize doubled haploid lines. All the quantitative traits exhibited less than three kurtosis value indicating that the tails of the distribution of these traits are platykurtic. It indicated that genetic control of these traits was influenced by many genes, with the majority of them displaying complementary epistasis with increasing effects. Correlation studies revealed that kernel weight per cob had a significant positive correlation with cob length, cob girth, kernel rows per cob ($p < 0.001$) followed by plant height ($p < 0.01$) and ear

height ($p < 0.05$). It indicated that kernel weight per cob can be increased by giving importance to these traits while formulating selection criteria in yield improvement programme. In the Principal Component Analysis, the first principal component (PC1) showed 30.85 *per cent* while, PC2 and PC3 exhibited 21.25 *per cent* and 15.10 *per cent* variation respectively, among the doubled haploid lines for the traits under study. As indicated by the principal component analysis, the K-mean clustering resulted in three clusters with the cluster B consisted of 118 DH lines followed by cluster A with 110 DH lines. The DH lines with highest values for plant height, earheight, cob girth, cob length, kernel weight per cob and test weight were formed in cluster C. The study was helpful in identifying several superior DH lines which can be used as parents in hybrid development programme.

Keywords: Maize, Doubled haploids, Correlation, Complementary epistasis, Platykurtic distribution, Principal component analysis, K-means clustering

A STUDY ON QUANTITATIVE TRAIT LOCI, GENOMIC PREDICTION AND THEIR CROSS-VALIDATION FOR SOUTHERN RUST (*PUCCINIA POLYSORA* UNDERW.) RESISTANCE IN DOUBLED HAPLOID POPULATIONS OF MAIZE (*ZEA MAYS* L.) NOOR E. MUJJASSIM¹, H. C. LOHITHASWA², NENAVATH KRISHNA KUMAR RATHOD³, N. MALLIKARJUNA⁴

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Southern corn rust disease (SCR) caused by *Puccinia polysora*, is emerging as a potential production constraint in maize. To effectively manage the disease, development and deployment of resistant cultivars to SCR is crucial with minimal effects on the environment. Under these premises, QTL for resistance to southern corn rust were detected by using mean disease severity data under artificial epiphytotic condition across three locations from three doubled haploid (DH) populations viz., PL#09× PL#07, PL#08× PL#07 and PL#08× PL#15. The Linkage map was constructed using the genotyping data of 109, 127 and 102 polymorphic SNP markers. In population 1 (PL#09× PL#07), three QTL were detected on chromosomes 2 and 4 (qSCR-2-2, qSCR-2-1 and qSCR-4-1). Among these QTL, one major QTL on chromosome 2 (qSCR-2-2) was found to be consistent across three locations. Five QTL regions conferring resistance to SCR were mapped onto chromosomes 1, 2, 3 and 10 in population 2 (PL#07× PL#08) and only one major QTL (qSCR-10-1) was detected in population 3 (PL#08× PL#15). The five DH populations viz., PL#09× PL#07, PL#08× PL#07, PL#08× PL#15, PL#09× PL#15 and PL#18× PL#15 were used for predicting and validating GEBVs for SCR resistance. The accuracy of predicted GEBVs was marginally less in five-fold cross validation approach compared to leave-one-out-cross validation approach (LOOCV) in all the five populations. In population 1 and 2 prediction accuracy was ranged from 0.2-0.7 and in population 3, 4 and 5 the prediction accuracy was ranged from 0.1 to 0.47. In cross-population validation of genomic estimated breeding values (GEBVs) three DH populations were pooled and used as training set and predictions were calibrated in population 2 (PL#08× PL#07) and population 5 (PL#18× PL#15), the predictive accuracy was more in population 5 (0.49) followed by population 2 (0.44).

Keywords: Maize, Doubled haploids, Genomic estimated breeding values (GEBVs), Southern corn rust

USE OF DIFFERENT DIETARY ZINC SOURCES IN THE FEEDS OF FINGERLING *HETEROPNEUSTES FOSSILISTO* IMPROVE GROWTH, BIOCHEMICAL AND HEMATOLOGICAL PARAMETERS

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Aquaculture is a growing industry facing several challenges such as sustainable feed production, water quality management, disease control and environmental degradation. Trace elements in the feeds at optimum levels play significant role in sustainable aquaculture. Aquatic animals require trace elements for normal growth, reproduction and other physiological processes. Nanoparticles of the trace elements which are considered to be nutritionally more efficient than conventional forms, have to be compared in terms of growth performance. Zinc is an essential micronutrient and it plays crucial roles in stabilizing the cellular organelles, membranes and fluids as well. An experiment was conducted to compare the effects of zinc oxide nanoparticle and zinc gluconate on stinging catfish *Heteropneustes fossilis*. There were significant differences ($P < 0.05$) observed in the final weight gain among the fish fed diets containing different sources of zinc. Fish fed basal diet reflected the minimum growth rate, minimum whole body, and muscle zinc contents. However highest concentration was evident in fish fed diets containing zinc nanoparticles. Serum lysozyme and alkaline phosphatase activities were also found to be higher in fish fed diets with nano-zinc as compared to others. Survival rates were not treatment dependent. Dietary provision of nano-zinc also influenced the antioxidant status and prevented the oxidative damage caused due to basal diet.

Keywords: Zinc gluconate, zinc nanoparticle, growth, stinging catfish, oxidative damage

SEASONAL DYNAMICS OF GRASS DIVERSITY AND DROUGHT TOLERANCE TRAITS: A COMPREHENSIVE STUDY IN AHMEDABAD DISTRICT, GUJARAT, INDIA**NUPUR VIJAYANSHI¹ AND RUPE SHNAKAR²**^{1,2}**Botany Department, Sheth PT Arts and Science College, Godhra, Gujarat (India)**

Grasses play pivotal roles within ecosystems, reflecting intricate responses to environmental shifts. A thorough examination of 25 grass species in Ahmedabad District, Gujarat, India, was conducted across both summer and winter seasons to elucidate species diversity and pinpoint potential drought-tolerant characteristics. The survey unveiled the dominance of Paniceae and Eragrostaceae tribes, comprising 29% of the species, followed by Chlorideae at 21%, Andropogoneae at 9%, and Agrostideae, Eragrostaceae, and Sporoboleae at 4%. Ecological indices, including Simpson index (D), Simpson index of diversity (1-D), Shannon diversity index (H'), and Pielou's evenness index (J'), were computed for both seasons. During summer, D registered at 0.50, 1-D at 0.49, H' at 1.15, and J' at 0.00032. Conversely, winter displayed lower diversity, with D at 0.18, 1-D at 0.81, H' at 2.11, and J' at 0.00043. Significantly, *Cynodon dactylon* emerged as a consistently dominant species, boasting an Important Value Index (IVI) of 29.08 in summer and an even higher 52.49 in winter. Furthermore, ecophysiological analysis unveiled grass species exhibiting drought-tolerant traits, shedding light on their adaptive mechanisms in arid conditions. This study provides invaluable insights into the seasonal diversity of grass species in Ahmedabad District, Gujarat, India. The robust presence of *Cynodon dactylon* underscores its resilience, rendering it a promising candidate for sustainable landscaping and ecosystem management in arid regions. Additionally, the ecophysiological data lay groundwork for identifying and studying grasses with drought-tolerant attributes, offering promising solutions to water scarcity challenges.

Keywords: Grasses, Diversity, Important Value Index (IVI), Shannon Diversity Index (H'), Simpson index of diversity (1-D), Simpson index (D), Pielou's evenness index (J'), Proline, Ecophysiology.

COMPARATIVE STUDY ON VARIABILITY AND CORRELATION OF YIELD RELATED TRAITS IN DIVERSE WHEAT GENOTYPES UNDER IRRIGATED AND DROUGHT STRESS CONDITION**OINAM BOBOCHAND SINGH¹, SHREENIVAS DESAI², NAVEEN KUMAR, K. S¹., BASAVARAJ BAGEWADI³, ABHISHEK. K. GOWDA⁴, LALITA JAGGAL¹, MAHALAXMI K. PATIL⁴, SHIVASHANKAR AGOUDA PATIL⁴, BORANAYAKA M. B⁵., SUMA S. BIRADAR⁶ AND SANJAY KUMAR SINGH⁷****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

A study was conducted at the University of Agricultural Sciences, Dharwad during the rabi season of 2022-23 to explore and compare genetic variability and correlations among yield and its component traits under drought stress and irrigated conditions. Two hundred and twelve wheat genotypes along with six checks were grown in an augmented design, with field conditions categorized as irrigated (non-stress) and non-irrigated (stress). ANOVA analysis was performed using the "augmented RCBD" package in RStudio v3.3.3, while correlation estimation was carried out in IBM SPSS software 21. High phenotypic coefficient of variation (PCV) and genetic coefficient of variation (GCV) values, alongside high heritability and genetic advance over the mean, were observed for grain yield, biomass, and number of productive tillers. Correlation studies revealed that traits such as biomass, harvest index, canopy temperatures, relative water content, and early vigor exhibited significantly positive correlations with grain yield under stress conditions compared to irrigated conditions. The combination of high GCV with high heritability suggests minimal environmental influence on the expression of these traits, making them ideal criteria for selection. Additionally, the identified correlated traits with yield could be utilized for indirect selection, thus contributing to genetic improvement strategies for wheat.

EFFICACY OF HERBAL ORGANIC LIQUID ON GERMINATION, GROWTH, YIELD AND QUALITY OF LATE SOWN WHEAT
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Sub-optimal temperature during sowing, results in delayed germination, poor crop establishment, and constrained vegetative development, that results in forced maturity, low yield, and wheat with poorer quality grains north India. Thus, in 2020-21, a field experiment with fixed plots was carried out to analyze the impact of organic liquid manure "herbal kunapajala" (HK) as seed priming and foliar spray on the development and output of late-sown wheat. A total of 14 different treatments were tested in this thrice-replicated randomized block design study. Treatments include T₁: No seed priming + 100% RDN (Recommended dose of nutrients), T₂: Hydropriming + 100% RDN, T₃: 10% HK priming + 100% RDN + foliar application of 10% HK, T₄: 10% HK priming + 75% RDN + foliar application of 10% HK, T₅: 10% HK priming + 50% RDN + foliar application of 10% HK, T₆: 10% HK priming + no Fertilizer + foliar application of 10% HK, T₇: 25% HK priming + 100% RDN + foliar application of 10% HK, T₈: 25% HK priming + 75% RDN + foliar application of 10% HK, T₉: 25% HK priming + 50% RDN + foliar application of 10% HK, T₁₀: 25% HK priming + no fertilizer + foliar application of 10% HK, T₁₁: 50% HK priming + 100% RDN + foliar application of 10% HK, T₁₂: 50% HK priming + 75% RDN + foliar application of 10% HK, T₁₃: 50% HK priming + 50% RDN + foliar application of 10% HK and T₁₄: 50% HK priming + no fertilizer + foliar application of 10% HK. The results revealed that priming with 10% HK and its foliar application under 100% RDN increased the growth, productivity, grain quality indices, enzyme activities and economic profitability of late sown wheat. From the current research, it can be concluded that HK is a successful and cost-efficient method that may be utilized to increase crop production under late-sown conditions.

Keywords: Alpha amylase; Herbal kunapajala; Nitrogen; Seed priming; Wheat

SEED PRIMING WITH NANO PRIMING IMPROVES GERMINATION, SEEDLING VIGOUR AND BIOCHEMICAL PROPERTIES OF RABI MAIZE**OKRAM RICKY DEVI^{1*}, NAYANJYOTI OJHA², BIBEK LAISHRAM³, KALYAN PATHAK⁴, SAMIRON DUTTA⁵, MAHIMA BEGUM⁶ AND PRAKASH KALITA⁷**^{1,3}Ph. D Research Scholar, Department of Agronomy, Assam Agricultural University, Jorhat-Assam,²Professor, Department of Agronomy, Assam Agricultural University, Jorhat-Assam, India⁴Professor and Head, Department of Agronomy, Assam Agricultural University, Jorhat-Assam, India⁵Professor, Department of Soil Science, Assam Agricultural University, Jorhat-Assam, India⁶Associate Professor, Department of Sericulture, Assam Agricultural University, Jorhat-Assam, India⁷Professor, Department of Crop Physiology, Assam Agricultural University, Jorhat-Assam, India

A laboratory experiment was conducted at Assam Agricultural University, Jorhat, Assam, India during *rabi* season of 2022-2023 and 2023-2024 to study the influence of seed priming with nano urea on germination and biochemical activity in *rabi* maize hybrid variety DKC-9081. The experiment was laid in completely randomized design which consisted of three treatments viz; T₁: Nano priming (Nano urea @0.03% for 12 hours), T₂: Hydropriming (tap water for 12 hours) and T₃: Control (untreated dry seeds). Results showed that highest germination (99.7%) was found in T₁ which was statistically at par with T₂ (99.3%). Seed reserve mobilization efficiency was significantly affected by seed priming treatments. Dehydrogenase activity recorded significantly higher (0.70 OD) in T₁ which was at par with hydroprimed seeds (0.63 OD) than control. The alpha amylase activity was found highest in T₁ than other treatments followed by T₂. In conclusion, nanoprimering with nano urea for 12 hours was the most effective treatment to bring about improvement in germination of wheat through the stimulation of early seedling growth and predict its field performance.

Keywords: seed priming, maize, hydropriming, nanoprimering, field performance**CULTIVATION OF OIL PALM: IMPACT ON SOIL PROPERTIES****OKRAM RICKY DEVI^{1*}, NALLA CHARITHA², BIBEK LAISHRAM³, NAYANJYOTI OJHA⁴, KALYAN PATHAK⁵, SAMIRON DUTTA⁶ AND MAHIMA BEGUM⁷**^{1,3}Ph. D Research Scholar, Department of Agronomy, Assam Agricultural University, Jorhat-785013, Assam, India²Ph. D Research Scholar, Department of Agronomy, Dr. PDKV, Akola, Maharashtra, India⁴Professor, Department of Agronomy, Assam Agricultural University, Jorhat-785013, Assam, India⁵Professor and Head, Department of Agronomy, Assam Agricultural University, Jorhat-785013, Assam, India⁶Professor, Department of Soil Science, Assam Agricultural University, Jorhat-785013, Assam, India⁷Associate Professor, Department of Sericulture, Assam Agricultural University, Jorhat-785013, Assam, India

The effects of oil palm farming on the environment, especially soil health, have drawn both praise and condemnation in recent decades. Despite disagreements, new study indicates that oil palm plantations may indeed improve the qualities of the soil. This article examines how oil palm farming improves soil health, emphasising increases in microbial diversity, soil fertility, and organic matter content. Oil palm farming creates an environment that is favourable for plant growth by encouraging nutrient cycling and improving soil structure, which supports sustainable agricultural methods. Moreover, integrated management practices like cover crops and intercropping show promise as ways to improve soil resilience and lessen environmental issues related to oil palm production. This paper, which takes a holistic stance, seeks to highlight the potential for coexistence between agricultural development and environmental conservation by highlighting the beneficial effects of oil palm farming on soil qualities.

Keywords: Oil palm, Soil health, Sustainable agriculture, Soil fertility and Environmental conservation.**REVOLUTIONARIES IN BIOLOGY IN THE RECENT PAST USING THE MOLECULAR MECHANISM OF PATHOGENS
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Some recent biological advances have revealed alternative ways to treat a number of diseases ranging from cancer to infectious diseases. In this group, Alexander Fleming's accidental discovery of penicillin still stands as a significant turning point, which revolutionized the treatment of bacterial diseases and ultimately saved numerous lives. On the basis of this solid foundation, immunotherapies have arisen as a beacon of hope by targeting the body's immunity to fight cancer using better efficiency and fewer side effects than traditional treatments. Furthermore, the boost of precise biology targeting individual genomics has created a revolutionary realm of personalized healthcare, increasing effectiveness while reducing side effects. In the area of infectious diseases, the quick innovation of vaccines has been a principal tool in public health protection. Indeed, the innovation of mRNA vaccines at the forefront of vaccine development has created world record-breaking vaccines to combat COVID-19 which were previously unavailable. Moreover, innovations in vaccine delivery systems like nanoparticle-based platforms will not only improve the effectiveness of the vaccines but also increase the accessibility, especially in resource-constrained areas. Besides, the constant work on new antimicrobial drugs by scientists is delivering encouraging results in the battle for drug-resistant pathogens. The emergence of novel antibiotics and antiviral drugs will be of great help in the battle against antimicrobial resistance- a major global health threat. Innovative solutions, like phage therapy and CRISPR-based antimicrobials, show good prospects for addressing the problem of infectious diseases. In summary, ongoing intensive research in molecular biology and vaccine development keeps the world inching forward towards a healthier and more resilient future. Innovations in this field, such as the serendipitous discovery of penicillin or the development of advanced immunotherapies and vaccines, can reduce pain and suffering, lengthen people's lives, and even improve the status of humankind worldwide.

STUDY OF SOLAR OPERATED WALK BEHIND TYPE FIELD SPRAYER

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Proper technique of application of pesticide and the equipment's used for applying pesticide is vital for the success of pest control operations. Farmers generally use lever operated knapsack sprayer which is manually operated equipment. While operating the knapsack sprayer, the body is in awkward posture which creates the lot of discomfort on operator head, neck clavicle and shoulder regions. Therefore, a solar operated walk behind type sprayer was developed, to reduce discomfort and time required for sprayer. Walk behind type sprayer is economical, more efficient and spray theta faster rate. It is helpful for small-scale farmer and unskilled Labor who can also operate it without any difficulties. Based upon review of literature and data, design a walk behind type sprayer was done. Based upon design, CAD model of solar operated walking behind type sprayer was developed. The operating hours of pump using 8AH or 12AH batteries was expected to be 2-3 hours or 5-6 hours, respectively. The total cost of per year solar operated walking behind type sprayer was Rs 21415.80. The break-even point (BEP) calculated on area basis for solar operated walking behind type sprayer was 253.68 ha. The break-even point (BEP) calculated on year basis for solar operated walk behind type sprayer was 3.14 years.

Keywords: Solar panel, Walk-behind type sprayer, Break-even point, etc.

STUDY ON SEASONAL VARIATION IN ESSENTIAL OIL COMPOSITION OF CITRONELLA (CYMBOPOGON WINTERIANUS JOWITT.) GENOTYPES IN MEGHALAYA CLIMATIC CONDITIONS

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Citronella is renowned for its aromatic and industrial significance worldwide, undergoes substantial variations in essential oil composition due to environmental fluctuations across seasons. This study aimed to assess the chemical constituents of Citronella essential oil over four cuttings (August 2018 to February 2020) cropping seasons. Principal component analysis (PCA) was studied using AMMI model, showed PC1 of 69.79% for plant height, 76.31% for the number of leaves per clump, 73.61% for fresh biomass yield per plot, and 61.74% for essential oil yield of GEI sum of squares percentage. The genotypes viz., Bio-13, Mandakini and JC-4 exhibited higher fresh biomass yield and better adaptability for most traits. These genotypes demonstrated consistent performance across all seasons due to their ability to tolerate diverse environmental conditions. Analysis using Gas Chromatography-Mass Spectrometry (GC-MS) results indicated notable variations in essential oil composition. Citronellol (26.28%), citronellyl acetate (6.03%), β -Elemene (3.38%), D-Limonene (1.75%), and Linalool (1.82%) showed significantly higher percentages in February 2020 (S4). Additionally, citronellal content varied across genotypes, with Jalapallavi (58.12%) and JC-2 (57.61%) exhibiting the highest in October 2019 season, and JC-2 (36.85%) and Mandakini (37.25%) was showing the lowest in February 2019 season. Genotypes JC-1, Bio-13, and Mandakini depicted stable performance across seasons. The study revealed consistent performance of these genotypes across the seasons for their economic traits under Meghalaya's agro-climatic conditions. Therefore, these genotypes can be feasibly utilized in future breeding programs in Citronella based on their high oil yield and stable nature.

Keywords: AMMI model, Citronellal%, essential oil, stability analysis, fresh biomass yield

EVALUATING THE EFFICIENCY OF THE MICROBIALLY MEDIATED ENZYMATIC DEGRADATION OF LIGNOCELLULOSIC AGRICULTURAL RESIDUES

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In this study the samples such as elephant dung, termite (gut), degraded wood, forest soil were collected from the Anaikatty forest range of Coimbatore district. From these samples, a total of 34 microbes were isolated containing 24 cellulose, 10 lignin degraders. Isolated and screened strains were undergone compatibility study. The cultures with maximum enzyme activity were selected and phylogenetically identified. With the help of these efficient microbes, consortium was formed as all the cultures were compatible with each other. *In vitro* degradation study with rice and maize straw was carried out. The results revealed that the degradation has been occurred in the treatment T₇ (*Stenotrophomonas maltophilia* + *Cellulomonas flavigena* + *Trichoderma yunnanense* + *Penicillium citrinum* + *Phanerochetes chrysosporium* + Rice Straw) in the experiment I and T₇ (*Stenotrophomonas maltophilia* + *Cellulomonas flavigena* + *Trichoderma yunnanense* + *Penicillium citrinum* + *Phanerochetes chrysosporium* + Maize Straw) in the experiment II which is observed with the wide decrease in CN ratio in the mixed culture treatment when compared with the untreated and monoculture treatments, further the destruction of substrate were seen visually through SEM imaging.

Keywords: Lignocellulosic wastes, microbial isolates, microbial enzyme, biodegradation

ASSESSING THE PERFORMANCE OF DIFFERENT MICROBIAL CONSORTIUM ON GROWTH AND YIELD OF TOMATO CROP IN A ON FARM TESTING EXPERIMENT IN SALEM DISTRICT

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Tomatoes, are a widely cherished and versatile fruit that has earned a permanent place in culinary cultures around the world. These vibrant and plump fruits are not only a staple in countless dishes but also a symbol of garden-fresh flavor and nutrition. Their rich history, diverse varieties, and numerous culinary applications make them a fascinating subject of study and appreciation. In Salem district, tomato is cultivated in an area of 3568.58 ha. An investigation was conducted to assess the effect of different microbial consortium on growth and yield of tomato through on farm trial in five different locations in Salem district during rabi season with Shivam tomato hybrid in the irrigated condition. Under the study treatments imposed were Application of CSSRIGrowmor @ 12.5 kg/ha as SD @ 0.5 % foliar spray (TO1), Application of Arka Microbial Consortium @ 25kg/ha (TO2), Control – RDF (Non application of microbial consortium) (TO3). The results of the on farm testing revealed that application of microbial consortium supplemented over control with respect to growth, yield and quality of tomato crop. Among the microbial consortium application of Arka Microbial Consortium @ 25kg/ha through Seed treatment @ 10g/100g seed, soil application @ 12.5kg/ha with 1250kg FYM and soil drenching @ 20 g/lit at 10 DAS was observed to be better in growth, yield and economics of the tomato crop.

Keywords: Tomato, microbial consortium, growth, yield, quality

QUANTUM TUNNELLING FOR ECO-FRIENDLY ELECTRONICS: A REVIEW OF COLD FIELD EMISSION DEVICES AND THEIR SUSTAINABILITY

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Cold field emission (CFE) devices offer promising advancements in various electronic applications due to their Low-power operation and potential for reduction. CFE is purely a quantum-tunnelling phenomenon, where one can reduce the barrier width to eject the electron through tunnelling process from the material by applying electric field. The fascinating phenomenon has found its application in different fields like electron microscope, X-ray generator, electroluminescence and other. There are many materials that have proved its potential as cold emitter. The material includes, carbon nanostructure, copper oxide, titanium di-oxide, zinc oxide and many others. Keeping this in mind the work reviews the synthesis and of different ZnO nanostructure and its CFE performance. This review further examines the life cycle of CFE device, from fabrication to disposal, to identify opportunities for enhancing their environmental performance. It evaluates traditional fabrication methods of ZnO including both chemical as well as physical top-down and bottom-up technique and detail comparison regarding the dependence of CFE performance of ZnO synthesized by different technique has been done. This in-depth review will surely serve as an effective addition to the existing literature

Keywords: Cold field emission; Tunnelling; Green synthesis; Reduced energy consumption

ASSESSMENT OF FLOWERING BEHAVIOUR AND PRODUCTIVITY TRAITS IN PRE-SELECTED HYBRID PROGENIES DERIVED FROM COMMERCIAL SUGARCANE (*SACCHARUM OFFICINARUM* L.) CROSSES

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Aim: To investigate the floral behavior and variability for productivity traits in pre-selected clonal progeny populations, with a focus on identifying productive high sugar progenies with shy/non-flowering features. **Methodology:** The investigation at Agricultural Research Station Sankeshwar (2011-2013) involved 142 pre-selected hybrid sugarcane progenies from 18 crosses, comprising 11 biparental and 7 general crosses, advanced to clonal II generation to assess exploitable variability. Sparse/Non-flowering productive progenies were further analyzed for jaggery productivity and quality parameters. **Results:** Among 142 pre-selected clonal progenies, 14 genotypes excelled in cane, sugar, and jaggery yield, wherein SNK 09221 and SNK 09212 showed superior performance in sugar/jaggery yield, quality parameters combining non-flowering features. While, crosses such as Co 86032 × Co 86250, CoM 262GC, and SNK632GC, showed promising results, producing transgressive segregants with desirable traits like non-flowering behavior coupled with high cane and sugar yield. **Interpretation:** The study offers greater scope for combining desired non-flowering behavior with productivity traits in hybrids of commercial sugarcane crosses. Identified genotypes with desirable traits hold promise for commercial cultivation, potentially boosting yield and quality while mitigating concerns regarding flowering behavior.

Keywords: Flowering behavior, Non-flowering, Jaggery yield, clonal II generation

EFFECT OF IPM STRATEGIES ON POPULATION DYNAMICS OF THRIPS AND WHITEFLY IN KINNOW MANDARIN

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Kinnow mandarin (*Citrus reticulata* Blanco) is one of the valuable fruit crop that mostly grown in North Indian states of India due to its high-quality juice content and resistant to decline disease. Thrips and whitefly insects damage the crop and reduce the yield and quality of fruits. Thrips are minute insects which cause damage to flowers, leaves and young as well as grown-up fruits by lacerating, rasping and sucking the cell sap. Silvery-white irregular patches with circular ring around the neck of fruit are the peculiar symptom of thrips damage on fruits. Whereas, whitefly nymphs and adults suck the plant sap and secrete honeydew by which sooty mold develops on the leaves and fruits. To manage thrips and whitefly, farmers often resort to cocktail of insecticides without achieving the desired result. Hence, area wide implementation of Integrated Pest Management (IPM) in kinnow mandarin was implemented during 2021, 2022 and 2023 covering 5 villages at Hisar, Haryana. Results revealed that, highest average population of thrips 3.74 ± 1.47 and 2.82 ± 1.57 no. of thrips/tapping was recorded in untreated control and Farmer practice (FP) plots compared to 1.96 ± 1.13 no. of thrips/tapping in IPM plots respectively. Similarly, lowest average population of whitefly 2.80 ± 1.56 no. of nymph and adult/leaf was recorded in IPM plots followed by 3.89 ± 1.51 no. of nymph and adult/leaf in Farmer practice (FP) and 4.90 ± 2.05 no. of nymph and adult/leaf in untreated control plots. The highest population dynamics of both insects were observed in April-May, June-July and August-September months. Integrated Pest Management (IPM) strategy has increased economic yield, the net profit by preventing pest resurgence, pesticide resistance, maintaining natural enemy diversity.

Keywords: Kinnow, thrips, whitefly, IPM strategy

EVALUATION OF *AZOSPIRILLUM* ISOLATE ON GROWTH AND YIELD OF FOXTAIL MILLET (*SETARIA ITALICA*) UNDER DIFFERENT LEVELS OF NITROGEN FERTILIZATION

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Field experiment was conducted during Kharif 2022 and 2023 at College farm, College of Agriculture, Hanumanamatti, Ranebennur taluk, Haveri district. The study was conducted in factorial randomized block design with 15 treatment combinations consisting of use five *Azospirillum* isolates and three nitrogen levels as per recommended package of practices. In the present investigation, the pooled data (2022 & 2023) indicated that among different *Azospirillum* isolates used consortium of ACDAZS-35 + UASDAZO-29 has recorded significantly higher plant height (124.33 cm), number of tillers per plant (6.73) and higher TDMP per plant (11.05 g.) as compared to rest of the treatments under study. Similarly, among different Nitrogen fertilization, application of 100 per cent N as per RPP has recorded significantly higher growth parameters. The interaction between *Azospirillum* isolates and Nitrogen fertilization revealed that use of consortium of *Azospirillum* isolates along with application of 100 per cent N has recorded significantly higher growth parameters. Similarly, among *Azospirillum* isolates significantly higher panicle length (19.68 cm), test weight (3.40 g.), seed yield per plot (0.75 kg), straw yield per plot (1.52 kg), projected seed yield (12.68 q ha⁻¹) and projected straw yield (18.29 q ha⁻¹) was recorded in use of *Azospirillum* consortium. Among different N levels application of 100 per cent N has resulted in significantly higher yield parameters and yield. Among *Azospirillum* isolates higher net return was recorded in use of *Azospirillum* consortium (Rs. 17284.39 ha⁻¹). Among N fertilization higher net return was noticed in use of 100 per cent N as per RPP (Rs. 14891.13 ha⁻¹). Among interaction effects, higher net return (Rs. 22941.38 ha⁻¹) was observed in use of consortium along with 100 per cent N application. Similar trend was noticed with respect to Benefit:Cost ratio. Use of *Azospirillum* consortium along with 100 per cent N as per RPP helps to increase the yield of foxtail millet in turn adds monetary benefit to the farming community.

EFFECT OF ZINC AND IRON ON GROWTH AND YIELD OF FOXTAIL MILLET (*SETARIA ITALICA*) IN NORTHERN TRANSITIONAL ZONE OF KARNATAKA

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Field experiment was conducted during Kharif 2019 and 2020 at College farm, College of Agriculture, Hanumanamatti, Ranebennur taluk, Haveri district. The experimental site is located in Northern Transitional Zone (Zone-8) of Karnataka. The soil was red sandy loam in texture. The study was conducted in randomized block design with eight treatments replicated thrice. Following RPP (30:15:15 kg NPK ha⁻¹ + 6 t FYM ha⁻¹ + 500 g of *Azospirillum* ha⁻¹) along with application of ZnSO₄ and FeSO₄ @ 15 kg ha⁻¹ has recorded significantly higher number of tillers per hill (12.17) and was on par with RPP along with application of ZnSO₄ and FeSO₄ @ 10 kg ha⁻¹ (11.27) and adopting RPP along with application of ZnSO₄ @ 15 kg ha⁻¹ (11.08). Similar trend was noticed with respect to Total dry matter production per plant (g.). Further, RPP along with application of ZnSO₄ @ 15 kg ha⁻¹ has recorded significantly higher number of leaves per hill (32.20) as compared to rest of the treatments under study. However, it was on par with RPP along with application of ZnSO₄ and FeSO₄ @ 15 kg ha⁻¹ (31.78), RPP along with application of ZnSO₄ and FeSO₄ @ 10 kg ha⁻¹ (31.03) and RPP along with application of FeSO₄ @ 15 kg ha⁻¹ (30.43). Following RPP along with application of ZnSO₄ and FeSO₄ @ 15 kg ha⁻¹ was found superior and recorded significantly higher

panicle length (19.73 cm), panicle weight (6.37 g.), test weight (4.02 g.) and grain yield per plant (5.11 g.) as compared to rest of the treatments. Following RPP along with application of ZnSO_4 and FeSO_4 @ 15 kg ha⁻¹ resulted in higher grain yield (18.45 q ha⁻¹) over rest of the treatments. However, it was on par with RPP along with application of ZnSO_4 and FeSO_4 @ 10 kg ha⁻¹ (17.20 q ha⁻¹). Similar results were obtained in stover yield (53.05 & 49.57 q ha⁻¹ in T₈ & T₇, respectively). But higher net returns was recorded in RPP along with application of ZnSO_4 and FeSO_4 @ 15 kg ha⁻¹, closely followed by RPP along with application of ZnSO_4 and FeSO_4 @ 10 kg ha⁻¹ (Rs.26,618 and 23,792 ha⁻¹, respectively) as compared to all other treatments. Higher Benefit: Cost ratio was recorded in RPP along with application of ZnSO_4 and FeSO_4 @ 15 kg ha⁻¹ (1.99) as compared to all other treatments. Significantly higher zinc content in foxtail millet grain was observed in RPP along with application of ZnSO_4 and FeSO_4 @ 15 kg ha⁻¹ (35.95 ppm) followed by RPP + ZnSO_4 @ 15 kg ha⁻¹ (35.87 ppm), RPP + ZnSO_4 @ 10 kg ha⁻¹ (33.77 ppm) and RPP + ZnSO_4 and FeSO_4 @ 10 kg ha⁻¹ (33.73 ppm). Following RPP along with application of ZnSO_4 and FeSO_4 @ 15 kg ha⁻¹ has recorded significantly higher zinc content (39.88 ppm) in foxtail millet stover as compared to rest of the treatments. In contrast soil available zinc and iron did not differed significantly due to application of zinc and iron for foxtail millet.

IDENTIFICATION OF METHOD FOR ASSESSING SEVERITY OF ROOT ROT OF BRINJAL

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Root rot caused by *Rhizoctoniasolani* is an important disease of brinjal. A simple and reliable method for assessing this disease would enhance our capacity in identifying resistance sources and developing resistant brinjal cultivars. So for this method, a conidial suspension of *R. solani* was dropped on tosterilized elongated subcrown internodes and incubated in sandwich filter paper using polyethylene transparent envelopes. Initial disease symptoms were easily detected after inoculation. Highly significant correlation coefficients were found in each experiment (A, B and C) between filter paper and seedling assays, indicating that this testing procedure was reliable. The method presented facilitates a rapid pre-selection under uniform conditions.

Keywords: Brinjal, Root rot, *Rhizoctoniasolani*

APPLICATION OF NANOTECHNOLOGY IN AGRICULTURE

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Nanotechnology is a promising field of interdisciplinary research. It opens up a wide array of opportunities in various fields and also equally useful in agriculture. Chemical residues destroy the soil ecosystem by affecting the non-targeted organisms and decrease soil fertility. Its fruitfulness is for enhancement of agricultural productivity using bio-conjugated nanoparticles for slow release of nutrients and water, nanoparticles-mediated gene or DNA transfer in plants for the development of insect pest-resistant varieties and use of nanomaterials for preparation of different kind of biosensors, which would be useful in remote sensing devices obligatory for precision farming. Different nanofertilizers and nanopesticides such as silver, zinc, iron, titanium, phosphorus, molybdenum and polymer nanoparticles have shown great potential as plant growth and pest control agents. Therefore, nanotechnology would provide green and efficient alternatives in crop improvement.

Keywords: Nanotechnology, Nanoparticles, Nanofertilizers, Crop Improvement

RAINWATER HARVESTING FOR BOREWELL RECHARGE IN KARNATAKA, INDIA

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Karnataka is largely dependent on groundwater to meet industrial, municipal, domestic and irrigation needs. But, groundwater resource in Karnataka is under severe stress for years owing to increasing demand and unwise planning. Therefore, indigenous suitable technologies for ground water recharge are to be explored and popularized. Under the All India Co-ordinated Research Project on Irrigation Water Management (AICRP on IWM), Double ring technique of Borewell Recharge (BWR) Unit by harvesting rainwater has been established during March 2020 at Irrigation Water Management Research Centre, (IWMRC) Belavatagi Tq: Navalagund, Dt: Dharwad in Karnataka. The borewell recharge technique has shown encouraging results as far as ground water quality, discharge and water table are concerned. So far the borewell has been point recharged with 6.07 lakhs of litres of water by rain water harvesting during 2020-21. Similarly, point recharge from 6 rainfall events during the year 2021-22 is around 4.19 lakhs of litres. Also during the year 2022-23, two (2) recharge events have taken place in the months of June 2022 and July 2022. The point recharge during the year 2022-23 was 1.97 lakhs litres. The monthly average results from point recharge through recharge events during the years 2020-21, 2021-22 and 2022-23 revealed that there is a considerable rise in the groundwater table from more than 120 feet below ground level to around 50 feet below ground level, drastic reduction in electrical conductivity (EC) of ground water from more than 10 dS m⁻¹ to an average (EC) of around 2.0 dS m⁻¹ and borewell yield has significantly increased from 0.4 lps to around 1.5 lps. Therefore, Artificial Recharge techniques through Rainwater harvesting can be a better strategic approach to combat the emerging problems of water scarcity and groundwater quality deterioration in the context of climate change.

Keywords: Rainwater harvesting, Borewell Recharge, Double ring technique, groundwater quality

FARMER DRIVEN DESIGN OF PINEAPPLE MARKETING APPS: A SURVEY ON FARMERS' INTERFACE PREFERENCES**P. SHAKTAWAT¹ AND R. J. SINGH²**¹Ph.D. scholar, ²Associate professor, Agricultural Extension, SSS, CPGS-AS, CAU(I), Umiam- 793103, Meghalaya, India

In the ever-evolving landscape of agriculture, mobile applications have emerged as crucial tools for enhancing farmer productivity and market access. User Interface (UI) design is a pivotal factor influencing the adoption and effectiveness of such applications. This research delves into the specific UI characteristics that matter most to farmers engaged in pineapple farming and marketing, drawing from the existing literature and the unique context of Meghalaya, India. In the research, the locale of study are two villages: Marngar and Mawphrew, Umiling C&RD block, Meghalaya, as these areas have actively dedicated to pineapple-related interventions and production. A total of 100 farmers were purposively selected, meeting specific criteria such as having at least five years of farming experience and being no older than 50 years. Data analysis will employ various statistical tools and techniques, including descriptive statistics. The research calculates Pineapple Mobile Application Preference Ratings (PRS) using Rating-scale responses. The research findings reveal that the top three item statements on farmers' preferences for the mobile application interface are Rank 1: Accessibility of agronomic and horticultural crop history, Rank 2: Incorporation of drone imagery, and the provision of push and pull customer care services and Rank 3: User-Friendly Interface and Order Tracking specifically. This study sheds light on the priorities and preferences of pineapple farmers for user-centric tailored mobile application to their specific needs in Meghalaya.

Keywords: *Farmers' Preference, Marketing, Meghalaya, Mobile Application***IN VITRO EVALUATION OF DIFFERENT CROP RESIDUE BASED COMPLETE FEED PELLETS****P. V. PATIL*, M. K. GENDLEY, A, P, DHOK, M. K. PATIL, MEENUDUBEY, V. K. MUNDE, S. F. NIPANE, N. E. GADE****College of Veterinary Science & Animal Husbandry, Anjora, Durg, Chhattisgarh, India**

In this experiment, the *in vitro* degradability of dry matter, crude protein, NDF and *in vitro* gas production (IVGP) of different crop residue based complete feed pellets (CFP) were assessed. In total, 16 different types of crop residue-based CFPs were made by replacing paddy straw at 50%, 75%, and 100% with wheat straw, soybean straw, gram straw, arhar straw, and groundnut straw in the roughage portion while keeping a roughage-to-concentrate ratio of 50:50. Each of the 16 distinct CFPs was subjected to *in vitro* dry matter degradability and gas production procedures. Gram straw-based CFP had much higher dry matter and crude protein degradability than other pellets. Arhar straw-based CFP showed much higher NDF degradability, while groundnut straw-based CFP had significantly higher IVGP. At the 100% replacement level, DM, CP, NDF degradability, and IVGP levels were significantly higher. The significantly higher IVGP was observed at 12 to 24 hrs of incubation. Among all crop residue-based CFPs, paddy straw-based CFP had significantly lower DM, CP, and NDF degradability, as well as IVGP. The findings of the current study revealed that gram straw-based CFP include more degradable dry matter and crude protein. However, peanut straw-based CFP contain more fermentable nutrients.

Keywords: *Crop residues, In vitro crude protein degradability, In vitro dry matter degradability, In vitro gas production and In vitro neutral detergent fibre degradability***TRICHOPIRIASP. (HYMENOPTERA: DIAPRIIDAE) AS A MAJOR PUPALPARASITOID OF UZI FLY, IN KARNATAKA, INDIA****P. V. THEERTHA^{1,2*} AND K. RAJMOHANA^{1**}**¹Zoological Survey of India, New Alipore, Kolkata, West Bengal, India²Department of Zoology, University of Calcutta, 35 Ballygunge Circular Road, Kolkata, West Bengal

The southern states of India stand at the forefront of raw mulberry silk production, contributing 64% to the nation's total output. Posing a substantial challenge in sericulture, the uzi fly, *Exorista sorbillans* (Diptera: Tachinidae), the notorious endo-larval parasitoid of *Bombyx mori*, causes a 10–20% reduction in cocoon yield. For uzi fly management, rather than by chemical methods, biological control is advocated, since both the pest and the host are insects. Natural enemies, which are self-sustaining and cost-effective in the long term, are known to control 87% of insect pests in nature. In the realm of sericulture, over twenty species from five families of Hymenoptera (Chalcididae, Diapriidae, Encyrtidae, Eulophidae, and Pteromalidae) are documented as parasitoids of uzi flies. Among them, *Nesolynx thymus* (Eulophidae) and *Trichopria* sp. (Diapriidae) are the most prevalent. The present study explored the *Trichopriasp.* as a major pupal parasitoid of the uzi fly in Karnataka, India. In August 2023, a survey conducted at the cocoon market in Vijayapura revealed a 20% overall parasitization rate among 120 uzi fly pupae collected. *Trichopriasp.* (2200 exs.) and *Exoristobiasp.* (Encyrtidae) (30 exs.) emerged from 23 and one uzi fly pupae, respectively. Various biological attributes of the parasitoids related to mating, oviposition, and emergence were also documented. However, no parasitoid infestation was detected from the uzi fly pupae collected from Bandipalaya, Mysore. While previous studies in Karnataka identified the species of *Trichopria* from the uzi fly as *Trichopria khandala* Sharma, the species currently reared (undescribed) displayed distinct morphological characteristics on antennae and scutellum from *T. khandala*. Accurate taxonomic identification of both the host and the parasitoid is crucial for the success of biocontrol programs. Moreover, there is a need for research focused on sustainable pest management strategies to improve the livelihoods of sericulture farmers.

Keywords: *Diapriidae, Trichopria, pupal parasitoid, uzi fly, Karnataka, sericulture*

RESPONSE OF SOYBEAN (*GLYCINE MAX* L.) TO CONSERVATION PRACTICE AND ORGANIC MANURES**PAARDENSHA IVY CHINIR*¹, MANOJ DUTTA*², LENMEM YOSUNG*³, HILLEL CHISHI*⁴, CELINE ROEL RINGRIIH*⁵**^{1&2}Department of Soil and Water Conservation, ^{3&4}Department of Agronomy, ⁵Department of Zoology¹²³⁴SAS, Nagaland University, Medziphema Campus, ⁵South East Manipur College, Komlathabi, Manipur

In the quest of sustainable agriculture practices, integration of conservation practices along with organic sources has emerged as a promising opportunity. Organic manures play pivotal role in maintaining and improving the soil physico-chemical and biological fertility, ultimately influencing crop performance. A field experiment was conducted during the Kharif season of 2021& 2022 at the Experimental Research Farm of School of Agricultural Sciences, Nagaland University, Medziphema, which delved into the impact of conservation practices in combination to different organic nutrients on soil-health and crop performances of soybean. The experiment was framed in Split Plot Design (SPD) comprising of eighteen treatments replicated thrice, with two forms of conservation practices and different sources of organic nutrients i.e., FYM, Poultry manure, Vermicompost and Enriched Compost at varying amounts. Several key parameters were analyzed during the study including soil organic carbon (SOC), available N, P and K, soil microbial biomass carbon (SMBC) and seed yield. Amongst the treatments, available N (584.73 kg ha⁻¹), P (26.43 kg ha⁻¹), SMBC (233.21 µg/g soil) and seed yield (2410.09 kg ha⁻¹) were found significantly higher in Conservation practice (Bench terrace) + Vermicompost @ 5 t ha⁻¹, while the available K (177.39 kg ha⁻¹) was deemed significantly higher at Conservation practice (Bench terrace) + FYM @ 10 t ha⁻¹, and the SOC (2.53%) was significantly highest in both. From the forms of conservation practices, bench terrace recorded a significantly higher seed yield and uptake of nutrients over non-conservation. Amongst the organic sources, Vermicompost and FYM were reported to significantly enhanced the concentration of organic matter and plant nutrient elements in the soil and yield which therefore influence the yield and uptake of nutrients by 68.84% to 76.66% over control. Therefore, application of organic manures and employing bench terrace influenced the overall soil-health and productivity of soybean.

Keywords: Soybean, bench terrace, vermicompost, FYM and seed yield**ROLE OF VERMICOMPOST IN PROMOTING SUSTAINABLE FARMING PRACTICES****DR. PADMA SAXENA****Department of Zoology, Sri Tika Ram Kanya Mahavidyalaya, Aligarh (U.P.) India**

Vermicompost, the product of organic waste decomposition through earthworm activity, is emerging as a crucial element in promoting sustainable farming practices. This research paper explores the multifaceted benefits of vermicompost in enhancing agricultural sustainability. Vermicomposting not only provides an effective method for organic waste management but also produces nutrient-rich organic manure that significantly improves soil health and fertility. The application of vermicompost leads to better soil structure, increased microbial activity, and enhanced nutrient availability, which are essential for sustainable crop production. This study examines the impact of vermicompost on crop yield, soil quality, and environmental sustainability. Comparative analyses between chemical fertilizers and vermicompost demonstrate the latter's superiority in fostering a balanced ecosystem. Vermicompost reduces the dependency on synthetic fertilizers, mitigating their adverse environmental effects, such as soil degradation and water pollution. Additionally, vermicomposting processes contribute to reducing greenhouse gas emissions by diverting organic waste from landfills. The integration of vermicomposting into agricultural practices also supports the principles of circular economy and resource efficiency. This paper highlights case studies and field experiments conducted in various farming systems, showcasing the practical benefits and challenges of vermicomposting. Educational initiatives and policy recommendations for promoting vermicompost use in sustainable agriculture are discussed, emphasizing the role of institutions and governments in facilitating widespread adoption. In conclusion, vermicompost is a vital component of sustainable farming practices, offering environmental, economic, and agronomic benefits. Its adoption can lead to more resilient agricultural systems capable of meeting the growing food demands while preserving natural resources and enhancing ecological balance.

Keywords: Vermicompost, Sustainable agriculture, Organic waste management, Soil health, Nutrient availability**EFFECTS OF GAMMA RAYS ON YIELD PARAMETERS OF SESAME (*SESAMUM INDICUM* L.) GENOTYPES IN M₂ GENERATION****DR. PALLAVI R. SASANE, DR. ADITI R. RAJANE, DR. S.U. BORALE, DR. E.R. VAIDYA, Y.C. RAUT****Department of Agricultural Botany, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Dist. Akola, (M.S.), India**

In order to study the mutagenic effects of different doses of gamma rays on sesame genotypes i.e. AKT-64 and N-8 were irradiated with 400Gy, 500Gy, 600Gy and 700Gy doses of gamma rays and seeds of each treatment were sown in the Instructional Farm of Department of Agricultural Botany, Dr. PDKV, Akola and M₁ generation was grown carefully till maturity and seeds were harvested, M₂ generation was raised on Kharif 2019. In M₂ generation, it had been observed that there was mean value in both positive and negative directions compared to controls for all the characters. Seed yield per plant was recorded in genotype AKT-64, doses 400Gy, 500Gy and 600Gy showed increased in seed yield per plant compared to control and in N-8 genotype, increase in seed yield per plant in 400Gy and 500Gy doses. oil content was increased in 500Gy and 600Gy doses while 400Gy and 700Gy doses showed a decrease in oil content over the respective control. Useful and viable macro-mutants were individually selected in all the treatment, in M₂ generation. The yield related macro mutants types like capsules length, no. of seeds capsule-1, no. of capsule plant-1 were identified. All individually selected plants will be carried forward further generation for the confirmation of segregating loci.

Keywords: Sesame, Mutants, Gamma rays, M₂ generation

EXPLORING PLANTAIN PEEL: ANTIOXIDANT EVALUATION AND DIETARY FIBER EXTRACTION TECHNIQUES FOR NUTRITIONAL ENHANCEMENT**PALLAVISINGH^A, ADITI KUNDU^A, SUPRADIPSAHA^{A*}**^a**Division of Agricultural Chemicals, ICAR-Indian Agricultural Research Institute, New Delhi, India**

Banana/plantain (*Musa paradisiaca*) is a significant fruit crop in India, with the country being the largest producer globally, contributing 37.2% to total production. Despite the similarity in outward appearance between plantain and unripe bananas, plantains are larger and have starchy flesh, primarily used when unripe and requiring cooking. The valuable benefits of plantain peel often go unrecognized and are commonly wasted due to lack of awareness. Plantain peel contains various bioactive compounds, including carotenoids, biogenic amines, polyphenols, phytosterols, and antioxidants, as well as essential minerals and dietary fiber, which can aid in reducing the risk of diseases like cancer. This study aimed to evaluate the antioxidant activity of peel extracts from different plantain varieties using two antioxidant testing methods: DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azinobis (3-ethylbenzothiazoline-6-sulfonic acid)), and correlate the total phenolic and flavonoid content with their IC₅₀ values. Dietary fiber extraction from plantain peel was conducted using conventional methods, Ultrasonic Assisted Extraction (UAE), and Microwave Assisted Extraction (MAE), with optimization of extraction parameters using Response Surface Methodology (RSM) following Box-Behnken design. Characterization of functional carbohydrates was performed using UPLC-QTOF-ESI-MS/MS. Antioxidant activities and determination of total phenolic and flavonoid content were assessed using UV-visible spectrophotometry. These findings contribute in refining extraction techniques for enhancing dietary fiber content in food items and underscore the significance of harnessing plantain peel as a valuable reservoir of antioxidants and functional components with potential health benefits.

Keywords- Bioactive compounds, Antioxidants, Dietary fiber, Extraction, Functional carbohydrates**IMPACTS OF GLOBAL CLIMATE CHANGE ON WATER QUALITY OF RAJASTHAN AND ITS ASSESSMENT****PANCHAM KUMAR¹, DR RAVI PRAKASH²****1,2-Chemistry Department, BSA College, Mathura**

Water scarcity and degraded water quality have, of late, posed a great threat to a vast majority of mankind. Consequently, the study of the adverse impacts of global climate change (GCC) on water quality has become an emerging area of worldwide interest. It is also well accepted that human-induced climate change is, to an extent, inevitable. This paper summarizes the latest major scientific findings and the resultant implications for managing the potential impacts of GCC especially with regard to water quality. Recent findings, detailed technical data and analyses, maps, analytical methodology, graphs, models that support the findings are summarized in this paper that also incorporates various modelling approaches for assessment of such impacts on surface and ground water quality of Rajasthan. The paper, in addition, provides detailed information in a table on the various factors of GCC and their impacts on the parameters affecting water quality, types of water body, study area, and important findings and assessments.

Keywords- Climate Change, Water Scarcity, Rajasthan**PRELIMINARY INSIGHTS INTO THE DIVERSITY AND DISTRIBUTION OF TRUE BUGS (HETEROPTERA) FROM AHILYANAGAR, MAHARASHTRA, INDIA****PANDE GS* AND INAMDAR NS****Department of Zoology, BPHE Society's Ahmednagar College, Ahilyanagar-414001, MS, India**

The heteroptera includes a wide range of insect species, many of which are well-known as crop pests. Ahilyanagar (formerly Ahmednagar), located in Maharashtra State, India, has historical value and a diverse geographical landscape that fosters varied habitats conducive to proliferation of heteropteran bugs. Ahilyanagar, Maharashtra's largest district, offers a unique opportunity to investigate the heteropteran fauna of the region. This study aims to provide a preliminary insight into the diversity of heteropteran bugs inhabiting select areas within and surrounding Ahilyanagar city. The purpose of this study is to provide preliminary insight into the diversity of heteropteran bugs that live in and around Ahilyanagar city. Our findings show a significant diversity of heteropteran species, with 61 taxa dispersed throughout 48 genera and 12 families of Heteroptera. Notably, Pentatomidae is the most diverse family, with 17 taxa, followed by Coreidae (9 taxa), Reduviidae (8 taxa), Dinidoridae (5 taxa), Miridae (5 taxa), Pyrrhocoridae (4 taxa), Lygaeidae (4 taxa), followed by Scutellaridae (3 taxa), Alydidae (2 taxa), Tessarotomidae (2 taxa), Rhophalidae (1 taxa), Aradidae (1 taxa). The heteropteran fauna documented from this study contributes valuable data to Maharashtra's faunal resources, helping us better comprehend regional biodiversity. Furthermore, this study sets the groundwork for developing effective pest management strategies specific to the heteropteran pests found in Ahilyanagar and its surroundings.

Keywords: Heteroptera, Fauna, Diversity, Ahilyanagar

TO EXAMINE THE EFFECTIVENESS ON USE OF FOSS AI TOOLS BY POSTGRADUATE STUDENTS OF CPGS-AS, CAU (I), UMIAM, MEGHALAYA.**PANKAJ KUMAR¹, R. J. SINGH², LOUKHAMDEVARANI³, THONCHOILA MARING⁴**¹Ph.D Scholars (Agricultural Extension), ²Associate Professor, Professor (Agricultural Extension and ⁴Ph.D Scholar (Agricultural Extension), School of Social Sciences, College of Post Graduate Studies in Agricultural Sciences, (Central Agricultural University, Imphal), Umiam-, Meghalaya, India

Artificial Intelligence (AI) is the process of modeling human thinking and designing a machine to behave like a human; in other words, it is called a cognitive task, namely how machines can learn automatically from programmed data and information. Free and Open-Source Software (FOSS) is a software in which anyone is licensed to use freely, copy, study and even the source code is openly shared so that people voluntarily improve the design of the software. Students face challenges in writing and publishing research papers, requiring in-depth analysis and interpretation, and proficiency in AI is a prerequisite at this stage. Under these backdrops the present study was conducted to examine educational effectiveness in using FOSS Research AI Tools with the following objectives, (i) To examine the effectiveness on use of FOSS AI tools by Postgraduate students of CPGS-AS, CAU (I), Umiam, Meghalaya. The study followed formulative research design. Convenient sampling procedure was administered in order to select 30 respondents. There is statistically significant difference at 0.01 level of significance in the score of the respondents before and after the intervention of FOSS AI tools in academic research, indicating the significant effectiveness by students.

Keyword: Artificial intelligence, Free and Open-Source Software (FOSS), Awareness, Effectiveness, Student**REGULATION OF METHIONINE CONTENT IN MAIZE & ITS UTILIZATION IN HUMAN FOOD MAIZE****PANKAJ KUMAR^{1*}, RIMA KUMARI² AND V. SHAJEEDA BANU²**¹Department of Molecular Biology and Genetic engineering, Bihar Agricultural University, Sabour, Bihar (India)²Division of Plant Biotechnology, College of Agricultural Biotechnology, Bihar Agricultural University, Sabour, Bihar (India)

Maize (*Zea mays*) is the most significant coarse cereal used as a primary source of energy for both human and animal. Methionine, an important amino acid needed for healthy growth and development, is lacking in maize grains. Animal feed has included synthetic methionine, which is more expensive and has negative health consequences on consumers. The primary seed storage proteins in maize kernels, d-zein, are formed of methionine and are deposited by the zein proteins. The methionine content in maize is regulated, its use in human diet, its significance and necessity for diverse subjects, and its role in animal growth and performance are all summarized in this abstract. The improvement strategies include the expression of synthetic genes, modification of gene codon and promoters using genetic engineering techniques to enhance its expression, molecular modulation of maize seed storage proteins and target key enzymes for sulfur metabolism and its flux towards the methionine synthesis. By compiling data on methionine and essential amino acids linked Quantitative Trait Loci in maize and orthologous cereals, meta-QTL research will shed light on the genomic areas linked to hotspots throughout the wide variety of maize germplasm. The possibility to target specific locations for gene editing to increase the amount of methionine in maize will be made possible by the detailed knowledge about candidate genes. All things considered, this analysis will aid researchers in creating suitable plans to produce elevated methionine

Keywords: Maize, Methionine, QTL, Sulfur metabolism**ASSESSMENT OF FACTORS REGARDING THE ASSOCIATION OF THE FOREST STEWARDSHIP COUNCIL'S FOREST MANAGEMENT CERTIFICATION WITH GLOBALLY THREATENED SPECIES USING GENERALIZED RANDOM FOREST****PARAG KADAM¹, PUNEET DWIVEDI¹**¹Warnell School of Forestry and Natural Resources, University of Georgia Athens, GA

Around sixty-four percent of the total known species were found in forests in 2020, out of which sixty-five percent were found in countries with Forest Stewardship Council (FSC) certified forestlands, amounting to forty-two percent of the total species in the world. Direct analyses of possible associations between biodiversity and certification are few, typically focusing on a smaller geographical or temporal scale. Comparing Ordinary Least Square (OLS) with fixed effects with the machine learning algorithm of Generalized Random Forests (GRF), this study examines the linkages between FSC's Forest Management (FSC-FM) certifications and biodiversity loss at a global scale. Analyzing data from 91 countries between 2008 and 2019, the research identifies the relationship of FSC-FM certifications with biodiversity and associated factors. The results demonstrate that an increase in the proportion of FSC-FM area out of the total forest area is associated with a reduction in the percentage of threatened species by approximately 0.1 to 0.15. The findings from OLS regressions support and validate the associations observed by GRF. The study reveals that FSC-FM certifications positively affect biodiversity in regions with high population densities and tree cover loss. Additionally, a higher perception of corruption control and lower extraction of non-forestry natural resources are likely the enabling conditions that enhance the positive association between certification and biodiversity conservation. The study's heterogeneous linkages offer valuable insights for FSC to strategically expand the FM certification to achieve biodiversity conservation through sustainable forest management.

EVALUATION OF NATURAL DURABILITY OF SELECTED SPECIES THROUGH GRAVEYARD TEST**PARAMANAND K U¹, HANUMANTHA M², GANESHA B H³ AND ROOPA S. PATIL⁴**¹Dept. of FPU, College of Forestry, Sirsi – 581401, Uttara Kannada, Karnataka²Asst. Professor, Dept. of Forest Products and Utilization, College of Forestry, Sirsi, UAS Dharwad³Dept. of SAF, College of Forestry, Sirsi – 581401, Uttara Kannada, Karnataka⁴Assoc. Professor and Head, KrishiVigyan Kendra, Sirsi, UAS Dharwad

Wood is used in a broad range of applications and environmental conditions that can influence the service life of wooden structures. Hence, for proper utilization of timber, testing of durability/service life of timber is very essential. Decay and damage by white ants are by far the most important factors in the deterioration of timber in service. The inherent resistance of timber to attack by wood destroying organisms such as wood decaying fungi and wood destroying insects is defined as natural durability of timber and it is determined by graveyard test in field conditions. The graveyard test simulates the actual conditions that occur during the service life of timbers to test its durability. With this background, the present experiment was conducted at College of Forestry, Sirsi, Uttara Kannda, Karnataka. Healthy timber samples of fourteen different species were collected from different sawmills in three replications with a size of 30 cm (L) × 5 cm (W) × 2.5 cm (B) and buried to half of its into the ground. Readings were recorded at every two months to assess weight loss, fungi and insect damage using a standard score and formula. Significant weight loss was recorded among different tested species. Results revealed that significantly higher weight loss was noticed in the *Terminalia bellarica* (34.44%) over the rest of the species followed by *Dalbergiasisso* (21.21%) and significantly lower weight loss was recorded in the *Acacia nilotica* (5.61%) and *Terminalia tomentosa*. It was found that *Tremaorientalis* (3.67) noticed higher fungi infestation (>75%) followed by *Spathodiacampanulata* (2.00) and *Acacia mangium* (2.00) with 25-50 per cent infestation. But the species like *Terminalia tomentosa*, *Albiziaodoratissima*, *Dalbergiasisso* and *Terminalia paniculata* showed resistance to fungi. Similar trend was reported for termite infestation also; *Tremaorientalis* (0) was severely affected with termites; whereas, *Acacia nilotica* (6.0), *Spathodeacompanulata* (6.33), *Gliricidiasepium* (6.33) and *Samaneasaman* (6.33) were shown moderate resistance to termite infestation; but *Terminalia tomentosa*, *Albiziaodoratissima*, *Dalbergiasisso* and *Terminalia paniculata* are not affected by termites. Hence, among fourteen species tested, *Terminalia tomentosa*, *Albiziaodoratissima*, *Dalbergiasisso*, *Terminalia paniculata* and *Artocarpusheterophyllus* are more durable species as compared to others. Hence, these species can be utilized effectively for longer duration with least damage by wood destroying agencies such as fungi and termites.

POTENTIALS OF BIOCHAR FOR THE MANAGEMENT OF MIXED CONTAMINATIONS IN SOIL**Parameswari, E*, T. Ilakiya¹, S. Paul Sebastian, P. Kalaiselvi and V. Davamani****Dept. of Environmental Sciences, Tamil Nadu Agricultural University, Tamil Nadu, India**¹SRM College of Agricultural Sciences, Chengalpattu, Tamil Nadu, India

Soil contamination poses significant challenges to ecosystem health and human well-being. Mixed contaminations, comprising various pollutants, further complicate remediation strategies due to their diverse chemical properties and interactions. Biochar, a carbon-rich material derived from the pyrolysis of organic matter, has garnered attention as a promising soil remediation amendment. This study, conducted at Tamil Nadu Agricultural University, consisted of two phases. The first phase involved an incubation experiment to assess the fate of mixed contaminations in soil, while the second phase included a field experiment with marigold as a hyperaccumulator. The incubation experiment revealed significant effects of biochar application on the concentrations of chromium, cadmium, and Perfluorooctanoic acid (PFOA) in soil. Biochar amendment led to reductions of 19.2% for chromium, 17.8% for cadmium, and 68% for PFOA. In the field experiment, reductions of 68.3% for chromium and 52.7% for cadmium were observed in soil treated with biochar. Conversely, mixed contaminants showed lower reduction percentages in both incubation and pot culture experiments due to covalent binding of metals with organic groups. The mechanisms underlying biochar's effectiveness in sorption, immobilization, and degradation of contaminants were investigated, emphasizing its capacity to address multiple pollutants simultaneously. Additionally, the influence of biochar properties, such as surface area, porosity, and functional groups, on its remediation efficiency was assessed. The study underscores the negative impact of mixed contamination on soil and plant systems, advocating for an integrated approach such as phytoremediation with hyperaccumulators alongside biochar application at a rate of 5 t/ha. Biochar's ability to decrease bioavailability through adsorption prevents contaminant uptake by plants, enhancing their tolerance to toxicity.

Key words: Biochar, heavy metals, PFOA, mixed contaminants

RECYCLING OF SEWAGE SLUDGE FOR SYNTHESIS OF FUNCTIONAL NANOMATERIALS AND ITS ENVIRONMENTAL APPLICATIONS**PARAMESWARI, E*, S.PAUL SEBASTIAN, T.ILAKIYA¹, V.DAVAMANI AND P.KALAISELVI****Dept. of Environmental Sciences, Tamil Nadu Agricultural University, Tamil Nadu, India****¹SRM College of Agricultural Sciences, Chengalpattu, Tamil Nadu, India**

Hydrochar, a stabilized carbon material derived from sewage sludge via hydrothermal carbonization, exhibits promising energy and adsorption properties for environmental applications. This study focuses on optimizing hydrochar production and characterizing its properties, followed by evaluating its energy and adsorption capabilities. Hydrothermal carbonization of sewage sludge at 200°C for 6 hours yielded fluffy hydrochar with a coarser surface and carbon microspheres, as observed through Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM). Fourier-Transform Infrared spectra (FTIR) confirmed the presence of hydroxyl, aliphatic methyl, amino, ketonic, amide, and ether groups similar to sewage sludge, with minimal shifts and peak reductions. The higher heating value increased post-hydrothermal carbonization from 16.24 to 19.41 MJ kg⁻¹, indicating energy densification, with the blend of 90% coal and 10% hydrochar showing the highest value at 28.75 MJ kg⁻¹. Chemical activation of hydrochar with H₃PO₄, both pre- and post-activation, demonstrated effectiveness in removing PerFluoroOctanic acid (PFOA). Post-activated hydrochar exhibited a higher zeta potential (-38.6 mV) and achieved a PFOA removal percentage of 98.65% at pH 4 with an initial concentration of 0.50 mg L⁻¹. Freundlich isotherm model indicated an adsorption capacity of 236.38 mg/g for post-activated hydrochar, with chemisorption being the controlling step based on kinetic models. The activated hydrochar derived from sewage sludge shows promising potential for PFOA removal in aqueous media. However, further comprehensive studies are required to validate its commercial application as an adsorbent.

Keywords: Sewage sludge, hydrochar, energy potential, PFOA, adsorbent**EVALUATION OF DIFFERENT GROWTH MEDIA ON *CORYNESPORACASSIICOLA* UNDER IN VITRO TEST****PARAS SANGANI¹, PRASHANT B. SANDIPAN², TWINKLE MANAVADRIA³, NIRVA PATEL⁴ AND NISHI SAINI⁵, P. S. PATEL⁶ AND R. K. PATEL⁷****^{1, 2 & 4} PG Student Department of Plant Pathology, N. M. College of Agriculture, Navsari Agricultural University (NAU), Navsari****^{3 & 6} Main Cotton Research Station (MCRS), Navsari Agricultural University (NAU), Surat 395 007 (Gujarat), India****⁵ Department of Genetics and Plant Breeding, Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur 313 001 (Rajasthan), India****⁷ Krishi Vigyan Kendra, Navsari Agricultural University (NAU), Surat 395 007 (Gujarat), India**

Seven different growth media were tested for their suitability for the mycelial growth, colony colour, cultural characteristics and sporulation of the *C. cassiicola* under *in vitro* test. Among the various growth media tested, the growth of *C. cassiicola* was significantly maximum in the Potato dextrose agar (PDA) (83.73mm) as compared to the rest of the growth media, which was followed by V-8 Juice agar (V8A) (75.43mm). The next best growth media in order of merit was Sabouraud agar (SA) (64.8mm) and Richard's agar (RA) (55.8mm) media. The remaining of the growth media viz., Oat-meal agar (OA) (47.66mm), Malt Extract agar (MEA) (40.43mm) and Nutrient agar (NA) (25.53mm) also supported the growth of the pathogen. The colony colour and cultural characteristics of *C. cassiicola* on cotton was different on different growth media. On PDA media fungus produces greyish, moderate, smooth circular, fibrous and aerial mycelium, on RA media greenish white, cottony and aerial mycelium, on MEA media whitish gray, velvety with spreading margin, on NA media white, oily, transparent and no aerial growth, on V8A whiteish gray floccose or woolly, dense and tuft, on SA media white to grey, profuse mycelium and on OA media milky white to light gray moderate, circular, fluffy and raised mycelium was observed.

Keywords: Media, *Corynesporacassiicola*, Morphology**SALICYLIC ACID AND THIOUREA INDUCED PHYSIOLOGICAL GROWTH RESPONSES AND PRODUCTIVITY IN MUNGBEAN [*VIGNARADIATA* (L.) R. WILCZEK]****PARIKHA PRAKASH SINGH, DR.R. SHIV RAMAKRISHNAN, DR. GYANENDRA TIWARI****Department of Plant Physiology, COA, JNKVV, Jabalpur, MP**

Under Kharif sowing, the mungbean production area is drastically decreasing due to various environmental constraints. The crop faces frequent water-logging and drought due to the uneven rainfall distribution due to climate change. This climate change effect leads to a drastic reduction in yield and poor seed quality. PGR has the potential to alleviate the devastating effect of biotic stress and abiotic stress, as evident from a study concluded on various field crops. Besides that, due to variation in environmental factors, endogenous hormone level fluctuates, which causes disturbance in source-sink balance, consequently leading to yield reduction. Hence, we tested our hypothesis that exogenous application of Salicylic acid and thiourea will maintain endogenous hormone concentration at threshold level, which maintains source-sink balance and stabilize yield under Kharif sown condition. The research revealed that thiourea @250 ppm leads to enhancement of seed yield, seed recovery percentage, seed germination, and vigour due to enhancement in Chlorophyll content index (44.89), 100 seed weight (2.11 g), Seed yield (2.03 g/plant and 777.08 kg/ha), Biological yield (3453.13 kg/ha), Harvest Index (22.54), Seed recovery (89.66%), Seedling dry weight (0.02 g), Seed germination (85.33%), Seed vigour index – I (2836.98) and Seed vigour index – II (1.90) with respect to 6%, 12.56%, 8.55%, 14.86%, 35.55%, 6.35%, 10.15%, 86.19%, 183.01% and 4.39% superiority over control, respectively. This proves our hypothesis. Hence, thiourea @250 ppm is recommended to mungbean growing farmers for better growth, seed size, potential seed yield, and enhanced seed quality under Kharif sowing.

Keywords: Mungbean, Salicylic acid, Thiourea.

SUSTAINABLE LIVELIHOOD ACTIVITIES MODEL INTRODUCED THROUGH CONVERGENCE OF SCHEMES OF DIFFERENT DEPARTMENTS AT THE MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT ACT (MNREGA) PARK AT BHAUKHEDI VILLAGE MADHYA PRADESH

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Effective water management is needed for dry areas of our country due to shifts in land use patterns and catchment characteristics in conjunction with climate change. It has become a rigid barrier for water managers to learn and treat water for sustainability in the future. This study draws the implication towards the Mahatma Gandhi National Rural Employment Act (MNREGA) park at Bhaukhedi village in Ichhwar Janapad Panchayat is in an area of 25 acres. Bhaukhedi Village Organization has 18 active SHGs comprising of 184 members. These members are actively involved in carrying out various activities related to development and maintenance of the park. The park will not only provide MGNREGA wages to these members, in addition will also provide an alternate source of income to them. The park has the capacity to provide healthy fruits and vegetables to SHG members and will be a significant source of promoting dietary diversity not only among members but in the larger community. The nutrition garden through natural farming will be helpful in checking the uncontrolled use of fertilizers and pesticides widespread in standard farming practices in and around the village. The park will serve as a training centre and demonstration park for natural farming, various livelihood activities, and for students studying agriculture and rural development. A proper linkage with the educational institutes needs to be established for this purpose. This park will act as a model for different livelihood activities achieved through convergence of schemes of different departments. It will help in developing similar parks in the state of Madhya Pradesh. The livelihood activities being done at the park and also those suggested in this document can be taken up at other parks as well considering the local conditions including the economic aspects. The sustainability and success of this park depends largely upon the motivation of the SHG members, the support that they need and get from the different departments and the market linkages.

Keyword: Sustainability, Livelihood, (MNREGA), SHGs Bhaukhedi, Madhya Pradesh

GENOME-WIDE IDENTIFICATION AND *IN-SILICO* EXPRESSION ANALYSIS OF ORPHAN GENE FAMILY IN *ORYZA SATIVA* (RICE) IN RESPONSE TO CLIMATE-RESILIENT ENVIRONMENTS

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In this study, 55 ORPHAN genes were identified in *Oryza sativa japonica*, with diverse molecular weights ranging from 25.05886 to 108.69138 kD and predominantly hydrophilic properties. These genes exhibit localization primarily in the nucleus, cytoplasm, and chloroplast. GO enrichment analysis highlighted their roles in radial pattern formation, asymmetric cell division, and transcription coregulator activities. MicroRNA analysis identified 736 miRNAs targeting these genes, including those involved in salt stress response. Conserved cis element analysis revealed roles in light, stress, developmental, and hormonal responsiveness. Conserved domains such as GRAS superfamily and GRAS domain were found in all ORPHAN genes, influencing plant growth and stress responses. Gene structure analysis showed simple structures with one exon for 70.90% of the genes. Chromosomal distribution was random, with Chromosome 11 having the most genes. Gene duplication ages varied, indicating segmental duplication events. Syntenic analysis confirmed segmental duplications, suggesting evolutionary patterns. In-silico transcriptome analysis revealed tissue-specific expression patterns, with some genes up-regulated during drought and cadmium stress. These findings provide insights into ORPHAN gene structures and functions in stress environments, supporting gene cloning, functional analysis, and breeding efforts for climate-resilient rice cultivars.

Keywords: Climate-resilient environments; genome-wide analysis; *In-silico*; ORPHAN gene family; rice.

IN SEARCH OF PHYTOCHEMICAL SIGNIFICANCE OF FEW SELECTED MEDICINAL PLANTS

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The use of specific plants in the treatment of disease has been demonstrated since time immemorial for the ethnobotanical significance. A significant number of the bioactive components found in pharmaceutical drugs were initially extracted from plants. In numerous underdeveloped nations, therapeutic plants continue to be utilized on a regular basis. Study of medicinal plants has significance in various dimensions like commerce, botany, biochemistry, enzymology, genetics and pharmacology. Lately, there has been a notable increase in interest in herbal medical systems. A common belief is that plants are more naturalistic than synthetic pharmaceuticals, and may be produced at home at a lower cost than artificially produced treatments and could be used from the beginning of any disease symptoms initiation. One benefit of employing the whole plant is that various components of the plant might work together synergistically to achieve the desired effect. Without a doubt, there are still numerous undiscovered plant species in the plant kingdom that possess medicinal substances. Ongoing efforts are continuously screening a significant number of plants to determine their potential pharmacological benefits, specifically in relation to anti-inflammatory, hypotensive, hypoglycemic, amoebicidal, antifertility, cytotoxic, antibiotic, and anti-parkinsonism properties. A few samples of medicinal plants were collected from the medicinal garden of College of Agriculture, BCKV, Burdwan. Subsequently, a comprehensive biochemical analysis was conducted, encompassing quantitative and qualitative assessments of several compounds such as total sugar, total phenol, flavonoids, protein, alkaloids, tannin, saponin, terpenoids, and steroids. Moreover, DPPH scavenging assay also done to determine the anti-oxidant property. All of the chosen plants yielded positive outcomes in qualitative tests and constituents were measured using standard biochemical techniques.

Keywords- Medicinal plants, phytochemicals, ethnobotany, secondary metabolites.

ORGANIC AND NATURAL ECO-FRIENDLY FARMING IN INDIA**PARULTOMAR****Department of Chemistry, N.A.S. College Meerut UP India, C.C.S University, Meerut UP India**

India has a long history of using traditional farming methods that are better for the environment and need fewer resources. The natural agricultural methods that are being practiced across India have their roots in this ancient literature. Agroecological farming methods are an alternative to conventional high-input farming that minimizes intergenerational conflict and offers higher yields without sacrificing the needs of future generations. These have also received help from the US Food and Agriculture Organization. Natural agriculture is an approach to growing without the use of chemicals, utilizing resources that are available nearby, and agricultural goods. An old Indian agricultural technique is cow-centric farming methods. Nowadays consumers are significantly more conscious about their health and hygiene than their counterparts in the past. While it pertains to enjoying healthful, superior nourishment and keeping themselves neat, consumers are acting drastically. As a result, demands for nutritious content, knowledge of wellness and safety, long-term viability and environmental offerings are rising. Manufacturers, investors, and processors have to guarantee that what they produce is more wholesome and safe. Natural as well as sustainably produced materials have a unique quality to them that India hasn't yet fully realized. Bridging the barriers that prevent traditional, organic, and natural products from implementing the benefits of global markets could lead to jobs and significant economic advantages for the region. Many foodstuffs, including green tea, veggies and fruit, grains, legumes, sweetheart, oil seeds, coffee beans, spices and other herbs, beauty products, nourishing foods, personal grooming goods, and fiber made from cotton, are categorized as organically grown goods. The article focuses on the importance, comparisons, potential consequences, economic susceptibility, impact on output, human health, the environment, and the current condition of organic and environmentally friendly cultivation in India.

Keywords: Organic farming, Sustainable agriculture, Indian economy, Human well-being, Traditional farming, Environmental impacts.

EXPOSURE TO PESTICIDES ALTERS PHYSIOLOGICAL MARKERS OF HONEY BEE HEALTH**PARVATI SHARMA****Assistant Professor, Department of Zoology, Chaudhary Bansi Lal University, Bhiwani, Haryana**

Honey bee has a gut microbial community that is relatively stable and is thought to improve host health and defend against parasites and pathogens. Gut microbiome plays a significant role on bee health and its performance but this microbiota have been shown to be effected by a variety of factors such as exposure to pesticides and inhive chemicals. Pesticides and in-hive chemicals used in apiculture can disrupt the honey bee gut microbiome, putting host bee health at risk. Exposure to insecticides such as flupyradifurone (FPF) and sulfoxaflor (Sulf) or/and a fungicide, azoxystrobin (Azoxy) caused dysbiosis of bee gut microbiota that was associated with an increase in the relative abundance of opportunistic pathogens such as *Serratiamarcenscens*. Fungicide, insecticides, and fungicide-insecticides combinations all had varying effects on the relative abundance of the top ten genera of the bee gut microbiota. The concentration of Pesticide, duration of exposure, season and concurrent stressors, all influence whether and how bee gut microbiota are disturbed. Also, the mechanism of disturbance-i.e. whether a pesticide directly affects microbial growth or indirectly affects the microbiota by altering host health-likely affects disturbance consistency. Honey bee gut microbiota taxa shift in abundance after exposure but are rarely eliminated, with declines in beneficial bacteria such as Bifidobacteriales and Lactobacillus.

Keywords: Gut microbiota; Honey bees; Pesticides; fungicides; inhive chemical; host performance; pesticide exposure; symbiosis

INTEGRATED DISEASE MANAGEMENT**PARWATI****Ph.D Scholar, Department of Nematology, Maharana Pratap University of Agriculture and Technology, Udaipur**

Plant diseases are considered an important biotic constraint which leads to significant crop losses world wide. Over the past few decades 'application of pesticides, fungicide was the dominant form of disease control in developed and increasingly in developing countries. During the cropping cycle, regular crop monitoring is used to decide if and what action is needed. 'Integrated Disease Management 'involves the selection and application of a harmonious range of control strategies that minimize losses and maximize returns. IDM calls for minimal use of pesticides. Integrated Disease Management (IDM) is a holistic approach which first assesses the disease situation, evaluates the merits of disease management options and then implements a system of complementary management actions within a defined area. IDM aims to optimize our control measures by integrating different techniques and tools. By considering the interactions between diseases, hosts, and environments, IDM promotes a holistic and collaborative approach towards disease management, leading to healthier and more resilient systems. Nevertheless, the use of IDM strategy is gaining momentum, but in developing countries it often lacks the enabling environment for its successful implementation. Success requires appropriate policies in place that cover a wide range of them such as plant protection, private sector investment, trade and export, land use, education and awareness, and agriculture extension. Wide adoption of IDM practices is a pre-requisite for achieving impact at the country level.

Keywords: monitoring, fungicide

IN VITRO ATTENUATION OF SALMONELLA TYPHIMURIUM BY KNOCKING OUT FNR AND NARL GENES**PASHUPATHI M, PRADEEP KUMAR GODWAL, PRAVAS RANJAN SAHOO, SREENILA.V.V, RASHMI MISHRA, SWAGATIKA PRIYADARSINI, NIKHIL K.C, MEETA SAXENA, AJAY KUMAR*****ICAR - Indian Veterinary Research Institute, Izatnagar, Bareilly, U.P**

Salmonella Typhimurium (STM) is a zoonotic bacteria and is a member of *Enterobacteriaceae* that has to transform its complete metabolism from aerobic to anaerobic respiration for the successful colonization and infection inside host cell in a microaerophilic environment. Salmonellosis can be spread through food products such as meat, eggs, and milk because chicken, cattle, and pigs are considered important STM reservoirs. We developed a double mutant of STM by deletion of *fnr* and *narL* genes from its genome and this double mutant has been studied for its effective reduction in various virulence and colonization factors. These two genes of STM play an important role in the metabolic shift from aerobic to anaerobic respiration. A comparative glucose uptake study by using a fluorescent glucose analog 2-NBDG, revealed that an initial decrease in uptake was observed in both groups viz. double mutant and heat killed wild type bacteria whereas in later stages (at 6hrs p.i), the significant decrease was seen mainly in wild type which indicates that bacteria started decreasing the glucose uptake to prevent the phago-lysosomal acidification. In the *in vitro* bacterial burden assay, wild type STM was replicating significantly higher compared to the double mutant. The RT-qPCR assay of many of the glucose metabolism genes (GLUT1, Mondo A and AMPK, aldolase A), immune related genes (IFN- γ , TNF α , IL-1 β , IL6, IL10, NF-k β and MHC-II) showed that the virulence of the double mutant STM got decreased significantly. These results were also supported by ELISA assays at protein level. The SPI-I (*sptP*) and SPI-II (*sppH2* and *srfH*) genes, necessary for entry and replication of the *Salmonella* Typhimurium inside the host, were slightly upregulated in double mutant as compare to wild type for its necessary survival. Hence these findings suggest that *fnr* and *narL* genes are necessary for the survival, replication and virulence of the wild type *Salmonella* Typhimurium.

Keywords: Nitrate reductase, Glucose uptake, Virulence, Cytokine, *Salmonella* Pathogenicity Islands**MANAGEMENT OF ABIOTIC AND BIOTIC STRESS WITH CRISPR-CAS-9****PATAIT NEHA* N¹, PATAIT², D. D. AND KHARADE³, M. R.**¹**Department of Plant Pathology, College of Agriculture, Parbhani**²**Department of Agricultural Entomology, College of Agriculture, Parbhani**³**Department of Horticulture, College of Agriculture, Parbhani, VasantnaikMarathwadaKrishiVidyapeeth, Parbhani (M.S.),**

In recent years, genome editing has developed rapidly and has the potential to become the main tool used to reduce biotic and abiotic stress in plants. Plant genomes have been altered by the use of genome editing methods including zinc finger nucleases (ZFNs) and transcriptional activator-like effector nucleases (TALENs). However, one of the most effective, practical, and quick ways to successfully modify the targeted gene is the clustered regularly interspaced short palindromic repeat (CRISPR)-Cas (CRISPR-associated) system. Currently, the main factors limiting agricultural productivity and affecting plant growth are biotic stressors like disease and insect pests and abiotic stressors like cold, drought, and saline-alkali stress. CRISPR/Cas9 technology has been used to edit the genome to improve plant immunity system and obtain a long-term resistivity against various biotic and abiotic factors, thus improving plant vitality and resistivity and also utilized to improve genetics, boost biomass production, increase nutrient usage efficiency, and develop disease resistance. In the field of vegetable and fruit crops as well as major cereal crops (such as maize, rice, wheat, etc.), these strategies have produced amazing results in resistance breeding. Crop yield stability is guaranteed globally by CRISPR/Cas (clustered regularly interspaced short palindromic repeats/CRISPR-associated).

Keyword: Abiotic stress, Biotic stress, CRISPR-Cas9, and Genome.**INULIN INCORPORATION IN DIETS OF AMUR COMMON CARP (*CYPRINUS CARPIO HAEMATOPTERUS*) FEED TO ENHANCE GROWTH, HAEMATOLOGICAL PARAMETERS AND IMMUNOLOGICAL PARAMETERS****¹PAVAN KUMAR P, ²MANJAPPA. N, ³HARSHA NAYAK, ⁴SWAPNIL W.G., ⁵PARVIND KUMAR****^{1,2,3,4,5,7}Fisheries Research and Information Centre (I), Hesaraghatta, KVAFSU, Bengaluru**

Aquaculture now viewed as strong option for increasing fish production as it plays a vital role in providing food security to the world. There is a need for enhanced disease resistance, feed efficiency and growth performance of cultured fish species. Dietary supplementation of different feed additives. Immunostimulants such as probiotics and prebiotics usually in small quantities for the purpose of fortifying it with certain nutrients have been found to be beneficial for improving immune status, feed efficiency and growth performance of finfishes. The present study of prebiotic inulin performance on fish health and growth in Amur common carp were investigated for a period of 90 days. The basal diet in all trials (30% protein) were incorporated with different levels of prebiotic inulin, 5g/kg (T₁), 10g/kg (T₂), 15g/kg (T₃) and control diet (T₀) with no prebiotics in triplicates. A stocking density of 15 fishes (4 $\pm$ 0.5g) per tank were stocked in FRP tank and fed at the rate of 5% of body weight for a period of 90 days for evaluation of growth performance, haematology and immune response. The growth parameters such as weight gain, SGR, FCR, PER and survival were significantly higher in T₂ followed by T₁, T₃ and control groups. The fishes fed with treatment T₂ showed significantly positive elevation in immune parameters such as NBT assay, lysozyme activity and phagocytic activity followed by T₁, T₃ and control groups. The treatment T₂ fed fish showed higher serum parameters such as serum albumin, serum globulin. Highest serum protein and albumin and globulin ratio was observed in T₀(control). The hematological parameters such as RBC, WBC, hemoglobin, hematocrit, MCV, MCH, MCHC showed no significant difference but higher values in T₂ followed by T₁, T₃ and control groups.

Keywords: Prebiotic; Inulin; Immunostimulants; Immune response; Haematology.

EFFECT OF SILICON ON GROWTH, YIELD AND QUALITY OF TOMATO (*SOLANUM LYCOPERSICON* MILL.)**PAVANKUMAR SHARMA* DR.SUSHEEL KUMAR*******Ph.D. Scholar, Department of Horticulture (Vegetable Science), SKRAU, Bikaner******Assistant Professor, Department of Horticulture SKRAU, Bikaner**

The present investigation entitled “Effect of Silicon on Growth, Yield and Quality of Tomato (*Solanum lycopersicon* Mill.)” was carried out at Hi-Tech Unit, Department of Horticulture, College of Agriculture, SKRAU, Bikaner. The fourteen treatments for the tomato crop were evaluated with three replications under randomized block design. The results exhibit the significant effect of various treatments on growth, yield quality of tomato and their residual effect on different soil properties. Maximum plant height at 60 DAT, 90 DAT and 120 DAT (62.94 cm, 91.10 cm and 114.33 cm) respectively, leaf area index (4.54), number of branches (8.43), maximum days to anthesis (42.23), maximum days to harvest (69.45), stem girth (3.44 cm) was obtained in treatment T₉ (RDF + 25 t ha⁻¹ FYM + 100 kg ha⁻¹ Silicon through Diatomaceous earth), maximum number of clusters per plant (6.86), number of flowers per cluster (8.88), number of fruits per plant (27.73), fruit weight (83.47 g), fruit volume (77.28 cc), specific gravity (1.04 g/cc), fruit length (6.51 cm), yield per plant (1030.26 g), yield per plot (30.74 kg) and yield per ha (307.43 q/ha) was recorded with treatment T₉ (RDF + 25 t ha⁻¹ FYM + 100 kg ha⁻¹ Silicon through Diatomaceous earth). Among quality parameters maximum TSS (5.95%) of fruit, ascorbic acid (19.88 mg/100 g), Lycopene content (3.83 mg/100 g), and total chlorophyll content of tomato leaf (0.583 mg/g) were found with treatment T₉ (RDF + 25 t ha⁻¹ FYM + 100 kg ha⁻¹ Silicon through Diatomaceous earth). Soil parameters maximum pH (8.21) in T₂, EC (0.63 dsm⁻¹) in T₁₀, organic carbon (0.69 %) in T₁₂ and T₁₁, available N (282.19 kg/ha⁻¹) in T₁₄, available P (21.67 kg/ha⁻¹) in T₉, available K (366.74 kg/ha⁻¹) in T₈ and Maximum net return of ₹ 256182 found in T₉ and maximum B:C Ratio (3.88) was recorded with T₁₀.

ECOFRIENDLY ENERGY RESOURCES: RENEWABLE ENERGY, GREEN ENERGY, BIO-FUELS, WASTE PRODUCT ENERGY & NATURAL ENERGY**PAVAN S JADHAV¹, PRIYANKA S JADHAV²****¹Department of Physics, SNJB's Art's Commerce and Science College Chandwad, Nashik (M.S) India****²Department of Botany, H.P.T Arts And R.Y.K Science College, Nashik Dist- Nashik (M.S) India**

For sustainable energy sources quest has become imperative in the face of escalating environmental concerns and the pressing need to mitigate climate change. In this abstract explores the diverse landscape of eco-friendly energy resources and their pivotal role in shaping a sustainable future. Renewable energy, encompassing solar, wind, hydro, and geothermal power, stands as a beacon of hope, offering clean, abundant alternatives to fossil fuels. Green energy initiatives further underscore this commitment to sustainability, emphasizing the imperative of minimizing environmental impact while maximizing energy efficiency. Biofuels emerge as a promising avenue, utilizing organic materials to produce renewable alternatives to traditional fuels. Waste product energy solutions harness the untapped potential of waste materials, transforming them into valuable sources of clean electricity and heat. Natural energy sources, ranging from sunlight to geothermal heat, offer bountiful opportunities for sustainable energy generation while mitigating resource depletion and environmental degradation. As the world navigates towards a greener, more sustainable future, the adoption and advancement of these eco-friendly energy resources are paramount, driving progress towards a cleaner, more resilient energy landscape.

Keywords: Eco-friendly energy, Renewable energy, Green energy, Biofuels, Waste product energy, Natural energy, Sustainability, Clean energy alternatives.

IMPACT OF SEWAGE SLUDGE ON BIOAVAILABILITY AND UPTAKE OF HEAVY METALS BY CROPS**PAVAN SINGH AND YV SINGH****Department of Soil Science & Agricultural Chemistry, IAS, BHU, Varanasi, UP**

Sewage sludge (SS) is a byproduct of sewage treatment plants and results due to removal of solids and organic matter, from the sewage, industrial or municipal wastewater. An estimated 38,354 million litres of sewage per day generated in India. Management of SS is a very cost and labour-intensive work however, agricultural application of SS has potential for its proper disposal and utilization. Sewage sludge contain high amount of organic matter which improves physical, chemical and biological properties of soils. Furthermore, application of sludge to soil leads to a drop in pH and rise in an electrical conductivity EC. Sewage sludge is a vital source of various plant nutrient such as N, P, K, Zn, Cu, Fe, Mn etc. In addition to its beneficial effects on plant growth and development, high concentration of heavy metal i.e., Cd, Cr, Ni, Pb, Hg, As, etc. caused hazardous effect on soil and plant health which may further extended to food chain contamination (Singh and Agarwal 2008). Toxic accumulation of heavy metals in plants hamper biochemical and physiological process. Judicious application of SS along with inorganic fertilizer is a feasible way to amend the soil with SS to reduced heavy metals buildup in soil and plants to prevent the food chain contamination.

Keyword: Sewage sludge , Heavy metals

INNOVATIVE STEPS TOWARDS THE SUSTAINABLE AGRICULTURAL PAWANAHARI^{*1}, KAMLESH YADAV^{*}, SUMITJAT^{*}, JAGDISH CHAUDHARY²

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A farming method known as "sustainable agriculture" minimises detrimental effects on biodiversity while regenerating the productive potential of natural resources. To provide more food for the expanding population, agricultural intensification has put sustainable agriculture at the forefront. The usage of PGRs, excessive reliance on chemical fertilisers, uneven agricultural practices and other factors can result in a decline in biodiversity, soil health, weed and disease infestation, food nutrition and other issues. In addition to using integrated pest and weed management strategies to maintain agricultural output, farmers can also implement an integrated farming system by embracing all organic farming practices. The application of fertilisers, green manure and compost, organic waste, rock minerals and so on can all improve soil nutrients, soil health and WHC. Since 70% of agriculture depends on rainfall, the current climate can significantly impact production. Therefore, precision agricultural methods should be used in combination with innovative irrigation systems. Drones are used to monitor productivity, irrigation, field crop and fertilizer requirements. One of the main goals of the public, business, agricultural and government sectors is to eradicate hidden hunger in the nation and achieve food security and sustainable agriculture. Government programmes like the National Mission for Sustainable Agriculture (NMSA) concentrate on increasing productivity through the use of all integrated agricultural techniques, which can have a direct impact on the nation's and farmers' financial viability.

Keywords: Climate, Integrated farming system, NMSA, Sustainable agriculture

PRECISION AGRICULTURE AND CONSERVATION OF THE ENVIRONMENT

PAWAN KUMAR AND DHARNA SINGH

SHUATS, Praygraj

Greenhouse technology is a useful method to boost crop production by precisely controlling factors like temperature, humidity, light intensity, and CO₂ levels within the growth environment. The primary goals include providing significant new insights and compiling recent advancements in greenhouse technology to assist greenhouse engineers, researchers, and industry professionals in achieving higher productivity at a lower cost. The findings indicate that research and development projects in the past 5 years have generated significant interest in the greenhouse crops industry. When it comes to structural hardware, designers face difficulties in choosing an agricultural greenhouse design that aligns with the financial constraints of greenhouse growers. The findings indicate a shift in focus of research from traditional controllers to contemporary ones that rely on explicit perception of the environment. Research shows that renewable energies like solar and geothermal have become popular as eco-friendly options, making greenhouses self-sufficient in energy and enabling them to share energy with the electric grid. Protected cultivation in greenhouses is seen as crucial in the context of profitable and sustainable agricultural intensification practices due to the changing food production landscape with the rising global human population. With the aim of increasing yields all year round, greenhouses are constructed to control important elements that affect crop development, such as solar radiation, temperature, humidity, light intensity, and carbon dioxide levels. The provision of services is their main goal. Computers are included in the five primary categories of precision agricultural technology. Global positioning and mapping are done via sensors, GIS, and GPS. Control of applications: By streamlining agricultural procedures and minimizing waste and labor via efficient resource management, precision farming has the ability to boost crop yield while cutting costs. It also helps to lessen environmental pollutants.

Keywords- Contemporary, Precision, Greenhouse, GIS and GPS

MARINE RESOURCE RECYCLING: MOLLUSCAN SHELLS AS A PATHWAY TO SUSTAINABLE INDUSTRIAL PRACTICES PAYEL DEBBARMA^{1*}, NARESH KUMAR MEHTA¹, SUPARNA DEB² AND SHUBHAM KASHYAP³

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The innovative utilization of molluscan shell waste across various sectors, including food, feed, pharmaceuticals, cosmetics, wastewater treatment, and others, presents a compelling solution for enhancing sustainability and resource efficiency. Molluscan shells, rich in calcium carbonate and other valuable minerals, can be repurposed to create value-added products with diverse applications. In the food industry, they can be processed into a powder and incorporated into food products as a natural source of calcium fortification, improving nutritional content. Similarly, in the feed sector, molluscan shells serve as a sustainable source of essential minerals for animal health, reducing dependency on synthetic additives. Furthermore, in pharmaceuticals and cosmetics, molluscan shell derivatives offer potential as excipients, binders, or texture modifiers, contributing to the development of environmentally friendly products. Additionally, the high alkalinity and adsorption capabilities of molluscan shells make them effective agents for wastewater treatment, where they can be utilized to stabilize pH levels and remove contaminants from industrial effluents. This abstract underscores the multifaceted benefits of incorporating molluscan shell waste into various industries, including waste reduction, resource conservation, and the promotion of a circular economy. By leveraging the abundant, untapped potential of this marine resource, we can overcome sustainability challenges in multiple sectors and convert previously disregarded waste into valuable assets.

Keywords: Food Industry, Pharmaceuticals, Molluscan Shell Waste, Sustainability and Wastewater Treatment.

IMPACT OF ORGANIC FORMULATIONS ON GROWTH, FLOWERING YIELD, AND QUALITY OF CARNATIONPAYAL VYAS¹, DR. URFI FATMI², VIJAY BAHADUR³ & YOGESHWARI SAHU⁴¹Ph.D. Scholar, Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, UP.²Assistant Professor, Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, UP³Associate Professor, Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, UP⁴Guest Teacher, Department of Agricultural Economics, Indira Gandhi Krishi Vishwavidyalaya, Raipur, C.G.

Carnation (*Dianthus caryophyllus*) holds significant commercial value in the global flower market. Excellent keeping qualities and wide range of forms and colours make carnation one of the most sought-after cut flowers. Organic formulations, such as Panchgavya, Jeevamrit, Bokashi, and seaweed extract, have garnered attention for their potential to enhance plant performance while minimizing environmental impact. This abstract aims to synthesize existing literature on the effects of these organic formulations on the growth, flowering yield, and quality of carnation cultivars. Panchgavya, has demonstrated positive effects on carnation growth parameters, including increased plant height, leaf area, and shoot biomass. Jeevamrit, a fermented solution rich in beneficial microorganisms, has shown promise in enhancing nutrient uptake and improving soil health, thereby contributing to enhanced carnation growth and development. Bokashi, a fermented organic matter, has been reported to positively influence carnation flowering characteristics, such as flower number, size, and color intensity. Additionally, Bokashi application has been associated with improved soil structure and microbial activity, leading to enhanced nutrient availability and water retention. Seaweed extract, derived from marine algae, has exhibited multifaceted benefits in carnation cultivation, including promoting root development, increasing flowering yield, and enhancing flower quality attributes, and vase life. Despite the observed benefits, the effectiveness of organic formulations on carnation growth, flowering yield, resistance to diseases and pests and quality can vary depending on factors such as formulation composition, application rate, soil conditions, climatic factors, cultivar characteristics and management practices. However, overall, organic treatments have shown promising results in enhancing carnation growth parameters, including plant height, leaf area, and shoot biomass. Furthermore, organic formulations have been found to positively influence flowering characteristics, such as flower number, size, petal texture, color, and vase life. These effects are attributed to the balanced nutrient supply, improved water retention, and enhanced physiological processes associated with organic cultivation practices.

Keywords: Carnation, growth, flowering, yield, organic formulations.**SURVEY AND STATUS OF WEB BLIGHT OF MUNGBEAN [*VIGNA RADIATA* (L.) WILCZEK] CAUSED BY *RHIZOCTONIA SOLANI* IN RAJASTHAN (INDIA)**

PINKI DEVI YADAV*, RIDHISANKAR SHARMA, R. K. BAGRI AND SUNITACHOUDHARY

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Pulses are known to be an outstanding vegetarian source of proteins which are necessary part of a healthy and balanced diet. These crops also have ability to fix nitrogen into the soil thus, improve the soil fertility. India is one of the largest producers as well as consumers of pulses. Among the pulses mungbean [*Vignaradiata* (L.) Wilczek] also known as green gram or golden gram is one of the most important short duration pulse crops of India and Grown in *Kharif*, spring and summer seasons. Mungbean has wide application in agriculture, pharmaceutical, food and cosmetics industries. Seeds and sprouts serve as functional foods that help in lowering down the risk of several diseases and have health-promoting effects along with their nutritive value. Among them diseases caused by fungi, bacteria and viruses are major potential threats which adversely affect the productivity of mungbean. A survey was conducted in major mungbean growing regions of Rajasthan during *Kharif* season of 2022 which showed that web blight caused by *R. solani* is a fundamental obsessive issue for the major part of areas of Jaipur, Ajmer, Nagaur, Sikar, and Tonk districts. The survey was conducted when the crop stage was between 40 to 50 days. The most extreme disease frequency was seen in plants at a flowering and podding stage in July and August. An average disease intensity of 24.84 per cent was recorded in these surveyed districts. The higher disease frequency (31.04%) was assessed in Ajmer while least in Jaipur location (19.14%). The neighbourhood assortments were viewed as more defenceless to the disease of *R. solani* connected with overhauled assortments.

Keyword: Survey, Pulses, Disease, Intensity, *Rhizoctonia***MANAGEMENT OF BRINJAL SHOOT AND FRUIT BORER (*LEUCINODESORBONALIS*) INFESTING BRINJAL THROUGH BIOPESTICIDES**

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Investigation on management of brinjal shoot and fruit borer *Leucinodesorbonalis* infesting brinjal through biopesticides was conducted at the Department of Entomology, Rajasthan College of Agriculture, Udaipur during rabi, 2022-23. The experiment consist of 5 treatments and 5 replications. The treatments were T₁ (*Beauveria bassiana* @ 1x10⁸ conidia /gm, @ 5g/lit – 2 sprays at 15 days interval), T₂ (*Bacillus thuringiensis* @ 1kg/ha two times during season at 15 days interval), T₃ (Neem oil, Azadirachtin 1500 ppm @ 5 ml/lit. 2 sprays at 15 days interval), T₄ (Spinosad @ 0.32ml/ lit. 2 sprays at 15 days interval), T₅ (Untreated Control). During the experimental period, incidence of *Leucinodesorbonalis* was recorded. The minimum shoot infestation was found in Spinosad (13.32) followed by *Bacillus thuringiensis* (14.67), Neem oil (16.16) and *Beauveria bassiana* (17.37) in comparison to untreated control (21.46). The minimum fruit infestation also found in same treatments as in shoot infestation. Significantly, low yield was recorded in untreated control (9.58 t/h) in comparison to all treatments. It could be concluded that biopesticides had promising results in minimizing the pest damage with higher yield and they can be promote further as an alternative to chemical pesticides.

Keywords : *Leucinodesorbonalis*, Biopesticides, Brinjal, *Beauveria bassiana*, Spinosad

CLIMATE CHANGE ERA UNDERUTILIZED CROPS AND SMALL MILLETS ARE POTENTIAL FOOD CROPS**PIYUSHA SINGH¹, AKANKSHA TIWARI¹, AND AAKASHGARAV SINGH¹****College of Agriculture, ANDUAT, Ayodhya (U.P.)**

The threat of varying global climate has greatly driven the attention of scientists, as these variations are imparting negative impact on global crop production and compromising food security worldwide. Millets play an important role in food security, nutrition, and income generation of many resource-poor farmers and consumers especially in the developing world. these crops have high nutritional values, forage importance and grown in marginal land without much agricultural inputs. Climate change and Agriculture are correlated with each other in various aspects, as climate change is the main cause of biotic and abiotic stresses, which have adverse effects on the agriculture of a region. The land and its agriculture are being affected by climate changes dependence on a few major crops remain a major challenge due to its potential impact and contribution to food security. Higher temperatures, unpredictable rainfall and weather patterns, changes in growing seasons, increased occurrences of drought and extreme weather events will exert a greater strain on agriculture. Emerging evidence suggests that climate change will cause shifts in food production and yield loss due to more unpredictable and hostile weather patterns. There is now an increasing realization of this fact, and a greater awareness that these crops merit more research and development. Millets, therefore hold the key to the future of mankind. They are the 'Potential food crops of tomorrows' world.

ROLE OF NANO-SENSOR IN AGRICULTURE**POOJA* AND KINJAL MONDAL****Department of Molecular Biology and Biotechnology, Maharana Pratap University of Agriculture and Technology, Udaipur- (Raj.)**

Nano-based research in the current scenario is becoming one of the most captivating and thriving areas of biological science, as the recent breakthroughs in nanotechnology have successfully opened a broad array of bio-sensing or bio-imaging applications. Nanomaterials of dimensions typically between 1 to 100 nm are considered ideal for the analysis of phyto-pathogens, as they can offer a high surface-to-volume ratio and other unique chemical, optical, and electrical properties, unlike the bulk counterparts. Due to cost-effectiveness, accuracy and rapidity in pathogen detection, nano-based biosensors and their variants have already been appreciated in the field of agriculture as well as medicine. Nano-sensors are small-scale sensing devices that utilize nanotechnology to detect, measure and respond to changes in their environment at the molecular or atomic level. Nano-biosensors play an important role in revolutionizing farming through the development of diagnostic tools and techniques. These sensors are accurate, efficient, and cost-effective in dealing with various food, agriculture, and environmental issues. Some of the sensor applications in agriculture include the identification of heavy metal ions, pollutants, microbial load, and pathogens, along with rapid temperature, traceability, and humidity monitoring. Nano-sensors consist of nanoscale particles such as nanoscale wires (high sensitivity to detection), carbon nanotubes (high surface area), thin films, nanoparticles and nanomaterials from polymers. Although multiplex detection sometimes causes notable issues of cross-reactivity, researchers are very much optimistic to achieve sustainability in agriculture as well as food processing industry by using modified versions of nano-diagnostic tools in the coming future.

Keywords: Nanotechnology, agriculture, nano-sensor, bio-imaging**EFFECT OF SILICA OXIDE CONCENTRATIONS ON FLOWERING AND CORM ATTRIBUTES OF GLADIOLUS CV. ROSE SUPREME UNDER TARAI CONDITIONS OF UTTARAKHAND****POOJA FARTIYAL¹, B.D BHUJ², RANJAN SRIVASTAVA³, AJAY KUMAR⁴, N.K SINGH⁵, AJIT KUMAR⁶****Department of Floriculture and Landscaping, G.B.Pant University of Agriculture & Technology Pantnagar, Uttarakhnad, India¹****Professor, Dept. of Floriculture and Landscaping, G.B.Pant University of Agriculture & Technology Pantnagar, Uttarakhnad, India²****Professor, Dept. of Floriculture and Landscaping, G.B.Pant University of Agriculture & Technology Pantnagar, Uttarakhnad, India³****Assistant Professor, Department of Agronomy, G.B.Pant University of Agriculture & Technology Pantnagar, Uttarakhnad, India⁴****Professor, Dept. of Genetics and Plant Breeding, G.B.Pant University of Agriculture & Technology Pantnagar, Uttarakhnad, India⁵****Professor, Dept. of Floriculture and Landscaping, G.B.Pant University of Agriculture & Technology Pantnagar, Uttarakhnad, India⁶**

Gladiolus (*Gladiolus grandiflora* L.), "Queen of bulbous flowers" is also known as "sword lily" because of sword like leaves, the term coined by "Pliny the Elder". Gladiolus is a bulbous ornamental flowering plant native to South Africa. Gladiolus belongs to monocot family Iridaceae. The present experiment study described here was conducted at Model Floriculture Centre, GBPUA&T, Pantnagar, Uttarakhand, during 2020-21 to study the Effect of Silica Oxide Concentrations on Flowering and Corm Attributes of Gladiolus cv. Rose supreme under Tarai Conditions of Uttarakhand. Experiment was laid out in factorial concept of randomized block design (RBD) in open field condition. The experiment consisted of medium sized (4 – 4.5cm) corms of gladiolus variety viz. "Rose Supreme". Which were applied with different treatments of silica oxide as pre-planting soil application and foliar application at 30 and 60 days after planting in standing crop in different plot. The pre-planting soil application of SiO₂ viz. S₁ is control (0.0 kg/ha), S₂ (25 kg/ha), S₃ (50 kg/ha), S₄ (75 kg/ha) and S₅ (100 kg/ha) and for foliar application suspension was made of the same in water at 0% is control (Water spray), F₂ 1% (4.7 g/m²), F₃ 2% (9.4 g/m²) and F₄ 3% (14.1 g/m²) of silica oxide and applied at 30 and 60 days after planting. The medium sized (4.0-4.5cm) corms were used as experimental material of gladiolus cultivar viz. "Rose Supreme". The results revealed that most of the flowering parameters viz. days to spike emergence and flowering, flower size, spike and rachis length, number of floret per spike as well as corms parameters like number of corms, weight of corms and diameter of corm, numbers of cormels count and weight of cormels were found highly affected by the silicon oxide and were found to be best with the combined application of silica oxide as 75kg/ha soil application with 3% foliar application of silica dioxide. hence, it is inferred that the combined application of silicon oxide (soil and foliar application) effectively enhanced the quantity and quality of gladiolus corms and cormels attributes.

Keywords: Gladiolus, Rose Supreme, Silica oxide, Soil application, Foliar application

TOWARDS QTL MAPPING FOR EARLY MATURITY IN HEXAPLOID WHEAT (*TRITICUMAESTIVUM* L.)
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Department of Molecular Biology and Genetic Engineering, GBPUA&T, Pantnagar, Uttarakhand, India

Abiotic factors, particularly temperature, play a pivotal role in regulating crop growth and development. However, the global food production landscape faces a significant threat from heat stress induced by elevated ambient temperatures. The preservation and enhancement of wheat productivity are particularly challenged by rising temperatures, making it imperative to address this issue. Effective selection criteria empower plant breeders to harness genetic variation for improved stress tolerance in crops. Present investigation focuses on the identification of Quantitative Trait Loci (QTLs) associated with early maturity in hexaploid wheat (*Triticum aestivum* L.), considering it as an adaptive response to terminal heat stress. The research utilized an F2 population derived from an early maturing EMS mutant and a late maturing wheat genotype, revealing notable variation in the duration of maturity. Genotyping of this population using SSR markers uncovered polymorphism, laying the foundation for mapping QTLs linked to early wheat maturity. Through this investigation, consistent genomic regions may be pinpointed, holding promise for the development of novel markers. These markers can be integrated into diverse breeding programs aimed at mitigating terminal heat stress in wheat, thereby enhancing its resilience and productivity in the face of adverse climatic conditions.

Keywords: Polymorphism, EMS, Markers, QTLs

TRAIT MODELLING FOR SALT TOLERANCE IN LENTIL (*LENS CULINARIS* MEDIK.) BASED ON PHYSIOLOGICAL INDICES

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Lentil (*Lens culinaris*, Medik.), an economical and high-quality protein source for many, is susceptible to salt stress. When exposed to an electrical conductivity (EC) of up to 5 dS/m (~ 50 mMNaCl), it undergoes a significant yield reduction of about 90 per cent compared to other crops. Identifying stable lentil germplasm with salinity tolerance is crucial for ensuring higher yield. Evaluating diversity panels for their capacity to withstand salt stress conditions emerges as a primary approach for developing breeding lines and salt-tolerant varieties. In this investigation, 100 diverse lentil accessions were examined for photosynthetic traits under both control and saline condition (5 dS/m). A significant reduction was found under salinity as compared to the control. The stepwise regression approach revealed that transpiration rate (E), stomatal conductance (gsw), instantaneous water use efficiency (iWUE), intrinsic water use efficiency (inWUE), Chlorophyll, relative water content (RWC) and membrane stability index (MSI) contribute critically to reducing salt stress. This study contributes essential knowledge regarding how photosynthetic traits respond to salt stress in diverse lentil genotypes. The information acquired here will enhance our comprehension of photosynthetic alterations under salt stress.

Keywords: Lentil, Salt Tolerance, Yield, Photosynthesis, Regression

SEASONAL INCIDENCE OF SHOOT FLY AND LEAF ROLLER IN PEARL MILLET [*Pennisetum glaucum* (L.) R. BR.]
POOJAKUMARI

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The present experiments on seasonal incidence of shoot fly and leaf roller in pearl millet was conducted at Research Farm, Agricultural Research Station, Mandor during Kharif 2022. During Kharif 2022, the insect pests were recorded shoot fly, *Atherigona approximata* and leaf roller, *Marasmia trapezalis* in pearl millet. Infestation of shoot fly, *Atherigona approximata* and leaf roller, *Marasmia trapezalis* started from last week of July (30th SMW). The infestation of shoot fly and leaf roller reached to peak in third week of August (33rd SMW) in pearl millet. Weather parameters revealed that leaf roller incidence showed negative significant correlation ($r = -0.649$) with maximum temperature while shoot fly infestation showed non-significant correlation with all the weather parameters.

Keywords: *Pennisetum glaucum*, Seasonal incidence, Insect pests, Correlation coefficient

ADVANCEMENTS IN INTEGRATIVE APPROACHES FOR SUSTAINABLE BIOTIC AND ABIOTIC STRESS MANAGEMENT IN PLANT SYSTEMS

POOJAKUMARI

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Plant stress encompasses adverse factors disrupting physiological functions and growth, including biotic (e.g., pests, pathogens) and abiotic stressors (e.g., drought, salinity). These stressors hinder crop growth and quality. Plants lack mobility, prompting the development of coping mechanisms like stomatal closure and stress hormone production. Despite these adaptations, prolonged stress harms plants. Effective management involves strategies like crop selection, soil and water management, pest control, and genetic engineering. Implementing these methods combats both biotic and abiotic stresses, promoting healthier crops and maximizing productivity in agriculture. The key is a balanced approach, combining preventative measures, ongoing monitoring, and timely interventions to ensure plant resilience and optimal performance in challenging environments.

Keywords: Integrative approaches, Sustainable, Biotic stress, Abiotic stress etc.

EDIBLE CUTLERIES: A SUSTAINABLE SOLUTION FOR DISPOSABLE PLASTICS**¹POOJA M E, ²MADHUSUDHAN NAYAK C, ²HANUMANTHARAJU K N, ²ANUSHA M B, ²CHENNAPPA GURIKAR AND ³LOKESH A.C****¹Ph.D Scholar, ²Assistant Professor, ³Professor, Dept. of Food Technology, Faculty of Life and Allied Health Sciences, Ramaiah University of Applied Science, Bangalore**

Plastic has emerged as a serious danger to the environment as a whole, and daily use of plastic items has various negative effects. Beyond-description losses include the air pollution brought on by burning plastic, the marine ecosystem being contaminated, animals' internal organs being damaged by microplastics, and people being indirectly harmed by eating meat, seafood, and other goods which abundant in microplastics. To assess the usage of plastic plus its replacement using a better choice, this study reviewed studies on various types of cutlery, ways to produce edible cutlery, its medicinal characteristics, and the food cutlery industry. Since they occur on a regular basis, they degrade the quality of life. It is not possible to totally eliminate plastic because it is continually utilized and necessary; nevertheless, plastic usage may be decreased by utilizing better alternatives. Therefore, cutlery composed of plant-based ingredients such rice, sorghum, flour, soy, and wheat bran flour is a superior option. Edible cutlery is the best option for replacing plastic cutlery since it is environmentally friendly and biodegradable. This cutlery can contribute to the transformation of an unhealthy lifestyle into a healthier one by reducing the risks of cancer, endocrine disruption, and weakened immunity caused by exposure to food-storing plastic packaging that leaches. The ultimate goal of the study was to decrease the usage of plastic and products made of plastic. It can help to achieve the sustainable development goals (SDG) of the United Nations Organization, which include ensuring healthy lives and promoting well-being to everyone at all ages (SDG-3) and taking urgent action to combat the effects of climate change and its impacts (SDG-13).

Keyword: Climate action, carcinogenic, biodegradable, healthy, well-being, toxicity**CHARACTERIZATION OF THE VOLATILE AROMA COMPOUNDS FROM THE CONCRETE OF JASMINUMSAMBAC CULTURE ACC. JS-36****POOJA P^{1*}, K RAJAMANI², M GANGA³, R SIVAKUMAR⁴, R KALAIYARASI⁵****¹Doctoral Scholar, Department of Floriculture and Landscaping, University of Horticultural Sciences Bagalkot, Karnataka, India****²Professor (Ret.), Department of Floriculture and Landscape Architecture, TNAU, Coimbatore****³Professor and Head, Department of Floriculture and Landscape Architecture, TNAU, Coimbatore****⁴Professor (Crop Physiology) Department of Crop Physiology TNAU, Coimbatore****⁵Professor and Head (Plant Breeding and Genetics) CPBGTNAU, Coimbatore**

The perennial plant called Arabian or Tuscan jasmine (*Jasminumsambac*) is a shrub or vine that can reach heights of up to 3 meters. Revered for its fragrance and rich historical background, *J. sambac* is a member of the Oleaceae family. While typically characterized by three budded cymes, a variant known as Js-36 exhibits an unusual nine-budded cyme pattern, which is noteworthy. Jasmine holds significant importance as a traditional commercial flower crop in India, deeply integrated into religious ceremonies, social gatherings and cultural events. Additionally, it serves as a vital source for essential oils, specifically 'concrete', pivotal in the cosmetics and perfumery sectors. The floriculture sector, research facilities and exporters of flowers rely on final assessments to evaluate the quality of jasmine flowers and their derived concrete. The current study was conducted in the academic years 2022–2023 at the Tamil Nadu Agriculture University Coimbatore department of Floriculture and Landscape Architecture. In experiment on aroma profiling of *J. sambac* culture Acc.Js-36 was done in comparison with the standard check variety Ramanathapuram Gundumalli. Harvesting fully bloomed flowers is essential for extracting concrete by Soxhlet extraction method. Analysis of volatile compounds of *J. sambac* flowers was carried out by gas chromatography - mass spectrometry (GC-MS). More than 50 volatile compounds were identified. Of the various volatile compounds identified, the major compounds with highest peak area percentage were observed in the culture Acc.Js-36. The major aroma compounds were Benzyl Alcohol (6.52%), Linalool (2.42%), Phenylethyl Alcohol (1.84%), Benzoic acid (3.51%), Farnesene (1.74%), 9, 12, 15-Octadecatrienoic acid (5.33%), Methyl Anthranilate (3.51%), Squalene (1.95%). The result of this study revealed that the concrete extraction using Soxhlet apparatus and gas chromatography - mass spectrometry (GC-MS) method is efficient.

Keywords: *Jasminumsambac*, Concrete, Soxhlet Apparatus, Gas Chromatography - Mass Spectrometry.**ORGANIC FARMING: AN NATURAL ECOFRIENDLY TECHNOLOGY TO PROMOTING NON-CHEMICAL AGRICULTURE****POOJA RATHORE****Ph.D. Research Scholar, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur (Rajasthan)**

Organic agriculture completely avoid the use of chemical fertilizers and synthetic agrochemicals that's why it is eco-friendly. Organic systems is use of off-farm purchased organic and biological inputs and need based soil correction through natural mined minerals. Use of organic manures viz., FYM, poultry manure, composts, green manures, oil free cakes etc., increase soil microorganisms count and activity, which improves soil health and fertility. Natural farming systems are based on biomass mulching, round the year green cover, indigenous cow-based dung and urine formulations in exclusion of all purchased inputs organic, biological or otherwise. Natural Farming is a chemical-free alias traditional farming method. It is considered as agroecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity. Thus organic agriculture has the ability to boost up the economy of small farmers. Research has revealed that organically grown food grains and vegetables are safe than conventionally grown, which contains residues of fertilizers, agrochemicals, nitrates, metals and antibiotics causing health hazards. Organic food products are more nutritious and beneficial to health that's the reason the demand and price both are increasing day by day in the market.

Keywords – rejuvenation and recycling, organic agriculture, Natural farming, crop rotation, biological inputs.

GREENHOUSE GROWTH REVOLUTION: ADVANCING AGRICULTURAL FRONTIERS WITH HYDROPONIC SYSTEM**POOJA SAHU****Dept. of Floriculture and landscaping, Odisha University of Agriculture & Technology, Bhubaneswar, Odisha**

"Hydroponics" is one of the most popular systems or technology that is being highlighted right now. Global crop production has increased dramatically in recent years due to the use of hydroponics, which offers better control over climate and pest factors as well as more efficient use of water and fertilizers. Additionally, the productivity and quality of crops are increased through hydroponic production, boosting economic incomes and competitiveness. The nutrient solution is thought to be one of the key determinants of crop yield and quality among variables influencing hydroponic production systems. Although not all soilless culture is hydroponics, hydroponics is always soilless culture. The amount of water used in hydroponics is less than 1/5th to 1/10th for soil cultivation. Plants may be cultivated in sterile, or microbe-free, substrates or in a simple nutrient solution. Hydroponics basic requirements are as follows: growing media, nutrient solution, temperature, air, water, mineral nutrient, and light. Hydroponic plants receive all necessary nutrients in the form of nutrient solution, which is made up of fertilizer salts dissolved in water. With the right amount of water, fertilizer, and no pesticides, plants are grown in a soilless environment. Based on the principles of operation, hydroponics is divided into different systems. Several systems, automation techniques and operation are control methods have been used in hydroponics as a standard approach for many aspects of plant biology research. Other benefits of hydroponics include year-round production, increased yields, improved quality, and environmental advantages in addition to encouraging healthy plant growth. Microbes provide free food, and a great deal of profit has been shown in hydroponics research.

Keywords: Fertilizers, hydroponics, nutrients, soilless and yield.**DEEP LEARNING REVOLUTIONIZES SEED IDENTIFICATION****POOJA SAINI¹, AVINASH GODARA², SONALI SANGWAN^{1*} AND NEERU REDHU^{2*}****¹Department Bio-Sciences and Technology, Maharishi Markandeshwar Engineering College, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala****²Department of Bioinformatics and Computational Biology, College of Biotechnology, CCS Haryana Agricultural University, Hisar**

Seed identification is crucial for ensuring optimal agricultural practices and farmer's economy. Traditionally, seed identification has depended on visual inspection of seed analysts relying on morphological characteristics. This process is highly time-consuming, prone to human error, and require extensive expertise. The genetic integrity of the original crop may be compromised through mechanical mixing and inadequate labelling of seeds. Therefore, in modern era, employing an automated system for non-destructive and accurate seed classification is critical. Deep learning (DL) is a subfield of machine learning which can be utilized for automating seed identification. The Graphical Processing Unit (GPU) has enabled the feasibility of Deep Learning (DL) through its facilitation of parallel computing. The key advantage of DL is that it learns features automatically from the provided data. DL can analyse large numbers of seeds rapidly, significantly streamlining seed identification workflows. Deep convolutional neural networks (CNNs) are commonly used DL architecture. CNNs have achieved state-of-the-art performance for computer vision tasks viz., image identification, image classification/regression and image segmentation. CNNs are consist of convolutional layer with filters to learn features, activation layer to introduce non-linearity of complex patterns, pooling layers to reduce dimensionality and fully connected layers to handle final classification step. There are other architectures and classifiers like Support Vector Machines (SVMs) and Transfer learning also used in image recognition tasks. DL based seed identification provides an automated and efficient solution compared to manual methods. It minimizes the human error and ensure reliable identification. This can be valuable for farmers, seed companies, and researchers in various applications, such as ensuring seed purity, optimizing breeding programs, and improving crop management practices. However, there are also challenges such as the need for high-quality, diverse datasets and ensuring interpretability of the models.

Keywords: Deep learning, CNNs, Seed identification, Image identification, GPU**POTENTIAL OF CRISPR-CAS9 TO REVOLUTIONIZE SPACE NUTRITION AND ASTRONAUTS HEALTH: A REVIEW****POOJA SHARMA* AND DESMOND LUTOMIA****Affiliation: Department of Bio-sciences and Technology, MMEC, Maharishi Markandeshwar (Deemed to be University), Mullana-133207, Ambala, India**

The CRISPR/Cas9 system was first discovered in bacteria and archaea as a defence mechanism to provide protection against phages. Later on, this approach is widely spreading throughout the different area such as agriculture and medical sciences to improve the crop production and therapeutic application. It has been applied to increase the nutritional value of plants-based foods, hence could potentially be used in space agriculture to modify crop genes for boosting nutritional density, improving food safety and, shelf-life, and increasing crop output. It can improve the nutritional value in astronaut diet and veggie system of space craft. There are various advantages of using the CRISPR/Cas9 technology in DNA repair in space. High cosmic radiation in space can harm DNA directly by interacting with the DNA molecules itself through charged particles forming lesions known as double strand breaks or indirectly by producing free radicals which could be rectified using CRISPR/Cas9. Here we summarize the applications of CRISPR/Cas system and its future prospects to improve the nutrition in veggie system and DNA repair system in space.

Keywords: CRISPR, Nutrition, Veggie system, ZFNs, TALENs, phytoene synthase, Omega-3

SUSTAINABLE MICROWAVE ABSORBENTS DERIVED FROM FLY ASH BASED NANOMAGNETIC MATERIALS***POOJA SINGH¹ AND M.G.H. ZAIDI²****Department of Chemistry, College of Basic Sciences and Humanities,****G.B. Pant University of Agriculture and Technology, Pantnagar, U.S Nagar-263145, Uttarakhand.**

To ensure a safe, healthy and radiation-free environment, researchers have been exploring different types of microwave (MW) absorbents. Recently, there has been great progress in the production of diverse types of ferrite absorbers. This could help protect people and their devices from unhealthy levels of radiation. Microwave absorbing nanomaterials (MANs) are an effective way to reduce or eliminate electromagnetic reflections on large objects relevant to high frequency electronics, biomedical devices, aerospace and defense. MANs made devices are fabricated into sheets, coatings and sponges for desired applications. Explorations are on the way towards development of novel MANs that can effectively absorb MW with improved reflection loss and wide absorption bandwidth. Present research shall reveal advancements in fly ash (FA) derived nanomagnetic materials applicable as MW absorbers. Research shall demonstrate the status of FA as potential industrial waste and its application in development of ferrite based MANs. For the purposes of the current research, NHs have been fabricated, characterized and examined for electrical conductivity (σ_{DC}) in a wide range of physical conditions. Development and stability of nanohybrids (NHs) has been confirmed by UV spectroscopy. Surface morphology of NHs has been ascertained through scanning electron microscopy. The effect of temperature on σ_{DC} of NHs has been evaluated from the range of 25°C to 115 ($\pm 2^\circ\text{C}$). I-V characteristics of all the specimens were recorded in the voltage range of 5 to 45 V at RT.

Keywords: FA, DC conductivity, NHs, Nano-ferrite, Microwave absorbing material, Reflection loss.**BIORATIONAL MANAGEMENT OF COWPEA APHID, *A. CRACCIVORA* IN COWPEA, *VIGNA ANGUICULATA* WALP.*****POOJAYADAV, AKHTER HUSSAIN, RAJENDRAYADAV, SEEMA YADAV, PRAKASH*****Ph.D Research Scholar, Dept. of Entomology, College of Agriculture, AU, Jodhpur, Rajasthan**

The cowpea aphid, *A. craccivora* is serious sucking insect pest of this crop and occurs in different parts of India that causes 20-40 per cent yield loss. An experiment was carried out for the management of cowpea aphid, *A. craccivora* in cowpea using different biorational insecticides. On the basis of per cent reduction of pest population in cowpea, spiromesifen 22.9 SC proved most effective against aphid followed by dimethoate 30 EC. The treatments, emamectin benzoate 5 SG, pyriproxyfen 10.8 EC, chlorfenapyr 10 SC and spinosad 45 SC were moderately effective; whereas, the treatment of *Beauveria bassiana* 1.15 WP, *Metarhizium anisopliae* 1.15 WP, azadirachtin 0.03 EC and NSKE (5.0%) were least effective against aphid. The maximum seed yield of 21.32 q/ hectare was obtained in the plots treated with spiromesifen 22.9 SC followed by dimethoate 30 EC (19.56 q/ha) and minimum was obtained in *B. bassiana* 1.15 WP (11.09 q/ ha) and *M. anisopliae* 1.15 WP (11.27 q/ ha) treated plots.

Keywords: Cowpea, Cowpea aphid, *A. craccivora*, Biorational insecticides, Management**OPTIMIZATION OF GROWTH PARAMETERS FOR HYPERPRODUCTION OF BIOMASS AND PHYCOBILIPROTEIN OF SPIRULINA PLATENSIS****POOJAL CHHIRANG¹, VIJAY KUMAR¹, B.P. SINGH²****¹Department of Interdisciplinary Sciences, National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Kundli, Sonapat, Haryana, India****²Department of Agriculture and Environmental Science, National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Kundli, Sonapat, Haryana, India**

A recently emerged vegan and environment-friendly superfood, Spirulina is a type of blue-green algae that has a variety of nutritional components. Spirulina has been used as a nutraceutical for a long time since it contains high protein (47%), γ -Linolenic acid (24.45 g/100 g of fat), iron (16.27 mg/100 g), calcium (207 mg/100 g), and potassium (1675 mg/100 g), and pigments like chlorophyll a and carotenoids. Spirulina also produces phycobiliproteins such as Phycocyanin, Phycoerythrin, and Allophycocyanin, which can serve as pigments. The pigments synthesized and extracted from algal sources have vast commercial value in various industries, including cosmetics, nutraceuticals, pharmaceuticals, etc., apart from their numerous health benefits. Over time, there have been multiple advancements in the production and extraction strategies of pigments from *Spirulina platensis* through scientific research, which has led to the expansion of its applications in various sectors. This study aims to investigate the role of various factors such as temperature, light intensity, and photoperiod to enhance the production of biomass and pigment content (Phycocyanin) of *Spirulina platensis*. Microalgae suspensions were cultured in Zarrouk medium and were illuminated under white light with three different intensities (3500 lux, 5600 lux, and 12000 lux) at three different light cycles in hours (16:08, 12:12, 08:16). Cultures were also subjected to a mixture of red and white light under the same photoperiod ratios. Lastly, the cultures were subjected to different temperatures (24, 26, 28, 33, 37°C). The optimal conditions for the biomass hyperproduction were found to be in white light at 3500 lux during the 12-hour light period, resulting in a dry mass of 0.2736 g/100 ml, and the highest biomass, i.e., 0.214333 g/100 ml, was found at 28°C. Meanwhile, the optimal conditions to achieve the highest Phycocyanin were found in white light for 08:16 hours.

Keywords: Spirulina, Phycocyanin, Optimization, Biomass

EXPLORING THE ANTIFUNGAL POTENTIAL AND PHYTOCHEMICAL RICHNESS OF INDIAN BARBERRY POONAM CHAUHAN* AND ASHWANI TAPWAL

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Berberis lycium Royle, also known as Indian Barberry, belongs to Berberidaceae family, is native to the northwest mountain ranges of the Indian Subcontinent. It is a spiky evergreen shrub, can grow up to 2-3m, leaves are attached to nodes protected by spines and exhibiting solitary inflorescences. It produces variety of secondary metabolites, which exhibit numerous biological activities, including antifungal activity. This study focuses on ecofriendly management of fungal pathogen *Ganoderma lucidum*, which causes wilt, root rot, and basal stem rot in perennial crops, posing a severe threat to cash crops, Indian native forests and forest plantations. Traditionally fungal disease has been managed using synthetic fungicides, but their detrimental impact on the environment and living organisms, necessitate the exploration of sustainable alternatives. In this study, crude extracts of *B. lycium* were assessed for their antimycotic potential against *G. lucidum* at concentrations of 10%, 20% and 30%. Fungitoxic activity was evaluated following poisoned food technique in Petri plates under laboratory conditions. The growth of *G. lucidum* was recorded on fifth day after incubation and compared with control to determine percent growth inhibition. The growth inhibition was recorded in the range of 30-60%. Highest growth inhibition was recorded at 30% concentration of *B. lycium* extract followed by 20% and 10%. The phytochemical characterization of leaf extract was done by using methanol as solvent through GC-MS. Various phytochemicals phenols (Phenol, 2,6-dimethoxy-4-vinyl, Benzoic acid, 4-hydroxy-3,5-dimethoxy (Syringic acid), Butylsyringone (1-(4-Hydroxy-3,5-dimethoxyphenyl)ethan-1-one), terpenoids (Neophytadiene (7,11,15-Trimethyl-3-methylenehexadec-1-ene), 2-Pentadecanone 6,10,14-trimethyl, Phytol stearate, gamma-Sitosterol), alkaloids (1-Acetyl-2,2,6,6-tetramethyl-4-acetyloxypiperidine, Corydine), lipids, amines, vitamins etc. which probably contribute to antimycotic activity of plant were listed.

Keywords: Fungitoxic, GC-MS, Crude extract, Sustainable, Ecofriendly

TAXONOMIC STUDY OF *APIS DORSATA* (FABRICIUS, 1793), COLLECTED FROM *PRUNUS PERSICA* (L.) STOKES FLOWERS FROM DIFFERENT REGIONS OF WESTERN HIMALAYA

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Apis dorsata play a vital role as pollinator in agricultural food production and natural ecosystems across the globe. *Apis dorsata* is an important insect pollinator of *Prunus persica* plant and samples of pollinator were collected from eleven localities of Himachal Pradesh i.e. Mashobra (2146 m), Summer Hill (2100 m), Naldehra (1887 m), Jatoli (1464 m), Kandaghat (1425 m), Jaladi (508 m), Hamirpur (786 m), Gheori (786 m), Bathra (503 m), Bilaspur (673 m) and Rajgarh (1555 m). During present investigation, the samples of *Apis dorsata* were identified on the basis of morphological features, wing venation and external genitalia. Study of morphological variations, wing venation and genitalia of insects help in identify the relationship between morphology, and ecology and also provide the information about their evolution. The taxonomic and morphological feature of insects helpful in their classification, proper identification and conservation of many endemic insect species.

BEYOND THE NAKED EYE: A CLOSE-UP LOOK AT *Aedes* MOSQUITO SENSORY STRUCTURES VIA SCANNING ELECTRON MICROSCOPE

POONAM KUMARI AND SUNIL KUMAR

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Mosquitoes (Diptera: Culicidae) undeniably represent the most medically significant arthropod vector of diseases. Worldwide 3500 species of mosquitoes were reported each with unique host and habitat preference. However, only a handful species transmit diseases with *Aedes aegypti* a notable carrier. Zika, dengue, yellow fever, and chikungunya virus are known to be transmitted by *Aedes aegypti*. The sensory mechanism of mosquitoes exerts a substantial influence on their host-seeking and oviposition behaviors, facilitating the transmission of diverse diseases to humans. So, this study was designed to examine different type of sensory structure present on insect body. Samples were collected from different regions of Himachal Pradesh and Scanning Electron Microscopy was performed to study sensory structure along with bristles, hairs, and scales. Sensilla, specialized sensory receptors, are situated at distinct anatomical sites across the insect body, including the antennae, maxillary palps, proboscis, tarsi, and tergum. We find that there are many types of sensilla, each with a different function. On the dorsal side, maxillary palps are densely covered with flattened scales, but their ventral sides are covered with sensilla coeloconica and grooved peg sensilla. Flagellomeres of antennal flagella contain numerous sensilla trichodea. The head and appendages of *Aedes aegypti* were covered with sensilla chaetica. A multitude of microtrichia were observed on wings. Morphologically and morphometrically all these sensilla exhibit different characteristics. Scales densely cover almost all parts of mosquito body. Leg scales have been proposed as a possible factor in egg laying. So present work aimed to investigate and describe sensilla types and various microstructures present on different organs of medically important *Aedes aegypti* mosquito.

Key words: *Aedes*, SEM, sensilla, scales, microtrichia, setae.

PREDICTING FORB SPECIES SURVIVAL UNDER CLIMATIC ABERRATIONS: USING LEAF- TRAITS VARIATIONS IN VARIED MICROCLIMATES AS A CASE

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The forest characterized by its highly diverse environmentt, leaf, a vascular asymmetric appendicle structure, highly sensitive organ that responds quickly to environmental conditions and affects the growth and development of other components of the plant and having an significant impacts on plant phenology. Leaf can shape and influence the natural composition of the environment and is considered as a gateway for the productivity of ecosystems. Light and atmospheric temperatures had an immense effect on leaf dynamics. However, no information is available regarding the adaptive significance of variations in leaf form and the functional integrations. Attempt was made to dissect the adaptational strategies of forbs in response to habitat characters and climatic variations within the annual cycle. Kumaun Himalaya, the area of the present study has unique characteristics and climatic features. In the study, leaf traits, other functional traits, and their spatial variations are driven by both temperature and water availability. In the study, forb species changed their growth tactics to optimize the benefits of the warm, rainy monsoon season and were able to survive by utilizing even minimum light radiations and cold temperatures, or beneath the antagonistic microclimates while adhering to the limitations of given by competition, phylogenetic limitations with the adaptations of various leaf-traits . Leaf life span was influenced by the microclimate, resulting in variations in leaf longevity among individuals of the species and leaf longevity were found to be associated with specific leaf mass loss and specific leaf mass (SLM) during senescence. These characteristics have a significant impact on plants, such as their growth and nutrient cycling. By considering leaf longevity, it becomes possible to make predictions about the performance of these forbs. Moreover, environmental factors were also found to be linked with other traits also such as leaf number, size, and shape. Notably, variations in leaf size were identified as a crucial trait consistent with several studies. Leaf size can be used to predict about an species' ability to survive in the face of climate change. This data can also offer valuable knowledge on whether a species is suitable for cultivation and restoration efforts in various environmental conditions, including climate, soil, and socio-cultural factors.

DIVERSITY OF CORTICIOID FUNGI BELONGING TO FAMILY ATHELIACEA IN CHAMBA DISTRICT (HIMACHAL PRADESH)

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The aim of the present paper is to describe and illustrate 14 taxa belonging to 5 genera of family *Atheliaceae* based on the specimens collected from various localities of Chamba district (Himachal Pradesh). In this paper *Amphinema byssoides*, *A. byssoides* var. *macrospores*, *Athelia bombacina*, *A. decipiens*, *A. epiphylla*, *A. fibulata*, *A. salicum*, *Athelopsis baculifera*, *A. lunata*, *A. subinconspicua*, *Leptosporomyces mutabilis*, *L. roseus*, *Piloderma byssinum* and *P. lanatum* have been described. Of the taxa described highlighted in bold are new addition to corticioid mycoflora of India, while *Athelia epiphylla*, *A. fibulata*, *Piloderma lanatum* are reported for first time from Himachal Pradesh and *Athelia salicum*, *Athelopsis lunata* and *A. subinconspicua* are described for the first time from Chamba district of Himachal Pradesh. Collection of Corticioid fungi were made from different localities of district Chamba (Himachal Pradesh) during fungal forays conducted in various sub divisions of Chamba district. The dried sporophores were packed in bond paper and their morphological details were noted. The micromorphological details of the collected specimens were observed by making crush mounts/vertical sections of the sporophores in water, 3% KOH solution, 1% pholxine, 1% congo red, 1% cotton blue and Melzer's reagent (0.5gm Iodine + 1.5gm KI + 20gm Chloral hydrate + 20ml Distilled water). The outline of the microscopic structures was drawn with the help of a camera lucida mounted on compound microscope at 100X, 400X and 1000X magnifications. All specimens have been deposited at the Herbarium, Department of Botany, Punjabi University, Patiala (PUN).

Keywords: Basidiomycota, Agaricomycetes, Atheliaceae, Western Himalaya, corticioid fungi

INSECTICIDAL ACTIVITY OF AQUEOUS EXTRACT OF MEDICINAL PLANTS AGAINST TRIBOLIUM CASTANEUM

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The world is full of chemical insecticides and pesticides, which have tremendous side effects on the environment and cause health related issues. Using plant based insecticides that have very low side effects become the centre point of attraction among many researchers nowadays. In this regard between many useful medicinal plants two medicinal plants that is *Sphaeranthus indicus* Linn. (Gorakmundi) *Annona squamosa* (custard apple) were selected because they have a wide range of benefits in human health related issues and are widely distributed among the India. It is already proved that *Annona squamosa* seed oil extract has pesticidal activity and is used in treatment of hair lice and *Sphaeranthus indicus* Linn. is widely used in Ayurvedic system of medicine. Therefore, these two medicinal plants studied for their insecticidal activity against the insect pest that is *Tribolium castaneum*. Our experiments showed good results. Aqueous extract of *S. indicus* fruits and *A. squamosa* leaves are obtained by using percolation method and studied in various concentrations ranging from 50mg to 500mg and measured there insecticidal activity against *Tribolium castaneum*. It Showed results within 24hr to 72hr in the. Out of these aqueous extract of *A. squamosa* leaves showed best results upto 100% mortality of *Tribolium castaneum* in all given range of extract.

Keywords: Insecticidal activity, Aqueous extract, *Annona squamosa*, *Sphaeranthus indicus* , *Tribolium castaneu*

BUCKWHEAT: THE SUPERFOOD REVOLUTIONIZING HEALTHY EATING**PRABHA HALDKAR¹, VIRENDRA KUMAR TIWARI² AND ALKA MISHRA³**¹Ph.D. scholar, College of Agricultural Engineering, JNKVV, Jabalpur, M.P., India²Professor, College of Agricultural Engineering, JNKVV, Jabalpur, M.P., India³Guest Faculty, College of Agricultural Engineering, JNKVV, Jabalpur, M.P., India

Buckwheat is a resilient crop that thrives without extensive use of pesticides or fertilizers, making it an environmental friendly food choice. It supports sustainable agriculture and promotes biodiversity. Buckwheat is packed with essential nutrients, offering high-quality protein, dietary fiber, vitamins, and minerals like magnesium, manganese, and phosphorus. It includes all nine essential amino acids, making it a complete protein source. Rich in antioxidants and phytonutrients, buckwheat supports cardiovascular health. It helps reduce cholesterol levels and improves blood circulation, contributing to lower risk of heart disease. The low glycemic index of buckwheat helps regulate blood sugar levels, making it a suitable food choice for diabetics and those managing blood sugar. It promotes a slower, more gradual release of glucose into the bloodstream. The rich fiber content of buckwheat supports digestion and encourages a well-balanced gut. Additionally, its resistant starch functions as a prebiotic, nurturing the development of beneficial gut bacteria. With its high fiber and protein content, buckwheat aids in weight management by promoting satiety and reducing overall calorie intake, helping to prevent overeating and keeping a person feeling full for longer periods. Buckwheat contains rutin, an antioxidant with anti-inflammatory effects that can help reduce inflammation in the body. Ideal for individuals with gluten intolerance or celiac disease, buckwheat is naturally gluten-free. It can be used in various forms, including groats, flour, and noodles (e.g., soba), making it a versatile ingredient in many recipes.

Keywords: antioxidants, phytonutrients, cholesterol, prebiotic, anti-inflammatory, glute**ENHANCEMENT OF CHARGE TRANSPORT CHARACTERISTICS OF CHITOSAN-BASED BIOPOLYMER ELECTROLYTE FILMS BY LITHIUM INCORPORATION: AN EFFECTIVE COMPONENT OF ELECTROCHEMICAL DEVICE****PRABHAKAR SHARMA, D. BANERJEE****Thin Film and Nano Technology Laboratory, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad, U.P., India**

This work presents an overview of recent developments in electrochemical devices facilitated by biopolymer electrolyte films, focusing on the utilization of chitosan as the host polymer and the incorporation of lithium nitrate salt to enhance performance. Chitosan, derived from renewable sources, has emerged as a promising biopolymer for electrolyte applications due to its inherent biocompatibility and film-forming capabilities. The incorporation of lithium nitrate salt into chitosan-based electrolyte films offers a pathway to enhance ion conductivity and electrochemical stability, critical factors in the efficient operation of electrochemical devices. This work explores the fabrication methods employed to prepare these electrolyte films, encompassing solution casting, solvent evaporation, and thin film deposition technique. Furthermore, the abstract discusses the influence of lithium nitrate salt concentration on the electrochemical properties of the films, including ion transport, mechanical strength, and thermal stability. It highlights the synergistic effects between chitosan and lithium nitrate salt, elucidating their role in improving the overall performance and reliability of electrochemical devices. Moreover, this abstract reviews the application of chitosan-based electrolyte films in various electrochemical devices, such as lithium-ion batteries, supercapacitors, dye-sensitized solar cells, and electrochromic devices. It evaluates the impact of incorporating lithium nitrate salt on device performance, including charge/discharge kinetics, cycling stability, and energy efficiency. In conclusion, this abstract provides valuable insights into the development and application of biopolymer electrolyte films using chitosan as the host polymer, augmented by lithium nitrate salt incorporation. It highlights the promising prospects for advancing sustainable and high-performance electrochemical devices through innovative material design and engineering strategies.

Keywords: Biopolymer, Chitosan, Electrolyte film, electrochemical devices.**PERFORMANCE OF DIFFERENT INTERCROPS IN BAMBOO BASED AGROFORESTRY IN BUNDELKHAND****PRABHAT TIWARI¹, R.P. YADAV², M.J. DOBRIYAL³, PRADYUMNA DESHMUKH⁴, RAHUL DHAKAD⁵**^{1,2,3,4,5}Department of Silviculture & Agroforestry, RLBCAU, Jhansi

A study was conducted in the semi-arid condition (Bundelkhand region) of Uttar Pradesh during the Rabi season of 2023-24 to assess the growth and yield performance of different legume crops under Bamboo based Agroforestry. Bamboo has potential to provide higher economic returns to the farmers, improve the soil health, fill the gap of national forest cover (33%) and provide raw material to the industry as well as for domestic use of the rural community. During the research, spacing of *Bamboo spp.* were examined was 8 m × 6 m. additionally, two different growing conditions, namely sole cropping and intercropping, were studied under *Bamboo spp.* The data analysis indicates that crops cultivated in open conditions had superior development and production characteristics compared to those produced under agroforestry. An analysis was conducted on various growth and yield characteristics of lentil, chickpea, lathyrus, jack bean and broad bean revealing a notable impact of growing conditions on both plant growth and production. The findings indicate that parameters such as plant height, number of pods per plant, number of branches, dry matter accumulation, number of root nodules per plant, number of days taken to 50% flowering, number of days taken to physiological maturity, grain yield, and biological yield were greater in sole cropping compared to agroforestry. The grain yield of pulse crops in agroforestry was 1217 kg/ha for lentil, 1258 kg/ha for chickpea, 624 kg/ha for lathyrus, 2620 kg/ha for jack bean, 2761 kg/ha for broad bean. The growth and yield characteristics of different legumes were influenced by plant spacing. The growth performance of bamboo was also good in terms of height, girth of 3rd internode, length of 3rd internode and culm diameter. *Bamboo spp.* has the potential to be a highly beneficial and versatile tree species for the development and success of the Bundelkhand regions of India.

Keywords: Intercropping, Agroforestry, grain yield and Bamboo

POST-HARVEST APPLICATION OF ETHEPHON STIMULATES RIPENING AND ALTER PHYSICAL CHARACTERISTICS OF MATURE GREEN TOMATO (*SOLANUM LYCOPERSICUM* L.) FRUIT**PRABIN KUMAR MAHATO, SANGITA RAWAT, AAKANSHYA GHIMIRE, SMRITI SUBEDI, GANGA PRASAD YADAV, PUJA BHUJEL, KUMAR LAMA****Department of Life Sciences, School of Science, Kathmandu University, Panchkhal, Kavre, Nepal**

Tomato (*Solanum lycopersicum* L.) is one of the widely grown vegetable of Nepal and follows climacteric pattern during fruit ripening. Ethephon, a commonly used plant growth regulator, plays a crucial role in accelerating ripening of climacteric fruits. In this study, we analyzed different concentration of ethephon with aim to identify optimum concentration for ripening without deteriorating fruit quality. Mature green tomato fruits cv. Shrijana having uniform size and maturity stage without decay and mechanical injury were treated by 750 ppm, 1500 ppm and 2500 ppm ethophon and stored under ambient conditions (day and night temperature: 20-21°C and 7-9°C respectively) for 8 days. Among the ethephon concentration tested in two consecutive years, tomato fruits treated with 750 ppm ethephon exhibited uniform ripening within 4-6 days of treatment followed with minimal weight loss (2.42%). Conversely, 2500 ppm treated fruits exhibited uneven ripening, increased weight loss and shrinkage. Total soluble solid was observed highest in tomatoes treated with 2500 ppm ethephon (6.06° Brix) compared to control (5.16° Brix). During 6 days storage of all treated and control ripen tomato fruits (>60% red color coverage), 750 ppm ethephon treated fruits demonstrated least weight loss, shrinkage and no decay symptom. On the other hand, 2500 ppm treated fruits showed highest decay percentage (29.5%) accompanied by higher shrinkage and weight loss. Titratable acidity was noted highest in control fruits compared to all treated ones. Thus, 750 ppm of ethephon concentration is confirmed to achieve uniform ripening without compromising in fruit quality and storage duration. In the future, tomato growers can use an optimized concentration of ethephon to fasten ripening of tomato fruits as per the market demand at peak season and minimize haphazard use of different fruit ripening chemicals.

COMBINING ABILITY ANALYSIS FOR YIELD AND YIELD CONTRIBUTING TRAITS IN GROUNDNUT (*ARACHIS HYPOGAEA* L.)**PRACHI MAHLA****Ph.D. Research Scholar, Department of Genetics and Plant Breeding, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India**

In the *kharif* season of 2023, a study was conducted at Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, to investigate the combining ability of groundnut for fifteen yield and yield-related traits using a line x tester (L x T) mating design. The experiment involved ten lines crossed with three testers in a systematic manner. The analysis of variance (ANOVA) indicated significant differences among the breeding material for all fifteen traits, demonstrating substantial genetic variability. The mean sum of squares estimates for lines, testers, crosses, and their interactions revealed significant variation across all traits. The higher variance in specific combining ability (SCA) compared to general combining ability (GCA) suggested that non-additive gene action played a crucial role in the inheritance of these traits. Evaluating the mean performance and GCA effects identified the lines GPBD-4 and KDG-128, and testers OG-52-1 and GJG-32 as superior parents for yield and related quality traits. Among the thirty cross combinations, the cross OG-52-1 x SB-XI emerged as the ideal cross for yield enhancement. Additionally, the crosses DH-86 x J-100, UG-223 x GJG-32, and GPBD-4 x OG-52-1 were recognized as the best combinations for improving yield along with quality traits such as high oil and protein content, making them valuable for future breeding programs aimed at isolating high-yielding, high-quality segregants.

Keywords: L x T mating design, GCA, SCA, groundnu**BIOFORTIFICATION: A SOLUTION TO GLOBAL HIDDEN HUNGER****PRACHI SINGH^{1*} AND LAXMI KANWAR¹****¹M.Sc. Scholar, Department of Genetics and Plant Breeding****¹Agriculture University, Kota**

The global population has reached 8 billion with a GHI (Global Hunger Index) of 18.3, which is a moderately alarming condition. GHI includes four indicators viz., undernourishment, child wasting, child stunting and child mortality and these will only be corrected with increased crop production. But increased crop production does not answer the very important question i.e., malnutrition which recently became a source of disease susceptibility in humans. Malnutrition or under nutrition along with other indicators can be overcome by increasing bioavailable nutrient levels more specifically micronutrient in crops through biofortification. Biofortification can be done by three types i.e., agronomic (application of zinc fertilizer to increase grain zinc concentration), conventional (using parental lines with high vitamin or mineral concentration and crossing them for generations to produce varieties with desired nutrient and agronomic traits) and transgenic (by transferring suitable genes responsible for particular nutrient production from one organism to another). There are several advantages to biofortification such as that it covers the nutrition demands of low-income households, highly sustainable, higher nutrient quality on a daily basis and increases genetic variability. There are several examples of biofortified crops such as zinc and iron rich rice (Senguttuvel et al. 2023), iron rich maize (Yan et al. 2023), zinc biofortified wheat (Ali et al. 2023), iron rich foxtail millet (Ingle et al. 2023) and many more to count. India released 17 biofortified varieties on World Food Day in 2020 such as girnar-4 and girnar-5 (groundnut), CFMV-1 and CFMN-2 (finger millet) and Da340 and Sreeneelima (yam). To reach everyone, it must be integrated into public and private breeding programmes and it must also be accepted by consumers which are its major limitation. But biofortification techniques are improving day by day using modern techniques such as CRISPR/Cas9 applications.

Keywords- Global Hunger Index, biofortification, malnutrition, micronutrient, CRISPR/Cas9

REMOVAL OF INDIGO CARMINE AND METHYLENE BLUE USING RICE HUSK ASH AS AN ADSORBENT**PRACHI SINGHAL^{1*} AND ABHA AWASTHI²****Meerut College, Chaudhary Charan Singh University, Meerut**

Adsorption plays a vital role in treating wastewater, particularly in handling the colored effluent discharged by dyeing and bleaching industries. In recent years, there has been a growing interest in using inexpensive adsorbents to achieve high removal rates and meet effluent standards. This article presents findings from batch experiments investigating the removal of color from water solutions containing Indigo Carmine and Methylene Blue using Rice Husk Ash as a cost-effective alternative adsorbent. The study analyzed various factors such as initial dye concentration, adsorbent dosage, contact time, and temperature influence on performance. Results showed a remarkable color removal efficiency for both dyes, with Methylene Blue reaching a maximum removal of 98.57% and Indigo Carmine at 97.84%. Detailed analysis revealed that Methylene Blue adsorption followed the Temkin isotherm, whereas Indigo Carmine adhered to the Freundlich isotherm, aligning well with experimental observations. Furthermore, batch kinetic data indicated that pseudo-second-order kinetics governed the adsorption process in both cases.

Keywords: Aqueous Solutions, Methylene Blue, Adsorption, Rice Husk as**INVESTIGATING THE IMPACT OF TRIACONTANOL, BRASSINOLIDE AND NITROBENZENE ON GROWTH AND FLOWERING PARAMETERS OF ASIATIC LILY****PRACHI TAMRAKAR^{*1} AND URFI FATMI^{*2}****^{*1}Ph.D Scholar, Dept. of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Naini, Prayagraj****^{*2}Assistant Professor, Dept. of Horticulture, Sam Higginbottom University of Agriculture Technology and Sciences, Naini, Prayagraj**

The cultivation of Asiatic lilies is of great importance to floriculture due to their vibrant blooms and commercial value. The study explores the effects of bio-stimulants namely triacontanol, brassinolide, and nitrobenzene on the growth and flowering parameters of Asiatic lilies. The experiment was conducted at the Research Farm of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during 2021-22 and 2022-23. The experiment consisted of thirteen treatments in Randomized Block Design with three replications. Asiatic lilies were treated with various concentrations of triacontanol, brassinolide, and nitrobenzene. Growth parameters such as plant height, stem diameter, and leaf area were monitored throughout the growth cycle, while flowering parameters included number of flowers per stalk, flower diameter, and longevity during the blooming phase. Results revealed significant variations in growth and flowering parameters among the various treatments. Triacontanol exhibited better effect on plant height and stem diameter, leading to increased overall growth parameters. Brassinolide treated plants demonstrated better effect on flowering parameters, such as enhancing number of flowers per stalk and flower diameter. The findings of this study contribute valuable insights into optimization of bio-stimulants applications for enhancing the cultivation of Asiatic lilies as well as understanding the specific impacts of triacontanol, brassinolide, and nitrobenzene on growth and flowering parameters enables more precise and efficient management practices in Asiatic lily production, ultimately leading to improved crop yield and quality in floriculture industries. Further research could facilitate a deeper understanding of bio-stimulants and their implications for ornamental crop production.

Keywords: Asiatic Lily, Triacontanol, Brassinolide, Nitrobenzene, Growth**INTRINSIC RESISTANCE MECHANISM OF DIAMONDBACK MOTH AGAINST BT-BASED COMMERCIAL INSECTICIDES****PRADEEP KUMAR ^{1*}, S. RAMESH BABU², HEMANT SWAMI³, MANOHAR LAL OJHA⁴ AND DEVENDRA JAIN⁵****¹Ph.D. Research Scholar, Department of Entomology,****²Associate Professor and Head, Department of Entomology, ³Assistant Professor, Department of Entomology, ⁴Associate Professor, Department of Aquaculture and, ⁵Assistant Professor, Department of Molecular Biology and Biotechnology, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan**

Diamondback moth (*Plutella xylostella* L.), belonging to Plutellidae family is the most destructive lepidopteran insect pest of cole crops (Cabbage) throughout the world. The absence of effective natural enemies and insecticide resistance are believed to be the major causes of *P. xylostella* outbreaks in most of the parts all over the globe. *P. xylostella* is not native to the United States and is believed to have originated in either the Mediterranean region or southern Africa. The assessment of its origin being in southern Africa is based on the diversity of parasitoids attacking *P. xylostella* as well as the large number of indigenous *Brassica* species present in that area. Patterns of general insecticide usage vary widely over time and space, but have been greatly influenced by the development of insecticide resistance and new insecticides becoming available. Given this heavy reliance on synthetic chemicals, *P. xylostella* has developed resistance to almost every class of insecticide. It was one of the first agricultural pests in the world to develop resistance to DDT, and later to the microbial insecticide *Bacillus thuringiensis*. Resistance to the older organophosphates and organo-chlorine insecticides was addressed by the widespread adoption of pyrethroids in the early 1980s, but by the mid-1980s, widespread control failures of these insecticides were reported. This pattern of introduction and failure of insecticides continues today because of the widespread lack of adoption of any insect resistance management (IRM) strategy by farmers. Research focused on the molecular genetics and genomics of *P. xylostella* has dramatically increased in recent years, providing tremendous amounts of information on the specific mechanisms controlling *P. xylostella* physiology and its interactions with plants. This new information has the potential to revolutionize the way we approach management of this pest. There is now a large and rapidly accumulating body of knowledge on *P. xylostella* physiology and pesticide resistance, including chemosensory proteins, proteinase

activities in the midgut, pheromones and their receptors, sodium channel genes, cytochrome P450 genes, and bacterial symbionts. This high level of selection pressure and the high fecundity of DBM are key factors which have contributed to this species developing resistance to a wide range of insecticides in the field, including novel insecticides such as spinosad and indoxacarb as well as some strains of the bacterial insecticide, *Bacillus thuringiensis*. The rapid evolution of resistance to insecticides makes DBM particularly challenging to control in a sustainable fashion. This problem is especially acute for poorer farmers in Asia and Africa, who lack access to up-to-date knowledge and the newest insecticides and so tend to rely heavily on and overuse older, more toxic, broad-spectrum insecticides. Researchers are nowadays trying to improve BT strains to check DBM infestation in Brassica field either by introducing useful molecular variations into them or upgrading the commercial BT-formulations with some advanced combinations like nano-emulsions.

Key Words: Diamond Back Moth (DBM), Bt, Cabbage, DDT and insect resistance management (IRM)

EFFECT OF TILLAGE, FERTILITY LEVELS AND WEED MANAGEMENT ON LATE SOWN WHEAT (*TRITICUM AESTIVUM* L.)

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A field experiment was conducted for two consecutive *rabi* seasons of 2018-19 and 2019-20 at the Agronomy Research Farm of the Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.). The field experiment was laid out in split plot design assigning two tillage practices viz., Conventional tillage (3 ploughing) and Zero tillage (ferti-cum-seed drill) along with three fertility levels viz., 100% RDF (120:60:40 NPK Kg ha⁻¹), 75 % RDF + 25% RDN- FYM (6 t ha⁻¹) and 50% RDF + 50% RDN FYM (12 t ha⁻¹) in main plot. Each main plot was further divided into four sub plots to accommodate sub plot treatments i.e. weed management practices comprising Weedy check, Weed free upto 60 DAS, Sulfosulfuron @ 30 g a.i. ha⁻¹ (POE) and Sulfosulfuron @ 30 g a.i. ha⁻¹ + Metsulfuron @ 4 g a.i. ha⁻¹ (POE) - Ready mixture. Thus a total of 24 treatment combinations were tested in the study and were replicated thrice. The soil of the experimental field was silty loam in texture having slightly alkaline in reaction, low in organic carbon and available nitrogen, but medium in available phosphorus and potassium during experimentation. The total rainfall experienced during the crop growth season was 65.5 mm in 2018-19 and 228.4 mm in 2019-20. K-7903 (halna) variety of wheat was used for sowing of the experiment. Tillage, fertility levels and weed management were done as per treatment. Other crop management practices were followed as per the recommendation of the area. Among the tillage practices, zero tillage had a significant influence on weeds, crop growth; yield attributes and yields along with nutrient uptake of wheat during both the years. In case of fertility levels, application of 100% RDF (120:60:40 NPK kg ha⁻¹) exerted significantly less weed density, weed dry matter, weed index and higher weed control efficiency, crop growth, yield attributes and yield, nutrient content and their uptake along with protein content during both the experimental years. Weed free upto 60 DAS recorded significantly less weed density, weed dry matter, weed index and higher weed control efficiency, crop growth, yield attributes and yield, nutrient content and their uptake along with protein content during both the experimental years. Economically, combined application of M₂F₁W₂ (Zero tillage with application of 100% RDF (120:60:40 NPK kg ha⁻¹) under weed free upto 60 DAS). However, higher net returns and B: C ratio were obtained with combined application of M₂F₁W₄ (Zero tillage with application of 100% RDF (120:60:40 NPK kg ha⁻¹) under post emergence application of Sulfosulfuron @ 30 g a.i. ha⁻¹ + Metsulfuron @ 4 g a.i. ha⁻¹ (POE)-Ready mixture) was proved superiority in terms of net returns and B: C ratio of wheat over rest of the treatments during both the years.

RECENT TRENDS TO MITIGATE HEAT STRESS IN HORTICULTURAL CROPS

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As the global climate continues to undergo significant changes, the horticultural industry is facing an increasingly pressing challenge: the impact of heat stress on crop productivity and quality. In response, researchers and growers have been exploring a range of innovative strategies to mitigate the detrimental effects of rising temperatures on horticultural crops. One of the prominent trends in this area is the development of heat-tolerant plant varieties. Through selective breeding and genetic engineering, scientists are working to enhance the intrinsic ability of horticultural crops to withstand high temperatures and maintain optimal growth and yield. This includes the identification and incorporation of genes associated with heat stress response pathways, as well as the optimization of physiological traits such as canopy structure and transpiration efficiency. Another key focus is the optimization of irrigation and water management practices. By carefully monitoring soil moisture levels and implementing precision irrigation systems, growers can ensure that their crops have access to adequate water resources, which is crucial for maintaining plant health and resilience under heat stress conditions. In addition, the use of protective structures, such as shade nets and evaporative cooling systems, has become increasingly common in the horticultural sector. These technologies help to create a more favourable microclimate, reducing the direct impact of high temperatures on the plants and mitigating the risk of heat-related damage. As the global community continues to grapple with the challenges posed by climate change, the development and implementation of these innovative strategies will be critical for ensuring the long-term sustainability and resilience of the horticultural industry.

Keywords: Irrigation, shade nets, cooling, heat-tolerant, precision, protective structures.

IMPACT OF DIFFERENT PLANTING GEOMETRIES OF *MELIA DUBIA* ON GROWTH AND YIELD PERFORMANCE OF LENTIL IN BUNDELKHAND**PRADYUMNA DESHMUKH¹, PRABHAT TIWARI², R. P. YADAV³, M. J. DOBRIYAL⁴, PRAVEEN H⁵**^{1,2,3,4}**Department of Silviculture & Agroforestry, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**⁵**Department of Agronomy, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**

Melia dubia considered as fast growing multipurpose tree species utilized as a primary resource in the plywood, pulp, and paper industry. A study was conducted in the semi-arid region of Bundelkhand during the Rabi season of 2023-24 to assess the impact of varying tree spacing on the growth and yield characteristics of Lentil. During the research, three distinct spacing were examined: 5 m × 3 m, 5 m × 4 m, and 5 m × 5 m. additionally, two different growing conditions, namely sole cropping and intercropping, were studied under *Melia dubia*. The data analysis indicates that plants cultivated in open conditions had superior development and production characteristics compared to those produced under agroforestry. An analysis was conducted on various growth and yield characteristics and the findings indicate that parameters such as plant height, number of pods per plant, number of branches, dry matter accumulation, number of root nodules per plant, number of days taken to 50% flowering, number of days taken to physiological maturity, crop growth rate, absolute growth rate, grain yield, and biological yield were greater in sole cropping compared to agroforestry. The growth and yield characteristics of Lentil were influenced by plant spacing. The parameters were found to be better when using a spacing of 5 m × 5 m compared to a dense spacing of 5 m × 3 m. It has the potential to be a highly beneficial and versatile tree species for the development and success of the Bundelkhand regions of India.

Keywords: Intercropping, Agroforestry, dry matter accumulation, Lentil and Bundelkhand**IMPACT OF SOWING DATES AND LEAF CUTTING MANAGEMENT ON GROWTH, PHENOLOGY, YIELD AND ECONOMICS OF CORIANDER VAR. JD-1****PRAGYA UIKEY^{1*}, REENA NAIR² AND ANJALI KAUSHIK³**¹**Department of Vegetable science, College of Agriculture, O.U.A.T., Bhubaneswar, Odisha, India**²**Department of Horticulture, College of Agriculture, J.N.K.V.V. Jabalpur, M.P., India**³**Department of Plant Pathology, College of Agriculture, Jabalpur, J.N.K.V.V., Jabalpur, M.P., India**

The annual plant coriander (*Coriandrum sativum* L.) belongs to the Apiaceae (umbelliferae) family. Coriander is originated from Mediterranean region. It is widely used as a seed spice, usually grown in tropical climates, coriander needs cool temperature during the seed production stage in order to maximize yield and improve the quality of the seed. One important aspect of crop production that requires consideration is optimizing the sowing time in relation to the various growth stages of the crop. The regeneration capacity of coriander plants assists to pick two or three cuttings. This distinct character of coriander helps farmer to enhance their earnings. In the Rabi season of 2021–2022, an agricultural experiment was carried out at the Vegetable Research Centre, College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, India. The experiment involved five levels of sowing dates (20th October, 30th October, 9th November, 19th November, and 29th November) and four cutting levels (0 cutting, 1 cutting, 2 cuttings, and 3 cuttings). A factorial randomized design with three replications was employed in the experiment, in which treatment (T10) with November 9th sowing and single cutting (D9C1), the tallest plant (118.33 cm) was observed. The treatment (T12) with sowing on November 9th and three cutting (D9C3) had the maximum number of branches per plant. The treatment (T16) including November 19th sowing and three cutting (D19C3) produced the maximum herbage production (7645.50 kg/ha). The treatment (T9) with November 9th sowing and no cutting (D9C0) had the highest seed yield (15.65 q), while the treatment (T11) with November 9th sowing and three cuts had the maximum B: C ratio (Rs. 2.98). 50% flowering occurred earliest (56.23 days) in the treatment (T17) including sowing on November 29th and no cutting (D29C0), and the treatment (T5) with sowing on October 30th and no cutting (D30C0) recorded minimum days (46.33 days) to initiate flowering.

Keyword: Coriander, Yield, Economics, Regeneration capacity**ASSESSMENT OF DDP 4 INHIBITION AND PANCREAS PROTECTIVE POTENTIAL OF WITHANIA COAGULANS FRUIT AQUEOUS EXTRACT (STOCKS) DUNAL****DR. PRAMOD KUMAR¹ AND DR. HEERA RAM²**¹**Department of Zoology, SSN College, University of Delhi India** and ²**Department of Zoology, Jai Naraian Vyas University Jodhpur, Rajasthan India**

Diabetes mellitus (T2DM) is a metabolic disorder where hyperglycemia is caused by a combination of insulin resistance and relatively low insulin levels. The Dipeptidyl Peptidase -4 inhibition is an interesting target for the development of antidiabetic agents which pro-motes the longevity of Incretin hormones as GLP -1 and GIP. The nowday study was intended to assess DPP IV inhibition mediated antidiabetic effect of phytoconstituents of an aqueousfruit extract of Withania coagulans (Stocks) Dunal by in-vitro, in-silico and in-vivo approaches. The in-vitro DPP-IV activity was inhibited up to 68.3% by the test extract. The histopathology represented increased pancreatic cellular mass which caused in restoration of histo-architectures. It can be concluded that the phyto- compounds of an aqueous fruit extract of Withania coagulans have the potential to inhibit DPP-4 which result in enhanced glucose homeostasis and restoration of pancreatic endocrinal tissues in type-2 diabetic mellitus.

Keywords: DDP-IV, Withania coagulans, Pancreas, Phyto- compounds, Diabetes type 2.

CLIMATE CHANGE AND GLOBAL WARMING: IMPACTS, POLICIES, PLANNING AND MANAGEMENT

PRAHLAD

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Climate change is any significant long term change in the expected patterns of average weather of a region (or the whole Earth) over a significant period of time. Climate change is about abnormal variations to the climate and the effects of these variations on other parts of the Earth. Examples include changes in solar output and volcanism. Global Warming is the long term rise in the average temperature of the Earth's climate system. Direct temperature is one way to illustrate this, which is a significant part of the current climate change. Although the terms "climate change" and "global warming" are commonly used synonymously, they actually refer to slightly different concepts. Global warming pertains solely to the increase in the Earth's surface temperature, whereas climate change encompasses both the warming process and its aftermath, such as the melting of glaciers, increased frequency of droughts, or stronger rainstorms. Put another way, climate change induced by humans is a much bigger issue than global warming, of which it is only one symptom. Climate change, on the other hand, can mean human caused changes or natural ones, such as ice ages. Besides burning fossil fuels, humans can cause climate change by emitting aerosol pollution – the tiny particles that reflect sunlight and cool the climate – into the atmosphere or by transforming the Earth's landscape, for instance, from carbon – storing forests to farmland. Either internal processes or external forces may be the cause of climate change. Changes in the ocean's and atmosphere's energy distribution, such as adjustments to the thermohaline circulation are frequently the result of internal, unforced processes. One of the main determinants of humanity's future food security on Earth will be the effects of climate change on agriculture. India has in place a detailed policy, regulatory and legislative structure that relates strongly to GHG (Green House Gases) mitigation: The Integrated Energy Policy was adopted in 2006. Some of its key provisions are: Promotion of energy efficiency in all sectors, Emphasis on mass transport, Emphasis on renewable including biofuels plantations, Accelerated development of nuclear and hydropower for clean energy, Focused R & D on several clean energy related technologies.

Keywords: climate, global warming, weather, drought, fossils, mitigation

EFFECT OF ORGANIC AND INORGANIC SOURCE OF NUTRIENTS ON DIFFERENT FORMS OF NITROGEN AND PRODUCTIVITY OF FENUGREEK (*TRIGONELLA FOENUM* – *GRAECUM* L.)

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A field experiment was conducted during *rabi* season of 2021-22 and 2022-23 at Instructional Farm (Agronomy), Rajasthan College of Agriculture, Udaipur (Rajasthan) to study the “Effect of Organic and Inorganic Source of Nutrients on Different Forms of Nitrogen and Productivity of Fenugreek (*Trigonella foenum – graecum* L.)”. The experiment was laid out according to factorial Randomized Block Design with three replications. The treatments consisting of four levels of organic source (control, 2 t vermicompost + foliar spray of vermiwash @10%, 4 t vermicompost + foliar spray of vermiwash @7.5% and 6 t vermicompost + foliar spray of vermiwash @5% ha⁻¹) and four levels of inorganic source (control, 50% RDF + foliar spray of Zn @0.75%, 75% RDF + foliar spray of Zn @ 0.50% and 100% RDF + foliar spray of Zn @0.25% ha⁻¹) were applied to the fenugreek var. RMT-1 as soil application with uniform application of nitrogen, phosphorus and potassium as per recommended doses. The main findings of investigation are summarized as: The combined application of 4 tonne vermicompost with foliar spray vermiwash 7.5% + 100% RDF with foliar spray of Zn @ 0.25% ha⁻¹ was more beneficial for seed yield, straw yield, biological yield, N, P, K and Zn uptake by seed and straw and net return and B:C ratio of fenugreek crop as compared to their individual application during both the years as well as in pooled analysis, respectively. The seed yield of fenugreek was found significantly and positively correlated with straw yield, biological yield, total uptake of N (seed and straw) and different forms of nitrogen in soil and coefficient of multiple determinations was found highly significant. Therefore, in this tract for fenugreek variety RMT-1, the application of 4 t vermicompost with foliar spray of vermiwash @ 7.5% ha⁻¹ + 100% RDF with foliar spray of Zn @0.25% ha⁻¹ as a most profitable dose is being recommended for higher seed yield and net returns per hectare in Sub-humid Southern Hills and Aravali region of Rajasthan.

EFFECT OF DIFFERENT ORGANIC MANURES ON YIELD AND QUALITY OF STRAWBERRY (*FRAGARIA* × *ANANASSA* DUCH.) CV. WINTER DAWN

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With the growing threat of chemical farming, attention is shifting to organic farming. Before we lose control over the ecology, it is imperative that we begin an ecological revolution. Crops can be grown organically by applying natural fertilizers (FYM, compost, bone meal, etc.). The research was carried out during the Winter season of 2022-23 to identify “Effects of different organic and inorganic manures on the yield and quality of fruit of strawberry Cultivar Winter drawn.” The experiment was laid in a Randomized block design. The result revealed that among the various treatments, T₁ (Poultry Manure 8 t/hect) showed maximum yield per plant, yield per plot, yield per hectare, T.S.S, pH (73.94), (472.62), (63.36), (8.47⁰), (4.3) respectively and minimum was observed in control.

Keywords: Organic farming, Farm Yard Manure, Inorganic manure, Ecosystem

ROLE OF TRANSGENICS FOR STRESS TOLERANCE IN VEGETABLE CROPS**PRAMOD¹ SUMIT JAT², DR. D.R. CHAUDHARY³**¹M.Sc. scholar, Department of vegetable science and floriculture, CSK HPKV Palampur, ² M.Sc scholar Department of Agronomy, MPUAT, Udaipur, ³Professor, Department of vegetable science and floriculture, CSK HPKV Palampur

Exacerbation of plant growth and productivity due to a wide range of stresses has significantly affected global food security, agricultural productivity, and quality worldwide. In order to bridge the gap between the supply and demand of the ever-increasing global population, it is indispensable to foster a new breed of stress-tolerant crops with refined traits and higher yields against several abiotic and biotic stresses. The transgenic approach of conventional breeding, owing to the limited and time-consuming success due to the complex nature of genes involved in stress tolerance, is now being widely adopted to breed crop plants with enhanced stress tolerance. The discovery of genome-editing technology, particularly CRISPR/Cas, has enabled researchers to make precise modifications at specific sites in the DNA to generate vegetable crops possessing novel and desired traits within a short time. The Bt (*Cry*) gene, particularly effective in controlling lepidopteran insects, has been successfully applied to various crops, ensuring resistance and sustainable pest management. Additionally, the incorporation of genes like *mtID*, *StnsLTP1*, *CodA*, and *cAPX* has enhanced abiotic stress tolerance in crops such as tomatoes and potatoes. The genome-edited crops through CRISPR/Cas9 should be considered as BE (bioengineered) crops for the quick application and acceptance of the technology in the field. By using genome editing technologies, we can offer improved crop production to meet the demand for food. We should grasp this opportunity to increase crop production and the potential to save the lives of millions of people who are facing food shortages around the globe, especially in developing nations.

Keywords: Stress, genome, transgenic, vegetable, abiotic**EXPOSURE TO THERMAL STRESS (42 °C) INCREASES EXPRESSION OF PIMT IN *PSEUDOMONAS AERUGINOSA*****PRASANTA KUMAR K. MISHRA*¹, ARCHANA MAHAPATRA², ASIT VIJAY PATHADE³, SAUMYA³, PRAKASH CHANDRA BEHERA¹**¹Department of Veterinary Biochemistry, C. V. Sc. & A.H., Odisha University of Agriculture and Technology, Bhubaneswar, Odisha²Faculty of Veterinary and Animal Sciences, I. Ag. Sc., R.G.S.C., Banaras Hindu University, Barkachha, Uttar Pradesh³Plant Biotechnology, Department of Genetics and Plant Breeding, I.Ag.Sc., R.G.S.C., Banaras Hindu University, Barkachha, UP

Protein-L-isoaspartate-O-methyl transferase (PIMT) (2.1.1.77) is a protein repair enzyme that targets repairing of abnormal isoAsp residues with the help of a methyl donor i.e. SAM. Several stress factors like exposure to heat; oxidative environment, senility and salinity may induce formation of isoAsp residues which can bring conformational distortion in the proteins rendering them functionally impaired. PIMT repairs the isoAsp residues back to their normal form and maintains the structural integrity of the protein. However, it is indispensable for the protein/enzyme PIMT to remain stable under such harsh conditions to catalyze the methyl transferase reaction. The present study describes about cloning and expression of PIMT of *Pseudomonas aeruginosa* and evaluation of its stability upon exposure to thermal stress (42 °C). Additionally, we have checked the expression level of PIMT in the bacterium upon exposure to 42 °C. The protein sequence of the bacterium was retrieved from uniprot server and the sequence was deconvoluted to deduce an appropriate nucleotide sequence compatible for expression with the pET28a(+) expression system. A synthetic gene was constructed and ligated to the expression vector. The protein was expressed and purified by affinity chromatography. The molecular weight of the recombinant protein was found to be 25 kDa. pAntibody was raised against the protein. An enhanced expression of PIMT was observed in *Pseudomonas* after exposure to 42 °C. The expression levels of PIMT were studied by using Western blot and ELISA. The circular dichroism (CD) spectra of the rtPIMT were acquired. Effect of thermal stress on the rtPIMT was studied by SDS-PAGE, Fourier transformed infrared (FTIR) spectroscopy and Dynamic light scattering (DLS) experiments. The protein was found to be stable after 2 hours of constant exposure to thermal stress of 42 °C. It can be summarized that exposure to higher temperature i.e. 42 °C can cause an increase in the level of expression of PIMT in *Pseudomonas aeruginosa* and the enzyme remains structurally unaltered at this temperature.

Key words: PIMT, IsoAsp, Thermal stress, Cloning, Expression, CD, ELISA, FTIR, DLS**ENHANCING DIYARA CULTIVATION USING NANO FERTILIZERS****PRASHANT¹, NIRAJ KUMAR PRAJAPATI¹ AND DHARMENDRA BAHADUR SINGH²**¹Dept. of Horticulture, SAST, Babasaheb Bhimrao Ambedkar University, Lucknow, (U.P.)²Dept. of Vegetable Science, CSA University of Agriculture and Technology, Kanpur, (U.P.)

In the face of growing global food demands and the need for sustainable agricultural practices, the exploration of innovative solutions has become paramount. One such promising approach is the use of nano fertilizers to enhance the productivity of diyara cultivation, a traditional farming technique prevalent in many parts of the world. Diyara cultivation, also known as floating agriculture or hydroponics, involves the cultivation of crops on floating platforms or beds constructed from organic materials such as water hyacinth, reeds, and straw. This unique method of farming is particularly well-suited for regions with waterlogged or flood-prone conditions, where conventional agriculture may not be feasible. The integration of nano fertilizers into diyara cultivation has the potential to revolutionize this age-old practice. Nano fertilizers, which are characterized by their minute particle size and high surface-to-volume ratio, offer several advantages over traditional fertilizers. They exhibit enhanced nutrient use efficiency, targeted delivery, and controlled release, allowing for more precise and effective nutrient management. By incorporating nano fertilizers into the diyara system, growers can optimize the availability and uptake of essential nutrients by their crops, leading to improved growth, yield, and overall plant health. Moreover, the controlled release of nutrients can help mitigate the risk of nutrient leaching or runoff, thereby reducing the environmental impact associated with excessive fertilizer application.

Keywords: Floating agriculture, Controlled release, Targeted delivery, Flood-prone regions.

EFFECT OF SELECTED AMINO ACIDS AND THEIR DERIVATIVES ON GROWTH, ANTIOXIDANT PROPERTIES AND HAEMATOLOGICAL PARAMETERS OF CATLA CATLA**PRASHANTH. B.R¹, MD AKLAKUR*², TINCY VARGHESE¹, MANISH JAYANT¹, G.H. PAILAN³**¹Fish Nutrition, Biochemistry and Physiology Division, ICAR-Central Institute of Fisheries Education, Maharashtra, Mumbai, India²ICAR-Central Institute of Fisheries Education, Motipur Centre, Muzaffarpur, Bihar, India³ICAR-Central Institute of Fisheries Education, Kolkata Centre, Salt Lake, Sector V, West Bengal, Kolkata, India

The feed is one of the major inputs of aquaculture and their proper utilization is very important for the success in aquaculture. The impact of feed will be maximum if it is consumed at the earliest once it is placed in water, because the leaching of feed leads to the loss of nutrients. Attractants and stimulants are known to play a major role to overcome this problem. A 60-day feeding trial was conducted to evaluate the effect of selected amino acids and their derivatives as feeding stimulants and attractants on growth, antioxidant enzymes and haematological parameters of Catla catla (Ham. 1822). Following a completely randomized design, four hundred eighty (29.67 to 33.22 g) fishes were randomly selected and stocked for the experiment. Eight iso-nitrogenous (30%) and iso-caloric (375Kcal/100g) practical diets were prepared with different amino acids. The treatments were Control (no amino acid) Ala (alanine 1.5%), Arg (arginine 1.25%), Bet (betaine 0.5%), Glu (glutamic acid 1%), Gly (glycine 1%), Hyp (hydroxyproline 1%) and Lys (lysine 1.5%). The results showed that supplementation of amino acid in the feed improved the weight gain % (WG%) significantly ($p < 0.05$). The highest growth was observed in hydroxyproline followed by arginine, alanine and betaine fed groups. The increased antioxidant activity was observed in amino acid supplemented groups with the highest SOD and catalase activity observed in alanine and arginine supplemented groups. There was an increase in the total leucocyte count in alanine and arginine supplemented diets. From these results, it can be concluded that, supplementation of amino acids improves growth, antioxidant properties and the total leucocyte count in Catla catla. The best result was observed with alanine (1.5%), arginine (1.25%) and hydroxyproline (1%) supplementation in feed.

Keywords: Amino acids, attractants and stimulants, antioxidant enzymes, Catla catla**PERFORMANCE OF FRENCH MARIGOLD (*TAGETES PATULA* L.) GENOTYPES FOR GROWTH, DISEASE AND PEST INCIDENCE****PRATHEEKSHA C.T.*¹. AND BALAJI S. KULKARNI²**^{1,2}Department of Floriculture and Landscape Architecture, College of Horticulture, Bagalkot

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The experiment on “Performance of French marigold (*Tagetes patula* L.) genotypes for growth, disease and pest incidence” was carried out at the Department of Floriculture and Landscape Architecture, College of Horticulture, Bagalkot, University of Horticultural Sciences, Bagalkot, Karnataka. The experiment was laid out in Randomized completely block design with two replications. Among 25 genotypes, genotype Pusa Arpita recorded highest plant height (60.50 cm) followed by IIHRFm-411 (51.90 cm) and UHSFm-6 (48.31 cm). Further, Pusa Arpita had shown greatest plant spread (49.15 cm) in the North-South direction, followed by IIHRFm-184 (39.80 cm). In Bonanza Mix and UHSFm-10. The highest girth was recorded in Pusa Arpita (13.35 mm) subsequently in IIHRFm-411 (12.17 mm), IC-250303 (8.37 mm). The maximum leaf area was noticed in Pusa Arpita (1586.38 cm²) followed by the genotype Fine Grow Dwarf Mix (1491.38 cm²). Genotypes of French marigold varied significantly with regards to intensity of Alternaria leaf spot. The disease intensity was highest (87.20%) in IC-250316 followed by IC-250323 (85.20%), IC-250321 (83.20%), Pusa Arpita and IC-250310 (82.00%). There were no genotypes which are resistant. Regarding aphids and mites, there was no incidence was observed among the genotypes.

Keywords: Alternaria, French marigold, leaf spot, mites, stem girth**STUDIES ON MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF BIRD OF PARADISE (*STRELITZIA* SPP.) GENOTYPES****PRATHIBHA B T*, BASAVARAJAPPA H R, NAVEEN M PUTTASWAMY, SATISH D, AND RAMANAGOUDA HADLAGERI**

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Bird of paradise is an exotic, monocot, evergreen, rhizomatous, perennial herbaceous ornamental plant well known as crane flower belongs to the family Strelitziaceae. These are valued as cut blooms, architectural plant and focal plant in landscape. As bird of paradise flower gaining remarkable marketable value because of its low maintenance and high potential nature, identification of superior genotype for higher spike yield is need of the hour. To identify the better performing genotype, 10 genotypes were evaluated morphologically and also by molecular markers by adapting randomized block design with three replications. Among ten bird of paradise genotypes the mean performance varied significantly for all the growth and yield parameters. Selection- 5 performed better for most of the vegetative and flowering parameters viz., plant height (92.17cm), number of leaves (7.42), leaf length (27.68cm), stalk length (83.30 cm), stalk girth (16.20 mm), flower length (19.77 cm) and vase life (10.33 days). For DNA fingerprinting twenty-three ISSR primers were used, Polymorphic information content for twenty-three ISSR markers for ten bird of paradise genotypes ranged from 0.16 to 0.36 with an average of 0.25. 100 per cent polymorphism observed in the primers UBC 852, UBC 836, UBC 827 and UBC 813. Based on ISSR data points of 24 polymorphic ISSRs, dendrogram was constructed by employing hierarchical clustering method which differentiated the ten bird of paradise genotypes into 2 clusters.

Keywords- Bird of paradise, Morphological characters, ISSR markers

VULNERABILITY OF AGRICULTURE TO CLIMATE VARIABILITY**PRATIBHA PANDEY¹ AND DR. DEEPA VINAY²**¹PhD Scholar, Deptt of FRM, College of Home Science, GB Pant University of Agriculture and Technology²Professor, Deptt of FRM, College of Home Science, GB Pant University of Agriculture and Technology

The degree to which a system is vulnerable to the negative consequences of climate change, such as climate variability and extremes, and unable to adapt to them, is known as its vulnerability to climate change. One way to characterize vulnerability is as a function of exposure, sensitivity, and ability to adapt. The system's ability to withstand and absorb calamity is known as its adaptive capacity. It refers to a household's or community's capacity to adapt to and recover from the consequences of climate change. The amount and length of time that a population is subjected to a disaster is known as exposure. The degree to which a tragedy affects a system is its sensitivity. The study attempts to understand the impact of climate variability in agriculture in Uttarakhand. This study involves the data collected from previous literature available. The secondary sources of information include data from research articles, reports, and the internet. Concurrently, the majority of the local population acknowledges that plant blossom and fruiting times have changed. It is also stated that agricultural productivity has declined. There have also been reports of an increase in animal attacks and bug problems in the area. The majority of farmers believed that recent decades had seen a change in the climate. Farmers felt that summer temperatures were rising and that climate change was becoming a more significant issue. The districts that were deemed to be most vulnerable were Pithoragarh, Bageshwar, and Almora. Over the past 20 years, there has been a noticeable 50% fall in crop area, productivity, and production, indicating a decline in traditional agriculture. Climate change, severe geo-hydrological disasters, wildlife-damaged crops, population growth, declining landholdings, low soil fertility, low yield from arable land, mono-cropping, and a lack of utilization of modern technology were the main causes of the decline.

Keywords: Vulnerability, Exposure, Sensitivity, Adaptive Capacity, Climate variability**ABIOTIC STRESS IN FRUIT CROPS AND MANAGEMENT TECHNOLOGIES****PRATIKSHA A. SASANE^{1*}, P.B. MANJARE², MANISHA A. KHARAT³**^{1,2,3}Ph.D. Research Scholar, College of Agriculture, V.N.M.K.V., Parbhani,

Abiotic stresses such as drought, salinity, heat, and cold, pose significant challenges to fruit production worldwide, impacting yield, quality, and economic sustainability. Fruit crops are particularly vulnerable to these stresses due to their sensitive physiology and prolonged growth cycles. In recent years, there has been growing emphasis on developing innovative technologies to mitigate the adverse effects of abiotic stress on fruit crops. This abstract provides an overview of abiotic stress in fruit and highlights recent advances in technologies aimed at overcoming these challenges. Drought stress limits water availability, hindering photosynthesis and altering hormone levels, resulting in diminished fruit size and yield. Salinity stress imposes osmotic and ion toxicity effects, disrupting water uptake and ion balance in fruit crops. Extreme temperatures cause cellular damage, affecting membrane integrity and metabolic pathways, reducing fruit quality. To mitigate the impact of abiotic stress on fruit crops, recent advances technologies offer promising solutions. These includes development of drought-tolerant and salt-tolerant fruit cultivars through traditional breeding techniques and modern biotechnological approaches, such as marker-assisted selection and genetic engineering. Additionally, the application of exogenous substances, such as osmoprotectants, antioxidants, and plant growth regulators, enhances fruit tolerance to abiotic stress by improving water retention, scavenging reactive oxygen species, and modulating stress-responsive gene expression. Furthermore, precision agriculture technologies, including remote sensing, sensor-based irrigation, and climate modeling, enable real-time monitoring of environmental conditions and facilitate targeted management practices to optimize fruit production under abiotic stress conditions. Advanced greenhouse systems with climate control mechanisms offer a controlled environment for fruit cultivation, minimizes impact of external stress factors. In conclusion, the integration of innovative technologies, including genetic improvements, agronomic practices, and precision farming techniques, holds great promise for enhancing fruit crop resilience to abiotic stress and ensuring sustainable production in the face of changing environmental conditions.

Keywords – Abiotic-stress, Drought, Salinity, Precision agriculture**DEVELOPMENT OF MACRAMÉ SAMPLES USING DIFFERENT HOUSEHOLD AND INDUSTRIAL TEXTILE WASTE****PRATISHTHA VERMA¹ AND SURABHI MAHAJAN²**¹Department of Apparel and Textile Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana²Assistant Professor Department of Apparel and Textile Science, Punjab Agricultural University, Ludhiana

Knots are used in everyday activities such as tying shoe laces or simple bows on gift boxes; serve as both practical necessities and artistic pursuits that can become lifelong passions. Macramé craft is the art of inter-knotting yarns without using needles or hooks, is a beautiful craft used to create various utility articles such as decorative plant hangers, bracelets, dresses, and jewellerys, mostly made from macramé cord (synthetic material) or cotton cords available in the market. In this study, researchers made an attempt to create twelve samples of size approximately 5"×5", from various industrial and home textile waste materials by employing various macramé knots, including square, hitch, and lark knots. The materials included drawstrings, satin ribbon, cotton and wool thread, net, chiffon, knitted and denim fabric, synthetic leather, piping cords, and jute cords. The developed samples were presented to a panel of experts comprises of fifteen members from the College of Community Science, PAU, Ludhiana, in order to determine the appropriate textile waste material. The experts ranked the samples on basis of overall appeal and suitability of textile waste material used in them for further dress development. Five samples of textile waste materials were selected using weightage mean score. These materials were cotton thread (11.6), chiffon fabric (8.13), artificial leather (8), wool (7.73) and satin ribbon (7.67) respectively. These materials were cost-effective and from this idea we can also recycle the waste for another craft purpose.

Keywords: Macramé, Textile Waste, Knots, Recycle

FOOD PROCESSING AND VALUE ADDITION IN MANGO**PRATIKSHA A. SASANE^{1*}, DR. SYED SHABNAM², MANISHA A. KHARAT³**^{1,3}Ph.D. Research Scholar, College of Agriculture, V.N.M.K.V., Parbhani,²Senior Research Assistant, Department of Horticulture, V.N.M.K.V., Parbhani

Postharvest losses of mango fruit have estimated to exceed 50%, particularly during the primary harvest season. The transformation of mango fruit into various shelf-stable products through food processing and value addition ensures its availability to consumers throughout the year, transcending the seasonal limitations. Over time, research and advancements in food product development have yielded a plethora of distinctive processed mango products tailored to meet specific consumer preferences and nutritional requirements. These products are the outcome of employing suitable food processing techniques and value addition technologies that convert fresh mangoes into shelf-stable items boasting desirable organoleptic, nutritional, and quality attributes. Among the diverse processed mango products are pulp (puree), juice concentrate, ready-to-drink juice, nectar, wine, jams, jellies, pickles, smoothies, chutney, canned slices, chips, leathers, and powder. In addition to primary mango products, mango pulp or powder serves as a versatile ingredient enriching or flavoring secondary products such as yogurt, ice cream, beverages, and soft drinks. The byproducts of mango processing, including the peel and kernel, are rich in bioactive compound carotenoids, polyphenols, and dietary fibers. Moreover, interest is growing in minimal processing of mango fruit as fresh-cut products, catering to health-conscious consumers. and hence, use of novel processing technologies is increasing Such as High-pressure processing, irradiation, pulsed electric field (PEF), ohmic heating, power ultrasound, ozone, ultraviolet, oscillating magnetic fields, and cold atmospheric plasma are some novel processing technologies which have gained popularity due to their ability to achieve food safety without compromising nutrition and fresh-like sensory properties of the food. Innovative processing technologies provide a promising solution in mango processing to create products which have high microbial safety and fresh-like product characteristic with high nutritional value for sustainable future. This abstract accentuates the current trends in mango processing and value addition.

Keywords: Postharvest loss, Value addition, Shelf stable, Byproducts, Food processing**DEVELOPMENT OF MACRAMÉ SAMPLES USING DIFFERENT HOUSEHOLD AND INDUSTRIAL TEXTILE WASTE****PRATISHTHA VERMA¹ AND SURABHI MAHAJAN²**^{1*}Department of Apparel and Textile Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana^{2*}Assistant Professor Department of Apparel and Textile Science, Punjab Agricultural University, Ludhiana

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Keywords: Macramé, Textile Waste, Knots, Recycle**AGRI-FUTURISM: INNOVATING SUSTAINABLE AGRICULTURE THROUGH ADVANCED BUSINESS MANAGEMENT
PRATISHTHA****Institute of Agri Business Management, Bikaner, SKRAU-Bikaner**

Agricultural business management, focusing on innovative strategies that drive sustainable growth in the agricultural sector. It explores cutting-edge technologies, novel business models, and strategic frameworks that redefine traditional practices and address emerging challenges. The abstract discusses the integration of artificial intelligence, machine learning, and Internet of Things (IoT) in precision agriculture, enabling data-driven decision-making for optimized resource use, yield enhancement, and environmental conservation. It also examines the adoption of vertical farming, hydroponics, and urban agriculture as disruptive models that enhance efficiency, reduce resource consumption, and promote local food production. Moreover, the abstract emphasizes the importance of value-added products, agritourism, and direct-to-consumer marketing in diversifying revenue streams and creating brand value for agricultural businesses. It also discusses the role of sustainable finance, impact investing, and carbon trading in incentivizing sustainable practices and attracting investment in the agricultural sector. Furthermore, the abstract addresses the significance of resilient supply chains, digital platforms for market access, and block chain for supply chain transparency in enhancing the competitiveness of agricultural enterprises. It concludes by highlighting the need for continuous innovation, strategic partnerships, and stakeholder collaboration to unlock the full potential of advanced agricultural business management in driving economic prosperity, environmental stewardship, and social well-being.

Keywords- Sustainable Agriculture, Innovation, Advanced Technologies, Precision Agriculture,

INDUCED MUTATION STUDIES FOR IMPROVEMENT OF BOUGAINVILLEA (BOUGAINVILLEA SPP.)**PRATIVA ANAND*, BABITA SINGH, S.S. SINDHU AND M.K. SINGH****Division of Floriculture and Landscaping, ICAR-Indian Agricultural Research Institute, Pusa Campus, New Delhi**

Bougainvillea is one of the most prominent and popular perennial ornamental crops in floriculture for multitudinous use and a very appropriate plant for multidisciplinary research work due to its wide range of bract colors, leaf characters, and plant stature. Drought, saline, and pollution tolerant attributes recognized bougainvillea as a very important plant for general landscaping, landscaping for industrial regions and areas where other ornamental flowering plants do not easily thrive well. Consumer taste and choice always necessitate the introduction of new varieties in the floriculture trade. The induction of genetic alterations is a prerequisite for the development of new forms which plays a very significant role in breeding. Bougainvillea breeders worldwide are deeply engaged to develop new varieties using different scientific strategies. Induced mutagenesis is taken into account as an important technology for crop improvement in bougainvillea. Therefore, the present study was undertaken to induce mutation in six bougainvillea genotypes using physical and chemical mutagens. For physical induction of mutation, hardwood cuttings (15 cm) of selected bougainvillea genotypes were irradiated with varying doses of gamma rays (0, 5, 7.5 and 10 Gy). The chemical mutagen viz., Ethyl methanesulfonate (EMS) was used at varying doses (0, 0.01%, 0.02% and 0.03%) and duration (3 and 6 hrs) to induce variability in the studied genotypes. Variations were observed in leaf and bract in some genotypes subjected to physical and chemical mutagens.

EFFECT OF TILLAGE AND WEED MANAGEMENT ON INDIAN MUSTARD IN BUNDELKHAND**PRAVEEN H¹, GUNJAN GULERIA², YOGESHWAR SINGH³, AMIT KUMAR SINGH⁴, S. K. SINGH⁵, & PRADYUMNA DESHMUKH⁶**^{1, 2, 3,4,5,6}**Rani Lakshmi Bai Central Agricultural University, Jhansi (U.P.)**

Conservation Agriculture (CA) encompasses three interconnected principles: minimizing soil disturbance, maintaining permanent soil cover with crop residual mulch, and implementing diverse crop rotations. A study was conducted in the semi-arid region of Bundelkhand during the Rabi season of 2023-24 to evaluate the tillage and weed management practices in Indian mustard (*Brassica juncea* L.) for higher productivity and profitability. Different eleven treatments were given such as T₁: CT + PE herbicide (Pendimethalin @ 1 kg a.i./ha), T₂: CT + PE herbicide (Pendimethalin @ 1 kg a.i./ha) + PoE herbicide (Quizalofop-ethyl @ 0.05 kg a.i./ha), T₃: CT + PE herbicide (Pendimethalin @ 1 kg a.i./ha) + Mechanical weeding (at 30DAS), T₄: ZT + PE herbicide (Pendimethalin @ 1 kg a.i./ha), T₅: ZT + PE herbicide (Pendimethalin @ 1 kg a.i./ha) + PoE herbicide (Quizalofop-ethyl @ 0.05 kg a.i./ha), T₆: ZT + PE herbicide (Pendimethalin @ 1 kg a.i./ha) + Mechanical weeding (at 30DAS), T₇: ZT + R (Maize @ 3t/ha) + PE herbicide (Pendimethalin @ 1 kg a.i./ha), T₈: ZT + R (Maize @ 3t/ha) + + PoE herbicide (Quizalofop-ethyl @ 0.05 kg a.i./ha), T₉: ZT + R (Maize @ 3t/ha) + PE herbicide (Pendimethalin @ 1 kg a.i./ha) + Mechanical weeding (at 30DAS), T₁₀: CT + Weedy check, T₁₁: CT + Weed free plot. Among the all treatments T₈: ZT + R (Maize @ 3t/ha) + + PoE herbicide (Quizalofop-ethyl @ 0.05 kg a.i./ha) was found to be most effective in terms of crop growth parameters and yield parameters.

Keywords: Conservation Agriculture, Mechanical weeding, Weed management**A PRELIMINARY STUDY OF XYLOCOPA SPP. (INSECTA: HYMENOPTERA) FOUND IN THE SAUBHARI NAGAR VAN, VRINDAVAN, MATHURA, INDIA****PRAVEEN KUMAR, MAHENDRAPAL SINGH****Department of Zoology, B.S.A. College, Mathura, India**

Saubhari Nagar Van is the largest city forest of India is being developed in 130 hectares of land near Sunrakh village of Vrindavan. More than 25 types of trees of mythological importance of Braj kshetra have been planted in this forest. This urban forest is being considered as a significant eco-restoration unit in the India. The forest is surrounded by agricultural land and therefore a buffer ecological zone has been developed, that may be a unique area to support specific insect community. One of the insects called *Xylocopa* is an important insect fauna of the area. This insect is commonly known as "Carpenter bee", since this burrows into plant material with a single exception of subgenus *Proxylocopa* which form nest in the soil. Most of the species of carpenter bee have short mouth parts and adopted for pollinating the flowers and for some plants like *Passiflora incamata* and *Orphium*, the bee are considered as obligate pollinators. The investigation on *Xylocopa* is in progress in the new eco-zone, i.e. Saubhari Nagar Van and very soon we will be able to provide complete spectrum on biodiversity of *Xylocopa*.

Keywords: Saubhari Nagar Van, *Xylocopa*, India

ADVANCEMENT IN AQUACULTURE - AQUAPONICS FARMING**PREETI MAURYA****PhD Scholar, West Bengal University of Animal & Fishery Sciences, Kolkata, West Bengal**

Numerous fish culture systems are present worldwide to provide a variety of techniques to the fish farmers according to their ability and their requirements. But the main objective of any culture system remains the same i.e. to get the higher economic benefit. Aquaponics, hailed as a transformative technology for sustainable food production, combines aquaculture and hydroponics to maximize economic benefits. It utilizes methods such as media-based, nutrient film technique (NFT) and deep water culture (DWC) to cultivate plants in nutrient-rich water from aquaculture. Critical water quality parameters include oxygen levels, pH, temperature, nitrogen levels, and hardness. This method enables multiple crop production with minimal water and fertilizer usage, making it ideal for small-scale producers targeting local markets and agritourism. Various fish species exhibit excellent growth rates in aquaponic setups. Optimal conditions for plant growth in aquaponics encompass factors like light, oxygen, carbon dioxide, pH, temperature, and nutrients, resulting in robust and rapid plant development. Aquaponics presents a promising solution to produce nutritious food using minimal water resources, potentially benefiting remote communities. This innovative method is gaining attention for its potential to revolutionize traditional farming practices. By harnessing natural processes, aquaponics offers a sustainable and efficient way to produce both fish and vegetables. It's a testament to human ingenuity in leveraging technology to address modern agricultural challenges.

Keywords: Aquaponics, plants, fishes, bacteria**ADVANCEMENT IN AQUACULTURE - AQUAPONICS FARMING****PREETI MAURYA, PHD SCHOLAR,****West Bengal University of Animal & Fishery Sciences, Kolkata, West Bengal**

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Keywords: Aquaponics, plants, fishes, bacteria**EFFECTS OF CLIMATE CHANGING PATTERN ON PHYTOPLANKTON IN REWALSAR LAKE, HIMACHAL PRADESH*****PREETI NEGI****Department of Animal Science, Central University of Himachal Pradesh,**

Climate changes are recognized as important environmental regulatory factors to assess the primary productivity in relation to changing pattern of abiotic and biotic characteristics in lake ecosystem. Rewalsar Lake is the largest lake approximately 85.26 ha among all the lakes in Himachal Pradesh. The comparative data of last twenty years of Rewalsar Lake catchment basin revealed that air temperature has been increased 1.5 to 2.1 °C in summer, 0.2 to 0.8 °C in winter, relative humidity increased 4-6% in summer and rainfall pattern changed erratically in rainy season. The surface water temperature of lake showed an increasing pattern as 0.8 to 2.6 °C, pH value decreased 0.2 to 0.5 in winter and increased 0.4 to 0.6 in summer and dissolved oxygen level showed a decreasing trend as 0.4 to 0.7 mg/l in winter. The changing pattern of phytoplankton indicated that biomass of Chlorophyceae and Bacillariophyceae families were decreasing as 1.99 and 1.08% respectively in Rewalsar lake. The biomass of Cynophyceae was increasing as 0.45% and contributing the algal blooming in summer season. The phytoplankton species composition exhibited their correlation with pH, water temperature, dissolved oxygen and other nutrient parameters of lake water. The present research paper emphasized on the effects of climatic variables on phytoplankton biomass in Rewalsar Lake of Himachal Pradesh.

Key words: Climate change, Productivity, Rewalsar Lake, Phytoplankton, Ecosystem productivity, HP.

UNVEILING THE ROLE OF GUT BACTERIA OF *HYPOSIDRA TALACA* IN PESTICIDE TOLERANCE AND DEGRADATION: A FUTURISTIC APPROACH FOR PEST MANAGEMENT IN TEA AGRICULTURE

PREETI SUBBA[#], SUDESHNA NANDI AND MALAY BHATTACHARYA*

Molecular Biology and Tissue Culture Laboratory, Department of Tea Science, University of North Bengal, Raja Rammohanpur, Siliguri, Darjeeling, West Bengal, India

The looper caterpillar poses a significant threat to the tea industry, causing production losses of up to 20-40% and compromising the quality of the tea leaves. One major challenge faced by tea growers is the development of pesticide resistance. In this context, research has found that the pest's gut microbiome can contribute to the detoxification or degradation of the pesticides applied. *Hyposidra talaca*, a major folivorous looper caterpillar known for causing severe damage to the tea gardens of Northeastern India harbour inside their gut the colonies of bacteria that are able to utilize the pesticides for their growth and development. Eight such bacteria have been isolated in pesticides supplemented media at a concentration of 2.5 mg/ml from the gut of *Hyposidra talaca* which were designated as HT1a, HT1b, HT3, HT5, HT6, HT7, HT8 and HT10. Subsequently, in vitro assays were performed to evaluate their minimum inhibitory concentration against flubendiamide and cross tolerance to other pesticides including deltamethrin, quinalphos and emamectin benzoate. These isolates have exhibited a remarkable level of tolerance ranging from 2X to 400X of the recommended dose of pesticides. Among all, HT6 and HT7 were significant and have been explored further for their biochemical characterization. Moreover, these isolates grow efficiently in pesticides supplemented mineral salt media indicating their pesticides utilizing ability. Such characteristics feature of the isolates play a crucial role in the pesticides resistance by utilizing the pesticides for themselves and thus detoxify the environment where they lived in. Therefore, reduced pesticide toxicity may have increase pesticide resistance in this looper pest. Hence, this finding has future implications for integrated pest management systems, suggesting the incorporation of microbial-based approaches to enhance pest control.

A COMPREHENSIVE ETHNOBOTANICAL SURVEY & DISTRIBUTION STATUS OF SOME MEDICINAL PLANTS OF HIMACHAL PRADESH

*PREETI THAKUR, *POOJA SHARMA, ¹MUNIT SHARMA AND **POOJA SIHOTA

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The Himalayas are the Highest & youngest in the World. Indian Himalayan Region (IHR) is the rich repository of medicinal plants with its mega Hotspot of Biological Diversity. Local and Tribal communities of Himachal Pradesh has used both human Nutrition & Medical uses since the Vedic Era. Himachal Pradesh located in the lap of Himalayas, has varied climatic condition due to variation in altitude ranging from 450-6500m. Inhabitants are largely dependent on the forest resources particularly on medicinal plants. Ethnomedicinal plants have various pharmacological activities like antibacterial, antifungal, anti-cancer, antidiabetic and anti-inflammatory. The present study is an attempt to assess the medicinal plants diversity of Central Himachal Pradesh of North Western Himalaya. A total of 102 species of medicinal value belonging to 51 families were recorded. Different plant parts were utilized, of which leaf (61 spp.) was used in the majority of cases. 59 species were natives and 43 non-natives. Maximum number of native (59), non-native (41) and near-endemic (02) species were found between 1800-2800m amsl, 02 species (*Pimpinella acuminata* and *Angelica glauca*) were found endemic to the Indian Himalayan Region. Maximum species (71) were used for fever followed by wounds (05), skin problems (10), dysentery (4) and Headache (12). Due to over exploitation and habitat degradation the population of many species is decreasing fast.

Keywords: Medicinal Plants, Biological Diversity, Ethno botanical Survey, Distribution Status, Therapeutic practices

CULTURAL AND MORPHOLOGICAL VARIABILITY AMONG DIFFERENT *TRICHODERMA* ISOLATES ISOLATED FROM RHIZOSPHERIC SOIL OF MAJOR COTTON GROWING DISTRICTS IN HARYANA

PREETI VASHISHT¹, N. K. YADAV², PRAHALD¹

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Trichoderma biocontrol agents are proven to be effective agents against soil-borne diseases. *Trichoderma* species are vital for root growth and development, crop yield, resistance to abiotic stress, and nutrient uptake and utilisation in addition to preventing the spread of illnesses caused by soil-borne pathogens. Cell wall degrading enzymes, or CWDEs, are essential to mycoparasitic action because they hydrolyze pathogen cell walls, releasing the organism's contents in the process. The antifungal action of *Trichoderma* includes a great variety of lytic enzymes such as chitinase, proteases, cellulases, IAA production, siderophore production, Zn solubilisation and phosphate solubilisation etc. which play a key role in biocontrol activity of *Trichoderma*. Cultural and morphological studies of different isolates of *Trichoderma* were also studied and observed that maximum mycelial growth (53.67) was recorded by HST2, Whereas, least (36.33mm) was showed by HMT2 after 6 DAI. The colony colour of all the isolates varied from dark green, whitish green to light green. The reverse colony colour of native *Trichoderma* isolates varied from creamish white, colourless and colourless to yellowish and the edge of colony varied from wavy to smooth. The length of conidia varied from 2.69 to 4.66 μm . The longest conidium was observed in HFT with a conidial length of 4.66 μm . Width of conidia of different isolates varied from 2.31 to 3.65 μm . The maximum width was observed in case of HFT (3.65 μm).

Keywords: *Trichoderma*, biocontrol, myco-parasitic, mycelial, maximum

ISOLATION, IDENTIFICATION AND PREVALENCE OF STAPHYLOCOCCUS AUREUS FROM POULTRY BIRDS AND FARM PREMISES OF PUNJAB**PREETINDER SINGH¹, DR. T. S. RAI², DR. PAVITAR KAUR³ & DR. A. K. ARORA⁴**¹M.V.SC Veterinary Microbiology, GADVASU, Ludhiana^{2,3,4}Department of Veterinary Microbiology, GADVASU, Ludhiana

Staphylococcus aureus a Gram-positive pathogenic bacterium, causes a variety of diseases in Poultry birds mainly including yolk sac infection (omphalitis) and Bumble foot. It mainly affects hock joint making birds reluctant to walk. In this study altogether 420 samples were collected from different poultry farms of various districts of Punjab, India. These samples included skin swabs, cloacal swabs, wound swabs from live birds and abscess swabs from internal organs from post-mortem cases and various environmental samples. A total of 67 isolates were confirmed to be *Staphylococcus aureus* by amplification of *nuc* gene. The overall prevalence of *Staphylococcus aureus* in poultry birds and farm premises was found to be 15.95%. The highest prevalence of *Staphylococcus aureus* was found in Rupnagar district (30%) and Moga district (20%) of Punjab. Among various samples collected, high prevalence of *S. aureus* was found in wall/floor samples (28.57%) and wound/abscess samples (23.33%).

Key Words: *Staphylococcus aureus*, Poultry, Punjab, Prevalence**ENVIRONMENTAL CONTAMINATION OF PHARMACEUTICALS AND PERSONAL CARE PRODUCTS: AN EMERGING HEALTH CONCERN****PREM RAJAK*, ARITRA CHAKRABORTY, AND ABHRATANU GANGULY****Toxicology Research Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, West Bengal, India**

Pharmaceuticals and Personal Care Products (PPCPs) are emerging environmental contaminants that pose serious health threats to global population. PPCPs include personal care products and therapeutic drugs across the globe. Inappropriate disposal of PPCPs contaminate the various components especially water bodies of the biosphere. PPCPs are generally discharged as the domestic waste, hospital and industrial waste, veterinary waste, etc. Moreover, contamination of soil with PPCPs can also lead to contamination of underground water reservoirs through leaching of rain water. Humans and other organisms can be exposed to these contaminants through nasal, dermal, and oral routes. PPCPs can be detrimental to health. They fuel free radical production and trigger oxidative stress. Such outcome leads to the onset of various health issues including metabolic disorders, reproductive failure, and reduced physical activity, and modified stress response. In addition, some PPCPs could be carcinogenic and trigger gastro-intestinal toxicity. PPCPs can potentially modulate various sub-cellular signaling cascades that may lead to DNA damage and apoptosis of premature cells. PPCPs modulate several antioxidant enzymes viz. SOD, Catalase, glutathione reductase, etc. and it can be hepatotoxic in outcome. Therefore, it is essential to develop treatment measures to effectively remove PPCPs from the water media to minimize risk of exposure.

Keywords: Pharmaceuticals and Personal Care Products; Environmental pollution; Health hazards; Oxidative stress; Free radicals**PLANKTON-BASED COMPOSITE FISH FARMING: A STEP FOR SUSTAINABLE AQUACULTURE****PRERANA MAITI****Department of Aquaculture, Faculty of Fishery Sciences, West Bengal University of Animal & Fishery Sciences, Budherhat Road, Pancha Sayar, Kolkata, West Bengal**

Aquaculture involves the underwater farming of commercially important aquatic organisms such as fish, crustaceans, molluscs, and aquatic plants in a controlled conditions or environments with human intervention. Sustainable aquaculture refers to the practice of cultivating aquatic organisms in a way that minimizes harm to the environment and promotes ecological balance. Composite fish culture, also known as polyculture is a sustainable aquaculture practice that involves the simultaneous farming of multiple compatible fish species in the same water body or system. This method aims to optimize space utilization, increase productivity, reduce disease risk, and improve resource efficiency in fish farming. Plankton- based composite fish farming is a sustainable aquaculture method that can help meet the increasing global demand for fish while minimizing environmental impact. Plankton are tiny, usually microscopic, organisms that drift in water columns, playing a crucial role in aquatic ecosystems. Feeding fish plankton can enhance their immune system, growth rate, and overall well-being. Plankton are abundant, renewable, and require minimal resources to cultivate, making them a sustainable feed option. Plankton-based composite fish farming offers several benefits. Plankton helps create a diverse ecosystem, which supports a wide range of marine life. Fish in plankton-based systems have efficient feed conversion, reducing waste and the environmental impact of fish farming. Plankton helps maintain good water quality, reducing the need for water exchange and minimizing the risk of disease. Plankton-based systems can increase fish yield while maintaining a healthy and sustainable environment. This method has a low environmental impact compared to traditional fish farming methods. Plankton-based composite fish farming supports biodiversity and promotes a balanced ecosystem. The diverse ecosystem and nutrient-rich environment reduce the risk of disease in fish.

Keywords: Aquaculture, Sustainable, Polyculture, Composite, Renewable, Diverse, Biodiversity, Ecosystem, Plankton

BENTHIC MACROINVERTEBRATE COMMUNITY IN TWO PRISTINE RIVERS OF THE WESTERN HIMALAYA: DETERMINING THE REFERENCE CONDITION

PRETAM SINGH & SANDEEP KUMAR

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The current study documents the benthic macroinvertebrate community structure and functional ecological state of the scientifically unexplored rivers, Sewa and Khad (tributaries of the Ravi river system) in the Western Himalaya. The benthic community was sampled at three stations: Dhaggar (1800m ASL) on the Khad River; Sarthal (2334m ASL) and Bani (1224m ASL) on the Sewa River, using D-frame kick net (500 µm mesh size; 30 cm² area) following an extensive sampling approach. Multiple quadrates were laid in the 100-200 m section at each station, aiming at exploring all the existing microhabitats. The composite samples were preserved in 70% ethanol and identified up to genus/family level following standard literature. The community features (diversity, taxonomic richness and density) registered higher values at Dhaggar (2.96, 22, 285.3 indiv. m²) followed by Bani (1.67, 11, 176 indiv. m²) and least at Sarthal (1.6, 6, 133.3 indiv. m²). The assemblages were formed by *Eperous psi-Cincicostella* sp. at Dhaggar, *Baetis* sp.-*Diasma* sp. at Bani and *Baetis*-Heptageniidae at Sarthal indicating variations in the distribution of the benthic community at each station. The functional feeding group analysis revealed the dominance of gatherer-collectors (50%) at Bani and shredders (50%) at Sarthal indicating the heterotrophic state, whereas the scrapers (45%) and collectors (41%) reflect the transition of the ecological state from autotrophic to heterotrophic at Dhaggar. The present contribution is the initial step in investigating these intact riverine ecosystems and recommends additional research to be carried out on the rivers within the ecoregion, which may serve as reference for the ecological health evaluation of Himalayan waters.

Keywords: Community structure; FFG; Taxonomic richness; reference condition

IMPACT OF NANOPARTICLES ON THE GROWTH AND BIOACTIVE COMPOUND PRODUCTION OF SHIITAKE MUSHROOMS (*LENTINULA EDODES*)

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The integration of nanotechnology in agriculture presents promising opportunities for enhancing mushroom production yields and quality. This study investigates the effects of various nanoparticles on the growth, quality and bioactive compound production of Shiitake mushrooms (*Lentinula edodes*), which are renowned for their rich bioactive compounds such as Lentinan β-(1,3)-glucan, Lentinus edodes mycelium (LEM), eritadenine, and ergothioneine. The research focuses on the influence of silver (AgNPs), zinc sulphate (ZnSNPs), and zinc oxide (ZnONPs) nanoparticles on mycelial growth, fruiting body development, and bioactive compound synthesis to optimize cultivation methods. Nanoparticles (NPs), due to their small size and high reactivity, can significantly influence biological processes at the cellular level. The effects of silver (AgNPs), zinc sulphate (ZnSNPs), and zinc oxide (ZnONPs) nanoparticles on mycelial growth, fruiting body development, and bioactive compound synthesis in Shiitake mushrooms. Low concentrations of nanoparticles (10 ppm) generally enhance mycelial growth, yield, and the production of bioactive compounds. Shiitake mushrooms treated with 10 ppm zinc sulphate (ZnSNPs) showed a 33% increase in yield and a 20% increase in lentinan content compared to the control group. ZnSNPs and ZnONPs at 10 ppm were particularly effective, suggesting potential for improved cultivation practices. Higher NP concentrations negatively impact mushroom growth and quality, highlighting the need for careful dosage control.

Keywords: Nanoparticles, Shiitake Mushrooms, Bioactive compound.

CROP WEATHER MODELING

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Crop weather modeling bridges the gap between weather variability and crop performance. These models act as simplified mathematical representations of the intricate relationship between weather conditions and crop growth, yield, and overall health. By incorporating established statistical and agronomic principles, crop weather models offer valuable insights for farmers and agricultural stakeholders. There are two primary categories of crop weather models: crop growth simulation models and crop-weather analysis models. Crop growth simulation models delve deeper, simulating the complex physiological and chemical processes underlying plant growth in response to environmental factors. Crop-weather analysis models, on the other hand, focus on the statistical relationships between weather variables and specific crop responses at various growth stages. The applications of crop weather modeling are vast. Farmers can leverage these models to optimize irrigation practices, predict potential yield based on weather forecasts, and make informed decisions about resource allocation and pest management strategies. Additionally, crop weather models play a crucial role in large-scale agricultural planning and food security assessments.

Keywords: Crop weather modeling, Crop growth simulation, Crop-weather analysis, Weather variability, Crop yield, Agricultural decision making, Food security

EFFECT OF NANOPLASTICS ON BLUE GREEN ALGAE *SPIRULINA PLATENSIS***PRITAM SARKAR¹, RATHI BHUVANESWARI G^{2*}, SP SHUKLA¹, MARTIN XAVIER³**¹Aquatic Environmental Management, ICAR-Central Institute of Fisheries Education, Mumbai²Mariculture Divison, Vizhinjam RC, ICAR- Central Marine Fisheries Research Institute, Kochi³Post-Harvest Technology, ICAR-Central Institute of Fisheries Education, Mumbai

Among various pollutants, in aquatic environment plastic pollution has a significant impact because of its wide usage and non-biodegradable nature. In 1950, the global production of plastic was only about 1.5 million metric tons, but in 2020 the production reached 367 million metric tons. Larger plastics are broken down into smaller ones such as microplastics (MPs) (<5mm) and nanoplastics (NPs) (<0.1 or <0.01 μm) under various environmental forces including wind action, wave action, UV radiation, photodegradation, mechanical abrasion, and microbial activities. Though NPs are more toxic than MPs, till now, more focus has been given to MPs. Hence, in the present investigation, an effort is made to determine the effect of 0.1 μm polystyrene nanoplastics (PS NPs) on blue green algae *Spirulina platensis* following OECD guidelines. The results showed significant differences in growth, pigments and stress enzymes of *S. platensis* at graded concentrations of PS NPs (1, 5, 10, 50 and 100 mg L^{-1}). The growth rate reduced with increasing concentrations of NPs and maximum growth inhibition of 42.57% was observed at 100 mg L^{-1} treatment. PS NPs also reduced pigment contents of the microalgae. At 100 mg L^{-1} treatment chlorophyll *a* and carotenoid content was inhibited 33.66% and 33.53% respectively compared to the control. As a stress response it was found that microalgae produced elevated levels of antioxidant enzymes during the 96h acute toxicity study. Catalase and peroxide levels increased 3.9 and 2 fold respectively in the treatment groups compared to the control. Protein content also decreased (42.48%) at 100 mg L^{-1} the NPs treatment. Moreover, to evaluate the effect of PS NPs on the functional groups of microalgae, treated microalgae were analyzed using Fourier transform infrared spectroscopy (FTIR). Differences in the FTIR spectra suggested that PS NPs can interact with the major biomolecules of the microalgae. The present study revealed that Nano plastics have dose dependent adverse effect on the primary producers of the aquatic system.

Keywords: Nanoplastics, Polystyrene, microalgae, growth inhibition, antioxidant enzyme**FOREST BASED LIVELIHOOD: OPPORTUNITIES AND CHALLENGES IN INDIA: A REVIEW*****PRITI SINGH¹, S. S. DHURIA², NEHA SOAN¹, KULDEEP CHAUHAN³ AND SHRADDHA PANDEY¹**¹Research scholar, Department of Forestry, Wildlife & Environmental Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh, India²Professor, Department of Forestry Wildlife & Environmental Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh,³ICFRE - ECO-Rehabilitation Centre, Prayagraj, Uttar Pradesh, India

Forests play a vital role in sustaining the livelihoods of over 300 million forest-dependent people in India. This review examines the opportunities and challenges presented by forest-based livelihoods. A wide range of sources indicate that non-timber forest products (NTFPs) like tendu leaves, bamboo, and medicinal plants contribute substantially to rural incomes and employment generation. Forests also provide essential provisioning services like fuelwood, fodder, and grazing land that support livelihoods. However, communities face pressures from unsustainable extraction practices and lack of secure tenure that degrade forests and undermine long-term incomes. Other constraints include dependence on single NTFPs, elite capture of benefits, low wages, and vulnerability to climate change impacts and market risks. Strategies suggested to promote sustainable use include strengthening community rights, diversifying productive tree species and alternative opportunities, restoring degraded forests through joint management programs, reviving traditional knowledge systems, and building rural capacities. Studies evaluating India's joint forest management program and forest rights recognition show these aim to balance conservation with development objectives but have had mixed outcomes. An analysis of evidence around factors influencing forest access, dependency trends, and successful approaches provides insights for policymakers to safeguard forest-based rural livelihoods.

Keywords: Livelihood, forest, Non-Timber Forest Products, Rural and Tribal People, NTFPs,**EXAMINING HEALTH AND NUTRITIONAL PATTERNS: A COMPARATIVE STUDY OF HALAKKI VOKKALIGA AND KUNBI TRIBAL WOMEN IN UTTARA KANNADA DISTRICT, KARNATAKA****DR. PRIYA RAMESH HEGDE* AND DR. VINUTHA U. MUKTAMATH*******Young Professional-II, All India Co-ordinated Research Project-Women in Agriculture, UAS Dharwad, Karnataka, India******Scientist and Assistant Professor, All India Co-ordinated Research Project-Women In Agriculture, UAS Dharwad, Karnataka**

The health of women is paramount for the well-being and prosperity of future generations, playing a pivotal role in sustainable development efforts and fostering resilient societies. In this regard, a study was conducted on 230 Halakki Vokkaliga and 230 Kunbi tribal women in the age group of 20-50 years at Uttara Kannada district, Karnataka. QUAN-qual mixed research method was used to assess the health status, conduct situational analysis on health status of women. Self-structured general questionnaire, PGI-2 health questionnaire, Reproductive health practice scale, Nutritional status assessment and Socio-economic status (SES) scale were the tools used. Results revealed that, more than sixty per cent of Halakki Vokkaliga and Kunbi women having better general health, reproductive health and normal nutritional status. Halakki Vokkaliga women having better reproductive health compared to Kunbi women. Higher education, working other than agriculture labourer/housewife, higher socio-economic status, husband's higher education and husband's occupation were positively and significantly correlated with health status of Halakki Vokkaliga and Kunbi women. Education, socio-economic status, husband's education, age at marriage, age at first pregnancy and type of delivery were the significant predictors of health status underlining the importance of addressing socio-economic disparities and promoting education for improved health among tribal communities.

Key words: Health status, Nutrition, QUAN-qual method, situational analysis

EFFECT OF IRON AND ZINC SOLUBILIZING MICROBIAL INOCULANTS AND FERTILIZERS ON YIELD, NUTRIENT CONTENT AND UPTAKE OF MICRONUTRIENTS IN WHEAT**PRIYA SATWADHAR, SYED ISMAIL AND RAMPRASAD KHANDARE****Dept. of Soil Science and Agricultural Chemistry, Vasantao Naik Marathwada Agriculture University, Parbhani, Maharashtra**

Agronomic biofortification with application of microbial inoculants and fertilizers to improve the nutritional quality of foods is a new approach being used to improve the nutrient content of a variety of staple crops. The present field experiments were conducted during post monsoon season of 2021-22 and 2022-23 at research farm of Soil Science and Agricultural Chemistry, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani to evaluate the iron and zinc solubilizing microbes as novel tool for biofortification in wheat. Experiment consists of thirty-six treatment combinations which includes four iron and zinc solubilizing inoculants (Control, *Pseudomona striata*, *Pseudomona fluorescens* and *Bacillus megaterium*), three levels of iron sulphate (0, 20, and 40 kg FeSO₄ ha⁻¹) and three levels of zinc sulphate (0, 20, and 40 kg ZnSO₄ ha⁻¹) which were replicated twice in factorial complete randomized block design. The results emerged out from two years experimentation indicated significant effect of microbial inoculants and graded levels of FeSO₄ and ZnSO₄ on grain and straw yield of wheat. Highest grain and straw yield were noted with *Pseudomona striata* i.e. 2968 kg ha⁻¹ and 5331 kg ha⁻¹ respectively. Further, 40 kg FeSO₄ ha⁻¹ application also yielded maximum grain (2975 kg ha⁻¹) and straw (5612 kg ha⁻¹) of wheat. Similarly, 40 kg ZnSO₄ ha⁻¹ also showed higher grain (2971 kg ha⁻¹) and straw yield (5530 kg ha⁻¹) of wheat. The above inoculant (*Pseudomona striata*), Fe and Zn application also accumulated significantly more iron and zinc in grain and plant of wheat. An application of *Pseudomona striata* + 40 kg ha⁻¹ FeSO₄ + 40 kg ha⁻¹ ZnSO₄ also showed significantly maximum uptake of micronutrients 9Fe, Zn, Mn and Cu) by wheat crop grown on Vertisol.

Key words: microbial inoculants, wheat, iron, zinc, *Pseudomona***TRADITIONAL ETHNOMEDICINAL PLANT USED FOR THE TREATMENT OF HUMAN HEALTH CARE IN NORTH WESTERN HIMALAYA INDIA*****PRIYA SHARMA, *SHWETA SHARMA, ¹MUNIT SHARMA AND **RITIKA KAUSHAL*****Research Scholar, Department of Botany, Thakur PG College of education, Dhaliara H.P.****¹Assistant Professor, Department of Botany Thakur PG College of Education, Dhaliara H.P.**

The Himalayan region have a great wealth of natural resources and rich wisdom of the traditional system of medicine which is widely used by local inhabitants since time immemorial. Ethnomedicinal studies are used for primary health care treatment to cure human beings. The treatment and control of human diseases with traditional knowledge is an old practice in many parts of the world. Medicinal plants have been used since the Vedic era and have played a key role in the lives of peoples living in the Himalayas by providing products for both food and medicine. Their primary health care system is primarily depending on traditional knowledge of medicinal herbs. Almost all plant parts have own medicinal properties due to presence of chemical constituents in them. Various types of secondary metabolites found in medicinal plants are useful in treating many kinds of diseases and disorder. A number of the plants are also reported to possess many useful activities like anti-oxidant, anti-inflammatory, anti-depressants, immunity booster, memory boosters, and antivirals and also used widely by the local and tribal people all over the world. As per available literature, a total of almost 105 medicinal plants are used in Himalayan region to treat human beings for health care. Local people, Gujjars and local communities inhabiting in the hilly remote areas possesses traditional indigenous knowledge of medicinal plants to treat various human ailments and disorders. However, it is therefore, necessary to preserve this indigenous knowledge on traditional medicines by proper identification, documentation surveying and herbal preparation of plant species. The current study mainly focused on gathering indigenous information about the plants used by local peoples in traditional medicine, to highlights the description of medicinal plants including local name, the parts used, the preparation methods as well as traditional uses to treat human diseases.

Keywords: Ethnobotany, Traditional knowledge, Medicinal and Aromatic plants, Chemical Constituents**DIGITAL TRANSFORMING NATION THROUGH TECHNOLOGY****¹PRIYA SINGH & ²ROOPESH SINGH****¹Research Scholar, Department of Extension Education & Communication Management****²Subject Matter Specialist, Chandra Shekhar Azad University of Agriculture & Technology Kanpur, KVK ANDUAT Jaunpur, UP**

Digital India is a comprehensive initiative launched by the Government of India with the aim of transforming the nation into a digitally empowered society and knowledge economy. This abstract explores the multifaceted aspects of the Digital India program, focusing on its key objectives, strategies, and impact on various sectors of the economy and society. At its core, Digital India seeks to leverage technology as a catalyst for inclusive growth, governance reform, and empowerment of citizens. Through the deployment of digital infrastructure, including broadband connectivity, mobile networks, and digital platforms, the initiative aims to bridge the digital divide between urban and rural areas, as well as among different segments of the population. One of the central pillars of Digital India is e-governance, which aims to simplify and streamline government processes, enhance service delivery, and promote transparency and accountability. Initiatives such as Digital Locker, e-Sign, and e-Hospital have revolutionized citizen-government interactions, making public services more accessible, efficient, and citizen-centric. Digital literacy and skill development are also integral components of the Digital India vision. The National Digital Literacy Mission (NDLM) and other programs seek to empower citizens with the necessary digital skills to participate meaningfully in the digital economy and society. By promoting digital literacy among marginalized communities and underserved populations, Digital India aims to ensure that no citizen is left behind in the digital age. In addition to governance and literacy, Digital India is driving innovation and entrepreneurship through initiatives such as Startup India and Digital India Innovation Fund. By fostering a conducive ecosystem for startups and promoting digital entrepreneurship, the initiative is fueling job creation, economic growth, and innovation-led development.

Key word: Digital, innovation, India, entrepreneurship, growth.

BIOMEDICAL APPLICATION OF TURMERIC**PRIYA****Lokmangal College, Maharashtra, India**

Ayurveda is filled with knowledge on medical sciences. Ayurveda, thus recommends traditional foods and their associated dietary principles. Many of the traditional health foods in India can be referred to as ayurvedic foods because of the similarities between ayurveda dietetics and traditional cuisines. People have utilized spices for centuries. Spices are parts of plants that are used as flavorings, preservatives, and medications due to their properties. *Curcuma longa* (Turmeric) has been used since an ancient time. Turmeric is a natural fragmented medicinal herb that is derived by rhizome of the *Curcuma longa* plants belonging to *Zingiberaceae* family. Curcumin, is the major bioactive substance of *Curcuma longa* (turmeric). Traditional uses for *Curcuma longa* (turmeric) include the treatment of wounds and burns, gastrointestinal and liver disorders, respiratory system diseases such as asthma, cough, runny nose, sinusitis, anorexia, and rheumatism. *Curcuma longa* (Turmeric) also has antiseptic, antibacterial, anti-inflammatory, choleric, and carminative properties. Strong antioxidant, anti-inflammatory, antibacterial, antifungal, and antiviral properties have been attributed to *Curcuma longa* (turmeric). *Curcuma longa* (turmeric) has long been known to provide health advantages since they include chemicals like alkaloids, terpenes, flavonoids, tannis and so on. As a result, there is incredible interest in the potential of *Curcuma longa*. People have used *Curcuma longa* (turmeric) to treat conditions ranging from indigestion and diarrhea to headaches. Recent research has shown that *Curcumin longa* (turmeric) is a beneficial herb with therapeutic characteristics and can be employed in the preparation of several medically significant goods.

Keywords: *Curcuma longa*, Curcumin, Rhizome, Alkaloid, Flavonoids.

STUDY ON INCIDENCE OF INSECTS ON MEDICINAL CROPS AT JABALPUR**PRIYAL CHOUDHARY¹ AND AMIT KUMAR SHARMA²**¹Ph.D. Research Scholar, Department of Entomology, College of Agriculture, R.V.S.K.V.V., Gwalior, M.P.²Associate Professor, Department of Entomology, College of Agriculture, J.N.K.V.V., Jabalpur, M.P.

The present study was proposed to study the incidence of various insects on medicinal crops viz., Shatavari, Kalmegh and French Basil during *Rabi* season at Jabalpur (Madhya Pradesh) from October, 2021 to April, 2022. Observations made in Shatavari revealed the occurrence of three species of insect pests and one species of predator belonging to orders Hemiptera and Coleoptera, respectively. The highest mean population of both Asparagus aphid, *Brachycorynella asparagi* (109.2/six leaves) and Oleander mealy bug, *Paracoccus burnerae* (6.45/plant) was recorded during 2nd SMW and of red cotton bug, *Dysdercus koenigii* (2.1/plant) was recorded during 8th SMW. The mean population of larvae (3.6/plant) and adult (1.4/plant) of transverse ladybird beetle, *Coccinella transversalis* was recorded maximum during 6th and 10th SMW, respectively. Among them, the asparagus aphid and the oleander mealy bug appeared during the reproductive stage and maturity stage of the crop, whereas, the red cotton bug was observed on the crop from vegetative stage till maturity stage. The appearance of transverse ladybird beetle larvae was observed during the reproductive and maturity stages, whereas, the adult was found only during the maturity stage of the crop. No incidence of insect pests and predators was recorded in Kalmegh during *Rabi*, 2021-2022. In case of French Basil, only one species of insect pest belonging to order Hemiptera was being observed on the crop during the entire observation period i.e. from reproductive stage till maturity stage of the crop. The highest mean population of lace bug, *Cochlochila bullita* (57.7/plant) was recorded during 1st SMW.

Keywords: Medicinal plants, insect, pests, predators, population

NANOCOMPOSITES: A BOON FOR MODERN AGRICULTURE AND ENVIRONMENTAL SUSTAINABILITY TO MITIGATE ABIOTIC STRESS IN PLANTS**PRIYAMVADA MISHRA¹, NEELESH KAPOOR^{1*}, RAVINDRA KUMAR¹, R.S SENGAR¹, VAISHALI¹, ADHESH SINGH² AND ABHINAV SINGH¹**¹Division of Plant Biotechnology, College of Biotechnology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut- (UP), India²Department of Genetics and Plant Breeding, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut- (UP), India

Nanocomposites, which are developing materials made up of nanoparticles distributed in a matrix, provide potential options for mitigating abiotic stress in plants, hence increasing agricultural yield and resistance in harsh environments. This abstract discusses the impact of nanocomposites on several abiotic stressors on plants, such as drought, salt, temperature extremes, nutrient deficiencies, heavy metal toxicity, and UV radiation. Nanocomposites have a variety of functional properties that improve plant responses to abiotic stresses. They improve water management by increasing soil water retention, enable nutrient absorption with tailored delivery methods, and minimize soil toxicity by immobilizing hazardous metals. Furthermore, nanocomposites regulate soil temperature, protect plants from UV radiation, and activate plant defense systems, all of which improve stress tolerance and promote sustainable soil management methods. Harnessing the promise of nanocomposites in agriculture necessitates more study to optimise their nanoformulations, understand their environmental consequences, and assure their safe deployment. Overall, nanocomposites show tremendous potential as new methods to solve abiotic stress concerns in modern agriculture and contribute to global food security initiatives.

Keywords: nanocomposites, nanoparticles, abiotic stresses, food security, nanoformulation, sustainable soil management

EFFECT OF SULPHUR NANO-PARTICLES ON SULPHUR USE EFFICIENCY (SUE), GROWTH AND YIELD OF SOYBEAN***PRIYANKA CHOUDHARY¹, K. C. PATEL², BABULAL RAIGAR¹, DIBYAJYOTI NATH¹**¹Ph.D. Scholar, Dept. of Soil Science, PG College of Agriculture, Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar³Associate Research Scientist, Dept. of Soil Science & Agricultural Chemistry, Anand Agricultural University, Anand, Gujarat

To meet increasing demand of food, it is necessary to increase the efficiency of inputs. Nano-fertilizers are the nano-particles-based fertilisers, where supply of the nutrients is made precisely for maximum plant growth after stimulating the plant capability, have higher use efficiency, exploiting plant unavailable nutrients in the rhizosphere and can be delivered on real time basis into the rhizosphere or can be made available to plant by foliar spray. Nano sulphur allows the plants to efficiently utilize many nutrients by rapidly reducing the soil reaction (pH) and cause increase in yield and quality. A pot study was conducted at net house of Micronutrient Research Scheme, AAU, Anand during *kharif* season of 2021-22 to the effect of sulphur nanoparticles on growth parameters, yield and its attributes of soybean and nutrient content and also uptake was found significantly higher in treatment RDF+ SNPs @ 8 mg S/kg soil. Availability of P, K, S and Zn in soil after harvest of crop was higher in treatment RDF+ SNPs @ 8 mg S/kg soil. The sulphur use efficiency of sulphur nanoparticles was comparatively found higher as compared to elemental sulphur. On the basis of results, it can be concluded that the application of sulphur nano-particles @ 8 mg S/kg soil along with RDF (NPK 30:60:00 kg/ha) significantly increased growth and yield attributes, seed and haulm yields of soybean over control (RDF only) and elemental sulphur @ 4, 6 & 8 mg S/kg soil. The nutrients content and uptake and status of available P, K, S and Zn in soil after harvest of crop were found significantly higher due to treatment RDF+ SNPs @ 8 mg S/kg soil. The sulphur use efficiency of sulphur nanoparticles was comparatively found superior as compared to elemental sulphur. Hence, looking to the overall results, the sulphur nanoparticles proved better in increasing the growth, yield attributes and yields of soybean and also increase the nutrients content and uptake of sulphur was found higher as compared to elemental sulphur proving better efficiency of sulphur nano particles compared to elemental sulphur.

Keywords- Sulphur Nanoparticles, Sulphur Use Efficiency, Elemental Sulphur**EMPOWERING HOUSEHOLDS: THE IMPACT OF HOME SCIENCE EXTENSION EDUCATION ON INCOME GENERATION AND SUSTAINABLE LIVELIHOODS"****DR. PRIYANKA JALAL****Teaching Personnel, Department of Extension Education and Communication Management, College of Home Science/Community Science, GBPUA&T Pantnagar, Uttarakhand**

Equipping all ages with accurate knowledge, technical know-how, updated skills, new demands and services are important aspects for achieving dream of developed nation. Thus there is a need of a transformative force to catalyze individual's economic efforts from each household. In this line, Home Science (H.Sc.) Extension Education plays a major role in developing an empowered community especially targeting to women. Meanwhile, to walk with new world, rural women are receiving multiple trainings and practical hands on over digital technologies and also making informed decisions beyond the households. One pivotal aspects of H.Sc. Extension is to focus on income-generating activities through small scale enterprises to unlock new avenues. This not only diversifies household income but also cultivates resilience against economic shocks. Furthermore, it promotes women led innovation in product development and also providing a selling platform, enables women to capitalize on their skills and generate a sustainable income. Moreover, this education fosters a culture of collaboration and community engagement by forming networks and cooperatives like SHGs, FIGs and FPOs etc to share knowledge, experiences and opportunities for amplifying impact of their efforts. For many years, women are the negligible part of our community, but the objective of H.Sc. Extension Education is to make women as a valuable treasure full of talents, self-confidence, empowered and economically sustained. In conclusion, this stream emerges as a potent tool for socio-economic upliftment of rural household by empowering women with advanced knowledge, skills, and networks needed to boost income, build resilience, and create a path towards a more prosperous future.

Key words: Women, Innovation, Viksit Bharat, Economic empowerment**EFFECTS OF AUTOMOBILES EFFLUENTS ON MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF ROADSIDE PLANTS****PRIYANKA PARASHAR****MUIT, LUCKNOW, UP**

Advancement in industrialization, automobiles and urbanization responsible for release of different atmospheric gases at supra optimum level which results into pollutants. These pollutants like oxides of nitrogen, oxides of sulphur, carbon dioxide, hydrocarbons and particulate matter and many others cause serious injuries internally as well as externally to roadside plants. A morphological damage to plants is generally visible through lesions on the leaves, flowers and fruits. To carry out biochemical effects of air pollutants on plants chlorophyll content analysis carried out by collecting samples from polluted sites and control site. Chlorophyll analysis of plants is an important tool to determine the effects of automobile Effluents on plants as it plays an important role in plant metabolism.

Keywords: Environmental pollutants, biochemical effects, air pollution stress, morphological effects

INFLUENCE OF CROP LOAD ON PHYSICO-CHEMICAL ATTRIBUTES OF MANGO FRUIT CV. AMRAPALI PRIYANKA KUMARI^{1*}, RAVINDRA KUMAR¹, KUMARI KARUNA¹ AND KUMARI NANDITA²

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The study was conducted to investigate the response of crop load on physico-chemical composition of mango cv. Amrapali. The experiment was conducted on 35 years old mango trees located in the All India Coordinated Research Project on Fruits field under Department of Horticulture (Fruit and Fruit Technology) at BAU, Sabour during 2022-23. Studies were conducted with the objective to evaluate the effect of crop load levels i.e. retaining of 20, 30, 40, 50, 60 and 70 fruits per plant and control (no thinning) on physical and biochemical parameters of mango cv. Amrapali under high density planting. The experimental observations revealed that the physical attributes such as fruit weight (290.79 g), fruit length (114.82 mm), fruit breadth (76.03 mm), fruit volume (256.60 cc), pulp weight (229.54 g), pulp: stone ratio (6.65) and pulp per cent (78.71) were found to be highest in (T₁) i.e. crop load with 20 fruits per tree retained at marble stage. Further, fruit quality attributes in terms of TSS (23.69 °Brix) and total carotenoids (5.71 mg 100 g⁻¹ FW) was recorded maximum by the crop load 20 fruits per tree retained at marble stage (T₁). Similarly, minimum titratable acidity of 0.22%, was recorded in the crop load 20 fruits per tree retained at marble stage (T₁). All the above attributes were found statistically at par with the crop load 30 (T₂), 40 (T₃) and 50 (T₄). From the results, it can be concluded that thinning of fruits (i.e. retaining of 20, 30, 40, 50, 60 and 70 fruits per plant) significantly improved the physical and biochemical character of fruits. Retaining of 20 fruits per plant was recorded significantly higher for both physical and biochemical attributes. Therefore, from this experiment, it may be concluded that for quality and fruit size, retaining 20 to 50 fruits per tree (T₄) is advisable.

Keywords: mango, crop load, marble stage, thinning, carotenoids

STUDY ON ALGAL DIVERSITY OF WAGHAD DAM, NASHIK (M.S) INDIA

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Dams are resources of water, which are mainly used for irrigation purposes and other purposes such as power generation, River Navigation, Industrial uses and hydroelectric power generation. Nashik, Dindori Tahsil has a large number of water resources such as Lakes, ponds and rivers. In which Waghad dam is less studied. There is one road survey done on it. The dam water is pure. The dam has water in all the Seasons. Water is there all over the year, so the ecosystem under the water has great purity. Raw material of algae is present in very pure and large amounts this research is mainly carried out for the algal diversity of the specific Waghad dam. Algal diversity plays the most important role in maintaining the ecological balance in aquatic ecosystems. Algae provide oxygen, serve as the food base for almost all aquatic life, and provide foods and industrial products, including petroleum products. This research helps others to find a raw source of algae from Dam.

Keywords- Waghad Dam, Algae, Algal diversity, Nashik, Dindori

LAC DYE BASED INTELLIGENT COLORIMETRIC INDICATORS FOR REAL-TIME FRESHNESS MONITORING OF PACKAGED PERISHABLE FOOD PRODUCTS

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In the present study, lac dye-based color-changing intelligent indicators were developed to change the trend of assigning a static 'best before/use by' date to the products and bring in the 'Dynamic Shelf Life' concept. The indicators were developed by immobilizing the sensing reagent (lac dye) on different immobilization matrices (filter paper and membrane). Further, the indicators were characterized for their sensitivity to different food spoilage metabolites; structural, mechanical, thermal properties; and color stability. The indicators were evaluated for freshness monitoring of paneer and mushroom. During the freshness test, paneer and mushroom samples were packed with indicators in package headspace and stored at refrigerated and ambient conditions. The spoilage of food products was monitored concurrently by indicator color change, quality parameters, and volatile organic compounds (VOC) generated during storage. For paneer, the indicator changed color from purple to orange-red upon spoilage, while for mushrooms, the color transitioned from orange-red to purple. The visual color change of the indicator distinguished paneer and mushrooms into three stages: 'fresh', 'moderately fresh', and 'spoiled'. Principal Component Analysis (PCA) validated the synchronization between indicator color change and paneer and mushroom quality parameters. Partial Least Square (PLS) regression models derived from the indicator's color parameter data successfully predicted paneer and mushroom quality parameters. The results of the freshness test revealed the potential of indicators in monitoring real-time freshness status of packaged perishable food products via direct naked-eye inspection of indicator color.

SUSTAINABLE AGRICULTURE PRACTICES AND SYSTEMS: AN ECOLOGICAL PERSPECTIVE**PRIYANKA YADAV*, VIJENDRA KUMAR AND SOBHANA BISHNOI****Ph.D. Research Scholar, Department of Agricultural economics and management, Rajasthan College of Agriculture (MPUAT), Udaipur**

Sustainable and productive agroecosystems must be developed that will meet today's needs for food and other products, as well as preserving the vital natural resource base that will allow future generations to meet their needs. To increase production efficiency, to improve farming strategies based on local resources, and to design systems that are resilient in the face of changing climate require thorough understanding of the ecology of agricultural systems. One indicator of the traction these terms have-ecology and sustainability is the increasing frequency of their use by input providers who advertise their products "to create a more sustainable and profitable farming system." Organic and sustainable farmers have developed many production practices and integrated crop/animal systems that are finding application in more conventional farming enterprises. While they do seek greater resource use efficiency and substitution of more environmentally benign inputs to replace chemicals used in conventional farming, High amount of fertilizer used in conventional agriculture practice increase the cost of fertilizer and have residual effect on next season crop. Sustainable farmers increasingly depend on thoughtful redesign of production systems to provide internal management of soil fertility and pests, careful use of contemporary energy and rainfall, and reliance on internal resources rather than imported inputs. Evaluation of systems based on productivity, sustained economic return, viable environmental indicators, and equitable social consequences of agricultural production are central to future sustainable farming and food systems.

Keywords:- ecological practices, crop rotation, agroecosystem management.**EFFECT OF SOIL MANAGEMENT PRACTICE AND PESTICIDE USE IN SINGLE VISIT FORAGING DURATION OF *LASIOGLOSSUM* SPP., A GROUND NESTING BEE ON BRINJAL FLOWER****PRODIPTA BISWAS^{1,2*}, RAJMOHANA KELOTH^{1**} AND PARTHIBA BASU^{2***}**¹**Zoological Survey of India, New Alipore, Kolkata, West Bengal, India**²**Department of Zoology, University of Calcutta, 35, Ballygunge Circular Road, Kolkata, West Bengal, India**

Ground-nesting solitary bee *Lasioglossum* spp., plays a crucial role as pollinators for both agricultural crops and wild plants, significantly contributing to ecosystem health. However, high pesticide and fertilizer inputs, multi-cropping, increased tillage pressure, and alterations in natural vegetation serve as important drivers of decline in pollinator populations threatening pollination services for crops and wildflowers. As *Lasioglossum* spp. nests in soil, the agricultural management including pesticide use and tillage practiced in intensive agriculture can directly impact their biology. This study (2022-2023) aimed to investigate the effect of soil management and pesticide use affecting their foraging by studying the single-visit foraging duration (SVFD) of *Lasioglossum* spp., the commonly encountered solitary bees in the agroecosystems of southern West Bengal, India, in Brinjal crop. Results based on 81 individuals of *Lasioglossum* spp. foraging on 148 Brinjal flowers observed which showed a significant difference in the number of *Lasioglossum* spp. and also their SVFD between high and low agricultural intensification areas. SVFD of *Lasioglossum* spp. in Brinjal flowers (response variable) decreases significantly with an increasing number of harvests per year, number of tillage per year and type of pesticides used in Brinjal gardens (predictor variables). However, frequency of pesticides used in a month, did not have any significant effect on SVFD. Since agricultural intensification has negative implications on the reproductive success and pollination efficiency, to conserve these pollinators, behavioural studies on foraging should also be studied in order to monitor their populations.

Key words: Ground nesting solitary bee, *Lasioglossum* spp., Agricultural intensification, Single visit foraging duration.**EFFECT OF SELENIUM ON GROWTH PERFORMANCE AND SALINITY TOLERANCE OF *LABEO ROHITA*****PUJADEBI BERA*, TAPAS KUMAR GHOSH, SURYA KANTA SAU****Department of Aquaculture, Faculty of Fishery Sciences, WBUAFS, Kolkata-94**

Global appetite for fish is increasing day by day for its better nutritional profile. *Labeo rohita* (Rohu) is one of the major cultivable species in India, which has higher consumer preference. But increasing salinity of inland water body due to global warming is creating stress on this freshwater stenohaline species. So, it is important to study its salinity tolerance before culturing it in newly formed saline area for better production. The effect of a micronutrient (Selenium) was studied on fish by fortified it in feed. In the present experiment, growth study was carried out for 1st 90 days with 4 experimental groups-C (control feed without Se), T1 (feed with 0.25% Se), T2 (feed with 0.5% Se) and T3 (feed with 0.75% Se). After that same fishes were subjected to salinity tolerance test. Growth parameters were studied during experimental period. There was less than 50% mortality in 8 ppt salinity in T1 and T3 whereas C showed 100% mortality in the same. T2 group showed better performance in 10 ppt salinity. During feeding trial, it also showed the best result with FCR of 1.31±0.009 and SGR of 2.54±0.06 followed by T3, T1 and C. After salinity test, there was an increase in FCR in both groups but the variation was lesser in T2 and other experimental groups than control. So, selenium can be used during feed formulation to increase productivity of rohu both in freshwater area and salt affected area with a better growth performance.

Keywords: Rohu, Selenium, Salinity, FCR, SGR

SUSTAINING BT COTTON YIELD AND SOIL HEALTH THROUGH *IN-SITU* GREEN MANURING, IRRIGATION REGIMES AND MICRONUTRIENTS IN A *VERTISOL* OF MALAPRABHA COMMAND AREA

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The study was aimed to know the effect *in-situ* green manuring, irrigation regimes and micronutrients on yield, water use efficiency and soil health status of *Bt* Cotton in a *Vertisol* of *Malaprabha Command Area*. A factorial experiment (2014-15 to 2017-18) was conducted at AICRP on Irrigation water management Research center (IWMRC) at Belavatagi with split plot design including three irrigation levels; I_1 and $I_2 = 0.8$ and 0.6 IW/CPE ratio and $I_3 =$ critical stages and nutrient levels $F_1 = 100\%$ RDF + FYM @ 10 t ha^{-1} , $F_2 = F_1 +$ one row of sunhemp in between two rows of *Bt*-Cotton, $F_3 = F_2 + \text{ZnSO}_4 @ 25\text{ kg ha}^{-1} + \text{FeSO}_4 @ 25\text{ kg ha}^{-1} + \text{Borax} @ 5\text{ kg ha}^{-1}$, F_4 and F_5 are 75 and 50% RDF + FYM @ $10\text{ t ha}^{-1} + \text{Bio-fertilizer} +$ one row of sunhemp in between two rows of *Bt*-cotton + $\text{ZnSO}_4 @ 25\text{ kg ha}^{-1} + \text{FeSO}_4 @ 25\text{ kg ha}^{-1} + \text{Borax} @ 5\text{ kg ha}^{-1} + \text{Maize stalk } 10\text{ t ha}^{-1}$, respectively. The pooled results revealed that irrigation level, I_1 0.8 IW/CPE recorded significantly higher kapas yield of 19.01 q ha^{-1} as compared to I_3 (16.17 q ha^{-1}). Among nutrient levels, F_3 recorded significantly higher kapas yield of 21.65 q ha^{-1} and water use efficiency of $3.69\text{ kg ha}^{-1}\text{mm}$. The data on soil analysis (2016-17 to 2017-18) showed non-significant differences in pH and EC and a significant difference in organic carbon content, available P_2O_5 , available K_2O and Zn were noticed.

Keywords: WUE, IW/CPE ratio, In-situ, kapas yield

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING AQUEOUS LEAF EXTRACT OF *DIPLAZIUM MAXIMUM* (D. DON) C. CHR. AND THEIR ANTIFUNGAL POTENTIAL

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Biological synthesis of nanoparticles has gained worldwide attention due to several advantages, wide range of applications besides being environment friendly. In the present study anti-fungal potential of biologically synthesized silver nanoparticles (AgNPs) from the aqueous leaf extract of *Diplazium* was evaluated. This wild edible fern, distributed in different parts of India, widely consumed as a leafy vegetable is also being traditionally used for the treatment of various human ailments by the herbal practitioners. The synthesized AgNPs were characterized by UV-Visible Spectroscopy, X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), and High-Resolution Transmission Electron Microscopy (HRTEM). The XRD analysis of AgNPs revealed face-centered cubic crystalline structure with an average size of 17.01 nm . Further, HRTEM analysis confirmed mostly spherical, oval shaped nanoparticles with an average particle size of $19.90 \pm 3.84\text{ nm}$. The minimum inhibitory concentration (MIC) of synthesized AgNPs was quite low i.e. $0.078\text{ mg}/100\text{ }\mu\text{l}$ and $0.156\text{ mg}/100\text{ }\mu\text{l}$ with *Aspergillus niger* and *Candida albicans*, respectively in comparison to the crude extract (0.625 - $1.250\text{ mg}/100\text{ }\mu\text{l}$). The results indicate that the anti-fungal potential of AgNPs of *D. maximum* increased several folds and this characteristic of the NPs make them excellent resource for future development of novel herbal-based pharmaceuticals for wider applications and healthcare benefit of the masses.

Keywords: AgNPs, antifungal, wild edible fern.

COMPARATIVE ASSESSMENT OF DIFFERENT PRODUCTION SYSTEMS FOR SOIL HEALTH AND PRODUCTIVITY IN SELECTED KHARIF CROP IN NORTH WESTERN HIMALAYAS

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A field experiment was conducted to assess the effect of different crop production systems on major kharif crops at CSKHPKV, HAREC, Dhaulakuan (HP) India. The experiment comprised of fifteen treatments involving three crop production systems (organic, natural and conventional) in sub plot with five crops (maize, okra, sesame, black gram and rice) in main plot replicated thrice in split plot design during kharif season (July-October) of 2020. Organic farming system increased soil organic carbon, mean weight diameter, water holding capacity, total porosity and dehydrogenase activity by 9.3 , 30 , 4.85 , 17 and 16.2% over conventional system respectively and decreased bulk density by 4.8% as compared to conventional system. Macro and micro nutrient uptake parameters were in accordance with their biomass production. Subhash Palekar natural farming (SPNF) system recorded significantly higher microbial biomass carbon and bacterial, actinomycetes and fungal counts by 40.8 and 23.6 , 20.9 and 46.57% , respectively over conventional system. The macro and micro nutrient uptake was found to be significantly highest in conventional system followed by organic and lowest in SPNF system. Among selected crops, fruit uptake was highest under okra and straw uptake was greater under maize crop barring few exceptions. The crop productivity was found to be highest under conventional system followed by organic system and lowest in SPNF system in Maize equivalent yield. Among selected *kharif* crops, black gram showed improved soil properties and okra crop recorded highest Maize equivalent yield and harvest index. For quality parameters, crude protein content and protein yield were found to be significantly highest under conventional system followed by organic and significantly lowest under SPNF system. Black gram recorded highest crude protein content, grain protein yield and sesame showed highest sulphur and micronutrient contents.

Keyword- SPNF, Organic, Conventional, MEY, Kharif crops

ROLE OF NANOTECHNOLOGY IN PEST MANAGEMENT

PUSHPA CHGAUDHARY

Agriculture is the primary sector for human's livelihood. Agriculture changed its status from traditional to modern by the introduction of various technologies to meet the food requirement of the world's continuously increasing population. Insect pests are one of the most concerned biotic obstacles in agriculture and humans are constantly in search of new strategies to control them. This time synthetic pesticides are the important input of modern agriculture to manage the insect pests, diseases and weeds. Indiscriminate and excess use of these toxic chemicals resulted in so many problems like; pest resistance, outbreak, environmental pollution and human health hazards. Nanotechnology, an interdisciplinary field, has revolutionized different sectors of science and technology by introducing nanoparticles. Nanoparticles can be utilized for enhancing the efficacy of insecticides and pesticides in reduced doses. Among them, nanotechnology is the latest which can be utilized effectively in pest management. Using nanotechnology, we can transfer our desired material into the plant or insect effectively in the form of nanoparticles, nanocapsule, nanogel and nanoemulsion. It provides selective, targeted and long term controlled release of formulation of nanomaterial which is ecologically more viable. These chemicals contain the carrier molecule or the active ingredient in nano size. Several formulations viz., nanoemulsions, nanosuspensions, controlled release formulations, solid based nanopesticides have been developed by the research community. Nano-pesticides are one of the alternatives to overcome the lacunas of conventional group of insecticides. Nano-pesticides are plant protection chemicals, in which either the active ingredient or the carrier molecule is developed through nanotechnology.

Keywords: Nanopesticide, Agriculture, Pest

STUDIES ON THE APPLICATION OF VERMIWASH ON THE GERMINATION RATE OF MONOCOT AND DICOT PLANTS

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Sustainable agriculture has become increasingly important in combating soil pollution and degradation. One significant practice within this field is the widespread use of organic manures and biofertilizers. Vermiwash, a liquid organic biofertilizer, has garnered attention. This study examines the impact of vermiwash on seed germination and seedling characteristics of *Zea mays* and *Vigna radiata*. Vermiwash, at varying concentrations of 10%, 20%, 30%, and 40%, was compared with Gibberellic acid at 100ug/ml, with distilled water serving as the control. Seeds were treated with these solutions, and their germination percentages and seedling characteristics were observed. The findings revealed that lower concentrations of vermiwash were effective in promoting seed germination and seedling growth. Germination percentages increased with higher concentrations of vermiwash across all seeds studied. For both *Vigna radiata* and *Zea mays*, 100% germination was achieved. In terms of seedling growth parameters, hypocotyl length increased in *Vigna radiata* compared to *Zea mays* across the various concentrations of vermiwash. However, radical length was greater in *Vigna radiata* compared to *Zea mays*.

Key words: Vermiwash, *Vigna radiata*, *Zea mays*, germination rate, biofertilizer.

ASSESSMENT OF BIOEFFICACY OF THE BIOSTIMULANT AGROSATVA ON TOMATO

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Tomato is one of the most important staple vegetables widely cultivated all over the world. In an effort to select the bio-efficacy of the best treatment of bio-stimulant Agrosatva on tomato in terms of growth attributes, yield attributes and quality parameters. Four different dosages of Agrosatva was applied as treatments T1-(2.5mL/L), T2-(5mL/L), T3-(7.5mL/L), T4-(10mL/L), T5 was considered as control treatment of variety Lakshmi (NP5005) at 20 DAT, 40 DAT, 60DAT. At 60 DAT plants of T3 attained the maximum height whereas plants of T5 (control) attained lowest height. In case of leaf area maximum leaf area (47.56 Cm²) were observed in T3 at 60 DAT and minimum in control (T5). T3 recorded highest number of flowers per plant . whereas, Treatment T5 recorded the lowest value of number of flowers per plant. Number of flower clusters are increased 32% in T3 over the control at 60 DAT. Similarly, Number of fruiting cluster was maximum (2.08) in T3 and minimum (1.10) in T5. The total yield (546.64 q ha⁻¹) which was 46 % more than control was observed in T3 due to significantly more number of fruits plant⁻¹ and weight of fruits (90 gm) at harvest in full maturity. Quality parameters include lycopene content , Brix percentage in the terms of Total soluble solids and Firmness yielded values ranging from 3-8mg/100g , 3.64 to 4.7 °Brix and 64 to 80 Newton. From the present study it can be concluded that Agrosatva (7.5mL/L)(T3) can be recommended for promising performance in crop growth, yield attributes and yield of tomato.

Key words: Tomato, Brix percentage, DAT (Days after transplanting), Agrosatva, lycopene

IMPROVEMENT OF SOCIOECONOMIC CONDITIONS OF SMALL AND MARGINAL FARMERS OF DHARWAD DISTRICT THROUGH INTEGRATED FARMING SYSTEMS**R.B. NEGALUR^{1*}, C. P. CHANDRASHEKARA², SAVITA B³, CHETAN⁴, V. V. ANGADI⁵ AND N. RAVISHANKAR⁶**¹Principal Scientist and Head, AICRP on IFS-OFR, ARS, Mundgod, University of Agricultural Sciences, Dharwad²Professor of Agronomy, Institute of organic farming, MARS, University of Agricultural Sciences, Dharwad³Sr. Scientist (Soil Science), AICRP on Dryland Agriculture, RARS, Vijayapura

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On farm research was planned aiming to explore the diversification of existing farming systems under small and marginal household conditions, in 0.79 hectares area an average of seven farm families having Crop + Dairy as the component modules and 0.66 hectares area an average of thirteen farm families comprising Crop + Dairy + Horticulture modules over five years. The experiment was carried out in Dharwad district (High productive) block, encompassing Kurubagatti, Lokur, Shibaragatti villages, and Hubballi (Low productive) block, including Karadikoppa and Kuradikeri villages. Twenty trials were conducted, involving three villages from the high productive block and two villages from the low productive block, with an average of four farmers per village. Moreover, leased land was utilized for this experiment. The gross returns (Rs.2,53,256 and 2,00,593, respectively), net returns (Rs.1,66,643 and 1,42,027, respectively), B:C ratio (3.26 and 3.68, respectively) employment generation (490 and 655 Man days, respectively), overall assessment and key performance Indicators like equivalent yield, system productivity, system profitability, sustainable value index, GHG Emission and economic efficiency were better both crop + dairy and crop + dairy + horticulture modules of cropping systems compared to their bench mark survey at the end of five years. The key performance indicators suggest that both the farming system are productive, financially viable and provides livelihood opportunities.

Key words: Economics, Farming system modules, Integrated farming system, key performance indicators, On Farm Research (OFR) and ratio measures.

STUDIES OF TRACE ELEMENTS AND HEAVY METALS IN THE LEAVES OF *MURRAYA KOENIGII* LINN. (CURRY LEAVES) PLANT**R. B. SINGH****Scientist 'C' UGC, Department of Zoology, School of Life Sciences, Dr. Bhimrao Ambedkar University, Khandari Campus, Agra**

Murraya koenigii Linn. plant belongs to the family Rutaceae and this is popularly known as curry leaf. It is used as an item of daily food for its characteristic flavour. This is found as herbs in India and Sri Lanka. In the recent years, research of trace elements in medicinal plants has got emphasis. Trace elements are essential for human health because their presence increase the immune system of body and prevents from several diseases. These trace elements can be detected by Atomic Absorption Spectroscopy method, atomic fluorescent spectroscopy^[5] and eletromagetic coupling plasma method. Curry leaves have a strong fragrant flavour similar to the lemongrass. It is used as an herb and leaves pack a much subtler flavour than curry powder by landing a complex depth of flavour of any dish. Barkes and roots are used externally to cure the bites of poisonous animals. The green leaves were eaten raw as a cure for dysentery and diarrhea. It is also used as blood purifier, tonic and care for stomach and flavouring agents in curries chutneys. Dry leaves of *Murraya koenigii* Linn. were digested with HNO₃, and HClO₄, and the contents of the trace elements such as Fe, Ca, Zn, P, Mg, Cu, Mn, Cr, Pb, Cd, As, Hg were determined by atomic absorption spectroscopy. These elements were found to be within the permissible limits.

Key words: *Murraya koenigii* Linn. trace elements, heavy metals, atomic absorption spectroscopy

MANAGEMENT OF STEM FLY, *MELANAGROMYZA SOJAE* (Z) BY USING NEW INSECTICIDE MOLECULES IN SOYBEAN**R. CHANNAKESHA^{1*}, N. S. VINODA², G. SOMANAGOUDA³ AND ROHINI SUGANDI⁴**¹Scientist (Entomology), AICRP on Soybean, MARS, University of Agricultural Sciences, Dharwad, Karnataka (India)²Department of Entomology, College of Agriculture, University of Agricultural Sciences, Dharwad (Karnataka), India³Professor (Agronomy) & Head, AICRP on Soybean, MARS, University of Agricultural Sciences, Dharwad, Karnataka (India)⁴Institute of Organic Farming, University of Agricultural Sciences, Dharwad, Karnataka (India)

The field experiment was carried out to evaluate new insecticides against stem fly, *Melanagromyza sojae* in soybean at Main Agricultural Research Station, Dharwad, Karnataka, India. The trial was conducted in a Randomized Block Design (RBD) with eight treatments and three replications, including untreated check. The soybean cultivar DSb 21 (susceptible) was sown in the second week of July during kharif 2022 and 2023. Results revealed that, among different treatments plots treated with Thiamethoxam 12.60% + Lambda-cyhalothrin 9.50% ZC @ 0.25 ml/l (T₂) and Chlorantraniliprole 9.30 % + Lambda-cyhalothrin 4.60 % ZC @ 0.4 ml/l (T₃) has recorded least mean stem fly infestation after two sprays with highest per cent reduction (80.12 and 75.22% respectively) compared to the untreated control. With respect to mean per cent stem tunneling, least tunneling was also observed in T₂ (6.60 %) with highest per cent reduction (77.50 %) followed by T₃ (7.93 %) with reduction of 72.97 per cent. The treatment Thiamethoxam 12.60 % + Lambda-cyhalothrin 9.50% ZC @ 0.25 ml/l has recorded significantly higher yield (21.10 q/ha) with maximum B:C ratio of 2.98, followed by Chlorantraniliprole 9.30% + Lambda-cyhalothrin 4.60 % ZC @ 0.4 ml/l (T₃) (2.76). The lowest yield (7.80 q/ha) with B:C ratio (1.11) was observed in the untreated control. The ready-mix formulation of Thiamethoxam 12.60 % + Lambda-cyhalothrin 9.50% ZC was most effective as compared to other insecticidal treatments even at its lower dose level due to its dual mode of action.

Key words: Foliar spray, Management, Stem fly, Soybean

CHILLI ANTHRACNOSE: SURVEY FOR THE INCIDENCE AND CHARACTERIZATION OF COLLETOTRICHUM SPP. ISOLATES IN TELANGANA STATE**¹R.G. KAVYA, ²DR. M. MADHAVI, ³DR. P. SUJATHA, ⁴DR. B. RAJESWARI****¹PG student, Dept. of Seed Science, College of Agriculture, PJTSAU, Telangana State****²Scientist, Plant Pathology, Seed Research and Technology Centre, PJTSAU****³Professor, Agricultural College, PJTSAU, Adilabad (Dist.)****⁴Associate Professor, Dept. of Seed Science, College of Agriculture, PJTSAU, Telangana State**

Chilli (*Capsicum annum* L.) is most widely cultivated as fruit vegetable throughout the world. The crop is susceptible to many foliar and soil borne fungal diseases of which fruit rot/ anthracnose caused by the *Colletotrichum capsici* is significant. Typical anthracnose symptoms on chilli fruit include sunken necrotic tissues with concentric rings of acervuli. Since, the pathogen express the latent infection, in India the crop yield losses ranged from 10-80% with losses of up to 80-89% in Telangana. A roving survey was conducted during the month of December, 2023 in major chilli growing areas of erstwhile Khammam (Konijerala, Wyra mandals) and Warangal (Nallabelli mandal) districts of Telangana and the disease incidence was assessed in different popular cultivars such as swarnamukhi, tejitha, keerthi teja, armour and tomato. The study revealed variations in per cent disease incidence of anthracnose among the cultivars swarnamukhi, tejitha (32-35%), keerthi teja, armour (23-26%) and tomato (75-80%) and different chilli growing areas i.e Khammam and Warangal districts. Highest disease incidence was recorded in Pandillapalli village, Konijerala mandal of Khammam district with a range of 25-27% followed by Nagarajpalle village, Nallabelli mandal of Warangal district with 15-18% disease incidence. The collected infected seed samples were subjected to different standard seed health tests for detection of pathogen, wherein, standard blotter method was found effective in showing maximum per cent recovery of *Colletotrichum* spp. isolates. A total of five isolates were isolated from the cultivars and were further studied for morphological and cultural characterization which has showed variability in their colony colour ranging from yellowish to brown, light pinkish to brown, dark grey colour with cottony texture and the shape of the conidia was half-moon shape to ovoid where few isolates have exhibited pseudo septa and pinkish to black acervuli with setae.

ONE HEALTH APPROACH: A FUTURE PERSPECTIVES**RAGHAVENDRA PRASAD MISHRA¹, UDIT JAIN², BARKHA SHARMA², MANOJ KUMAR KALWANIYA³****¹Department of Veterinary Public Health & Epidemiology, M. B. Veterinary College, (RAJUVAS), Dungarpur, Rajasthan, India****²Department of Veterinary Public Health & Epidemiology, (DUVASU), Mathura, U.P., India****³Department of Veterinary Public Health & Epidemiology, Arawali Veterinary College, (RAJUVAS), Sikar, Rajasthan, India**

One Health is an approach calling for "the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and our environment", as defined by the One Health Initiative Task Force. Although the One Health approach has garnered widespread support, its practical implementation has presented certain difficulties thus far. One Health urges the fields of environmental, animal, and human health to collaborate more across institutional, disciplinary, and professional lines. The one health argues that the dysfunctions that characterize current forms of global health governance. This has partially contributed to the inadequacies in the current articulation of One Health. One Health could help remedy current dysfunctions in GHG and avoid becoming a part of them with the support of key global institutions, an operational definition of One Health that is agreed upon, efforts to establish One Health institutions from the ground up, comparative case studies of what works or does not work institutionally, and high-level global support for research, training, and career opportunities.

Key words: globalization, health policy and government**GROWING BEYOND SOIL: HYDROPONICS - A REVOLUTION IN AGRICULTURE*****RAGHUVIR J. JANI¹, SARYU TRIVEDI², HIMALAY R. PATEL² AND JAHNVI VYAS¹****¹Under Grad. Scholar and ²Assistant Professor, Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat, India**

Hydroponics, a method of growing plants without soil, has emerged as a transformative force in modern agriculture. The hydroponics industry is anticipated to grow at a CAGR of 11.3% between 2022 and 2028. Its role extends far beyond traditional farming practices, offering innovative solutions to various challenges faced by the agricultural sector. By providing precise control over nutrient delivery, water usage, and environmental conditions, hydroponic systems maximize resource efficiency and crop yields. Approximately 90% less water is consumed in hydroponic systems when compared to traditional soil-based agriculture. Growing population and increasing prosperity are expected to see an upward trend in expenditure of food. Indian households are expected to spend 35% of budget on Food in 2025. In India, we have a number of Hydroponic farming companies in India which are not only growing crops but also providing various services such as supplying hydroponic kits and equipment, installing hydroponic farms, providing training and workshops, and 360-degree solution to hydroponic farming-related issues and queries. All of them have the common aim of making India sustainable in agriculture and providing the population with healthy, hygienic, and pesticide-free food.

Keywords: Hydroponic kit, CAGR, precise, sustainable etc.

INTERCROPPING FOR PROSPERITY: STRATEGIES TO BOOST PRODUCTIVITY AND ENHANCE FARM PROFITABILITY**¹RAGHUVeer CHOUDHARY, ²DR. P.D. VEKARIYA, ³JITENDRA CHOUDHARY AND ⁴SATYA NAYARAYAN GURJAR****¹Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh, Gujarat****²Department of Agronomy, Main Dry Farming Research Station, JAU, Targhadia, Gujarat****³Department of Agronomy, College of Agriculture, Vivekanand Global University, Jaipur, Rajasthan****⁴Department of Agronomy, MPUAT, Udaipur, Rajasthan**

Intercropping, the practice of growing two or more crops simultaneously on the same land, has gained significant attention as a sustainable agricultural strategy to enhance productivity and profitability. Intercropping offers numerous advantages over monoculture systems, including efficient resource utilization, enhanced biodiversity, reduced pest and disease pressure, and improved soil health. By harnessing complementary interactions between different crops, intercropping can optimize resource use efficiency and mitigate the risks associated with environmental variability, such as drought, pests, and diseases. Through a review of existing literature and case studies, this paper explores various intercropping strategies tailored to different agroecological contexts and cropping systems. These strategies include crop selection based on complementarity and resource partitioning, spatial arrangement to maximize light interception and nutrient uptake, and temporal scheduling to minimize competition and enhance resource use efficiency. Furthermore, the economic implications of intercropping are examined, focusing on its potential to enhance farm profitability through increased yields, reduced input costs, and diversified income streams. However, successful implementation of intercropping requires careful planning, knowledge of crop interactions, and adaptation to local conditions. Barriers to adoption, such as limited access to information, land tenure issues, and market constraints, are also discussed, along with potential policy interventions to promote the adoption of intercropping practices. In conclusion, intercropping holds significant promise as a pathway to prosperity for farmers worldwide. By harnessing the synergies between different crops, intercropping offers a multifaceted approach to increasing productivity, improving farm profitability, and fostering sustainable agricultural development.

Keywords: Intercropping, productivity, profitability, efficiency etc.**ESTIMATION OF ABOVE-GROUND BIOMASS AND CARBON STOCKS IN THE FOREST OF NORTH BENGAL USING SENTINEL-2 DATA****RAGINI H R^{1*}, MANOJ KANTI DEBNATH²****¹Ph.D. Scholar, Department of Agricultural Statistics, Uttar Banga Krishi Viswavidyalaya, West Bengal, India****²Assistant Professor, Department of Agricultural Statistics, Uttar Banga Krishi Viswavidyalaya, West Bengal, India**

This study aims to estimate above-ground biomass (AGB) and carbon stocks in the forests of North Bengal, India, specifically within the micro watershed area of Alipurduar district, using Sentinel-2 multispectral data. The objectives are threefold: to estimate AGB and carbon stocks using field inventory data and allometric equations; to analyse the correlation between field-measured biomass, biophysical variables, vegetation indices, and spectral bands from Sentinel-2 images; and to identify the best predictor variables through correlation and regression analysis, ultimately developing an AGB prediction model using these variables. Field inventory data and four allometric models were employed to estimate AGB, with Nath et al. (2019) providing the most accurate results ($R^2 = 0.84$). Following the determination of AGB and carbon stocks, various vegetation indices (NDVI, NDVI45, SAVI, MSAVI, GNDVI) and biophysical variables (CAP, FCOVER, LAI, FAPAR) were extracted from the Sentinel-2 data. Among these, the biophysical variable showed the highest correlation with AGB, surpassing other vegetation indices. A stepwise regression approach was used to select the most significant predictor variables, resulting in the development of a robust AGB prediction model. The findings highlight the potential of Sentinel-2 multispectral imagery for accurately estimating biomass and carbon stocks, with important implications for regional carbon management and ecological monitoring.

Keywords: Above Ground Biomass, Carbon stock, Stepwise regression, Sentinel-2**AGRICULTURAL EDUCATION IN SCHOOL CURRICULUM*****RAJANI KARNWAL **KHWAIRAKPAM SHARMILA*****Research Scholar **Assistant Professor****Department of Human Development and Family studies, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow (Uttar Pradesh)**

The role of agriculture in the Indian economy, need to incorporate agricultural education into the school curriculum. This also discusses the evolution of agricultural education, the integration of technology and sustainable practices in the curriculum, and the transformative impact of the New Education Policy (NEP) in India. It underscores the importance of agricultural education in promoting food security, nutritional knowledge, sustainable production, survival skills, and environmental awareness. Furthermore, it explores the benefits of agricultural education in fostering interdisciplinary learning, responsible consumption, life skills, and career opportunities in agriculture. The inclusion of agriculture as a necessary discipline in schools is crucial for equipping students with comprehensive knowledge, addressing global challenges, and making informed decisions related to food production and sustainability.

Keywords: Agriculture Education, Curriculum, NEP.

SUSTAINABLE SOIL AND WATER CONSERVATION: LEVERAGING SOIL AND WATER ASSESSMENT TOOL (SWAT) MODEL FOR ESTIMATING RUNOFF AND SEDIMENT YIELD

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Soil erosion and water resource management must be managed effectively to ensure sustainable agriculture, necessitating the use of advanced modeling methods. The Soil and Water Assessment Tool (SWAT) has evolved as a notable tool for estimating runoff and sediment yield in agricultural system. This study assesses the SWAT model's applicability, capacities, and developments in managing soil erosion and sedimentation problems. This study includes a summary of the conceptual underpinnings of the SWAT model and highlights its capacity to replicate sophisticated hydrological processes on a variety of soil types and land uses. SWAT facilitates spatially explicit study of watershed-scale processes by integrating hydrological principles with data from geographic information systems (GIS). This allows for well-informed decision-making about soil and water conservation techniques. Important elements of SWAT are thoroughly covered, including its parameterization techniques, sediment transport algorithms, and depiction of the hydrological cycle. Furthermore, the review investigates the model's ability to estimate runoff and sediment output under various agricultural management techniques and environmental circumstances. In addition, current developments and challenges associated with SWAT modeling are discussed, including the integration of conservation measures, the effects of climate change, and methods for uncertainty analysis. The study emphasizes how crucial it is to continue conducting research to improve SWAT's functionality and make it more useful to stakeholders in soil and water conservation engineering. In conclusion, the Soil and Water Assessment Tool (SWAT) model continues to be an important tool for estimating runoff and sediment yield in agricultural contexts. SWAT helps to design sustainable methods to reduce soil erosion and protect water resources in agricultural systems by offering insights into the dynamic interactions between land management techniques, hydrology, and sediment transport mechanisms.

Keywords: SWAT, Modelling, Sediment yield, Runoff, GIS

DEVELOPMENT AND PERFORMANCE EVALUATION OF PORTABLE MOTOR-OPERATED TILLER MACHINE

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Agriculture has been an integral part of the human ecosystem. However, traditional farming methods require a lot of human effort and are very time-consuming. Farm tilling is one of the most labour intensive operations in agriculture. Manual tilling of fields is very strenuous task while tractors incur high capital along with heavy fuel consumption costs. This low-cost portable motor-operated tiller machine is a one-stop modern solution to enhance the conventional agriculture methods of farming, as it reduces the human effort, at a very negligible price using motorized tilling mechanism. The motor-operated tiller helps reduce the time and cost involved in tilling using a smart portable design thereby increasing the productivity and efficiency in agriculture. All the materials and their dimensions needed for the construction of the tiller were selected following the standard equations and reference studies. Overall dimension (L x B x H) of. 0.30m x 0.60m and 1.3m. The developed portable motor-operated tiller machine consists of the following components: a 24-volt DC motor, a 2000-watt speed controller, a high-capacity battery, two chain sprockets with 9 and 16 teeth, a chin, etc. After completion of the design, the tiller was critically tested on the experimental field for the different parameters. A 15 x 15 m² plot was prepared to evaluate the performance of the machine. Different speeds and depth conditions were selected as independent variables and field capacity, field efficiency, draft, and power requirement were taken as dependent variables. The forward speeds of the tiller were selected as 1.0, 1.5, and 2.0 km/h, and depths of 6, 8, and 10 cm. Result of the study shows that highest speed of the portable motor-operated tiller machine was found 2.0 km/h and the minimum speed was 1.0 km/h. The power requirement of the portable motor-operated tiller machine was 0.18 kW. The maximum field capacity was 0.033ha/h at a speed of 2.0 km/h and the field efficiency is 93%. Overall performance of the portable motor-operated tiller machine was found quite satisfactory the machine might be acceptable because. It is easy to operate, simple in design and mechanism, light in weight, requires less labour and cost of tillage.

Key words: Traditional Farming, Field Capacity, Field Efficiency, Labour Intensive etc.

EFFECTS OF HEAVY METAL IMPACTS ON SEED GERMINATION IN VEGETABLE AND PULSES CROP PLANTS

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The present investigation was carried to assess heavy metals (chromium and lead) pollutants effects on the seed germination in plants. The plants selected for the study were cowpea (*Vigna unguiculata*) and brinjal (*Solanum melongena*). The heavy metals were applied in four concentrations viz. 20, 40, 100 and 200 ppm solutions. Maximum seed germination frequency (60%) was observed with 40 ppm concentration of lead (Pb) and 20 ppm concentration of chromium (Cr) with stimulatory effect on seed germination in brinjal seeds. 100 and 200 ppm concentrations were stimulatory in the beginning but later on became inhibitory. Around 100% germination of cowpea seeds was observed in control. The maximum seed germination frequency was observed with Pb (40 ppm) and Cr (40 ppm). All concentrations of Pb and Cr, in general, had inhibitory effects on cowpea seeds germination except 20 ppm concentration of Cr after 48, 72 hrs and 40 ppm

concentration of Cr at 48 hrs. The study outlined how heavy metal contamination affected seed germination in brinjal and cowpea plants, emphasizing species-specific responses and temporal dynamics. Through experimentation and analysis, significant influences of heavy metal concentration on seed germination outcomes were observed. The analysis underscored the importance of considering plant diversity and conducting longitudinal assessments to accurately evaluate environmental impacts. By integrating findings with existing literature, insights are gained into plant responses to environmental stressors, informing strategies for sustainable land management and conservation practices. This study provides a succinct overview of the research, contributing to the broader understanding of heavy metal pollution's ecological consequences.

Key words: Heavy metals, chromium, lead, germination, brinjal, cowpea, regression

HONEYBEES AND PROBIOTICS: EXPLORING MICROBIAL COMMUNITIES IN *APIS DORSATA* GUT FROM DIFFERENT ALTITUDES OF (H.P.), INDIA AND THEIR POTENTIAL PROBIOTIC ATTRIBUTES

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The honeybee is a highly valued insect throughout the world, not only for honey production but also for its great importance to humans and ecosystems as a pollinator of many economically important crops and wild flora. The microbial communities associated with the alimentary tract of honey bees have garnered increasing attention due to their essential role in host health, nutrition, probiotic attributes, and ecological interactions. This study focuses on the isolation, characterization and identification of potential probiotic attributes of gut bacteria from *Apis dorsata*, the giant honeybee species known for its significant ecological and economic importance. Through a series of culture-dependent methods microbial communities residing within the gut of *A. dorsata* were investigated to unveil the diversity and functional potential of this intricate ecosystem. Utilizing selective media and biochemical assays, a diverse array of bacterial isolates were successfully cultivated from the gut samples of *A. dorsata*. These isolates were characterized morphologically, and biochemically to delineate their taxonomic identities and functional attributes. This study underscores the importance of *A. dorsata* as a reservoir of diverse gut bacteria with significant implications for pollinator health, ecosystem functioning, and biotechnological innovation. Understanding the composition and functional dynamics of the gut microbiota in *A. dorsata* not only enriches our knowledge of insect-microbe interactions but also offers promising avenues for the development of novel bioresources and sustainable strategies for agricultural and environmental management. Further research is warranted to elucidate the intricate mechanisms underlying host-microbe associations in *A. dorsata* and harness the full potential of its gut microbiota for diverse biotechnological applications.

Keywords: *Apis dorsata*, Microbiome, Selective Media, Host-Microbiome Interactions, Probiotics.

BIO-RATIONAL INSECTICIDES: A FUTURISTIC APPROACH FOR MANAGEMENT OF BRINJAL SHOOT AND FRUIT BORER IN PRESENT ERA OF HEALTH CONSCIOUSNESS

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Brinjal (*Solanum melongena* L.) is a solanaceous vegetable crop native of India, also known as eggplant, garden egg and aubergine. It is an important vegetable crop containing a variety of vitamins and minerals which is attacked by shoot and fruit borer, *Leucinodes orbonalis* Guen., losses ranged from 20-89 per cent in various parts of India under favourable conditions. Indiscriminate use of conventional insecticides leads to environmental pollution, residual problems, resistance in insects and adverse effect on natural enemies and pollinators so the newer insecticides and bio pesticides need evaluation on scientific line. For this The experiment on bio-efficacy of newer insecticides was laid out during Kharif 2022-23 at Horticulture farm, S.K.N. College of Agriculture, Jobner (Rajasthan) in a simple randomized block design (RBD) with eight treatments including control and a check (Malathion) and each treatment replicated thrice on brinjal variety 'Pusa Purple Round' (recommended for semi-arid region of Rajasthan). The per cent shoot infestation by *L. orbonalis* was recorded one day prior to spraying and on 1st, 3rd, 7th and 15th days of each spray and infestation mean value of each spray was computed. Fruit infestation was also recorded on one day prior to spraying and on 1st, 3rd, 7th and 15th day of the second spray after picking of fruits on number and weight basis. The data were subjected to statistically analyzed after angular transformation. The bio-efficacy of biorational insecticides evaluated against shoot and fruit borer, *L. orbonalis* on shoot infestation revealed that emamectin benzoate 5 SC, spinosad 45 SC and chlorfenapyr 10 SC were proved most effective with 8.07, 8.72 and 9.95 per cent shoot infestation respectively, and the moderately effective treatments were indoxacarb 14.5 SC (10.75%), followed by malathion 50 EC (33.87%). The least effective treatment was recorded *Metarhizium anisoplae* 1.15 WP and *Bacillus thuringiensis* 5 WP resulted in 17.79 and 15.66 per cent shoot infestation, respectively, whereas fruit infestation, both on (number and weight basis) emamectin benzoate 5 SC (8.00 and 7.76%), spinosad 45 SC (9.11 and 8.42%) and chlorfenapyr 10 SC (10.07 and 9.24%) were proved most effective. The moderately effective treatments were indoxacarb 14.5 SC and malathion 50 EC resulted 11.10 & 11.72 per cent infestation on number basis and 10.66 & 11.88 per cent infestation on weight basis, respectively. The least effective treatments were *Metarhizium anisoplae* 1.15 WP and *Bacillus thuringiensis* 5 WP resulted in 16.64 & 15.57 per cent and 17.13 & 15.42 per cent fruit infestation on number and weight basis, respectively. Among the various newer insecticides evaluated, emamectin benzoate 5 SC was found most effective against *L. orbonalis*, followed by spinosad 45 SC and chlorfenapyr 10 SC and whereas, *Metarhizium anisoplae* 1.15 WP followed by *Bacillus thuringiensis* 5 WP were found least effective which concludes that new molecule insecticides with less residual effect and environment friendly, proves an alternative approach of pest management.

Keywords: Newer insecticides, Biorational insecticides Brinjal, Shoot and fruit borer, Bio- efficacy, Emamectin benzoate 5 SC, Spinosad 45 SC, Chlorfenapyr 10 SC, Shoot infestation, Fruit infestation

STUDY ON EFFECT OF POULTRY MANURE AND VERMICOMPOST ON PIGEONPEA (CAJANUS CAJAN L.) UNDER THE RAINFED CONDITION IN CHITRAKOOT AREA**RAJESH DHAKAR¹, AJAY CHOHAN¹**¹School of Agriculture Science, L.N.C.T. University, Bhopal (M.P.) India²Department of Natural Resource Management, Mahatma Gandhi Gramodaya Vishwavidyalaya Chitrakoot, Satna (M.P.) India

A field experiment was conducted at Research Farm Rajola of Mahatma Gandhi Gramodaya Vishwavidyalaya Chitrakoot, Satna (M.P.) during 2018-19 Kharif season. The place of experiment in Chitrakoot is situated at 25010' North latitude and 80085' East longitude. The altitude is about 200m above mean sea level. The experiment was laid out in a completely randomized block design (RBD) comprising of nine treatment combinations with control, each replicated three times. The soils are sandy loam deficient in Phosphorus, Boron and Zinc. Three level of Organic manure using FYM, Vermicompost, Goat manure and Poultry dung with nine combinations (T1 to T9). Treatment are T1=P0V0 (Control) T2=P0V1 (0 q/ha Poultry Manure +5.0 q/ha Vermicompost), T3=P0V2 (0 q/ha Poultry manure +7.5 q/ha Vermicompost), T4=P1V0 (2.0 q/ha Poultry manure +0 q/ha Vermicompost), T5=P1V1 (2.0 q/ha Poultry manure +5.0 q/ha Vermicompost), T6=P1V2 (2.0 q/ha Poultry manure +7.5 q/ha Vermicompost), T7=P2V0 (4.0 q/ha Poultry manure +0 q/ha Vermicompost), T8=P2V1 (4.0 q/ha Poultry manure +5.0 q/ha Vermicompost), T9=P2V2 (4.0 q/ha Poultry manure +7.5 q/ha Vermicompost) The observations were recorded on four levels (30 DAS, 45 DAS and 60 DAS) growth parameters viz. plant height, no. of trifolige, no. of pod per plant, no. of primary branches per plant and nodules per plant and Seed yield per plant and seed yield per plots. The maximum seed yield per plant was observed at 9.31 (T8) followed by 8.47 (T3), 8.30 (T6), 8.09 (T5), 7.37 (T4), 7.28 (T7), 6.75 (T2), and minimum 6.28 (T1) with a general mean of 7.72. The maximum seed yield per plot (g) was observed at 1368 (T8) followed by 1328.33 (T7), 1308.33 (T6), 1291.67 (T4), 1290 (T5), 1258.33 (T3), 1253.33 (T2) and minimum 1078.33 (T9) with a general mean of 1257.87. Forgoing results and inferences revealed that presence of wide spectrum of exploitable variability in the material studied with respect to the treatment combination T8 showed maximum seed yield per plot (g) using Vermicompost and poultry dung combination. Number of branches per plant and plant height have high values for different genetic parameters, projecting thereby, immense scope for genetic up gradation in Pigeon pea.

Key word: Pigeon pea, FYM, Vermicompost, Goat manure and Poultry manure.**GROWING SIGNIFICANCE OF GREENERY & GREEN AUDIT FOR THE RESIDENTIAL SOCIETIES AND HIGHER EDUCATIONAL INSTITUTES****RAJESH KUMAR SHARMA¹, ADAMYA SHARMA² & KIRTI SHARMA³**¹Professor & Director- Kamla PG College, Dholpur (Affiliated to MSBU Bharatpur- Rajasthan, India)²Scholar-BPT III Year, Deptt. of Physiotherapy, ITM University, Gwalior (M.P., India)³Former Scholar- Deptt. of Law, Govt. Naveen Girls' College (Jiwaji University, Gwalior-M.P., India)

Modernity, materialism and inclination to luxurious modes of living have taken the modern people into their grip in a way that they are forced to live amidst pollutant environment. Greenery is the utmost demand of the day that can help man survive successfully and comfortably. The social structure in metro cities stands now chiefly on the enwalled societies with multistoried buildings that confine him to live within the walls of a two or three BHK flats. The life in the flats keeps the people away from greenery and nature as a result of which they suffer from several physical, mental and psychological disorders. The increasing density of population in the cities makes it difficult for the educational institutes at all levels to maintain greenery and plantation as per the norms. Green environment of the educational institutes including the higher educational institutes has a vital role to play in making the holistic development of the students and in helping them meet out the objectives of education through a good teaching-learning environment. The ongoing higher educational institutional scenario witnesses the lack of greenery and plants. Green audit is the demand of the day in the cities which are known for their technological advancement and other features of modernity, especially residential features. It is only through green audit that plantation and greenery are maintained, only useful plants, herbs and shrubs are promoted, ecological standards are maintained, and thus, life-standards based on nature and greenery are raised and maintained. The study which is based on personal observation and designed on both the primary and the secondary data deals with the significance of greenery and green audit for the modern residential societies in the metro cities and for all the educational institutes including the higher educational institutes.

Key Words: Greenery, Green Audit, Residential Societies, Institutes, Ecological Standards**EFFECT OF PLANT GROWTH REGULATORS AND CHEMICALS ON SEED GERMINATION, VIGOUR INDEX AND MORTALITY OF POLY HOUSE CONDITION PAPAYA (CARICA PAPAYA L.)****RAJESH SINGH, NIRALI ARYA AND ANSHUL ASRE****College of Agriculture, Rewa (M.P.) Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur**

An investigation entitled Effect of Plant Growth Regulators and Chemicals on Seed Germination, Vigour Index and Mortality of Poly house condition Papaya (*Carica papaya* L.) was conducted during August-September 2019 at Horticultural Research Farm, Department of Horticulture, College of Agriculture, Rewa under Randomized Block Design with ten treatments and replicated three. Seeds were soaked in different solutions of plant growth regulators and chemicals. Among all treatments seeds soaked in GA₃ 400 ppm recorded early germination (12.13 days), 50 per cent germination (17.07 days), highest germination percentage (82.83%), plant height 15,30 and 45 DAS (7.23, 18.40 and 31.67 cm) and seedling vigour index-I (1460 respectively). Among all the treatments, GA₃ 200 ppm and 1% KNO₃ was superior to the other treatments, followed by GA₃ 300 ppm for the enhancement of germination traits.

Key Words: Papaya, Seed germination, GA₃, KNO₃, Thiourea

FROM TRADITION TO INNOVATION: THE EVOLUTION OF FISH AGGREGATE DEVICES (FADS) IN FISHERIES MANAGEMENT

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Fish Aggregate Devices (FADs) are structures strategically placed in oceans to attract fish, enhancing recreational, artisanal, and commercial fishing capture rates. They have been utilized for centuries, with historical records dating back to 200 AD in the Mediterranean and traditional methods like bamboo rafts in Southeast Asia since the early 20th century. In modern times, FADs have become integral to industrial fishing, particularly for tuna species. Drifting FADs now contribute approximately 1.5% of the world's capture fishery annually, with around 1.2 million tons of tuna captured globally. The efficiency of purse seiners, responsible for half of the world's tuna catch, has markedly improved due to FADs. These structures not only concentrate fish but also benefit rural communities by increasing fish supply and consumption. Moreover, they serve as more than just fishing aids; studies highlight their role in environmental conservation. Natural floating islands, acting as FADs, mitigate heavy metal pollution and contribute to the sustainable maintenance of freshwater wetlands. Artificial structures, like brush piles and manufactured forms, mimic natural habitats, providing cover and spawning grounds for fish. This increases angler catch rates and supports juvenile fish survival, boosting natural fish production. However, successful FAD deployment requires careful consideration of material selection and structural design to resemble natural complexity and maximize effectiveness. FADs represent a longstanding and multifaceted fisheries management tool, offering economic benefits and ecological contributions. Their continued utilization and strategic development promise to enhance fishing practices and sustain aquatic ecosystems worldwide.

Keywords: Fish aggregate devices, Natural habitats, Fisheries management, Purse seiners, Tuna.

ANTAGONISTIC ACTIVITY OF MICROBIAL BIO-STIMULANTS ISOLATED FROM TOMATO RHIZOSPHERE AGAINST SOIL BORNE FUNGAL PLANT PATHOGENS

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Tomato (*Solanum lycopersicum* L.) is consumed globally as a fresh vegetable due to its high nutritional value and antioxidant properties. However, soil-borne diseases can severely limit tomato production. Using agrochemicals to combat these diseases can lead to chemical residues, pesticide resistance and environmental pollution. Unfortunately, resistant varieties are not yet available. In this regard, one of the most promising solutions is harnessing microbial communities that can suppress disease and promote plant growth and immunity. In the present study, the naturally associated rhizospheric microorganisms were evaluated for their antimicrobial potential against soil borne fungal pathogens viz., *Fusarium* sp. and *Ceratocystis* sp. A total of twenty bacterial and nine fungal isolates were obtained using Nutrient Agar and Potato Dextrose Agar respectively from the rhizospheric soil of tomato. A preliminary *in vitro* screening of isolated bacterial and fungal isolates for their antifungal activity was carried out in a dual culture test method. Among the nine fungal isolates, isolate UHSBF1 exhibited the highest per cent inhibition against *Fusarium* sp. (95%) and *Ceratocystis* sp. (100%) in comparison with the control. The bacterial isolate UHSBB4, showed 66% inhibition of *Fusarium* sp., while UHSBB12 exhibited 54% inhibition of *Ceratocystis* sp. with respect to the control. The isolates will be further subjected to antagonistic activity against important soil borne pathogens such as *Rhizactonia* and *Sclerotium* to evaluate their effectiveness in inhibiting the pathogen. The study emphasizes that these microbial isolates, possessing antimicrobial properties under *in vitro* conditions, hold great potential for developing effective and sustainable management strategies to protect tomatoes from numerous soil borne fungal diseases, thereby playing a vital role in safeguard of food security and sustainability.

Keywords: Tomato, soil born fungal pathogens, per cent inhibition

NOVEL LPAR6 AND RB1 VARIANTS IDENTIFIED AS CAUSE OF HYPOTRICHOSIS 8 AND INCREASED CANCER SUSCEPTIBILITY

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Background: Hypotrichosis 8 (HYPT8) (OMIM#278150), commonly known as autosomal recessive woolly hair, is a rare genetic condition that impairs hair development and texture. Recent studies have found heterozygous germline or somatic-cell mutations in *LPAR6* in bladder cancer patients and shown that homozygous inactivation of *LPAR6* caused by *RB1* deletion in the wild-type allele promotes *in situ* neoplasia. We are the first to link *LPAR6* and *RB1* mutations with HYPT8 with high familial cancer cases. **Cases:** In a case report of a family from Jammu and Kashmir, two affected members and two other family members were selected for whole exome sequencing (WES). The WES approach was used to identify the exonic mutations/variants in the patients. Sanger sequencing was employed to validate the exome sequencing results, specifically targeting regions of interest. **Molecular analysis:** The WES analysis of the proband led to the identification of rs121434309 in the *LPAR6* and rs3092904 and rs520342 variants in the *RB1* genes of patients, which were further confirmed through Sanger sequencing. The genetic variant rs121434309 is a coding sequence variant NM_001162498.3: c.565G>A located in exon 1 of the *LPAR6* gene and intron 17 of the *RB1* gene. Computational analyses further confirmed the disease-causing nature of this new genetic mutation. **Conclusion:** Nevertheless, the genetic variants rs3092904 and rs520342 of the *RB1* gene have been extensively investigated in relation to many types of cancer. Specifically, in the Indian population, rs3092904 has been identified as being significantly related to oral cancer. This study adds to the finding of a link between HYPT8 and cancer risk.

Keywords: Hypotrichosis 8, *LPAR6*, *RB1*, Cancer, Gene variants

STUDIES ON IMPACT OF FOREST FIRE ON PHYSICAL AND CHEMICAL PROPERTIES OF SOIL UNDER DIFFERENT VEGETATION TYPES IN UTTARA KANNADA DISTRICT

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A study was carried out to analyse the impact of forest fire on the physical and chemical properties of soil under different vegetation types in Uttara Kannada district during 2021-2022. Composite surface soil samples (0-30cm) were collected from two vegetation types (dry deciduous and moist deciduous forests) and two canopy density classes (very dense and moderately dense canopy) along with three fire disturbance levels (completely fire affected, partially fire affected and non-fire affected). Three-factor factorial RBD was carried out with twelve treatments and three replications. The individual effect and interaction effect of factors were studied. The results revealed that soils of moist deciduous forests showed higher porosity (49.72%), pH (6.36), organic carbon (1.77%), organic matter (3.05%), available nutrients such as N (203.50 kg/ha), P₂O₅ (26.15 kg/ha), K₂O (210.78 kg/ha), exchangeable Ca (4.86 meq/100g), Mg (2.15 meq/100g) and micronutrients viz., Mn (31.49 ppm), Fe (64.32 ppm), Cu (3.75 ppm), Zn (3.17 ppm). But bulk density (1.12 g/cc) and particle density (2.13 g/cc) were found lower. Soils under very dense canopy showed maximum pH (6.31), organic carbon (1.98%), organic matter (3.41%), available P₂O₅ (25.56 kg/ha), available K₂O (211.73 kg/ha), exchangeable Ca (4.55 meq/100g) and available S (18.61 kg/ha). Soil bulk density (1.23 g/cc), pH (6.55) and available P₂O₅ (25.12 kg/ha) increased in the fire-affected soils while soil porosity (46.06%), organic carbon, organic matter, available K₂O (188.49 kg/ha), available S (20.36 kg/ha), micronutrients viz., Fe and Cu decreased in the fire-affected soils.

Keywords: Forest fire, soil, physical properties, chemical properties

ISOLATION OF PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) FROM RHIZOSPHERIC SOIL OF RHODODENDRON ARBOREUM IN KANGRA DISTRICT OF HIMACHAL PRADESH

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Plant growth promoting rhizobacteria (PGPR) is beneficial bacteria that colonize plant roots and enhance plant growth by wide variety of mechanism like phosphate solubilisation, supply of nitrogen and other essential nutrients of micro and macro range etc. The use of PGPR has steadily increased in agriculture and offers an attractive bioinoculant to replace chemical fertilizers, pesticides and supplements. *Rhododendron arboreum* is one of the important medicinal plant growing in the Himalayas between 1200 and 4000 meter belongs to family Ericaceae found producing secondary metabolites in flowers, leaves, bark, stem namely alkaloids, steroids, terpenoids, anthraquinones, tannins, saponins, glycosides and reducing sugar while flavonoids and phlobatanins were absent in root extract. Due to the presence of secondary metabolites, many minerals and nutrients are associated with root of plant which in turn provides a suitable environment to the growing microorganism in the surrounding of root surface including a repository of PGPR. A total 75 bacterial isolates were recovered from 19 soil samples from three sites of Kangra district namely Jakhani mata mandir, Gawaltikkar, Boh Valley and Bir. Sixteen isolates were found positive for phosphate solubilisation activity on Pikovskayas agar assay. Out of 13 isolates, three isolates were found siderophore positive on CAS medium and these three were further identified biochemically as *Alcaligenes* spp. (02) and *Arthrobacter* spp. (01). These isolates were showing PGPR activities as per literature available and could be utilized as bio-inoculants for agricultural crops.

EXPLORING THE POTENTIALITY OF BOTANICALS AND PHYLLOSHERE MICROBIOME FOR THE MANAGEMENT OF BLACK GRAM ANTHRACNOSE

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Black gram (*Vigna mungo* L. Hepper) is the third most important pulse crop and its yield is reduced due to many diseases. Among them, anthracnose is one of the devastating global fungal disease and causes severe damage. Use of fungicide is highly effective to this disease. But continuous use of fungicide is unsafe to environment and it causes fungicide resistance. To overcome these problems, effect of plant extracts viz., *Anisomeles malabarica*, *Azadirachta indica* leaf extracts, phyllosphere antagonist *Bacillus amyloliquefaciens* and essential oils viz., peppermint oil and lemon grass oil were evaluated against black gram anthracnose disease caused by *Colletotrichum linduthianum* under pot culture. Among the different treatments tested, plants sprayed with standard chemical viz., Carbendazim @ 0.2 percent recorded the least percent disease index of 13.39 followed by *A. malabarica* leaf extract (10%) recorded percent disease index of 16.62, whereas plants treated with *B. amyloliquefaciens*, lemongrass oil and peppermint oil were recorded percent disease index of 20.91, 21.23 and 24.0 respectively against inoculated control (77.33 PDI). As well as induction of defense enzymes viz., Phenol, Peroxidase (PO), Polyphenol oxidase (PPO) was recorded more (21.25 µg of catechol /g of leaf tissue, 3.82 changes in absorbance / min/ g leaf tissue, 3.32 changes in absorbance / min/ g leaf tissue respectively) in the plants sprayed with *A. malabarica*. GCMS analysis of hexane and ethanol extract of *A. malabarica* showed the presence of 26 bioactive compounds.

Key words: Anthracnose, *Colletotrichum*, botanicals

BIOFERTILIZERS: A PROMISING COMPONENT OF INTEGRATED NUTRIENT MANAGEMENT**RAJKUMAR ADISON¹, GUNESHORI MAISNAM², DOREEN KANGJAM¹, TAKHELLAMBAM DIPARANI DEVI¹**¹Research scholar of Amity University, Noida, Uttar Pradesh²Assistant Professor-II, Amity University, Noida, Uttar Pradesh

Integrated nutrient Management (INM) is a comprehensive approach that emphasises the synergistic utilisation of multiple fertiliser sources to optimise soil fertility and increase crop output in a sustainable manner. Because of its capacity to enhance soil health, encourage plant growth, and lessen the environmental effects of using traditional fertilisers, biofertilizers have become essential elements within the framework of integrated nutrition management (INM). Biofertilizers, which include a variety of microorganisms such as nitrogen-fixing bacteria, phosphate-solubilizing fungi, and plant growth-promoting rhizobacteria, serve several functions in improving nutrient availability and cycling in agroecosystems. Biofertilizers greatly increase soil nitrogen enrichment by utilising the biological nitrogen fixing capacities of both symbiotic and non-symbiotic bacteria. This lessens the need for nitrogenous fertilisers and reduces nitrogen contamination of water bodies. Furthermore, the solubilization and mobilisation of insoluble phosphorus are facilitated by phosphate-solubilizing bacteria, which improves plant uptake and encourages root development. Furthermore, biofertilizers have positive effects on soil physicochemical qualities and microbial diversity, enhancing soil structure, water retention capacity, and nutrient cycling efficiency. Their application improves nutrient usage efficiency, reduces nutrient losses through leaching and volatilization, and promotes sustainable agricultural intensification when combined with organic amendments, crop residues, and mineral fertilisers as part of integrated nutrient management techniques. Farmers can optimise nutrient availability, enhance soil fertility, and lessen the negative environmental effects associated with conventional nutrient management approaches by utilising the synergistic interactions among biofertilizers, organic inputs, and mineral fertilisers. Adoption of biofertilizers in INM also supports larger sustainability objectives like food security, biodiversity preservation, and climate resilience. In conclusion, biofertilizers are valuable tools in integrated nutrient management systems for environmentally friendly farming.

Keywords: Biofertilizers, Integrated Nutrient Management, Sustainable Agriculture, Environmental Sustainability.

ENHANCING THE GROWTH, HEALTH, AND OUTPUT OF CHICKPEA PLANTS WITH THE USE OF MORE MODERN INSECTICIDAL TREATMENTS¹RAJKUMAR BAJYA*, ²DR. J.K.BANA¹²Ph.D Research Scholar, Department of Entomology, SKNAU, Jobner, Jaipur

The field experiment Improving plant development, health and yield in chickpea using more recent insecticidal treatment in chickpea, Means analysis of all the three observation of 1st spray and 2nd spray indicated that all the insecticidal treatments were significantly effective in reducing the larval population of gram pod borer as compared to untreated plots (3.79 larve/mrl) (4.47 larve/mrl). Flubendiamide 480 SC (0.87 larve/mrl) (0.59 larve/mrl) followed by Indoxacarb 14.5 SC (1.15 larvae/mrl) (0.91 larvae/mrl) proved to be most effective in controlling the incidence of gram pod borer and was significantly superior over rest of the treatments. Per cent Pod damage at harvest all the insecticidal treatments were found significantly effective in reducing the pod damage caused gram pod borer as compared to untreated plots (26.39%). Lowest pod damages, Flubendiamide 480 SC (7.45%) followed by Indoxacarb 14.5 SC (9.25%) proved to be most effective in controlling the incidence of gram pod borer and was significantly superior over rest of the treatments. Highest yield, Flubendiamide 480 SC (19.38 qh/ha) followed by Indoxacarb 14.5 SC (17.95 qh/ha) was significantly superior over rest of the treatments. Maximum C:B ratio (1:13.72) was recorded from flubendiamide treatment followed by indoxycarb (1:12.92), Spinosad (1:12.5), emamectine benzoate (1:12.02), cypermethrin (1:11.75), profenofos (1:10.5).

Keywords: Insecticidal treatments, Pod damage, Yield, C: B ratio

EFFECT OF ALCOHOLIC BARK EXTRACT OF *TERMINALIA ARJUNA* ON SERUM ENZYMES IN CIGARETTE SMOKE EXPOSED MALE ALBINO RATS**RAJNI SINGH* AND MADHURI YADAV**

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The objective of this study was study to determine the effect of alcoholic bark extract of *Terminalia arjuna* on serum enzymes in cigarette smoke exposed male albino rats. The rats were grouped in to three sets (I, II and III). One control set(I) and two experimental sets (II and III), each set containing five rats. Set (I) was unexposed to cigarette smoke. Experimental set (II) was exposed to cigarette smoke (6 cigarettes) for 1hr /day for 30 days and experimental set (III) was exposed to cigarette smoke along with oral administration of alcoholic bark extract of *Terminalia arjuna* (5 mg/rat/day) for 30 days. The findings showed a significant increase in alanine amino transferase (ALT) and aspartate amino transferase (AST) after exposure to cigarette smoke while, a significant decrease in alanine amino transferase (ALT) and aspartate amino transferase (AST) after exposure to cigarette smoke along with oral administration of alcoholic bark extract of *Terminalia arjuna* in comparison to cigarette smoke exposed rats due to antioxidant and anti-inflammatory activity of *Terminalia arjuna*.

Keywords: Albino rat, Cigarette smoke, Serum enzymes, *Terminalia arjuna*

GENETIC ENGINEERING – AN INNOVATIVE APPROACH FOR MANAGEMENT OF VIRAL DISEASES**RAJSHREE KARANWAL*, RAMJI SINGH****Department of Plant Pathology, SVPUAT, Modipuram Meerut**

Viral diseases are a major threat to world agriculture and breeding resistant varieties against these viruses is one of the major challenges faced by plant virologists, plant breeders and biotechnologists. The development of the concept of pathogen derived resistance gave rise to strategies ranging from coat protein based interference of virus propagation to RNA mediated virus gene silencing. Much progress has been achieved in protecting plants against these RNA and DNA viruses. Most recent transgene based strategies for viral disease management in plants will be discussed. Among the various contributing technologies like, CRISPR, Talens, Zfns and Homing endonucleases, genome editing stands out as one of the most crucial for the progress in gene and cell therapy. The discovery of CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) and the subsequent evolution of genetic engineering technology have markedly expanded the field of target-specific gene editing. The CRISPR system has demonstrated wide applicability to effective genome editing of various biological systems. The development of CRISPR-based base editing has enabled directional cytosine-to-thymine and adenine-to-guanine substitutions of select DNA bases at the target locus. Subsequent advances in prime editing further elevated the flexibility of the edit multiple consecutive bases to desired sequences. TALEN have since been largely replaced by the CRISPR technologies which are somewhat easier to build, much easier to multiplex, and have spawned multiple derived techniques. Nevertheless, the flexible and precise positioning of TALEN is unmatched.

Keywords: Coat-Protein, CRISPR-Cas9, Talens, Viral diseases, Zfns, Homing Endonucleases.

ENTOMOPATHOGENIC NEMATODE: AS BIOLOGICAL CONTROL AGENT FOR SUSTAINABLE AGRICULTURE**RAJSHREE KARANWAL*, RAMJI SINGH****Department of Plant Pathology, SVPUAT, Modipuram Meerut**

Entomopathogenic nematodes (EPNs) are soil-dwelling parasitic roundworms commonly used as biocontrol agents of insect pests in agriculture. Agriculture is vital to India's economy. Insect infestation significantly reduces agricultural crop productivity. To satisfy the demands of India's and other emerging countries' growing populations, the Indian agricultural system requires sustainable agricultural production for future generations. Entomopathogens as bio-pesticides are a safe, natural, and cost-effective alternative to replace those dangerous chemical pesticides. Due to a lack of innovative advancements in research and policies in India, there are currently few entomopathogenic formulations commercially available, which are insufficient to fulfill farmer demand. Particularly compared to synthetic chemical pesticides, entomopathogen production and usage are minimal. The entomopathogenic nematodes of the genera *Steinernema* and *Heterorhabditis* have capacity to manage insect pests mutually and interact with bacteria of the genera *Xenorhabdus* and *Photorhabdus*. *Steinernematidae* is represented by the genera *Steinernema* and *Neostenernema* and *Heterorhabditidae* is represented by the genus *Heterorhabditis*. They are associated with mutualistic bacteria in the genus *Xenorhabdus* for *Steinernema* and *Photorhabdus* for *Heterorhabditis*. Thus, it is a nematode bacterium complex that works together as a biological control unit to kill an insect host by penetrating the host through natural opening and there by releasing the bacterial symbiont which spread and multiply in the haemolymph of the insect pest and kill them by septicemia. Infective juvenile entomopathogenic nematode locate their hosts in soil by means of two strategies-ambusing and cruising. Nematode employs different foraging strategies to locate and infect hosts. The use EPNs can also offer a cost-effective alternative to insect-pest control and increase agricultural productivity in an environmentally responsible manner.

Keywords: Entomopathogenic nematodes, biopesticide, biological control, *Xenorhabdus*, *Photorhabdus*.

THE INFLUENCE OF VARIOUS BOTANICALS ON MANAGEMENT OF ROOT- KNOT NEMATODE (*MELOIDOGYNE JAVANICA*) IN TOMATO**RAJU DHAYAL*, SEEMA YADAV* B.S. CHANDRAWAT**AND MONIKA MEENA*******Rajasthan College of Agriculture, MPUAT, Udaipur- 313001 (Rajasthan)******Department of Nematology, SKN College of Agriculture, Jobner, Jaipur**

Tomato (*Solanum lycopersicum*) belongs to the family Solanaceae, it is an important vegetable crop and grown all around the world. Its cultivation is influenced by various biotic & abiotic factors and among biotic, plant parasitic nematodes (PPNs) are important pest. About 23 per cent yield losses has been estimated in tomato crop due to PPNs. Owing to harmful impact of various nematicides, the present study has been designed to investigate the role of various botanicals on management of root-knot nematode, *Meloidogyne javanica* in tomato. The experiment was conducted in field to test the efficacy of botanicals [garlic clove (*Allium sativum*), parthenium leaves (*Parthenium hysterophorus*), aak leaves (*Calotropis gigantea*), daturaleaves (*Datura stramonium*), marigold leaves (*Tagetes erecta*) and neem leaves (*Azadirachta indica*) against the root-knot nematode, *M. javanica* on tomato. Botanicals were used as root dip treatment @ 10% concentration on different time interval i.e., at the time of transplanting, 20 and 40 day after transplanting The experiment was harvested after 60 days of transplanting and observation was recorded on plant growth parameter (shoot length, shoot weight, root length and root weight) and nematode reproduction (no. of galls per plant, no. of egg masses per plant, no. of eggs per egg mass and nematode juvenile per 200gm soil). As results showed that the neem leaves at @ 10 per cent concentration was found best treatment in improving plant growth characters and significantly reduced reproduction of root-knot nematode on tomato, closely followed by parthenium leaves and garlic clove, which also had almost similar impact in plant growth and nematode reproduction parameters.

Keywords: *Solanum esculentum*, *Meloidogyne javanica*, Botanicals.

COMPREHENSIVE ANALYSIS OF QUANTITATIVE TRAITS AND GENE EXPRESSION PATTERNS IN POTATO CULTIVARS WITH EMPHASIS ON ANTHOCYANIN CONTENT

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This study delves into the intricate dynamics of quantitative traits and gene expression patterns in various potato cultivars, focusing particularly on anthocyanin content. Through rigorous analysis, it was observed that all examined quantitative traits displayed significant variance across all cultivars. Notably, cultivars CGCU-DF-02 and CGCU-JL-05 exhibited high anthocyanin content, whereas others showed none. Comparative gene expression analysis, particularly involving DFR, C4H, and ANS genes, revealed nuanced differences between cultivars CGCU-JL-05 and CGCU-JT-06. Localization studies indicated distinct subcellular localization patterns for the proteins encoded by these genes. Furthermore, gene activation mechanisms were elucidated, highlighting the prevalence of light-responsive cis-acting elements. Cluster analysis identified distinct gene family clusters, with DFR predominantly found on chromosome 1 and C4H and ANS on chromosomes 4 and 9, respectively. Additionally, a set of highly effective markers was identified, which can aid in the differentiation of anthocyanin-containing genotypes and be utilized in marker-assisted breeding programs and QTL mapping to enhance anthocyanin content. Overall, this comprehensive analysis provides valuable insights into the genetic and molecular mechanisms underlying anthocyanin regulation in potato cultivars, paving the way for future breeding strategies aimed at improving anthocyanin content.

HEALTH IMPACT OF YOGA ASANAS AND PRANAYAMA

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Yoga an ancient practice derived in India encircles a wide variety of method at balancing the body, mind and spirit. Among its key components are yoga asana (posture) and pranayama (breathing exercise), both of which provide countless benefits for physical, emotional and mental well-being. Yoga asanas through their gentle stretching and strengthening move encourage flexibility, enhance muscle tone and improve posture. Regular practice can reduce chronic pain conditions such as back pain and arthritis by improving joint and movability and decrease inflammation. Moreover, asanas stimulate blood circulation which helps in the delivery of oxygen and nutrients to cells promoting overall health. Pranayama technique focuses on managing the breath to improve respiratory function. Deep breathing exercise increase lung capacity, improve oxygen consumption and enhance respiratory relaxation. This not only increase vitality and energy level but also reduce the chance of respiratory ailment such as asthma and bronchitis. Additionally, pranayama induces a relaxation reaction in body reducing stress and anxiety and promoting mental clearness and emotional balance. The collaborate practice of yoga asana and pranayama provide a overall approach to well being and health by promoting a mind body connection practitioner establish greater self -awareness and attention leading to improve stress management and emotional flexibility moreover the meditative feature of yoga promote inner peace and calm enhancing overall quality of life. The benefit of yoga and pranayama are vast and intense by merging yoga into their daily live individuals can experience an intense modification fostering harmony and vitality in body, mind and spirit.

Keywords: Postures, mental peace, fitness, mental focus, energy and vitality

MINERAL STATUS OF FEEDS AND FODDER AND ITS INFLUENCE ON PLASMA LEVEL OF CATTLE IN RED LATERITIC ZONE OF WEST BENGAL, INDIA

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A survey was carried out in red lateritic zone of West Bengal to compare the mineral status in plasma of cattle grazing over red lateritic region. Sufficient number of samples of feeds, fodder and blood were collected from 4 districts of red lateritic zone. The samples were analysed for Ca, P, Cu, Zn, Mn and Fe. Paddy straw was deficient in Ca, P, Zn and Mn in the region. Most of the green and dry fodders were deficient in P, Cu and Zn and were below the critical level. Majority of the fodders have Mn content above the critical level. Abundance of iron (Fe) in feeds, fodder and tree leaves were many folds higher than the critical level and even some of these fodders and tree leaves have Fe content exceeded toxic level. Most of the tree leaves were deficient in phosphorus, copper and zinc and were below the critical level. Some of the tree leaves were marginally deficient in manganese content and were below the critical level. Estimated blood haemoglobin and plasma Ca values in different categories of Cattle were higher than the critical level. Phosphorus was deficient in plasma of all categories of cattle with the exception of bullock. Cu is deficient in plasma of calf and anoestrus animals. Zinc values in plasma was above the critical level of all types of cattle. Plasma Mn and Fe were higher ($p < 0.01$) in all categories of cattle in this region. Richness of plasma iron is the characteristic features of all cattle of red lateritic zone of West Bengal. The study indicating the overall deficiency of phosphorus in different categories of cattle and there is need of dietary supplementation.

Key words: Minerals, Red lateritic zone, Grazing cattle, Plasma

PHYTOREMEDIATION: A PROMISING STRATEGY FOR ENVIRONMENTAL RESTORATION**RAKESH PANDAY^{1*}, PRABHAT TIWARI¹, SARANSH KUMAR GAUTAM¹, YALAL MALLESH¹, SUMIT SOW², RAMAN CHOUDHARY¹**¹**Department of Silviculture and Agroforestry, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**²**Department of Agronomy, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India**

The accumulation of heavy metals in soil has escalated rapidly due to various natural processes and human activities, particularly industrial operations. Since heavy metals are non-biodegradable, they persist in the environment, potentially entering the food chain through crop plants and eventually accumulating in the human body through biomagnification. Due to their toxic nature, heavy metal contamination poses a significant threat to human health and the ecosystem. Thus, remediating land contamination is of utmost importance. Phytoremediation is increasingly recognized as an effective and environmentally sustainable method for mitigating pollution and restoring degraded environments. This approach utilizes the inherent capabilities of plants to absorb, sequester, and detoxify a wide array of contaminants from soil, water, and air. The primary mechanisms of phytoremediation include phytoextraction, where plants uptake and concentrate pollutants in their biomass; phytodegradation, which involves the breakdown of contaminants through metabolic processes; phytostabilization, where plants immobilize pollutants in the soil; and rhizofiltration, which uses plant roots to absorb or adsorb pollutants from aqueous environments. Phytoremediation offers numerous advantages over conventional remediation methods. It is cost-effective, requires less energy, and minimizes environmental disruption. Furthermore, it contributes to the aesthetic and ecological value of the remediation sites, promoting habitat restoration and biodiversity. However, several challenges impede the widespread adoption of phytoremediation. The process can be time-consuming, often requiring several growing seasons to achieve desired contamination levels. Additionally, the efficiency of phytoremediation is influenced by factors such as climate, soil properties, and the bioavailability of contaminants. Thus, no single approach is sufficient or feasible for the effective clean-up of heavy metal-polluted soil. A combination of methods, including genetic engineering, microbe-assisted techniques, and chelate-assisted approaches, is essential for achieving highly effective and comprehensive phytoremediation in the future, aiming towards sustainable and long-term environmental restoration.

Keywords: Biomagnification, Environmental restoration, Heavy metal, Phytoremediation, Rhizofiltration**EFFECT OF RDF AND MICRONUTRIENTS TREATMENT ON POST-HARVEST CHANGES IN GUAVA****RAKHI GAUTAM¹, PRATIBHA², A.K. SINGH³ AND OMVEER SINGH⁴****G. B. Pant University of Agriculture and Technology, Pantnagar 263145 U.S. Nagar, Uttarakhand, India**

Guava (*Psidium guajava* L.) is an important subtropical fruit crop that possesses both medicinal and nutritional values. This fruit crop is incredibly popular because it is one of the considerable sources of pectin, ascorbic acid, phosphorus, calcium, and contains enough thiamine and riboflavin. It is a climacteric fruit. It has shorter shelf life due to higher water content, higher sensitivity, perishability, decay and higher rate of softening leading to post harvest losses thereby serves as a constraint for commercialization. Thus a study was conducted to study the effect of RDF and micronutrient treatment on post-harvest changes in guava var. L-49. However, the nutrient levels were 100, 75, 50 and 25% recommended dose of fertilizers (RDF) under Tarai condition of Uttarakhand during the year 2023. The RDF for guava under the present investigation was assumed to be 450, 400 and 300 g NPK/plant/year and the micronutrient application of Zn₂SO₄ (1%), CaCl₂ (0.5%), FeSO₄ (0.5%) and H₃BO₄ (0.2%). Both the RDF and micronutrients influence the post harvest life of guava fruit. Several biochemical parameters of the fruit were influenced such as the TSS, acidity, ascorbic acid, fruit weight, reducing sugar, shelf life etc. But the best treatment in terms of enhancing the shelf life and quality of fruit was T₅ (75% RDF + Two foliar sprays (1% Zn₂SO₄ + 0.5% CaCl₂ + 0.5% FeSO₄ + 0.2% H₃BO₄).

Keywords: Climacteric fruit, RDF, micronutrients, shelf life**EVALUATION OF PHARMACOLOGICAL POTENTIAL OF FUNGAL ENDOPHYTES INHABITING MEDICINAL PLANTS****RAKHI KUMARI SINGH & ISHWARI PRASAD GUPTA****University Department of Botany, Dr. Shyama Prasad Mukherjee University, Ranchi, Jharkhand**

Microorganisms which colonize the intracellular spaces within the plant tissues are known as endophytic microbes. They do not exert any adverse effect on plant tissues. The world population is currently facing devastating diseases that affects human beings. Pathogens are getting resistant to commercial antibiotics, thereby limiting the therapeutic potential and effectiveness of antibiotics. The need to search for nontoxic, affordable and novel natural bioactive compounds from medicinal plants associated endophytes is therefore essential in developing new drugs which are multifunctional to meet the human needs. These fungal endophytes produce valuable bioactive metabolic compounds with anticancer, antimicrobial, anti-inflammatory, antitumor, antidiabetic properties, etc. The important bioactive compounds include taxol, pestacin, camptothecin, podophyllotoxin, ergoflavin, isopestacin, benzopyran, phloroglucinol, salidroside, tetrahydroxy-1-methylxanthone, borneol, methyl peniphenone, dibenzofurane, lipopeptide etc. Despite of being the aforementioned importance of these endophytic fungal metabolites, little information is available about their pharmacological potential and their importance. So, therefore, in this review, we shall elucidate the bioactive metabolic compounds obtained from the fungal endophytes of the medicinal plants.

Keywords: antimicrobial; endophytes; fungal metabolites; medicinal plants; pharmacology

EVALUATING THE IMPACT OF MAIZE AND SOYBEAN INTERCROPPING ON RUNOFF, SEDIMENT UNDER VARIED SLOPE CONDITIONS FOR HIMALAYAN**RAM KUMAR¹, P. V. SINGH¹ AND P. K SINGH²**¹Department of Soil and Water Conservation Engineering, College of Technology, G. B. Pant University of Agriculture and Technology, Pantnagar (Uttarakhand) India-263145²Department of Irrigation and Drainage Engineering, College of Technology, G. B. Pant University of Agriculture and Technology, Pantnagar (Uttarakhand) India-263145

The study investigated the effects of cropping practices and soil slopes on runoff, sediment yield, and nutrient loss in the Himalayan region. It was conducted at the Norman E. Borlaug (CRC) at G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India. The experimental area was divided into three main plots and planted with four different patterns: maize monoculture, barren land, one row of maize alternating with one row of soybean (M1+S1), and two rows of maize alternating with two rows of soybean (M2+S2). The findings showed that steeper slopes led to increased runoff, sediment yield, and nutrient loss. The M1+S1 intercropping pattern significantly reduced these factors compared to the other patterns and the control. Additionally, the study revealed strong correlations between rainfall and the measured variables. These results underscore the importance of effective slope management and advocate for the adoption of M1+S1 intercropping to mitigate soil erosion and nutrient loss in the Himalayan region. The research offers valuable insights for policymakers and farmers on sustainable land management practices in hilly areas.

Keywords: Rainfall, runoff, sediment yield, land slope, cropping pattern**VERSATILE TENDU: A TREE OF CULTURAL AND ECONOMIC SIGNIFICANCE****RAM LAKHAN MEENA AND RAJA RAM BUNKER****Ph.D. Research Scholar, Department of Horticulture, RCA, MPUA&T, Udaipur, (Raj.)**

The tendu plant, scientifically known as *Diospyros melanoxylon*, is a tree native to the tropical regions of India and Southeast Asia. It belongs to the ebony family (Ebenaceae) and is renowned for its multifaceted uses and significance in local economies and traditional practices. One of the most notable features of the tendu tree is its durable and flexible leaves. These leaves have long been harvested and used in various ways, most notably in the production of traditional Indian bidis, which are hand-rolled cigarettes. The tendu leaf serves as a natural wrapper for the tobacco, adding a distinct flavor and aroma to the bidi smoking experience. Additionally, tendu leaves are utilized as a sustainable packaging material for various goods, including spices, herbs, and other consumables. The leaves' natural properties make them ideal for packaging, providing protection while allowing for breathability and moisture regulation. The harvesting of tendu leaves is often done sustainably, ensuring that the trees are not overexploited and that the ecosystems they inhabit remain balanced. This practice contributes to local livelihoods, as communities engage in the collection, processing, and sale of tendu leaves as a source of income. Beyond its economic value, the tendu plant holds cultural significance in many regions where it grows. It is woven into traditional practices, rituals, and folklore, further highlighting its deep-rooted connection to the communities that depend on its resources. In essence, the tendu plant represents a harmonious blend of nature's bounty, sustainable livelihoods, and cultural heritage, making it a vital component of the ecosystems and societies it inhabits.

Key words- Tendu leaves, Bidis, Traditional practices, Sustainable harvesting, Packaging material, Economic significance, Cultural significance, Local economies, Livelihoods, Ecosystem**EXPLORING THE POSSIBILITY OF ENDOPHYTIC FUNGI FOR A SUSTAINABLE APPROACH FOR PLANT PRODUCTIVITY****RAM PRASAD****Department of Botany, Mahatma Gandhi Central University, Motihari-845401, Bihar, India**

Root colonizing endophytic fungus *Piriformospora indica* (*Serendipita indica*) has been isolated from the rhizosphere soil samples of spineless cacti and *Cenchrus* sp (desert grass) growing in North-West Rajasthan, India. The fungus was named *Piriformospora indica* based on its characteristic pear-shaped chlamydospores. According to the analysis of 18S rDNA and the ultrastructure of the septal pore, its phylogenetic relationship within the Hymenomycetes (Basidiomycota), order Sebaciniales. *P. indica* is a potential candidate to serve as biofertilizer, bioprotector, bioregulator, bioherbicide/weedicide, combats environmental stresses (chemical and physical), nutrient uptake, plants to survive under water, temperature and salt stress, confers (systemic) resistance to toxins, heavy metal ions and pathogenic organisms, stimulates growth and seed production and an excellent source for the hardening of the tissue-culture raised crops/plants. The fungus could be mass multiplied on cheap and simplified medium and tested plants (more than 145) were promoted as a result of early intervention with symbiotic fungus. Studies have also pointed out that the fungus also helps in better survival and establishment of tissue culture raised plants (agent for biological hardening). The soil treated with fungal bioinoculant, promoted the growth of the grass, turned greener, early flowering and seeding were set in, whereas, in the untreated soil plants failed to grow. The fungus has great potential for nano mediated application in agro-forestry, flori-horticulture, arboriculture, viticulture and especially for better establishment of tissue culture raised plants- much needed for the application in plant industry. This would open up numerous opportunities for the optimization of plant productivity in both managed and natural ecosystems, while minimizing risks of environmental damage. The increasing interest in this fungus worldwide will lead to novel information that will disclose potential agronomical and biotechnological applications.

HISTOLOGICAL, BEHAVIORAL, AND MORPHOLOGICAL IMPLICATIONS OF BENZOPHENONE-3 ON *CYPRINUS CARPIO***RAMAN SINGH AND RESHMA SINHA****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, Kangra**

Benzophenone-3 (also known as oxybenzone, 2-hydroxy-4-methoxybenzophenone, or BP-3) has been sold as a sunscreen ingredient for more than 40 years and is being used as an ultraviolet-curing agent in sunglasses, flavouring ingredients, fragrance enhancers, perfume fixatives, additives for plastics, coatings, and adhesive formulations. Many previous studies have reported the harmful effects of BP-3 in aquatic environments. The study investigates the chronic toxicity of BP-3 on *Cyprinus carpio* (size-12cm±2cm, weight-15g±2g). For 30-day carp (n=20) were exposed to 0.389mg/L of BP-3, equivalent to 1/10th 96h LC₅₀ concentration. The study concludes that chronic concentrations of BP-3 exhibit different histological alterations of eyes, and behavioural and morphological changes in the sampled organism. Stress led to changes in the histology of the eye, characterized by reduced retinal pigmentation and rupture of the pigment epithelium. The organism exhibits behavioural and morphological changes including air gulping, loss of scales, body colour fading, disrupted continuous movements (freezing behaviour), mucus secretion, and occasional hyperactivity under specific circumstances. The findings indicate that BP-3 may disrupt aquatic organisms' behaviour and morpho-physiology, underscoring the need for more investigation into the possible health effects of this compound.

Keywords: Benzophenone, effect, freshwater fishes, personal care product, ultraviolet.**PERFORMANCE EVALUATION OF THRESHING OF AJWAIN AND ONION SEEDS BY A PTO OPERATED MULTI-CROP THRESHER****RAMESH BEERGE^{1*}, SACHIN DEVARMANI² VIVEK S. D.³**¹Assistant Professor, Dept of Agri. Engg., College of Agri., Vijayapura, UAS, Dharwad, Karnataka²Senior Research Fellow, FMTC, College of Agriculture, Vijayapur, UAS, Dharwad, Karnataka³Vivek S. D. RARS, Vijayapura, University of Agricultural Sciences, Dharwad

The Multi-crop Thresher was developed at Farm Machinery Testing Center, College of Agriculture, Vijayapur with the aim of enhancing efficiency and versatility while reducing labor requirements and operational costs. Its design incorporates advanced features such as adjustable cylinder speed, concave clearance, efficient cleaning mechanisms, and safety features to ensure optimal performance and operator safety. The thresher's compatibility with a range of crops of size as small as onion seeds to as big as maize including ajwain, makes it a versatile solution for farmers with diverse cropping patterns. The field testing performance of the developed multicrop thresher was conducted at farmers field, Hittinahalli for the ajwain and onion seeds. The results showed that threshing efficiency was consistently high as compared to manual threshing, averaging 91.53% for ajwain crop and 88.97 % for onion seeds, with minimal grain loss recorded as 12.4% and 13.6 %, respectively. Cleaning performance was also commendable, achieving 94.91% for ajwain crop and 93.28 % for onion seeds of efficiency while maintaining low levels of unthreshed and spilled grains. These results underscore the thresher's ability to deliver high-quality output while maximizing productivity. The PTO operated Multicrop Thresher presents a promising solution for ajwain and onion farmers, offering increased efficiency, cost savings, and improved crop quality. By mechanizing the threshing process, farmers can reduce reliance on manual labor, optimize resource utilization, and enhance overall farm profitability. The successful development and performance evaluation of the Multicrop Thresher highlight its potential to revolutionize harvesting practices and contribute to sustainable agricultural development.

Key words: multi-crop thresher, Ajwain, Onion seed, Threshing efficiency, cleaning efficiency**IMPACT OF MSP IN INDIAN AGRICULTURAL FARMING****RAMESH CHAND BUNKAR^{1*} AND LAKSHEETA CHAUHAN²**¹PhD Scholar, Division of Dairy Extension, NDRI, Karnal. 132001 (HR)²Ph.D Scholar, Department of Extension Education, RCA, MPUAT, Udaipur. 313001 (Raj.)

Minimum Support Price (MSP), a key component of India's agricultural policy framework, aims to provide price assurance to farmers for their produce, thereby ensuring income stability and food security. Through a comprehensive review of literature, government reports, and empirical data, this study investigates the implications of MSP on various aspects of Indian agricultural farming, including production patterns, cropping choices, input use, income distribution, and market dynamics. Furthermore, the abstract analyzes the effectiveness of MSP in achieving its intended objectives, considering factors such as price distortion, procurement mechanisms, implementation challenges, and unintended consequences. Additionally, the abstract explores the evolving role of MSP in the context of broader agricultural reforms, such as liberalization, globalization, and technological advancements, and assesses its relevance and sustainability in the face of changing economic, environmental, and social dynamics. By shedding light on the complexities and nuances of MSP in Indian agriculture, this study aims to inform policymakers, researchers, practitioners, and stakeholders about the opportunities and challenges associated with price support mechanisms and stimulate discussions on strategies for enhancing the effectiveness and equity of agricultural policies in India.

Keywords: Agriculture, Farming, Impact, Minimum Support Price

ASSESSMENT OF GENETIC DIVERGENCE THROUGH CLUSTER ANALYSIS IN CHILLI (*CAPSICUM ANNUM* L.)**RAMESHWAR DAYAL¹, G.C. YADAV², HIMANSHU SINGH³, JAYSHREE SINGH³ AND HAREESH KUMAR MAURYA²**¹Department of Vegetable Science, College of Horticulture and Forestry, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India²School of Agricultural Sciences and Technology, Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India³Department of Vegetable Science, College of Horticulture, Banda University of Agriculture and Technology, India

Chilli crop development has so far been accomplished by utilising the existing sources of variability. Estimates of divergence across 36 chilli genotypes found that they differed significantly. The present experiment was conducted at Main Experiment Station of Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Ayodhya (U.P.) during Rabi 2019- 20. Experimental material for the study consisted of 36 genotypes including one checks (KA-2). The clustering pattern of the thirty-six genotypes were grouped into ten different non- overlapping cluster. The Maximum inter cluster distance was observed between cluster X and IV which may be used for hybridization and desirable segregates in segregating generation. As a result, it may be assumed that selecting for these features will be useful to future chilli improvement efforts. Further, one or two promising genotypes from different clusters may be chosen for further genetic studies.

Keywords: Chilli, Cluster, Divergence**INFLUENCE OF GOLD NANOPARTICLES ON VEGETATIVE GROWTH, FLOWERING PARAMETERS AND OIL YIELD IN CALENDULA (*CALENDULA OFFICINALIS* L.)****RANJAN K. SRIVASTAVA*, SATISH CHAND, B.D. BHUJ, AJIT KUMAR AND VERSHA GOSHWAMI****Department of Horticulture, G.B. Pant University of Agriculture & Technology, Pantnagar-263 245, INDIA**

Gold nanoparticles enhance growth and yield in various field crops and present an effective alternative to other traditional methods for increasing yield qualitatively and quantitatively. Calendula has ornamental as well as medicinal importance and hence increased growth for higher flowering is a primary goal. Gold-nanoparticles influence growth, flowering and seed yield of calendula. Keeping in view, an experiment was conducted to find the most suitable concentration of gold nanoparticles (AuNPs) for optimum growth, flowering, maximum seed and oil yield in calendula. Experiment consisted of four treatments (5, 10, 15, 20 ppm gold-nanoparticles as foliar application) along with control and was laid out in Randomized Block Design with four replications. Vegetative growth, flowering and seed yield parameters were positively affected by nanoparticles treatment. Among the various treatments, application of 10 ppm of gold-nanoparticles was found best for most of the parameters viz., plant height (73.95 cm), plant spread (54.62 cm), number of leaves (127.55), days to flowering (30.85 days), total number of flowers per plant (131.30), flower diameter (7.06 cm), fresh flower weight (4.31 g), flowering duration (105.15 days), flower yield per plant (565.90 g), estimated flower yield (28.0 tons/ha) and seed weight per plant (35.73 g) and hence may be recommended for higher flower and seed yield and oil recovery in calendula.

Key words: Calendula, gold-nanoparticles, growth, flowering, seed yield**MANAGEMENT OF OKRA ROOT ROT PATHOGEN, *RHIZOCTONIA SOLANI* THROUGH FUNGICIDES****RANJANA MEENA^{1*}, DR. R. P. GHASOLIA², RAJA RAM BUNKER³, KEWAL CHAND⁴**¹Ph.D. Research Scholar, Department of Plant Pathology, SKN College of Agriculture, Jobner-303328 (Jaipur-Rajasthan), India²Associate Professor, Department of Plant Pathology, SKN College of Agriculture, Jobner-303328 (Jaipur-Rajasthan), India³Ph.D. Research Scholar, Department of Horticulture, MPUAT College of Agriculture, Udaipur-208002 (Udaipur -Rajasthan), India⁴Ph.D. Research Scholar, Department of Plant Pathology, SKN College of Agriculture, Jobner-303328 (Jaipur-Rajasthan), India

Okra or lady's finger [*Abelmoschus esculentus* (L.) Moench] which is known as "Bhindi" in Hindi, is one of the most important summer vegetables of Rajasthan as well as India and belongs to the family *Malvaceae*. Earlier, its botanical name was *Hibiscus esculentus* (L.) under the section *Abelmoschus* of *Hibiscus*. The section *Abelmoschus* was subsequently proposed to be raised to the rank of distinct genus. The wider use of *Abelmoschus* was subsequently accepted in the taxonomic and contemporary literature. The genus *Hibiscus* created after the characteristics of the calyx, spatulate, with five short teeth connate to the corolla and caducous. Seven fungicides were tested under *in vitro* and *in vivo* conditions against root rot pathogen and among these, the combined formulation of captan + hexaconazole was found the most effective *in vitro* followed by tebuconazole + trifloxystrobin, penflufen + trifloxystrobin and fluxapyroxad + pyraclostrobin. Similar trend of effectiveness was also observed under field conditions. The seed application of captan + hexaconazole (2 g/kg seed) was recorded highly effective in reducing disease incidence and in increasing pod yield of okra followed by tebuconazole + trifloxystrobin (2 g/kg seed), penflufen + trifloxystrobin (2 g/kg seed) and fluxapyroxad + pyraclostrobin (2 g/kg seed).

Keywords: Inoculation, Corolla, fungicides, *in vitro* and *in vivo*

INDUCING VARIABILITY IN TUBEROSE VARIETIES THROUGH GAMMA IRRADIATION FOR BROADENING CONSUMERS' CHOICE**RANJEET SINGH*, RANJAN K SRIVASTAVA, B.D. BHUI, JASPREET KAUR, SATISH CHAND****Department of Horticulture, G.B. Pant University of Agriculture & Technology, Pantnagar, India*****KVK, ICAR-IVRI, Izatnagar, Bareilly, India**

The present investigation was conducted at Model Floriculture Centre of the University, during 2021-22 and 2022-23. The experiment was laid out to study the effect of different doses of gamma rays (1.5 - 4.0 Kr) in tuberose varieties, Suvasini and Prajwal to isolate and evaluate desirable mutants in vM₁ & vM₂ generations along with survey at producer, consumer, and florist levels for requirement/acceptability of newer traits through questionnaire. The bulbs of uniform size were treated with six doses of gamma rays along with one untreated control. The study revealed that vegetative characters like days taken to 50 per cent sprouting, plant survival percentage, plant height, number of leaves per plant, length, and width of longest leaf as well as number of tillers per plant decreased with increase in the doses of gamma rays. No bulb sprouting was recorded at 3.5 Kr dose of gamma radiations in Suvasini (V₁) and with 4.0 Kr in Prajwal (V₂) however, very less germination (5%) was observed in both the varieties at doses beyond 3.0 Kr. Moreover, early spike emergence and first floret opening, length of spike, rachis length, and number opened florets were recorded maximum at 2.0 Kr dose of gamma rays. The number of florets per spike, number of unopened florets and blooming duration was maximum at 2.5 Kr. However, the size and length of basal florets along with days to full bloom, was highest at 3.5 Kr. gamma doses. Among yield parameters the number of bulbs and bulblets per plant was noted maximum at 2.0 Kr rate of gamma radiation. However, at 2.5 Kr dose of radiation diameter of the bulb, weight of largest bulb and weight of bulblets per clump was recorded highest. The study revealed that consumers had choice for tuberose varieties with novel traits of the spike, flower and other marketable characters and promoting tuberose market which can be attained with 2.0 Kr and 2.5 Kr gamma radiation exposures as these doses had stimulating effect for obtaining desirable marketable characters viz. number of tillers, early spike initiation, rachis length and for all yield parameters of tuberose bulbs.

ASSESSING THE DIVERSITY OF MOSQUITOES IN THE RIVERSIDE VILLAGES ALONG THE BANSHLAI RIVER AND THEIR ROLE IN TRANSMISSION OF LYMPHATIC FILARIASIS**RANJIT KAPURI* AND MANAS PARAMANIK****Epidemiology, Vector biology and Environmental monitoring Research Units, Entomology Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, Paschim Bardhaman, West Bengal, India.**

Mosquitoes are the most important insect in the world because they serve as vectors for profuse diseases in humans. Approximately half of the world's population is at risk of mosquito-borne diseases including dengue, malaria, lymphatic filariasis (LF), etc. LF is a neglected tropical disease that affects approximately 107 million people worldwide. The study aimed to determine the diversity, and dominance of mosquitoes and their role in the transmission of LF. In a year-long study indoor resting mosquitoes were collected from the human habitations in the villages along the Banshlai river by hand collection method following standard protocols and identified. Mosquitoes were examined for the presence of microfilaria, if any. During the study period, altogether 15 species of mosquitoes belonging to 6 genera were identified. The overall predominant mosquito species are *Culex quinquefasciatus*, *Culex vishnui*, *Culex pseudovishnui*, *Anopheles subpictus*, *Anopheles stephensi*, *Armigeres subalbatus* with a clear seasonal variation in abundance. *Culex quinquefasciatus* is most predominant during summer (36.36%) while *Anopheles stephensi* in monsoon (24.05%) and *Armigeres subalbatus* in the winter (47.70). The overall diversity of mosquitoes is higher in monsoon. Among those species, *Culex quinquefasciatus* is distinguished as the vector for LF in the area. The vector infection rate, infectivity rate, and mean man-hour density were assessed to be 9.14, 1.21, and 40.20, respectively. There is a clear indication that summer is the most advantageous season for LF transmission in the area. Enhanced vector control strategies during summer months can be useful to achieve the sustainable development goal of eliminating LF.

Keywords: Mosquito diversity, *Culex quinquefasciatus*, Lymphatic filariasis, Banshlai river, Seasonal variation.**STATUS OF FISH ASSEMBLAGE STRUCTURE IN THE BANER RIVER: A MAJOR TRIBUTARY OF BEAS RIVER*****RANJNA KUMARI, KUSHAL THAKUR, DANISH MAHAJAN AND RAKESH KUMAR*****Department of Animal Sciences, Central University of Himachal Pradesh, Shahpur, Kangra, Himachal Pradesh**

The Baner River, a significant tributary of the Beas River, sustains diverse aquatic ecosystems crucial for regional biodiversity. Understanding the status of fish assemblage structure in this ecosystem is imperative for effective conservation and management strategies. The aim of the present study was to assess a comprehensive assessment of the fish assemblage structure in the Baner River, analyzing species composition, abundance, distribution patterns, and ecological indicators. Field surveys were conducted at multiple sites along the river, employing standardized sampling techniques to capture representative data. A total of 9 fish species belonging to the 3 families i.e. Cyprinidae, Bagridae, and Mastacembelidae were identified. *Tor putitora* and *Schizothorax richardsoni* was observed as dominant fish species followed by *Mastacembelus armatus*. Results reveal the presence of a varied fish assemblage, comprising only native species. However, certain anthropogenic factors such as habitat alteration, pollution, and overexploitation pose threats to the integrity of this ecosystem. The findings underscore the importance of continued monitoring and conservation efforts to safeguard the health and resilience of fish populations along the Basin of Baner River and its tributaries.

Keywords: Fish diversity, Baner, habitat fragmentation, Conservation, Beas River.

EFFECT OF VARIOUS NANO FORMULATIONS OF NUTRIENTS ON GROWTH, YIELD AND QUALITY OF CABBAGE (BRASSICA OLERACEA VAR. CAPITATA) CV. PRIDE OF INDIA
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SHUATS, Prayagraj, U. P.

A field study was conducted at the Horticultural Research Farm of Horticulture Department, Institute of Agriculture, Nain, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) during the academic years 2021-22 and 2022-23. In this study, we used a randomized block design with 09 treatments (including variations of micro- and macronutrients, biofertilizers and fertilizer Nano formulations) and 3 replications. "The main objective of this study was to evaluate the growth, yield and quality of cabbage grown with different concentrations of different Nano nutrients. The maximum plant height (28.89 cm, 27.42 cm and 28.16 cm) and the number of leaves per plant (20.04 cm, 19.78 cm and 19.91 cm) and maximum plant spread was observed in T2 displayed the most notable plant spread (cm) measurements i.e., (48.12, 45.46 and 46.79 cm) were in T2 Treatment. The height yield attributes of Cabbage are found treatment T2 displayed height of diameter of head was 16.49, 15.95 and 16.22 cm, in weight of trimmed head T2 1113.82, 1022.74 and 1068.28 and total weight of plant without roots (g) is 1212.84, 1119.80 and 1166.32, Head yield per plot (Kg) 10.02, 9.20 and 9.61 in T2 and Head yield per hectare was in T2 is 41.25, 37.88 and 39.57. However, the lowest values of these indicators were in T5. The quality attributes of Head compactness of cabbage in T2 24.84, 25.20, and 25.02 and TSS (°Brix) 5.62, 5.7 and 5.65 T2 displayed the most notable ascorbic acid (mg/100g edible portion) measurements i.e., 43.22, 41.92 and 42.57 mg/100g when compared to the remaining treatments across both years of investigation and in the pooled analysis found were determined in both years and associated with T2 (treatment number 1) with various nano formulations of nutrients with different combinations of micro and micronutrients at the nanoscale. On the other hand, T5 (treatment number 4 changed the mix of micronutrients and micronutrients in Nano preparations) recorded the lowest value for this crop cabbage.

Keywords: Cabbage, Micro, Macro, Nutrients, Nanocomposites, Growth, Yield and Quality.

APPLICATION OF BIO INSPIRED MULTIFUNCTIONAL AND REUSABLE LIP@MFO-GO AND LIP@MFO-CHIT HYBRID ENZYME COMPLEXES IN MELANIN DEGRADATION
RANJU KUMARI RATHOUR
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Skin pigmentation has been evolutionarily inherited by humans under selection pressure of exposer and intensity of sun light. However, difference in skin colour has attributed certain social enigmas among human population. Melanin, a complex brown colour pigment is primarily considered for skin pigmentations. Therefore, cosmetic industries have always in search of oxidative enzymes for melanin degradation and promise a fair complexion. In present study, lignin peroxidase from *Pseudomonas fluorescence* LiP-RL5 has been immobilized on two superparamagnetic nanoparticles, LiP@MFO-GO and LiP@MFO-Chit. The chitosan coated complex LiP@MFO-Chit showed higher melanin decolorization (47.30±2.3 %) in comparison to LiP@MFO-GO nanoparticles (41.60±1.6 %). The antimicrobial potential and minimum inhibitory concentration of synthesized nanoparticles were studied against the pathogenic microorganism *Pantoea agglomerans*, isolated from the skin infection. The inhibitory zone of 6±0.9 mm with 250 µg/100 µl MIC value, and 7±1.5 mm zone with 170 µg/100 µl MIC was recorded with LiP@MFO-GO and LiP@MFO-Chit nanoparticles, respectively. Both the bio-nano complexes, LiP@MFO-Chit and LiP@MFO-GO showed 75.7 and 88.3 % DPPH scavenging activity at a concentration of 180 µg/ml each. The results revealed that, LiP-bio nano complex hybrid is a potential molecule having antimicrobial activity, and can also be used in cosmetics for the development of skin whitening agents.

GENETIC DIVERSITY STUDIES BASED ON ISOZYME PROFILE IN MAIZE INBREDS (ZEA MAYS L.)
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The present study employed horizontal starch gel electrophoresis to analyze isozyme patterns and assess genetic diversity among eight maize inbred lines: CML 142, CML 144, CML 150, CML 176, CML 186, CM 300, CM 400, and CM 600. Six isozyme systems (peroxidase, esterase, acid phosphatase, catalase, amylase, and alcohol dehydrogenase) were utilized for characterization. The genetic distances among the inbred lines were calculated based on the presence or absence of bands, using Nie and Li coefficients. The resulting dendrogram, generated via the unweighted pair group method with arithmetic mean (UPGMA), classified the inbreds into five groups (A, B, C, D, and E). Notably, CM 600 exhibited the least similarity to the other inbreds, with a similarity coefficient of 0.4615 with CML 186, while the highest coefficient (0.8511) was observed between CML 142 and CML 144. The similarity coefficients ranged from 0.46 to 0.85, indicating moderate levels of diversity among the evaluated inbreds. The study concludes that isozyme pattern-based diversity groups could be effectively utilized in hybridization programs to obtain heterotic hybrids. Moreover, the electrophoresis technique demonstrated speed, precision, and minimal environmental effects, further supporting its suitability for genetic diversity analysis in maize breeding programs.

Keywords: Maize, Inbreds, Genetic diversity, Isozyme

FINANCIAL INCLUSION AND ACCESS TO CREDIT: EMPOWERING WOMEN FARMERS IN INDIA***DR. RASHMI DWIVEDI*****Assistant Professor, Department of Economics, NIMS University Rajasthan, Jaipur**

The Central Government has recognized that agriculture, India's largest production activity contributing significantly to the GDP, is increasingly becoming a women's activity, which will help in freeing it from serious problems like gender discrimination and poverty. According to the latest All India Agricultural Census (2015-16) report, the total number of operational holdings in the country has increased from 138.35 million in 2010-11 to 146.45 million in 2015-16, showing an increase of 5.86 percent. The male operational share (except institutional) was 86.0 per cent in 2015-16, while the female share was 14.0 per cent, down from 87.2 per cent and 12.8 per cent, respectively, in 2010-11. This data indicates increasing participation of women in the management and operation of agricultural holdings in the country. Financial inclusion and access to credit are vital components of empowering women farmers in India and promoting gender equality in agriculture. Despite playing a significant role in agricultural production, women farmers often face challenges in accessing formal financial services and credit facilities, limiting their ability to invest in farm inputs, technology, and livelihood diversification. This abstract explores the multifaceted dimensions of financial inclusion and access to credit for women farmers in India. It examines the barriers and constraints that hinder women's participation in the formal financial sector, including limited collateral, lack of financial literacy, and socio-cultural norms. Additionally, the abstract analyzes the role of government policies, programs, and initiatives aimed at promoting financial inclusion and gender-responsive lending practices in the agricultural sector. Furthermore, the abstract highlights successful interventions and best practices from various regions of India, showcasing innovative approaches to expanding women's access to credit and financial services. It discusses the impact of microfinance institutions, self-help groups, and digital banking solutions in reaching marginalized women farmers and empowering them economically. Through case studies and empirical evidence, this abstract demonstrates the transformative potential of financial inclusion and access to credit in enhancing women's agency, productivity, and resilience in agriculture. It underscores the importance of collaborative efforts among policymakers, financial institutions, civil society organizations, and grassroots communities to address systemic barriers and promote inclusive and sustainable development in India's rural areas.

Key Word: Financial inclusion, Women farmers, Agriculture**EFFECTS OF PROBIOTICS IN HEALTH MANAGEMENT****RASHMI GOLEY AND AMAR P. GARG****School of Biological Engineering & Life Sciences, Shobhit Institute of Engineering (Deemed to-be-University), Modipuram, Meerut**

The term “probiotic” was first presented by Werner Kollath in 1953, which is known to be a derivative of the Latin word pro and the Greek word βιο meaning “for life.” Kollath defined probiotics as active bodies with essential functions for promoting various health aspects. They are not an invention but existed in our traditional foods such as beverages, salty fishes, yogurt, different types of cheeses and so on since olden times. Probiotics, like lactic acid bacteria, are non-pathogenic microbes that exert health benefits to the host when administered in adequate quantity. The most important point of them is that they are proven to be safe, cost effective, and could interfere with the microbial infection. In 1994, the World Health Organization deemed Probiotics to be the next-most important immune defense system when commonly prescribed antibiotics are rendered useless by antibiotic resistance. The type of the microbes used as Probiotics increased due to the increase in the research concerning the subject as well as by the increase of the newly discovered and identified microbes, which could be used as Probiotics. Currently, research is being conducted on the molecular events and applications of probiotics. The suggested mechanisms by which probiotics exert their action include; competitive exclusion of pathogens for adhesion sites, improvement of the intestinal mucosal barrier, gut immunomodulation, and neurotransmitter synthesis. It became clear that intestinal microflora had metabolic functions, such as fermenting indigestible dietary residues and endogenous mucus, saving of energy, production of vitamin K, and absorption of ions. Probiotics have roles in epithelial cell proliferation and differentiation, and the development and the homeostasis of the immune system. Due to their capability to modulate gut microbiota and attenuate the immune system, probiotics could be used as an adjuvant in hypertension, hypercholesterolemia, cancer, and gastrointestinal diseases. Considering the functional properties, probiotics are being used in the dairy, beverage, and baking industries. After developing the latest techniques by researchers, probiotics can now survive within harsh processing conditions and withstand GI stresses quite effectively. Thus, the potential of probiotics can efficiently be utilized on a commercial scale in food processing industries.

Keywords: Probiotics, Lactic acid bacteria, Immune system, Gastrointestinal disorders etc.

PROTEIN MODELLING OF HC58 FROM *HAEMONCHUS CONTORTUS* AND ITS *IN SILICO* STRUCTURAL STUDY**RASHMI MISHRA¹, RAJAT GARG¹, PASHUPATHI M², AJAY KUMAR², HIRA RAM¹, M. SANKAR¹**¹Division of Parasitology, ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh²Division of Biochemistry, ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh

Haemonchus contortus, a hematophagous parasite, causes high mortality and economic loss in small ruminants. Control strategies include vaccination, breeding worm-resistant sheep lines, and integrated management. Efforts are ongoing to develop recombinant protein-based vaccines. In the present study, HC58 (a cathepsin B like cysteine protease) mRNA complete cds sequence (AY948978.2) was retrieved from GenBank and expression primers were designed to clone the complete ORF of HC58. The cDNA was prepared from RNA of *H. contortus* was cloned into pET-32a(+) expression system. The recombinant clone of HC58 was sequenced and analyzed using nucleotide-Basic Local Alignment Search Tool (nBLAST) of NCBI and DNASTAR Lasergene software. As the 3D structure of the HC58 protein was not available in the PDB database (both X-ray crystallography and predicted data), we modelled the HC58 protein 3D structure using two methods. One was using “Robetta” server and another by “AlphaFold structure prediction” server. Also, we predicted the 3D structure of Muleke’s Chinese isolate HC58 protein and other closely related cathepsin B like proteases of *Haemonchus* spp. The protein structures were compared for the possible conservativeness. Our Indian isolate HC58 protein was having the secondary structures as 19% helices, 24% sheets and 56% coils with solvent accessibility: 32% exposed, 30% intermediate, 36% in the buried form, whereas, the Chinese isolate was having secondary structures 18% helices, 17% sheets and 64% coils with solvent accessibilities like 30% exposed, 32% intermediate, 36% buried amino acids. The structures relative to active site were also studied in comparison to other cysteine proteases. The structural variations in HC58 of Indian isolate might be due to evolutionary process of the parasite in different geographical locations, which may even alter the pathogenicity of *H. contortus*.

Keywords: *Haemonchus*, HC58, Modelling, Secondary structures, Cysteine protease**FUTURE OF FARMING: USE OF ARTIFICIAL INTELLIGENCE IN NEXT GENERATION AGRICULTURE****RASHMI SAINI****Assistant Professor, Department of Zoology, Gargi College, University of Delhi, Delhi, India**

The demand for food products is increasing globally with the rise in the world’s population. Agriculturalists face many obstacles in their quest to maximize yields. To optimize the outputs, agriculturalists must overcome many obstacles. New technologies were developed to combat many issues faced by the agriculture sector, such as pest infestation, crop diseases, crop management, irrigation, infertile soil, field monitoring, and climate monitoring. In order to forecast practical answers to these issues and develop sustainable agricultural methods, artificial intelligence (AI) was first reported for application in agriculture in 1983. Agriculture saw a golden revolution with the introduction of digital technologies like artificial intelligence (AI) and the Internet of Things (IoT). It has mostly concentrated on sustainable development, which is vital to our survival. AI has successfully decreased the usage of chemicals in fertilizers and pesticides, which was the main contributor to soil erosion and infertility. Everything is made convenient, from the use of satellites for data transmission to the use of drones for field observation. AI-based methods yield remarkably precise results for plant disease diagnosis and weather predictions. Technologies are being used to advance the food business and the agriculture sector, which has tremendous growth potential in the next generation agriculture. Local farmers can now make better judgments about their farming operations since AI gives them access to a multitude of tools and information. This includes knowledge on the best times to plant, how to maintain healthy soil, how to use water efficiently, and how to deal with pests.

Keywords: artificial intelligence, farming, agriculture, food technologie**STAND DENSITY OF SAL (*SHOREA ROBUSTA*) FOREST IN DEHRADUN, UTTARAKHAND, INDIA****RASHMI T CHAMOLI¹, MANJU RANI², HIMALAYA DEBBARMA³, VILVI⁴, ANIL KUMAR UNIYAL⁵, VIKASPAL SINGH⁶, SANDHYA GOSWAMI⁷ AND MANISH KUMAR⁸**^{1 & 3-8}Deptment of Forestry, Dolphin PG Institute of Biomedical and Natural Sciences, Manduwla, Dehradun, Uttarakhand²Department of Botany, HMTV (PG) College, Raisi, Haridwar, Uttarakhand

The present paper oriented the relationship between crown width and tree diameter for open grown Sal forest in Dehradun so that maximum crown area can be estimated from tree diameter. The relationship of maximum crown area and tree diameter provided crown competition factor. A study area of 10 hector is being taken in both selected sites within which the area has been further divided into 10 equal parts which is of 1 hector each. The CCF model is a tool to evaluate the Crown Competition Factor as a function of measured d.b.h. in a plantation, and, accordingly, decide if a thinning should be done or not yet and design it. Amongst the two selected sites we have taken 100 trees to find out the crown width (CW), maximum crown area (MCA) and crown competition factor (CCF), from the observation and calculating data of both sites we can clearly say that, Asharodi forest have a greater number of trees with more d.b.h. as compare to Manduwala forest. This study establishes the utility of the crown size as the parameter of the growth space utilization directly depends on the crown competition of adjacent trees. The models are also helpful for the artificial thinning design for a even and un-even aged forest and proper layout of the open grown forests, to estimate the tree size crown width (CW) and maximum crown area (MCA) depending on the stand density.

Keywords - crown diameter, crown width (CW), maximum crown area (MCA) and stand density

HORTICULTURAL WASTE AS BIOFUELS**RATAN KUMAR PAL¹, NIRAJ KUMAR PRAJAPATI¹, SANJAY KUMAR¹ AND A K PAL²**¹Department of Horticulture, SAST, Babasaheb Bhimrao Ambedkar University, Lucknow, (U.P.)²Department of Horticulture, IAS, Banaras Hindu University, Varanasi, (U.P.)

As the world continues to grapple with the pressing issue of climate change, the search for sustainable energy sources has become increasingly crucial. One promising solution that has gained traction in recent years is the use of horticultural waste as a feedstock for biofuel production. Horticultural waste, which includes the discarded leaves, stems, and other plant materials generated from gardening and landscaping activities, has long been viewed as a mere byproduct with limited practical applications. However, researchers have uncovered the immense potential of this resource in the biofuel industry. The process of converting horticultural waste into biofuels typically involves the fermentation or thermal conversion of the organic matter. Through these processes, the cellulose and hemicellulose present in the plant material can be broken down into simpler sugars, which can then be further processed into ethanol or other liquid biofuels. One of the key advantages of using horticultural waste as a biofuel feedstock is its abundance and accessibility. In many urban and suburban areas, vast quantities of this waste are generated on a regular basis, often ending up in landfills or being incinerated. By repurposing this waste stream, we can not only reduce the environmental impact of waste disposal but also contribute to the diversification of our energy portfolio.

Keywords: Fermentation, conversion, disposal, energy, waste streams, ethanol.**MANAGEMENT OF BLAST DISEASE OF PEARL MILLET THROUGH NOVEL COMBINED FORMULATIONS OF FUNGICIDES****RATAN LAL SHARMA*, ASTHA SHARMA¹, PINKI SHARMA¹ AND JITENDRA SHARMA²**^{*}Department of Plant Pathology, Agricultural Research Station, (Agriculture University, Jodhpur), Keshwana, Jalore, Rajasthan,¹Department of Plant Pathology, S.K.N. College of Agriculture (SKNAU), Jobner, Jaipur, Rajasthan, India²Department of Plant Pathology, Agricultural Research Sub-Station, (Agriculture University, Jodhpur), Sumerpur, Pali,

The experiment was carried out during at Agricultural Research Station, Keshwana, Jalore is functioning under the jurisdiction of Agriculture University, Jodhpur. Seven different fungicides were evaluated for the management of Blast disease of Pearl millet through spraying twice at 15 days intervals under field conditions. The results showed that the per cent disease intensity revealed that all the fungicides significantly effectively reduced the Blast disease of Pearl millet disease over control. The minimum disease intensity (5.43 %) was recorded with the application of Propiconazole 25% SC @ 0.1 % (1ml/l) with 84.20 per cent decreased disease intensity. However, Tebuconazole 50% + Trifloxystrobin 25 % WG @ 0.04% (0.04g/l) were observed to be second best with 6.17 per cent disease intensity with 82.05 per cent decreased intensity. Carbendazim 12% WP + Mancozeb 63% @ 0.25% (2.5g/l) was found least effective with 20.35 per cent disease intensity and 40.70 per cent decreased intensity. The maximum yield (1872.5 kg/ha) was recorded in Propiconazole 25% SC @ 0.1 % (1ml/l) followed by Tebuconazole 50% + Trifloxystrobin 25 % WG @ 0.04% (0.4g/l) with 1780 kg /ha and, respectively. Least yield was obtained with Carbendazim 12% WP+ Mancozeb 63% @ 0.25% (2.5g/l) (1393 kg/ha).

Keywords: Management, Blast Disease, Pearl Millet, Fungicides**CONSTRAINTS FACED BY ENAM PORTAL BENEFICIARIES IN MARATHWADA****RATHOD A. S., DR. DESHMUKH P. R. AND R. P. KADAM****Department of Extension Education, College of Agriculture, VNMKV, Parbhani**

India is considered as one of the fastest growing economies in the world and India is the second largest producer of farm output but there is several challenges for marketing of agricultural produced such as fragmentation of state into multiple market areas. Integration of APMCs across the country through a common online market platform to facilitate pan-India trade in agriculture commodities, providing better price discovery through transparent auction process based on quality of produce along with timely online payment. Hence, The National Agriculture Market or e-NAM was introduced in India for promoting uniformity in agriculture marketing by streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real time price discovery based on actual demand and supply of agricultural produce National Agriculture Market (e-NAM) has recently updated with two new software so that farmers need not have to travel a long distance to sell their harvest. Through the new updates, the farmers will be able to access buyers through the mobile software from the nearest warehouses and will be able to connect to the e-NAM from their own collection centres. Currently, e-NAM faces several issues due to both the lack of cooperation from the local governments and parties involved and also due to the limitations in the availability of supportive infrastructures.

PERSONAL AND SOCIO-ECONOMIC ATTRIBUTES OF OF ENAM (ELECTRONIC NATIONAL AGRICULTURE MARKET) BENEFICIARIES**DR. RATHOD A. S. AND DR. P.R. DESHMUKH****Department of Extension Education, College of Agriculture, VNMKV, Parbhani**

The present investigation was carried out in Marathwada region of Maharashtra State to assess the level of personal and socio-economic attributes of the eNAM portal beneficiaries. The respondents those were registered on eNAM portal that was considered for the study. The 20 respondents were selected from each selected APMC. The total numbers of 160 respondents were selected for the present study. Collected data were analysed with the help of suitable statistical methods. It was noticed that majority of respondents were more than three fifth (61.25%) of eNAM beneficiaries were belonged to middle age group, had maximum number of respondent from secondary school category i.e 36.87 per cent, had majority of the eNAM beneficiaries belonged to joint family, had nearly half (48.78%) of the beneficiaries belonged to medium annual income, had majority of beneficiaries were having semi medium land holding, had most of respondents from research area was growing cotton, soyabean, Green gram, chickpea, Wheat, *Kharif* jawar, *rabbi* jawar, Maize, bajra, turmeric etc., had also observed that the more than fifty per cent respondents were medium source of information, had three fourth of eNAM beneficiaries had medium extension contact, had most of beneficiaries were aware about sorting, grading, storage godowns, cold storage and processing unit a facilities provided by the APMCs on eNAM platform, had less than three fifth (58.75%) of eNAM beneficiaries had medium farming experience, had nearly three fifth of the respondent farmers had medium risk orientation and most of eNAM beneficiaries had medium satisfaction.

(Key words-Socio- economic attributes, beneficiaries, eNAM)**DEVELOPMENT AND EVALUATION OF FUNCTIONAL AND NUTRITIONAL PROPERTIES OF COMPOSITE FLOURS****RATNESH KUMAR*, SAMSHER¹, SURESH CHANDRA¹, NEELASH CHAUHAN¹, B.R. SINGH¹ AND VAISHALI²****Faculty of Agriculture, Mangalayatan University, Jabalpur (MP), India****¹Department of Agricultural Engineering, , ²Department of Agricultural Biotechnology, SVPUAT, Meerut (UP), India**

The functional properties like water absorption capacity, swelling capacity, oil absorption capacity, emulsion activity, emulsion stability, foam capacity, foam stability, and bulk density were evaluated. The moisture content of composite flours ranged from 3.93 to 8.60% among all the flours. The highest moisture content was observed in T₆ composite flour (8.60%) while the lowest was in T₁ wheat flour or control (3.93%). The composite flour was prepared in different compositions and ratios. The WAC of the flour varied from 113 to 127.40% among all the types of composite flours. The highest water absorption capacity was observed in T₆ composite flour (127.40%) while the lowest was in T₁ wheat flour or control (113%). The swelling capacity of composite flour decreased with decreasing. The swelling capacity of the composite flours is also affected by the moisture of the flour and the ratio of individual flours, texture, and particle size of the flour.

Keywords: Water absorption capacity, Swelling capacity, Oil absorption capacity, Emulsion activity, Moisture content, pH, Protein and Crude fibre**EFFECT OF DIFFERENT LEVEL OF SALINE WATER IRRIGATION ON GROWTH OF LILUM SPECIES****RAVEENA¹, ARVIND MALIK² AND DIVYA²****¹Department of Horticulture, Maharana Pratap Horticulture University, Karnal****²Department of Horticulture, CCS Haryana agricultural university, Hisar**

The experiment on “Effect of different level of saline water irrigation on growth of lilum species” was conducted in 2021-22 and 2022-23 at the Agritourism Centre CCS HAU, Hisar. In the present study, three species of lilium viz. Asiatic lily, oriental lily and LA hybrid were used with two varieties of each species and four different level of salinity (canal water, 3EC, 4EC and 6EC). The experiment comprised of twenty four treatments, each having three replications and was planted in earthen pots under greenhouse in complete randomized design. The study revealed that among different treatments, maximum weight of bulb per plant, diameter of bulb (cm) was found in canal water followed by 3EC saline water irrigation whereas, minimum was observed in 6EC saline water irrigation. Among different species, maximum weight of bulb per plant, diameter of bulb (cm) was recorded in Oriental lily var. Siberia whereas maximum number of bulblets per plant LA hybrid var. Albuifelara and minimum was found in Asiatic lily var. Colaris.

Keyword: Salinity, polyhouse, bulb, species, weight**BIODIVERSITY LOSS AND HUMAN HEALTH****Prof. Ravi Kumar****(HOD) Department of Zoology, Narain College, shikohabad ,Distt.- Firozabad -205135(U.p)**

One of the principal consequences of loss of species is serious threat for survival of mankind . Loss of biodiversity reduces the opportunity to select the medical models and natural products of medicinal properties . This is turn would hinder the the right treatment and cure of many human diseases. Loss of many plant and animal species may also decrease the availability of natural materials required in paper, pulp, paint, leather, drug and other industries . Recent data indicate that biodiversity loss would also diminish the availability of certain new genetic resource in wild. Deforestation , unmanaged industrialization and over exploitation of other natural resources have brought to certain species (having biochemical and physiological similarities with human body) at the risk of extinction . The study of certain chemical substances of animal origin such as alkaloids of the frog toxin, ingredients of shark cartilage and squalamine from the dogfish tissue may provide clues for the synthesis of new therapeutic elements for the treatment of some human disease inclung Alzheimer, tumors and other bacterial disease . Some of the plants been used as medicine in the different parts of the globe since time immemorial now are on the verge of extinction.

PHYSICO- CHEMICAL STUDIES ON RURAL AREAS OF GROUND WATER OF MATHURA DISTRICT OF UTTAR PRADESH (INDIA)**RAVI PRAKASH¹, NEELESH KUMAR PANDEY² AND R. B. SINGH³**^{1,2}Department of Chemistry, B.S.A. College Mathura, U.P (India)³Scientist 'C' UGC, Department of Zoology, School of Life Sciences, Dr. Bhimrao Ambedkar University, Khandari Campus, Agra, U.P (India)

The most important natural resource for life is water. In order to meet life's necessities, ground water is crucial. The examination of the physico-chemical parameters of the numerous ground water bodies in the Mathura district area, where the marble and cement industries are the dominant businesses. It is necessary since ground water is the primary source of drinking water for the municipality. The quality of drinking water will be improved by the current analysis. The promotion of human health standards is significantly aided by water quality. The current study aims to evaluate the physio-chemical parameters of ground water in order to determine its quality. Samples of the ground water were taken from the several communities in the district of Mathura rural areas. On the basis of 25 distinct villages in the Mathura district, they recorded and compared their physio-chemical parameters, including electrical conductivity, pH, total alkalinity, TDS, chloride, fluoride, nitrate, and total hardness. The Scott- Sanchis (visual) method, the SPADNS method, the titrimetric, titration and colorimetry methods were all used to study the analysis. The results of the water quality testing in these particular areas were compared to BIS and WHO criteria. Some of the analysis areas were found to have excessive levels of EC, TDS, and fluoride. The study indicates the present state of the water quality in that location and integrating them is crucial to determining and maintaining the quality of the groundwater of rural area of Mathura district (UP), India.

Keywords: Drinking Water, Ground Water Quality, physio chemical studies, Mathura District, SPADNS method, Titrimetric, Titration and Colorimetry Method).

CONSTRAINTS AND SUGGESTIONS OF AGRI INPUT DEALERS IN AGRO ADVISORY SERVICES IN LOCALE GAYA, BIHAR**RAVI SHANKAR¹ & DR. DIPAK KUMAR BOSE²**¹Research Scholar, Dept. of Ag. Extension, S.H.U.A.T.S, Prayagraj & ²Associate Professor, Dept. of Ag. Extension, S.H.U.A.T.S, Prayagraj, Uttar Pradesh

Agriculture is an input intensive sector where numerous agri-inputs are required for production. To meet these ever increasing demands input dealers provide them with inputs such as seeds, fertilizers, pesticides etc. The study was done in Gaya district of Bihar with a sample size of 320 respondents. Garrets ranking was used for analysis. A comprehensive overview of the challenges faced in providing agro-advisory services is categorized into six main areas: Personal problems, Socio-economic problems, Technological problems, Supply, Communication, and Marketing problems, Situational problems, and Infrastructural problems. The major constraints notified among personal problems were inadequate technical qualification of input dealers in agro-advisory services (GMS-52.07), among socio economic problems lack of belief in agro-advisory services given by input dealers among farmers was ranked highest (GMS-55.26), among technical problems lack of feasibility and simple recommended technologies was observed highest (GMS-52.10), among Supply, Communication and marketing problems lack of market intelligence at various levels in providing market information to the farmers was noted (GMS-53.54), among situational problems lack of information on climate change /variability before advising farmers was observed (GMS-54.58), considering infrastructural problems transportation problem (cost and vehicle availability) while giving field visit to the farmers field was highest (GMS-51.59). Identifying major constraints directs focus areas for training need assessment.

Keywords: Constraints, Agri-input dealers, Garrett mean Score (GMS), Gaya.

MANAGEMENT OF PANAMA WILT DISEASE OF BANANA BY STEM INJECTION**RAVIKUMAR M. R. AND GANAPATHI, T***

Department of Plant Pathology, *Department of Horticulture, College of Agriculture, Hanumanamatti, University of Agricultural Sciences, Dharwad, Karnataka, India

The field experiment was conducted on management of panama wilt disease of banana in farmer's field, Kakol, Ranebennure and Rattihalli talukas of Haveri district for two season during *Kharif* -2022 and *Kharif* 2023. Different fungicides were tested for effective control of Panama wilt disease of banana. The banana variety G-9 (Grand -9) was used for the study. The experiment was laid out in Randomized block design with five treatments with four replications. Panama wilt disease of banana caused by *Fusarium oxysporum* f.sp. *cubense* (Foc), is the most important disease of bananas in India. There is no effective control measure for this disease other than the use of resistant cultivars. The objective of this study was to evaluate newly available fungicides under *in-vitro* and *in vivo* conditions for their efficacy against the responsible pathogen *Fusarium oxysporum* f. sp. *cubense* (Foc). Results shown that stem injection with carbendazim (0.3%) + copper oxy chloride (0.3%) + boric acid (0.3%) 30 ml twice at 20 days intervals has given maximum recovery of 100% after 10-15 days after first injection. However, injection with carbendazim (0.3%) + COC (0.3%), carbendazim (0.3%) + Boric acid (0.3%), Propiconazole (0.1%) + COC (0.3%), Hexaconazole (0.1%) + COC (0.3%) delayed recovery up to 35-45 days. Hence, the treatment with carbendazim (0.3%) + copper oxychloride (0.3%) + Boric acid (0.3%) @ 30 ml per plant twice has the given the maximum (100%) recovery.

A STUDY ON STAKEHOLDERS PERCEPTION AND FARMER ENGAGEMENT IN E-NAM: SURYAPET DISTRICT OF TELANGANARAVIKUMAR S¹, DR.VENKATESH P², GANAVI N R³¹Ph.D. Scholar, Agricultural Economics, University of Agricultural Sciences, Bengaluru,²Principal Scientist, Division of Agricultural Economics, ICAR-Indian Agricultural, Research Institute, Pusa Campus, New Delhi³Ph.D. Scholar, Agricultural Economics, University of Agricultural Sciences, Bengaluru,

The study conducted during 2021 in Suryapet district of Telangana, aimed to analyze the awareness and perception of farmers regarding the electronic National Agriculture Market (e-NAM) and constraints faced by different stakeholders of e-NAM in conducting agricultural marketing practices. Using a multistage random sampling technique, 120 farmers were interviewed, with Telangana chosen for its significance in agriculture and e-NAM implementation. Suryapet district, known for its substantial share in paddy production and efficient e-NAM operations, was purposively selected. Data was collected through personal interviews using a pre-tested schedule. The study employed the percentage, Logit model, and Garrett ranking methods to assess farmers' perceptions, awareness and determinants of farmers participation in e-NAM. Results indicated that while there is general satisfaction with e-NAM's transparency and efficiency, concerns remain regarding pricing, transaction costs, and infrastructure. Factors influencing farmers' participation in e-NAM included family size, education, farming experience, and access to credit. Addressing constraints faced by commission agents and traders, such as taxation and computer literacy, was deemed crucial for e-NAM's effective operation. The study concludes that the implementation of e-NAM in Telangana has significantly transformed agricultural marketing practices, offering both benefits and challenges. To enhance farmer participation and market efficiency, improvements in infrastructure, pricing mechanisms, and farmer education are necessary. The government of Telangana should continue supporting and improving e-NAM through policy reforms and infrastructure development to empower farmers, reduce post-harvest losses, and foster agricultural sector growth.

Keywords: e-NAM, agricultural marketing, awareness, perception, Logit model, Garrett ranking.

FIELD EVALUATION OF PRE-MIX FUNGICIDE (AMETOCTRADIN 25% + METALAXYL 20% WDG) AGAINST LATE BLIGHT DISEASE IN TOMATO

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A field experiment was conducted on management of late blight of tomato at College of Agriculture, Hanumanamatti, Ranebennur taluk, Haveri district for two seasons during *Kharif* -2021 and *Kharif* 2022. Different fungicides were evaluated for effective control of late blight of tomato. The tomato variety Arka Vikash was used as test material. The experimental plots were laid out in Randomized block design with three replications of eight treatments. The application of Ametoctradin 25% + Metalaxyl 20% WDG significantly decreased the late blight disease in tomato. Though, all doses of Ametoctradin 25% + Metalaxyl 20% WDG tested were found effective, the least PDI (5.33%) was observed in the treatment Ametoctradin 25% + Metalaxyl 20% WDG 1000ml/500 l/ha followed by Ametoctradin 25% + Metalaxyl 20% WDG @ 750ml/500 l/ha (13.33PDI). The highest late blight disease severity was recorded in untreated control (40.0 PDI). The maximum yield was recorded in the treatment Ametoctradin 25% + Metalaxyl 20% WDG @1250 ml/ 500 l of water /ha. (21.47 tonnes/ha) and followed by Ametoctradin 25% + Metalaxyl 20% WDG@ 1000ml/ha (20.77t/ha), Ametoctradin 25% + Metalaxyl 20% WDG @ 750ml/500L of water /ha (19.50 tonnes/ha). The minimum yield was recorded in untreated control [14.17 t/ha] respectively.

DEVELOPMENT AND PROCESS CHARACTERIZATION OF MILLET BASED STEAMED CAKERAVINA PARMAR^{1*}, BRIJESH KHANPARA² AND NAVNEET KUMAR³¹Ph.D Scholar, Department of Processing and Food Engineering, CAET, AAU, Godhra, Gujarat²Ph.D Scholar, Department of Farm Machinery and Power Engineering, CAET, JAU, Junagadh, Gujarat³Principal Scientist, ICAR-National Academy of Agricultural Research Management (NAARM), Hyderabad, Telangana

Millet and chickpeas are rich sources of nutrients and bioactive compounds, promoting both nutrition and health. Millet offers non-acidic, high-fiber and easily digestible snack options, complemented by the protein richness of chickpea flour. This study aimed to develop steamed cake using a combination consisting of pearl millet flour, barnyard millet flour and chickpea flour. An optimal mixture design was employed, including varying quantities of pearl millet flour (10-50 g), barnyard millet flour (10-50 g), sodium bicarbonate (1-5 g) and salt (1-5 g) per 100 g of chickpea flour. The fixed parameters like citric acid (3.5 g), sugar (10 g) and water (150 ml) were thoroughly mixed in the formulation of steamed cake. The physicochemical and sensory-quality attributes, such as appearance, color, taste and overall acceptability were evaluated. The optimization was performed using response surface methodology. The optimized product exhibited expansion of 1.67 cm, density of 0.403 g/cm³, moisture content of 54.22%, color parameters (L* 33.33, a* 0.45 and b* 24.83), pH of 7.82, protein content of 14.46%, carbohydrate content of 59.97% and overall acceptability score of 8.4 on the 9-point hedonic scale. The sensory attributes of all treatment combinations scored higher than the cutoff score of 5. This study not only demonstrates the nutritional potential of millet and chickpeas but also showcases innovative culinary applications, offering promising avenues for gluten-free, fiber and protein-enriched food products.

Keywords: Steamed cake, Pearl millet, Barnyard millet, chickpea flour, Gluten-free, High-fiber, Protein-enriched

SOIL QUALITY UNDER PREVALENT CROPPING SYSTEMS IN COLD ARID ZONE OF HIMACHAL PRADESH**RAVINDER KUMAR¹, PRIYANKA KUMARI² AND SUKHDEV SINGH PALIYAL³****Assistant Professor (Soil Science) Abhilashi University Mandi (H.P.) India¹****Assistant Professor (Agronomy) Abhilashi University Mandi (H.P.) India²****Principal Scientist (Soil Science) CSK HPKV HAREC Dhaulakuan, (H.P.) India³**

The present investigation entitled “status of soil quality under prevalent cropping systems in cold arid zones of Himachal Pradesh” was carried out with a view to ascertain the physical, chemical and biological properties of soils under prevalent cropping systems viz., maize-wheat, rice- wheat and vegetable based in different agro climatic zones of Himachal Pradesh. On the basis of detailed survey and random sampling, representative 45 soil samples from two depths i.e. 0-0.15 m and 0.15-0.30 m were collected. Soil samples were analyzed for their physical, chemical and biological properties and key indicators were identified using multivariate statistical analysis for computing the soil quality index. Soil reaction across various sites under present study was neutral to slightly alkaline. Higher salt accumulation (EC) was observed under vegetable based cropping systems as compared to those of cereal based. Organic carbon was medium to high and available N, P and K contents were in low to medium category in arid zone. Organic carbon and available and total N P and K contents were higher under the vegetable based cropping systems than cereal based. DTPA Fe, Mn, Zn and Cu were observed sufficient, whereas total Fe, Mn, Zn and Cu were recorded higher in cereal and vegetable based cropping system. Microbial biomass carbon, microbial biomass nitrogen, potentially mineralizable nitrogen and soil respiration were higher. Overall higher soil quality index was observed under vegetable based cropping system as compared to the cereal based cropping systems.

Keywords: Soil quality, cold arid zone H.P.**IMPACT OF URBANIZATION ON ENVIRONMENT****DR. REEMA UPADHYAY****Department of Botany, M.M.H. College, Ghaziabad affiliated by C.C.S. University Meerut,**

Urbanization is a global phenomenon with profound implications for the environment as it is an increasing proportion of a population comes to reside in urban areas. In search of better opportunities, urban areas expand, as rural populations migrate to cities leading to changes in land use, infrastructure development, and resource consumption. This transformation has significant implications for the environment, impacting air and water quality, biodiversity, and the overall health of ecosystems. This study is done by several reasons that are land use patterns, infrastructure development and their effect on environment. It causes changes in natural habitats to urban areas due to which there is loss of habitats. It affects biodiversity and may cause species in danger. The study aims to assess the environmental degradation caused by urbanization, to identify key factors contributing to environmental challenges in urban areas. It proposes sustainable solutions for mitigating the environmental impact of urbanization. The study will adopt a mixed method approach to investigate the impact of urbanization on environmental sustainability in Delhi. It will include both qualitative and quantitative research methods to provide a comprehensive analysis. The study was done in various urban areas of Delhi. The sample size of 200 residents was chosen to capture the diversity of the population in Delhi. The findings of this study reveal a strong correlation between concern for the environment and support for sustainable initiatives, highlighting the importance of rising awareness and fostering essence of responsibility among stakeholders. There is a need for special environmental policies to save environment and support urbanization together. The policy makers and urban planner should brainstorm to get better ways for urbanization maintain the environmental peace

MORPHOMETRIC, PRODUCTION AND BEHAVIOURAL TRAITS OF NATIVE CHICKEN OF HILL & PLATEAU OF JHARKHAND, INDIA**REENA KAMAL^{1*}, P. C. CHANDRAN², AMITAVA DEY³, RAJNI KUMARI⁴, A.K. SINGH⁵, REKHA SHARMA⁶****^{1,5}ICAR- RCER, Farming System Research Centre for Hill & Plateau Region, Plandu, Ranchi, Jharkhand, India****^{2,3,4}ICAR - Research Complex for Eastern Region, Patna, Bihar, India****⁶ICAR-National Bureau of Animal Genetics Resources, Karnal, Haryana, India**

The present study was conducted to describe the morphometric characteristics, production performance and certain behavioural characteristics of selected populations of indigenous chickens of Chotanagpur plateau of India. A total of 736 adult chickens were sampled and characterized for 17 quantitative traits and 438 adult chickens for 10 qualitative traits under field conditions. The average flock size was observed to range from 11 to 17. The black & golden mix (38.88%) followed by white & black mix (37.80%) plumage colour in males and white & black (34.60%) followed by brownish white to light brown (31.18%) plumage colour in were dominant in the study area. Single comb was the dominant comb type in all localities followed by pea comb. Hackle and saddle feathers of males are rich golden yellow in males forming Mala (garland) like shape with lacing plumage pattern. Predominantly, the native chicken possesses white skin colour (73.28%), red earlobe (55.92%) and yellow shank (64.46%). The mean body weights of indigenous male and female chickens were found to be 1.86±0.04 kg and 1.09±0.02 kg, respectively. The average values for body length (cm), back length (cm), wingspan (cm), comb length (cm), shank length (cm) was 39.30±0.16, 27.22±0.13, 34.00±0.20, 5.76±0.18, 9.49±0.06 respectively. Flight distance and height was 40.14 and 8.35ft, respectively. The territory radius of cocks was 122.69ft. The result of the present study provides a baseline data on phenotypic, production and behavioural traits of native chicken germplasms of Chotanagpur plateau of India. Efforts may be made towards their conservation and improvement.

Keywords: Native Chicken, Morphometric, Characterization, Production performance, Behavioural traits, Hill & Plateau Region, Jharkhand.

EFFECT OF BIO-PRIMED *PSEUDOMONAS FLUORESCENS* ON GROWTH AND DROUGHT TOLERANCE OF OKRA (*ABELMOSCHUS ESCULENTUS*)**¹REENA KUJUR, ²SHASHI KANT EKKA, ¹EUGENIA P. LAL****Research scholar, Research scholar, Associate Professor, ¹Department of Biological Science, SHUATS, Prayagraj, UP, India****²Department of Horticulture, SHUATS, Prayagraj 211007, Uttar Pradesh, India**

Drought stress not only suppresses the plant growth but also affect its yield and productivity. *Pseudomonas* spp. has a quality of phosphate solubilizing capacity. Thus, it improves osmotic balance by increased production of osmolytes under drought stress. The present investigation aimed to demonstrate the effect of bioprimered *Pseudomonas fluorescens* on growth and drought tolerance of okra (*Abelmoschus esculentus*). It was carried out in the Complete Randomized Design (CRD) with 3 replicates. Drought stress mitigation potential was observed in terms of increase in Amino acid content, Protein content, and Relative water content at the third and fifth day of stress. At 3rd day of stress the *Pseudomonas* inoculated plant was found to have higher (3.13mg/ml) concentration of protein as compared to uninoculated seed i.e. 1.08mg/ml. In terms of the amino acid content at 3rd day of drought stress the inoculated plant gave a concentration of 0.58 mg/ml and without bioprimering plant observed with a lower concentration of amino acid content i.e. 0.33mg/ml. Similarly, at 3rd day inoculated plant were observed with 31% of relative water content and for plants without inoculation with the *Pseudomonas fluorescens* was 27%. Best result in growth parameters was observed under the treatment with *Pseudomonas* i.e. maximum plant height (24.67 cm), average shoot length (21.67 cm), and average root length (13cm). So, this study concludes that the seed inoculated with *Pseudomonas flourescens* can effectively help in inducing drought stress tolerance.

Keywords- *Pseudomonas flourescens*, Relative water content, amino acid, Protein, Drought stress, okra.**SELF HELP GROUP: KEY FOR LIVELIHOOD SECURITY IN BIHAR****REENA KUMARI¹ AND DR. PRIYANKA KUMARI²****¹Research Scholar, P.G. Department of Home Science, Magadh University, Bodh Gaya, Bihar****²Assistant Professor, Department of Home Science, G. B. M. College, Gaya, Bihar**

Self-help groups are a 10-20 women group, a great initiative of Government of India .In Bihar named as Bihar Rural Livelihood Promotion Society (BRLPS) locally known as JEEViKA, an autonomous body under Rural Development Department of Government of Bihar with the objective of social and economic empowerment of rural poor which provides a good opportunity to provide holistic awareness. SHG members perceived change in their security level of food and nutritional, economic, habitat, education, social and health. The aim of the study is to analyze the role of self-help group in livelihood security with advancement of time. This study was based on Secondary data. Secondary data were collected from Annual reports, the statistical supplements, and operational statistics of Bihar State, Government Website, Published sources include Government publications and annual reports. This study empirically examines the effectiveness of the programme in providing secured livelihood to the rural poor. There were 1.30crore rural poor women mobilized under 10.46lakh SHG. Rural social security of 1.13crore women through microfinance. Women are engaged in various activities in all blocks for Nutrition security by implementation of dietary diversity campaign, farm intervention (24lakh), livestock intervention(2.94HH),poultry intervention, dairy intervention(liaison with COMFED and others),fish intervention. Nonfarm entrepreneurship development in various field such as Didi ki rasoi, gramin bazaar, stitching intervention, art and craft interventions, and bee keeping interventions are flourished. Didis children have also getting benefit of Deen Dayal Upadhyaya Gramin Kaushalya Yojna (DDU, GKY) 76.41Th youth trained and nearly 70 per cent got placement, under Rural Self Employment training Institute (RSETIS)27th got training and 74.2 per cent placed and many job fairs were organised and youth are getting career opportunities. SHG women are also getting Food Security Fund and Health Risk Fund towards nutritional security. Community library and career development centre is also intervened for educational development. SHG is milestone for holistic development of community in respect to livelihood security too.

Key words: livelihood security, Self Help Group, women, health**OPTIMIZING PRE-SOWING TREATMENTS FOR ENHANCED GUAVA SEED GERMINATION AND SEEDLING GROWTH****REENU DEVI¹, JEET RAM SHARMA¹, SATPAL BALODA¹, AAYUSH SINGLA^{2*}, MAYA LAMBA³****¹Department of Horticulture, CCS Haryana Agricultural University, Hisar****²Department of Horticulture, Maharana Pratap Horticultural University, Karnal****³Division of Fruits and Horticultural Technology, IARI, New Delhi**

The prime motive of the experiment was to study the effect of pre-sowing treatments on seed germination and seedling growth of guava (*Psidium guajava* L.). The experiment was carried out in the Department of Horticulture, CCS Haryana Agricultural University, Hisar during 2021-22. The experiment comprised of 15 different pre-sowing treatments viz, T₁ (control), T₂ (Sand + FYM), T₃ (Sand + FYM + PSB), T₄ (Sand + FYM + *Azotobacter*), T₅ (Sand + FYM + VAM), T₆ (Sand + FYM + PSB+ *Azotobacter*), T₇ (Sand + FYM + PSB + VAM), T₈ (Sand + Vermicompost), T₉ (Sand + Vermicompost), T₁₀ (Sand + Vermicompost + PSB), T₁₁ (Sand + Vermicompost + *Azotobacter*), T₁₂ (Sand + Vermicompost + VAM), T₁₃ (Sand + Vermicompost + PSB + *Azotobacter*), T₁₄ (Sand + Vermicompost + PSB + VAM), T₁₅ (Sand + FYM + PSB + *Azotobacter* + VAM) with three replications in fresh seeds of guava laid out in open field condition. Pre-sowing treatments significantly influenced seed germination and seedling growth of guava. Among different pre-sowing treatments, T₁₅ (Sand + FYM + PSB + *Azotobacter* + VAM) performed best in terms of germination percentage, minimum no. of days taken for germination, maximum vigour indices, maximum height of seedling, girth of seedling, maximum number of roots and maximum root length in case of fresh seeds of guava.

Keywords: *Azotobacter*, FYM (Farmyard manure), PSB (*Phosphate-solubilizing bacteria*), VAM (*Vesicular arbuscular mycorrhizae*), Vermicompost.

XENOBIOTICS IN MOTION: INVESTIGATING HEAVY METALS AND PESTICIDES POLLUTION IN THE BASANTAR RIVER AND ITS EFFECTS ON WATER QUALITY AND *HETEROPNEUSTES FOSSILIS*

REETU[#] AND AMIT KUMAR SHARMA*

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The accumulation of xenobiotic compounds in aquatic organisms and the excessive use of anthropogenic substances have led to pollution in the environment, affecting river fish, sediments, and water ecosystems. Heavy metals and pesticides negatively affect fish growth, reproduction, and physiology, threatening aquaculture's sustainable development. A study on *Heteropneustes fossilis* fish found pesticide buildup damages liver, intestine, gills, muscle, and heart, and signs of toxicity. The study showed the presence of heavy metals (Cd, Cr, Cu, Pb, Mn, Co) in riverine water, muscles, gills and liver of subjected fish. Data resulted with highest concentration of Mn in organs where the order of occurrence was $Mn(50.05 \pm 1.50) > Cu(30.51 \pm 0.20) > Cd(27.62 \pm 0.30) > Cr(21.10 \pm 0.13) > Pb(20.40 \pm 0.50) > Co(3.54 \pm 0.30)$ in fish muscles, $Mn(50.01 \pm 1.40) > Cd(34.50 \pm 1.47) > Cu(29.70 \pm 0.15) > Cr(28.01 \pm 0.23) > Pb(22.02 \pm 0.13) > Co(5.15 \pm 1.40)$ in gills and $Mn(56.20 \pm 1.40) > Cd(33.90 \pm 0.60) > Cr(30.51 \pm 0.15) > Cu(30.02 \pm 0.01) > Pb(25.56 \pm 0.20) > Co(6.25 \pm 0.12)$ in liver of *Heteropneustes fossilis*. Results also indicated that Cu has highest Geo index value i.e., +2.50 than other noted metals comparatively. There were large amounts of phorate and parathion 3.45 ± 0.02 and 2.03 ± 0.21 respectively, and low concentrations of Monocrotophos (0.55 ± 0.02). In sediments, organochlorines are more deeply ingrained. In the case of tissues the study found that the highest accumulation of β -BHC was found in the liver (8.52 ± 0.62), followed by gill tissues (4.32 ± 0.30) and muscles (2.15 ± 0.21), with the highest concentration in the liver and the lowest in the muscles whereas in case of organophosphorus, Monocrotophos (4.45 ± 0.30) has the least accumulation in muscles while Malathion (23.51 ± 3.63) has the most in gill tissues. These attributes concludes that subjected metals are more accumulated in fish liver with highest occurrence of Mn and Co with lowest value and subjected pesticides has highest accumulation of Malathion in gill tissues. In conclusion, presence of xenobiotic compounds severely affects the organs and water quality of river which have adverse consequences on aquatic ecosystem, humans and livestock.

Keywords: Xenobiotics, Basantar River, Heavy metals, Pesticides, impact, fish organs

INTEGRATED NUTRIENT MANAGEMENT IN SOIL AND SUSTAINABLE AGRICULTURE

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The world vision of no hunger target, food security, and zero poverty followed by raising standards of living of rural people through agricultural transformation is the greatest challenges faced by the agricultural planners worldwide. Due to the alarming state of population growth and cultivable land scarcity, change in agronomic practices which could bring a significant effect on crop production and productivity is urgently needed. The concept of using different sources of plant nutrients combined to check nutrient depletion, maintain soil health, and crop productivity, called INM, has a bright solution in this area. Recently several researchers introduced that integrated use of inorganic fertilizers, organic fertilizers, green manure, and bio-fertilizers is becoming an effective practice not only for increasing crop production and productivity but also for the better crop and soil health. In addition, INM helps to increase the activity of soil microorganisms and improves the soil physical, chemical and biological properties. So, INM create an economic eco-friendly environment by reducing the dependence on inorganic chemical fertilizers and improving the soil fertility, optimizing crop yield, maximizing profitability and ultimately making the agriculture sustainable. Lastly, INM is one of the good agricultural practices which needs to be followed by every conscious individual in order to maintain soil health, nutrient balance and to make the agriculture and environment more sustainable.

Key words: INM, Components, Sustainable agriculture

DEVELOPMENT CONSTRAINTS OF ALLAHABAD CITY TO BECOME SMART CITY

DR. RENU DEVI

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Urbanization has been a key driver of change in human societies and from the previous two centuries it has observed the great changes occurred mainly in rural way of life. Indian government has taken great initiative to develop hundred smart cities by 2023 under the Smart City Mission which has been praised as major step in the direction of socio-economic transformation of urban areas. The Allahabad city is one of the chosen cities to develop as smart city. Allahabad city has emerged as winner city in nationwide city challenge competition organized by Ministry of Housing and Urban Affairs, Government of India. It is a chosen one out of 12 future smart cities from Uttar Pradesh. The present study focus on the identification of the main challenges and problems of Allahabad city to become a SMART city and the study also evaluate the areas most affected by these challenges in the city. The study contain methods of factors against the scale of responses (frequency distribution). This in turn enabled the identification of the factor with the highest frequency to find the most occurring method using the Relative Importance Index formula (RII). Allahabad is facing a number of urban environmental issues and challenges. Large size of the city population lives in slum areas which have poor infrastructure facilities are absent in some areas. Water supply and sanitation conditions in slums are gruesome. The shortage of urban housing is another emergent problem in the city.

Keywords: Smart City, Relative Importance Index, Socio-Economic, Safety, Congestion

ARTIFICIAL INTELLIGENCE IN INTERNET OF THINGS**RENU KUMARI¹, HEMANT KUMAR LAMBA², SURENDRA RUNDLA³, KAVITA NITHARWAL⁴**^{1,2}PhD Scholar Department of Ag. Economics & management, MPUAT Udaipur (RAJ.)^{3,4}PhD Scholar Department of Ag. Economics and management, RVSKVV, Gwalior, (MP.)

The way the Internet works is constantly changing from being a "Internet of Computers" (IoC) to a "Internet of Things" (IoT). Massively linked systems, often referred to as Cyber Physical Systems (CPS), are developing as a result of the integration of several factors, including infrastructure, embedded technology, intelligent objects, people, and physical surroundings. A vast "Internet of Everything in a Smart Cyber Physical Earth" is where we're headed. The next "smart revolution" may be brought about by IoT and CPS combined with "data science." The issue that then emerges is how to process the massive amounts of data created with the far inferior present computational capacity. An answer to this issue has been the focus of data science and artificial intelligence (AI) research. IoT with AI can therefore lead to a significant advance. This is not simply about decreasing human labour, saving money, or using smart technology. It is far more than that; it is improving people's lives. IoT will continue to face several severe problems, such as security risks and ethical dilemmas. IoT with AI may sound exciting, but what matters most is how the general public views it—whether they regard it as a benefit, a burden, or a danger.

Keywords: Artificial Intelligence, Internet of Things, Intelligent Systems**PER SE PERFORMANCE OF PARENTS AND F1 HYBRIDS FOR GROWTH AND YIELD TRAITS****RENUKA MUTTAPPANAAVAR, VASANT GANIGER, SHASHIKANT EVOOR AND BHUVANESHWARI G.,****Assistant Professor of Vegetable Science, Directorate of Research, University of Horticultural Sciences, Bagalkot**

Tomato, *Solanum lycopersicum* L. ($2n = 2x = 24$), belongs to large and diverse family Solanaceae, All related wild species of tomato are native to Peru. The most likely ancestor is the wild *L. esculentum* var. *cerasiforme* (cherry tomato), which is indigenous throughout tropical and subtropical America. The first extensive domestication seems to have occurred in Mexico. Tomatoes are perennial herbaceous plants, although in their natural habitat tomatoes most probably behave as annuals. They have an erect or prostrate growth habit and possess taxonomically useful differences in leaf, inflorescence, flower, fruit and seed characters. A field experiment was conducted to study the "**Per se** performance of parents and F1 hybrids for growth and yield traits" with the objectives of identifying the good parents for yield and yield related attributes and thereby identification of best F1 hybrids. An experiment was undertaken at College of Horticulture, Bagalkot, for three seasons (2 years). The experiment was conducted in Randomized Block Design with three replications. Twelve diverse lines of tomato were crossed with four testers in line x tester mating design. The resultant 48 F1 hybrids along with 16 parents and two checks were evaluated for growth, yield and seed parameters in tomato. The experiment results revealed that hybrid, L4 X T3 performed best for characters viz., fruit yield per plant (3.53 kg), average fruit weight (93.67 g), yield per plot (52.95 kg), yield per hectare (51.54 t/ha) and number of seeds per fruit (126.67) when compared to all other hybrids. Besides, other hybrid, L12 X T3 also showed superior performance for fruit yield per plant (3.39 kg), yield per plot (50.78 kg) and yield per hectare (49.49 t/ha).

BIOMASS STOVE: BETTER ENVIRONMENT**DR. RENUKA S. SALUNKE, DR. SWATI VANNUR AND DR. S. S. DOLLI****Department of Family Resource Management, University of Agricultural Sciences Dharwad**

Biomass stoves emerge as a beacon of sustainability. Biomass stoves offer a cleaner, more efficient and alternative to traditional cooking methods and it is not just a cooking solution but also acts as catalysts for a healthier planet, reducing carbon emission, deforestation, and empowering communities worldwide. Keeping this in view a study was conducted in two villages namely Timmapur Village of Dharwad district and Bhaganagar village of Vijayapur district. In total 120 households were selected (From each village 60 households) for the study. Interview schedule was used to elicit the required information and computed the data with suitable statistical tools. Results revealed that, about 80 per cent of the women were illiterate in Timmapur village while 76.70 per cent of the women were illiterate in Bhaganagar village. Cent per cent of women relied on traditional fuels supplemented by varying proportions of different types of fuel wood, including acacia, procifera julifera, gulmorh, and glyricidea in Timmapur village. While the cent per cent of the respondent's utilized agricultural residues and cow dung cakes, and diverse range of fuel wood usage was observed in Bhaganagar village. The results revealed that, the noticeable percentage of reduction was found in carbon dioxide and carbon monoxide while using biomass stove as compared to traditional stove. However the experimental results revealed that the quantification of fuel wood (Karijali-Acacia Nilotica) was found to be significantly lesser quantity in the biomass stove when compared with the traditional stove. On an average 5760 kg of fuel wood was saved per year while using the biomass stove. About 384 trees would be saved per year from 100 families where the biomass stoves used for cooking.

Keywords: Biomass stove, carbon emissions, fuel wood and environment

WORKLOAD AND RATING OF PERCEIVED EXERTION OF THE FEMALE LABORERS IN CUTTING OF SORGHUM CROP**DR. RENUKA SALUNKE, DR. SWATI VANNUR AND ADITYA ARUNKUMAR BIKKANNAVAR****Department of Family Resource Management, University of Agricultural Sciences Dharwad**

Women constitute almost half of the workforce engaged in agriculture. The rural women participate in a broad range of agricultural activities involve a lot of physical strain which create serious health problems in the long run. Keeping this in view a study was conducted in four villages of Dharwad taluka were randomly selected for the study thus a total sample comprised of 160 women. With respect to the tools for harvest and post harvest activities of sorghum crop i.e., two improved sickle from dev Agro Tools Bangalore and one from CIAE Bhopal. The results revealed that mean working heart rate and energy expenditure was higher during cutting stalks with CIAE Bhopal sickle i.e., 141.40 beats/min and 13.76kj/min respectively when compared to traditional sickle. Based on the mean working heart rate, cutting stalks of sorghum crop was classified as very heavy for CIAE Bhopal sickle and as heavy for traditional, I-108 and I-104 sickles. With respect to the musculoskeletal disorder, the female laborers expressed very severe pain by the use of CIAE Bhopal sickle compared to other sickle and less score was observed with I-104 sickle for upper and lower parts of the body.

Keywords: Workload, Sorghum crop, Muscular-skeletal problems and female laborers**PHOSPHORUS FRACTION DYNAMICS IN ACIDIC SOIL AMENDED WITH ORGANIC SOURCES IN A MAIZE-FRENCH BEAN CROPPING SYSTEM****RESHMA SHINDE^{1*}, SUSHANTA KUMAR NAIK¹, AJIT KUMAR JHA¹ AND AURN KUMAR SINGH¹****ICAR- Research Complex for Eastern Region, Farming system Research Centre for Hill and Plateau Region, Ranchi, Jharkhand**

Ensuring an adequate supply of phosphorus (P) in soil is crucial for sustainable agriculture, particularly in the acidic soils of Jharkhand, where P is a limiting nutrient. Phosphate anions in soil often become immobilized by forming insoluble compounds with Ca²⁺, Fe³⁺, and Al³⁺ cations, rendering them unavailable to plants. To address this, a field experiment was conducted at ICAR-RCER FSRCHPR Ranchi during the *Kharif* season of 2021-22, aiming to enhance P mobilization through organic amendments. The study employed a randomized block design (RBD) with nine treatments and three replications, including a control (T1: RDF), RDF with lime (T2), various rates of phosphate-solubilizing bacteria (PSB: T3, T4, T5), different doses of vermicompost (T6, T7, T8), and green manuring with dhaincha (T9). Nitrogen and potassium were applied as per RDF across all treatments, while phosphorus was omitted from T3 to T9. PSB was mixed with finely powdered FYM at rates of 30, 50, and 70 kg/ha in T3, T4, and T5, respectively. Results indicated a significant increase in saloid-bound P, a labile pool, across treatments, attributed to microbial activity and organic acid dissolution. Inorganic P fractions such as Al-P and Fe-P were predominant, with total P levels ranging from 544 to 761.67 mg/kg, highest in treatments with inorganic fertilizer application. The different forms of inorganic P in general decreased in the order of Fe-P>Al-P>Saloid-P>Reductant Soluble-P>Ca-P>Occluded-P. Notably, the T8 treatment (vermicompost @ 7 t/ha) demonstrated the most effective P solubilization, leading to improved crop yield and enhanced soil fertility.

Keywords: Phosphorus, Organic Amendments, Phosphorus Fraction, solubilization**BACTERIAL CELLULOSE AND ITS POTENTIAL USE IN AQUACULTURE****REVATHI A¹, MANISH JAYANT¹, HUSIAN NOTTANALAN¹ AND HARSHAVARTHINI M²****¹Fish Nutrition, Biochemistry and physiology Division, ICAR-Central Institute of Fisheries Education, Mumbai****²Fish Genetics and Biotechnology Division, ICAR-Central Institute of Fisheries Education, Mumbai**

Nanocelluloses are promising bio-nano-materials for use as water treatment materials in environmental protection and remediation. Over the past decades, they have been integrated via novel nanoengineering approaches for water treatment processes. This abstract aims at giving an overview of nanocellulose requirements concerning emerging nanotechnologies of waste water treatments and purification, via various methods for, i.e., adsorption, absorption, flocculation, photocatalytic degradation, disinfection, antifouling, ultrafiltration, nanofiltration, and reverse osmosis. Firstly, the nanocellulose synthesis methods (mechanical, physical, chemical, and biological), unique properties (sizes, geometries, and surface chemistry) were quite interesting and their use for capturing and removal of wastewater pollutants will save the environment from pollution. Secondly, different chemical modification approaches surface functionalization (with functional groups, polymers, and nanoparticles) for enhancing the surface chemistry of the nanocellulose for enabling the effective removal of specific pollutants (suspended particles, microorganisms, hazardous metals ions, organic dyes, drugs, pesticides fertilizers, and oils) were useful for various purpose. Thirdly, new fabrication approaches (solution casting, thermal treatment, electrospinning, 3D printing) that integrated nanocelluloses (spherical nanoparticles, nanowhiskers, nanofibers) to produce water treatment materials (individual composite nanoparticles, hydrogels, aerogels, sponges, membranes, and nanopapers) for mass production of cellulose. Finally, the major challenges and future perspectives concerning the applications of nanocellulose based materials in water treatment and purification were recommended in future.

Keywords: Nanoparticles; Nanocrystals; Nanowhiskers; Nanofibers; Hydrogels; Bacterial cellulose; Surface functionalization; Membranes filtration.

EXPLORING THE NUTRACEUTICAL POTENTIAL OF WATERMELON (*CITRULLUS LANATUS*) SEEDS**RICHA BHTOYA, ANKITA DOBHAL*, SANJAY KUMAR****Department of Food Science & Technology, Graphic Era (Deemed to be University), Bell Road, Clement Town, Dehradun, UK**

The adaptive nature of watermelon (*Citrullus lanatus*) allows it to be cultivated in different areas including temperate and subtropical regions. It is sweet and has ample amount of water content in the pulp which makes it a very popular and refreshing fruit during the summer season. Watermelon pulp is the main edible part, however, a significant quantity of seeds are also embedded within the pulp. Despite being a rich source of nutrients, these seeds are generally discarded as waste, whereas the pulp is eaten as such or transformed into juice. The seeds contain many essential nutrients, especially a good quantity of protein, healthy fat, vitamins, and minerals. It also contains various bioactive compounds such as polyphenols, having importance in pharmaceutical applications like antimicrobial and antioxidant properties. Watermelon seeds are rich in arginine, which plays a role in blood pressure regulation and cardiac health, making them potential for preventive healthcare. The fiber content in these seeds makes them ideal candidates for incorporation into prebiotic or synbiotic food products. This review explores the nutritional content and health benefit of watermelon seeds and their potential in both the food and nutraceutical industries. In conclusion, considering the numerous advantages offered by these seeds, they can be utilized in the development of several functional food products thus providing therapeutic benefits alongside serving as a step towards food sustainability.

Keywords: watermelon seeds, nutraceutical, waste utilization, sustainable food production**IN VITRO PROPAGATION STUDIES IN GARLIC (*ALLIUM SATIVUM*)****RIDDHI RATHORE, ANUPAMA SINGH****Department of Biotechnology, Dr. Yashwant Singh Parmar University of Horticulture & Forestry, Nauni, Solan (HP) India**

Garlic (*Allium sativum*) is an important monocotyledonous aromatic bulb crop belonging to family Alliaceae. It is grown all over the world for medicinal and culinary purposes. Garlic is propagated vegetatively by cloves. It is sexually sterile and has lost its ability to flower due to repeated vegetative propagation. Also, its multiplication rate is low in field. *In vitro* propagation can alleviate these problems, improving propagation efficiency. The present research was taken up to standardize the protocol for *in vitro* regeneration in two garlic varieties 'VL Garlic 1' and 'Yamuna Safed'. Morphological analysis of clove and bulb characteristics was done in both varieties. Average bulb weight, Average bulb diameter and average clove weight were higher of 'VL Garlic 1' whereas average clove diameter was higher of 'Yamuna Safed'. Effective sterilization was achieved for explants of both varieties on treatment T6 in which explants were treated with 0.2% carbendazim and 0.1% HgCl₂ for 5 and 3 minutes respectively. Highest mean percent establishment, average number of roots and average root length in 'Yamuna Safed' was achieved on M4 medium (MS + 2 mgL⁻¹ 2,4 D). Highest average shoot length was obtained on SE6 medium (MS + 1.0 mgL⁻¹ 2,4 D + 2.0 mgL⁻¹ BAP + 1 mgL⁻¹ GA₃) and highest average number of shoots were at par in SE6 and SE9 medium (MS + 1.0 mgL⁻¹ 2,4 D + 2.0 mgL⁻¹ BAP). Highest average number of shoots and shoot length from shoot tip along with basal plate in 'VL Garlic 1' were achieved in E5 medium (MS + 2 mgL⁻¹ BAP + 0.3 mgL⁻¹ GA₃ + 0.5 mgL⁻¹ NAA) whereas highest average number of roots and root length were observed on E11 medium (MS + 2 mgL⁻¹ BAP + 0.3 mgL⁻¹ GA₃ + 0.5 mgL⁻¹ NAA + 4 gL⁻¹ activated charcoal). Obtained *in vitro* roots were used as explants to produce callus. Percent callus induction was highest on CFR11 medium (MS + 0.6 mgL⁻¹ 2,4 D + 0.5 mgL⁻¹ IAA + 2.5 gL⁻¹ KNO₃). Best medium for shoot induction from callus was SFC9 (MS + 0.6 mgL⁻¹ 2,4 D + 0.5 mgL⁻¹ IAA + 0.6 mgL⁻¹ 2 IP) on which highest average number of shoots were observed.

Keywords: tissue culture, garlic, *Allium sativum*, direct propagation, indirect propagation, callus**NEW BIOTECHNOLOGICAL TOOLS FOR THE IMPROVEMENT OF BLAST DISEASE RESISTANCE IN FINGER MILLET****RIMA KUMARI¹*, PANKAJ KUMAR², V. SHAJEEDA BANU¹ A.K. SINGH³ AND MAHESH KUMAR SINGH³****¹Division of Plant Biotechnology, College of Agricultural Biotechnology, Bihar Agricultural University, Sabour, Bihar (India)****²Department of Molecular Biology and Genetic engineering, Bihar Agricultural University, Sabour, Bihar (India)****³Bihar Agricultural University, Sabour, Bihar (India)**

Finger millet is a significant grain crop that grows well in dry and semi-arid environments and has remarkable nutraceutical qualities. However, the primary global limiting factors affecting finger millet production are biotic stressors. Due to its destructive behaviour under favorable conditions and its widespread dispersion throughout all finger millet-growing areas, finger millet blast, caused by *Magnaporthe grisea*, is the most damaging disease affecting the production and productivity of finger millet. A finger millet plant can become infected with *M. grisea* at almost any stage of growth, which can result in a 100% reduction in crop grain output. Due to the genetic instability of the blast pathogen, previous studies on screening and selecting finger millet cultivars or novel advanced lines towards specific strains of blast fungi had little success. This is because the phenotypic features gained are highly variable. Furthermore, when these tactics are used, it frequently takes a long time and expensive breeding to produce new types with broad-spectrum resistance to blast disease. However, in light of the development of new biotechnological instruments, current research deliberately concentrates on comprehending the biotic stresses on finger millet, especially in terms of advancing the molecular genetics of blast disease to create an integrated management system for blast disease resistance in palm millet. The availability of contemporary genomic tools has also greatly increased due to the development of high-throughput sequencing platforms. These tools, which include gene expression profiling, molecular markers, expressed sequence tags, genome-wide association studies, genetic transformations, and, more recently, genome editing, have been successfully applied in a variety of crops, including millets, to investigate the genetic basis of stress resistance and provide guidance for the development of plants of superior quality.

Keywords: Blast disease, Finger millet, Genome editing, *Magnaporthe grisea*

INTEGRATED PEST MANAGEMENT: BALANCING ECOLOGY AND PRODUCTION IN SUSTAINABLE AGRICULTURE**RISHABH KUMAR^A, MARRI KEERTHANA^B, NAWAZISH AHMAD^A, JIGYASA^A, PRIYANKA KUMARI^C**^aDepartment of Entomology, Bihar Agricultural University, Sabour, Bhagalpur, Bihar^bDepartment of Entomology, PGCA, Dr. Rajendera Prasad Central Agricultural University, Pusa, Samastipur, Bihar, India^cDepartment of Horticulture (Fruit Science), Bihar Agricultural University, Sabour, Bhagalpur

Integrated Pest Management (IPM) represents a paradigm shift in agricultural pest control, emphasizing a holistic and sustainable approach that balances ecological integrity with agricultural productivity. The principles, components, benefits, challenges, and future prospects of IPM in the context of global agriculture. Drawing upon a wealth of research, case studies, and expert insights, we examine how IPM integrates diverse pest management tactics, including biological, cultural, mechanical, and chemical controls, to minimize environmental harm while optimizing crop yields. Despite its numerous benefits, IPM faces challenges such as limited awareness, technical capacity, and policy support. However, with advancements in technology, education, and collaboration, the future of IPM holds promise for transformative change in sustainable agriculture. By embracing the principles of IPM and fostering global cooperation, stakeholders can cultivate a world where agriculture thrives in harmony with nature, ensuring food security, environmental sustainability, and prosperity for future generations. Integrated Pest Management (IPM) emerges as a beacon of hope in the pursuit of sustainable agriculture, offering a holistic approach that harmonizes ecological integrity with agricultural productivity. As we navigate the principles, components, benefits, challenges, and future prospects of IPM, it becomes clear transformative framework bodies of environmental and agricultural resilience. With its emphasis on prevention, monitoring, and integration of diverse pest management tactics, IPM empowers farmers to cultivate healthy crops while minimizing environmental harm and reducing reliance on chemical pesticides. Looking ahead, the future of IPM holds promise for innovation, collaboration, and transformative change, as stakeholders world-wide unite in the shared vision of a more sustainable and resilient agricultural future, where abundance, harmony, and prosperity flourish for generations to come.

Keywords: Agricultural productivity, pest management, food security, environmental sustainability**BRIDGING INNOVATION AND ACCESS: THE COMPLEXITIES OF INTELLECTUAL PROPERTY RIGHTS IN AGRICULTURE****RISHABH SINGH GAUR, SUDHANAND PRASAD LAL, BISWAJIT MALLICK AND VICKY YADAV****Ph.D. Research Scholar, Dairy Extension Division, ICAR-National Dairy Research Institute, Karnal, Haryana****Assistant Professor cum Scientist & Co-PI AICRPs WIA, Department of Agricultural Extension Education (PGCA), Dr. RPCAU, Pusa- Samastipur (Bihar), India****Ph.D. Research Scholar, Dept. of Agril. Extension Education, College of Agriculture, OUAT, Bhubaneswar, Odisha, India****Post Graduate Research Scholar, Department of Agricultural Extension Education, Dr. RPCAU, Pusa- Samastipur (Bihar), India**

Intellectual property rights (IPR) have a significant impact on agricultural extension, altering the dynamics of innovation, technological distribution, and access to resources. The use of Intellectual Property Rights (IPR) technologies in agricultural extension creates both potential and constraints. In this paper, we look at the diverse landscape of intellectual property rights in agriculture, focusing on the essential concerns and contemporary difficulties. Access to seeds and plant genetic resources is a primary challenge. Patents and plant breeders' rights (PBRs) can make it difficult for small-scale farmers to acquire crucial resources, limiting their ability to adapt to changing environmental circumstances and adopt innovative agricultural techniques. Furthermore, the transfer and licensing of agricultural innovations presents major challenges. Complex patents frequently impede the distribution of critical technologies, especially in areas with limited access to such developments. This quandary raises concerns about fair access and the possibility for technology transfer to support agricultural growth, particularly in underserved places. The threat of biopiracy looms large, heightening conflicts over benefit sharing and the preservation of traditional knowledge. Embracing open access and open-source approaches provides exciting opportunities for knowledge exchange and innovation. Strengthening legal frameworks and improving enforcement mechanisms are critical for protecting intellectual property rights while guaranteeing fair access to agricultural technologies. International trade agreements aggravate the situation, needing a complex balancing act to protect the interests of many parties. Ethical and social factors highlight the critical importance of ensuring that IPR regimes support justice, fairness, and sustainable agricultural growth. Addressing the numerous issues of IPR instruments in agricultural extension necessitates a thorough and coordinated strategy. By encouraging communication and collaboration among stakeholders, policymakers may traverse these challenges and realize the full potential of agricultural innovation while protecting farmers' interests and supporting sustainable development.

Keywords: Intellectual Property Rights (IPR), Agricultural Extension, Innovation, Technology Transfer, Sustainable Development

OHMIC HEATING PASTEURIZATION OF BOTTLE GOURD JUICE FOR MICROBIAL DEACTIVATION**RISHI RICHA, ZEESHAN FAROOQ AND S FAISAL**¹College of Agricultural Engineering and Technology, Sher-e- Kashmir University of Agricultural Sciences and Technology, Shalimar, Srinagar²Faculty of Horticulture Sher-e- Kashmir University of Agricultural Sciences and Technology

Bottle gourd juice (BGJ) is a rich source of nutrients that support the growth of microbes that cause spoilage. Processing methods used to reduce number of microbes that have adverse effects on nutritional quality of BGJ. The purpose of this research work was to examine the microbial safety and quality change using ohmic pasteurization method without addition of additives. Different physio-chemical and microbial parameters were studied during experiment. Ohmic heating is a green processing technology and is different from other heating methods. In this process electricity is allowed to pass through the food sample and heating occurs due to inherent resistance of food. It is highly effective technology that provides rapid and homogenous heating. A variac transformer with varying voltage was used to provide required voltage to the system according to the experimental design. The electrical variables were recorded using digital multimeter. A polyacryl sheet was used as base to fix entire ohmic setup. Ohmic heating treatment was applied to bottle gourd juice at different combinations of voltage, salt concentration and Time for the responses, viz. pH, TSS, ΔE , Microbial change and for optimization Box-Behnken Design was used. Time, current and voltage applied were monitored. The ohmic heating mechanism was analysed and evaluated on the basis of time required in (min) and point Electrical conductivity (S/m). The overall time required for Electrical conductivity for heating bottle gourd was 2, 2.5 and 3 (min) and 0.0809 to 2.85 S/m respectively. The optimum value of voltage, salt concentration and time were found to be 160 V, 0.199% and 3(min) respectively with a desirability value of 0.8963. At this optimum condition, the predicted values for pH, TSS, TA, Colour change and microbial change were found to 4-5.1°, 4.1°. 5.11° Brix, 1.99% and less then 30mg/l respectively. ohmic heating was found to be best with minimum colour change (6.34 %) and more effective at reducing microorganisms because of its greater severity.

Keyword: Ohmic heating, Bottle Gourd Juice, microbial safety**EFFECT OF ALTITUDE ON ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY IN WILD POMEGRANATE FRUITS****RITU MAHAJAN* AND AZHAR JAVED****School of Biotechnology, University of Jammu, Jammu, J&K**

Wild pomegranate (*Punica granatum* L.) is an important medicinal plant which is well adapted to a wide range of climatic conditions. Fruits are rich in secondary metabolites and as a result used by pharmaceutical industries. Methanolic extracts of green and red fruits from five different altitudes were explored for their antioxidant and antimicrobial activity. Regarding antioxidant activity, high activity was observed in peel as compared to their pulp in both green and red fruits. Green fruits collected from Dhera ki Gali and Patnitop showed high antioxidant activity while peel from red fruits of Patnitop and Udhampur also had significant antioxidant activity, while less activity was recorded in fruits from Budhal region. Regarding DPPH scavenging activity, fruit peel showed more radical scavenging activity as compared to pulp among fruits collected from five different altitudes. Both peel and pulp extracts from fruits of Dhera Ki Gali showed highest zone of inhibition against *Bacillus subtilis* and *Campylobacter jejuni*. Highest percentage inhibition of mycelia hyphae was observed with fruit extracts from Dhera ki Gali against *Aspergillus niger* and *Alternaria alternate*. Similarly for red pulp extracts, fruits collected from Budhal showed the highest percentage inhibition against *Penicillium notatum*. A good antifungal activity was observed with fruit extracts from Patnitop region. Thus, wild pomegranate fruits are potent sources of bioactive compounds for pharmaceutical and food industry. Since fruit extracts from different altitudes showed good antimicrobial property so fruits of this plant could serve as an alternate source of natural antibiotics with no side effects.

Key words: Wild pomegranate, antioxidant activity, antimicrobial activity, secondary metabolites**SYNTHESIS, CHARECTRIZATION AND ANTIMICROBIAL ACTIVITY OF BIS (HYDROXYISONITROSOBENZOYLACETONE) THIOCARBOHYDRAZONE WITH ZINC (II), MERCURY (II), TIN (II) AND LEAD (II) COMPLEXES****RITU RANI CHAUDHARY¹, SHRUTI BAGHEL², RAVI PRAKASH³ AND R.B. SINGH⁴**^{1,3}Department of Chemistry, B.S.A. College, Mathura, U.P. (India)²Department of Chemistry, Ganjdundwara College, Ganjdundwara, Kasganj, U.P. (India)⁴Scientist 'C' UGC, Department of Zoology School of Life Science, Dr. Bhimrao Ambedkar University, Khandari Campus, Agra,

Ligand Bis (hydroxyisonitrosobenzoylacetone) thiocarbohydrazone, (HINBA)₂ tcz have been synthesized by the interaction of thiocarbohydrazone with isonitrosobenzoylacetone in 1:2 molar ratio carried out in presence of methanol. The metal complexes of Zn(II), Hg(II), Sn(II) and Pb(II) with the ligand Bis(hydroxyisonitrosobenzoylacetone)thiocarbohydrazone have been prepared and characterized with the help of some physicochemical methods such as elemental analyses, magnetic susceptibility, IR, PMR, spectral data, thermal analysis and electrical conductance measurements. It has been found that the ligand and complexes are non- electrolytic in nature. Spectral measurements showed that the ligand was coordinated to metal ion through carbonyl and oximino groups. The magnetic moments and electronic, spectral data indicate octahedral geometry for the metal complexes. The newly prepared ligand and its metal complexes are subjected to antimicrobial against selected microbial strains.

Keywords : Antimicrobial activity, Zinc (II), Mercury (II), Tin (II), Lead (II), Metal Complexes, Synthesis, characterization).

EFFECT OF DIFFERENT PROCESSING TECHNIQUES ON THE QUALITY ATTRIBUTES OF WHEAT (*TRITICUM AESTIVUM*) GRAINS**RIYA BARTHWAL*, NARPINDER SINGH, DEEPIKA KATHURIA****Department of Food Science & Technology, Graphic Era (Deemed to be University), Dehradun, Uttarakhand, India**

Wheat (*Triticum aestivum*) is one of the oldest crop cultivated, processed and used as a staple food by human beings. Its rich nutritional profile including protein, carbohydrates, dietary fibre, B complex vitamins, lots of minerals, and ease of harvesting, storage, transportation, and processing in comparison to other grains, wheat emerged as the predominant choice for human consumption. However, only a fraction of wheat is used in its raw state, with the majority being utilized after applying different processing methods including milling, fermentation, malting, germination and extrusion. These techniques remove impurities, increases shelf life, enhance nutritional value and quality, modify texture and flavor, which is desirable in forming diversified wheat-based products. The present article integrates various research offering an in-depth description of the physiological, biochemical and nutritional alterations that occur during different processing techniques in wheat grains, along with their subsequent influence on the metabolomic constituents. Furthermore, different challenges and limitations related to the processing techniques, such as enzymatic reactions, microbial contamination and oxidative deterioration after germination, fermentation and malting, are critically evaluated. Novel strategies to overcome some of these challenges are also discussed in order to minimize the drawbacks and maximize the beneficial effects of processing on wheat kernels.

Keywords: Grain Quality, Nutrition, Processing, Wheat**NEED OF PHYTO-BIODIVERSITY CONSERVATION FOR SUSTAINABLE DEVELOPMENT****RIYA RANI AND ANJU RANI****Department of Botany, Keral Verma Subharti College of Science, Swami Vivekanand Subharti University, Meerut**

Despite the fact that plants are significantly more vital to humans than animals, there isn't the same urgency or financing for plant conservation as there is for animal conservation. Land plants (angiosperms, gymnosperms, ferns and bryophytes) are thought to number about 500,000 species, with a significant concentration of variety found in the wet tropics. Science still doesn't fully understand many species. Roughly one-third of all terrestrial plants are threatened with extinction, many of which are either poorly or completely characterized. Though many more species may be extinct because they have not been discovered recently, there have only been a small number of known worldwide extinctions to yet. The main dangers to plant variety include overexploitation, invasive species, pollution, human climate change, habitat loss, fragmentation, and degradation. Plant variety conservation is a huge undertaking when considered worldwide, but anyplace in the world, ex situ gap-filling and backup should be combined with a well-thought-out protected area system. In order to effectively focus both in situ and ex situ conservation, the completion of the global botanical inventory and an evaluation of the conservation status of the 94% of plant species that have not yet been assessed are of utmost importance. The hyperdiverse lowland tropical regions are home to the largest conservation gap in the world, and this is where one must direct attention. For their long-term sustainable use, medicinally significant plants must be conserved using cutting-edge biotechnological techniques.

Keywords: Biodiversity, Ecosystem, Habitat, Environment, Plant conservation**ISOLATION AND IDENTIFICATION OF MICROBES ASSOCIATED WITH DETERIORATION OF STORED KINNOW (*CITRUS RETICULATA*) FOUND IN KHARAR, PUNJAB****ROGESHWORI TOIJAM* AND GAGANPREET KOUR BALI****Department of Biosciences, UIBT, Chandigarh University, Mohali, Punjab, India**

Fruits are incredibly diverse in terms of nutrients and compounds. They are extremely vulnerable to microbial deterioration due to their nutritional composition. In order to determine the microbial factors responsible for deterioration of stored Kinnow (*Citrus reticulata*), found in Kharar, Punjab and to determine the effect of temperature to fruits at different storage condition. Fresh and spoiled fruits were collected from local market. Numerous microbes, most notably bacteria and fungi might grow in optimum condition found within fruits. The collected samples were first washed with distilled water and then surface disinfected with 70% alcohol. Infected part was used for serial dilution and cultured in nutrient agar media for bacteria isolation, through pour plate method. From each culture, some healthy colonies were picked and subculture to get pure culture. Two bacteria were isolated. The isolates undergo standard microbiological methods including morphological identification and biochemical test for identification purpose. For further identification we send the bacteria sample to lab which has facilities for 16S genome sequencing (Result awaiting). To examine the rate of deterioration of fruits in different storage condition, each sterilized fruit samples were stored in refrigerator (4°C) and room temperature (27°C). It was observed that the kinnow fruit stored in room temperature had shelf life of 17 days, where deterioration sign can be seen from 15th day was severely rotten on 21st day. But the one that kept on refrigeration has longer shelf life (45 days).

ENVIRONMENTAL MICROPLASTIC POLLUTION: DETECTION, DISTRIBUTION AND POTENTIAL ORIGINS IN THE GOMTI RIVER, UTTAR PRADESH, INDIA**ROHIT KUMAR GAUTAM, BULBUL ALI, NEELAM SHARMA, ABHA MISHRA*****Department of Zoology, School of Life Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India**

Riverine ecosystems are among the most vulnerable and threatened habitat of the world. These fresh water habitats are heavily contaminated due to discharge of untreated wastewater from different sources. Microplastic contamination in freshwater ecosystems is a pressing global concern due to its potential adverse effects on aquatic environments. They are ubiquitous in the freshwater system and have caused a global environmental issue. We have detected seven polymers of microplastic from four sites of the Gomti River. The microplastic components were identified and analysed by FTIR (PP, PET, PS, PU, PE, and PVC). Our findings alarms public concern and awareness towards the risks of microplastic pollution. This study also discusses the technique used, as well as the impacts and effects of MPs on fresh water fish fauna. Future perspectives are also thoroughly discussed in this study. The necessity for immediate and effective mitigation strategies is highlighted, emphasizing the importance of safeguarding the health of aquatic environments and the well-being of communities reliant on this river. This research contributes to the broader understanding of microplastic pollution in freshwater river ecosystems, offering valuable insights for policymakers, researchers, and conservationists alike in their efforts to combat this environmental challenge.

Keywords: Microplastics, Gomti River, Fishes, Pollution, Uttar Pradesh, FTIR.**FROM PARENT TO PROGENY: GENETIC INSIGHTS INTO DICOCCUM WHEAT YIELD AND MICRONUTRIENT TRAITS****ROHIT KUMAR, SUMA S. BIRADAR*, BHARATH C, SRIVIJAY S. MALIPATIL, REVANASIDDAYA, GOPALREDDY KRISHNAPPA, S. A. DESAI*, CHANNABASAVA, V. C. RAGHAVENDRA****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Raichur, Karnataka, India**

The aim of the study is to explore the genetic diversity of local dicoccum wheat germplasm rich in micronutrients, facilitating biofortification and transfer to other wheat species. The study employed a crossing involving three high-yielding genotypes with 15 micronutrient-rich donor parents to produce 45 F₁ hybrids. Phenotypic and genotypic evaluations were conducted for agro-morphological traits and grain micronutrients, with statistical analyses including ANOVA, and Mahalanobis D² statistic. The principal component analysis (PCA) analysis revealed significant trait associations in wheat genotypes, first two PCs explained 32.28% and 16.50% of the total variation respectively, with PC1 predominantly linked to traits related to plant height, grain weight, and nutrient content while PC2 highlighted grain quality traits. The intra-cluster D² values indicated that cluster II (D² = 59.94) had the maximum genetic diversity within the genotypes of that group. The highest inter-cluster distance (D² = 572.23) was between solitary clusters, namely V and cluster VI. Variability analysis showed significant differences between parental lines and F₁ hybrids across multiple agronomic and quality traits suggesting the need for strategic breeding approaches to simultaneously enhance yield and nutritional quality. Our findings provide valuable insights for breeding programs aimed at enhancing wheat yield and nutritional quality simultaneously, emphasizing the importance of considering trait associations and genetic diversity in crop improvement strategies.

Keywords: Local germplasm, grain micronutrients, D² statistic, PCA and Clusters.**HANDLING THE CHALLENGES OF CLIMATE CHANGE IN FOOD SECURITY TO FEED THE FUTURE****¹ROHIT KUMAR*, ¹SHANKAR RAJPOOT, ¹SHUBHAM GANGWAR, ²AMIT KUMAR, ³HRITUL KUMAR GAUTAM AND ⁴MANOJ KUMAR****¹Ph.D. Scholar, Department of Post-Harvest Technology, BUA&T, Banda (U. P.) India****²P.G. Scholar, Department of Post-Harvest Technology, BUA&T, Banda (U. P.) India****³P.G. Scholar, Department of Fruit Science, BUA&T, Banda (U. P.) India****⁴Ph.D. Scholar, Department of Agricultural Extension and Communication, SVPUA&T, Meerut (U. P.) India**

The Indian food system's effects from climate change put public health at danger. From a food security standpoint, this includes removing people's concern about the certainty of food supply and access at all times, as well as providing at least a minimal amount of food for everyone. Therefore, if food security is to be regarded as a component of human security, the individual must come first. There exist several information gaps regarding the food system components that are most susceptible to climate change as a result of the lack of focus on the relationship between climate change, food security and human health. Public health experts and collaborators in other sectors are unable to adequately prepare Indians for future health hazards due to a lack of knowledge about critical dynamics and their consequences. Important food system functions may be under risk from climate change, according to the evidence. The manner in which the effects of climate change propagate across the food chain and alter the vital aspects of food security to impact human health outcomes are multifaceted. Disturbances in the food system caused by climate change have the potential to indirectly affect human health by reducing food security, an important factor in determining health. The physical consequences of climate change on the food chain may also have an immediate influence on human health; these implications are mostly connected to how nutrition and foodborne infections are impacted.

Keywords: food system, climate change, food supply, food security, human health

ENHANCING FARM FERTILITY THROUGH SOIL CONSERVATION METHODS**ROHIT NAIN^{*1}, SHWETA LAURA², KHEMENDRA CHOUDHARY³, KRISHAN KANT MEENA⁴**¹Msc, Department of Soil Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India²Msc, Department of Agricultural Economics, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India³Ph.D. Scholar, Department of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India⁴Msc, Department of Horticulture (Fruit science), Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana

Soil fertility is crucial for sustainable agriculture and food security. Implementing effective soil conservation practices not only improves soil health but also boosts crop productivity and resilience to environmental stresses. The techniques involved in soil conservation are crop rotation, cover cropping, contour farming, terracing, mulching, and organic farming methods. Each method examined is for its benefits, implementation strategies and impact on soil fertility. Additionally, this study highlights the importance of adopting integrated approaches tailored to specific agroecological contexts for achieving long-term soil fertility enhancement and sustainable agricultural production. This explore the intricate interplay between soil health and farm productivity, underscoring the symbiotic relationship between soil conservation and fertility enhancement. By analyzing case studies and field experiments, the study provides empirical evidence demonstrating how adopting soil conservation measures can lead to improved soil structure, increased microbial activity, and enhanced nutrient cycling, thereby fostering optimal conditions for crop growth and yield.

Keywords-: Soil conservation, Sustainable agriculture, Erosion control, Soil health.

EFFECT OF DIFFERENT LEVELS OF NANO UREA AND CONVENTIONAL FERTILIZER ON SOIL HEALTH OF MAIZE (ZEA MAYS L.) VAR, P3544 IN AN INCEPTISOLS OF PRAYAGRAJ, (U.P) INDIA**ROHIT RATHORE¹, AMREEN HASAN², ARUN ALFRED DAVID, TARENCE THOMAS AND SRINATH REDDY**¹Senior Research Fellow, ²Assistant Professor, ³Associate Professor, ³Associate Professor, ⁵Research Scholar, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh

The experiment was laid down in randomized block design with three levels of conventional fertilizer (0% N, 50% N and 100% N) and foliar spray of nano urea fertilizer at three concentrations (0%, 50% and 100%) respectively. The result shows that the application of different levels combination of conventional fertilizer and nano urea increased growth, yield of Maize and improved soil chemical properties. However some parameters of soil physical properties decreased. The results showed that the application of conventional fertilizer and nano urea in treatment To (N100, 100%P and K fertilizers + 2 sprays of Nano nitrogen (4ml/l) minimum bulk density 1.200 Mg m³ in 0-15 cm depth and 1.407 Mg m³ in 15-30 cm depth, particle density 2.359 Mg m³ in 0-15 cm depth and 2.669 Mg m³ in 15-30 cm depth, water holding capacity 59.09% in 0-15 cm depth and 49.57% 15-30 cm depth, pH 7.105 in 0-15 cm depth and 7.309 in 15-30 cm depth, EC 0.222 dS m⁻¹ in 0-15 cm depth and 0.148 dS m⁻¹ in 15-30 cm depth, % organic carbon 0.487% in 0-15 cm depth and 0.387% in 15-30 cm depth, Available Nitrogen (kg ha⁻¹) 247.12 in 0-15 cm depth and 199.2 in 15-30 cm depth, Available Phosphorous (kg ha⁻¹) 39.36 in 0-15 cm depth and 31.63 in 15-30 cm depth, Available Potassium (kg ha⁻¹) 4.34 in 0-15 cm depth and 9.37 in 15-30 cm depth was found Significant.

Keywords: IFFCO nanofertilizers, growth and yield parameters, maize, soil physic-chemical properties

SCALE MEASURING THE ATTITUDE OF FARMERS TOWARDS CLIMATE SMART AGRICULTURE**DR. ROHIT^{1*} AND DR. HARISH CHANDRA SINGH²**¹Assistant Professor, Lords University, Alwar, Rajasthan²Professor, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur

The measurement of attitudes is a critical endeavour in the realm of social and psychological research, enabling a deeper understanding of human behaviours, preferences, and beliefs. Attitudes play a pivotal role in shaping individual and collective decisions, influencing behaviours, and reflecting psychological dispositions. Constructing a reliable and valid scale to assess attitudes requires a systematic approach that encompasses various stages, such as conceptualization, item generation, scale refinement, pilot testing, psychometric analysis, and validation. Keeping this in view a standardized scale has been developed to measure the attitude of the farmers towards climate smart agriculture as the important components of farming. A summated (Likert) rating scale was used to develop scale. The process started with identifying the dimension, collection of items followed by relevancy and item analysis and checking the reliability and validity for precision and consistency of the results. A total of 60 statements consisting 45 positive and 15 negative statements were framed in which 22 statements (20 positive and 2 negative statements) were retained in the final scale which have the practical applicability in measuring the attitude towards climate smart agriculture. Reliability of the scale was calculated by using split half method. Validity of the scale was tested by experts' judgement. The psychometric properties of the scale include: Pearson product moment correlation between two sets was 0.584, reliability of test 0.74 (P<0.01) and Cronbach α =0.759 which means scale is consistent in measurement. The reliability and validity of the scale indicates its consistency and precision of the results. This scale can be used to measure the attitude of students in similar situation beyond the study area with suitable modifications.

Key words: Attitude, climate smart agriculture, Agricultural Practices, Reliability.

IODINE OXIDES: A HIDDEN PLAYER IN THE COMPLEX DILEMMA OF GLOBAL CLIMATE CHANGE**ROSHAN LAL****Assistant Professor- Chemistry, Shaheed Mangal Pandey Govt. Girls P.G. College, Madhav Puram, Meerut, Uttar Pradesh**

The role of iodine oxides (IO_x) in the complex mechanisms governing global climate change is important in diverse ways. Among the lesser-known contributors to this complex mystery are iodine oxides, whose role and significance are often overlooked. Marine ecosystems are major natural source, with seaweeds and phytoplankton releasing iodine-containing compounds into the atmosphere through processes such as sea spray, aerosolization and volatilization. Additionally, industrial activities, particularly those involving the combustion of fossil fuels and certain chemical processes, contribute to the emission of iodine oxides. The atmospheric fate of iodine oxides involves intricate chemical reactions and interactions with other atmospheric substances. Oxidation reactions, initiated by various oxidants including ozone and hydroxyl radicals, play a crucial role in the transformation of iodine-containing compounds into reactive iodine species such as iodine monoxide (IO), iodine dioxide (OIO), iodine tetra oxide (I₂O₄) and iodine pentaoxide (I₂O₅). These reactive species may further participate in complex photochemical processes, influencing the abundance of ozone and other atmospheric pollutants, as well as contributing to the formation and growth of aerosols. The impacts of iodine oxides on climate extend beyond their direct chemical interactions, encompassing indirect effects through aerosol formation and atmospheric processes. Iodine-containing aerosols have been implicated in the formation of new particles and the growth of existing aerosols, thus influencing cloud properties and radiative forcing. Through a comprehensive analysis of observational data and modeling studies, we unveil the diverse pathways through which IO_x modulates climate dynamics, including its implications for regional climate variability and feedback mechanisms. This paper elucidates the versatile interactions of IO_x with atmospheric constituents, highlighting their impact on aerosol formation, oxidizing capacity of atmosphere and ozone depletion. Iodine oxides come out from both natural and anthropogenic sources. Moreover, we explore the anthropogenic activities exacerbating IO_x emissions and the potential for mitigation strategies to curb their impact on climate. In conclusion, iodine oxides represent a hidden player in the intricate variety of global climate change, with their influence extending across various facets of atmospheric chemistry and climate dynamics.

Key words: Iodine oxides, Radiative balance, Aerosol formation, Atmospheric interaction, Climate Change,

ISOLATION OF INDIGENOUS INDOLE-3-ACETIC ACID (IAA) FORMING RHIZOSPHERIC BACTERIA AND ITS EFFECT IN PLANT GROWTH**ROSHAN SUBEDI****Department of Agronomy, Agriculture and Forestry University, Rampur, Chitwan, Nepal**

Indigenous rhizobacteria are capable of producing Indole-3-acetic acid (IAA), a major plant growth hormone, and also assists plant to grow in different biotic and abiotic stress condition. Tartary buckwheat (*Fagopyrum tartaricum*) is one of the Neglected and Under-utilized crop species (NUS) praised for its nutritional benefits and capacity to grow in marginal soil. Application of Plant Growth Promoting Rhizobacteria (PGPR) with IAA producing ability can be utilized to improve the growth and yield of tartary buckwheat and used as organic amendment. In this study, we isolated IAA forming bacteria from rhizospheric soil of tartary buckwheat plant grown in high hill region. We screened 12 pure isolates from primary culture of the bacteria and tested for their IAA producing ability in the laboratory. The results showed that TB-10 isolate produced highest IAA (58.8 µl/mg) followed by TB-15 (15.5 µl/mg), TB-3 (10.38 µl/mg), TB-12 (9.84 µl/mg), TB-8 (6.69 µl/mg), TB-18 (5.22 µl/mg), TB-16 (2.98 µl/mg), TB-13 (2.93 µl/mg), TB-6 (2.15 µl/mg), TB-22 (0.84 µl/mg), TB-9 (0.41 µl/mg) and TB-7 (0.32 µl/mg). Among them four isolates namely TB-10, TB-15, TB-3 and TB-12 have been selected with higher IAA production to evaluate their effect in plant growth parameters. Plant compatible isolates is being identified in pot experiment where two Nepalese varieties namely Tite-1 and Tite-2 are inoculated with 4 isolates inside polyhouse in high hill area located at 2000 masl. The preliminary data has shown increased plant height and leaf numbers of the plant treated with bacteria. This experiment highlights the possibility of increasing growth of tartary buckwheat with PGPR use where inorganic fertilizer use is challenging. In future, research will be further carried out at open field at farmers' field in tartary buckwheat at high-hill area of Nepal.

Keywords: NUS, Tartary Buckwheat, IAA, PGPR, Fagopyrum

NEXT GENERATION SEQUENCING FOR CROP IMPROVEMENT**ROSHANI SINGH****Research Scholar at C.S.A.U.A.T Kanpur UP**

Next-generation sequencing (NGS) is present in all fields of life science, which has greatly promoted the development of basic research while being gradually applied in clinical diagnosis. Next-generation sequencing (NGS) is a powerful tool used in genomics research. However, the cost and throughput advantages of next-generation sequencing are offset by large tradeoffs with respect to read length and accuracy. The future scope of NGS holds tremendous potential for advancements and applications in various fields. With the development of next-generation and third-generation sequencing technologies, and high-throughput phenotyping technologies, TB strategies are being improved, integrated and transformed into whole genome assisted crop breeding. GAB provides comprehensive information to breeders with an updated synthetic view of how genomics can efficiently advance the efficacy of breeding programmes. The progress in bioinformatics, robotics, liquid handling, and nucleic acid preparation will revolutionize NGS sequencing methods, making them faster and more precise. These forthcoming sequencing platforms will necessitate smaller amounts of input DNA and reagents, scaling down to zeptoliters and even a few molecules. Additionally, advancements in bioinformatics and data analysis will be crucial for extracting meaningful insights from the vast amount of NGS data generated. The higher order multiplexing will enable more samples to be processed in a shorter time and at a reduced cost supported by the advances in robotics, liquid handling, and sample processing will contribute to these advancements.

Keywords: Next generation sequencing, Genomics, Microbiome, Molecular diagnostics, Bioinformatics, Nanopore, Pacbio, Illumina, Pyrosequencing

EFFECT OF PESTICIDES ON THE GROWTH OF *EISENIA FOETIDA***DR. RUCHI AGRAWAL****Department of Zoology, D.S. PG College, Aligarh, Uttar Pradesh, India**

Earthworms are important soil invertebrates and play an important role in improving soil quality. They act as nature's best fertilizers and have beneficial role in the process of vermicomposting which is very useful in crop production. The Indiscrete use of chemical fertilizers and pesticides poses a threat to soil quality, crop production and also hampered the growth of earthworms. In the present study the impact of pesticides and vermicompost in potato crops field and on *Eisenia foetida* was evaluated. The study aimed to understand the effect of chemical and biological fertilizers on the life table attributes of earthworm, *Eisenia foetida*. Laboratory adapted *Eisenia foetida* were reared on artificial soil supplemented with chemical fertilizers and vermicompost. Changes in number and biomass of *Eisenia foetida* were monitored four times in various applications of pesticides and in vermicompost. Four pesticides that are commonly used in potato crops are Chlorpyrifos, Malathion, Carbofuran and Cypermethrin. Thus, the negative impact of these pesticides on *Eisenia foetida* and Potato crops has been reported when compared to the control (Vermicompost). The effect of Pesticides was noted in following order: Chlorpyrifos > Malathion > Cabofuran > Cypermethrin. Application of Chlorpyrifos to the potato crop field harboring earthworms reduced the number of earthworms from 200 in the control group to 20 after 60 days of the application. The effect was more pronounced on the total biomass of the culture owing to the high toxicity of Chlorpyrifos. The Pesticides treatment decreased the per cent survival of the earthworms by 70% and 40%, respectively. The number and biomass of Earthworm decreased on increasing the application of pesticides thus, reduces crop production. On the other hand, the vermicompost had a positive effect on the earthworm's biology.

Key words: Pesticides, Chlorpyrifos, Malathion, Cabofuran, Cypermethrin, Organic farming, Vermicompost, *Eisenia foetida*

DOUBLING THE FARMER'S INCOME, CROP DIVERSIFICATION, GENETICS & PLANT BREEDING**RUCHI THAKUR, C.L. THAKUR, VAISHALI SHARMA AND SAHIL THAKUR****Department of Silviculture & Agroforestry, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Solan, H.P.**

Doubling farmers' incomes is a critical global objective in the fight for sustainable agricultural growth. This effort integrates the concepts of plant breeding, genetics, and crop diversification to improve the resilience, productivity, and economic sustainability of the agriculture system. Crop diversification emerges as a cornerstone strategy, offering multifaceted benefits. Shifting from monoculture practices to crop diversification, farmers can mitigate risks associated with pest outbreaks, climate change, and market fluctuations. The fundamental causes of a paradigm shift towards higher agricultural output are developments in plant breeding and genetics. By adopting targeted breeding programs, breeders can produce crop varieties that are climate-resilient, high-yielding, and suitable for certain agroecological regions. The unparalleled capabilities for precision breeding made possible by advancements in molecular genetics contribute to the generation of resilient varieties of crops that can withstand novel abiotic and biotic stresses. Through the application of genetics, farmers can optimize resource utilization and increase crop resilience to environmental stressors by cultivating crops that respond well to certain agro-climatic conditions. Furthermore, blending traditional breeding techniques with cutting-edge technologies makes it easier to produce crops with higher qualities, such as increased nutritional profiles, disease resistance, and drought tolerance. The effective implementation of these strategies depends on the cooperation of researchers, decision-makers, and farmers. Spreading knowledge, capacity building and supporting policies can accelerate the transition towards sustainable and diversified agriculture. In conclusion, the combination of plant breeding, genetics, and crop diversification offers a promising strategy to double farmer income while promoting sustainability and resilience in agriculture.

Keywords: Crop diversification, sustainable agriculture, farmer income, Genetics, Plant breeding

THE ARTISTRY OF HARYANA: EXPLORING BRIDAL DARI CRAFTSMANSHIP THROUGH THE LENS OF SUSTAINABILITY**¹RUCHI AND ²DR. ISHA BHATT****¹Research Scholar, Fashion Design Department, Banasthali University****²Assistant Professor, Fashion Design Department, Banasthali University**

This research paper delves into the intricate craft of Bridal Dari from the Indian state of Haryana, examining its craftsmanship, cultural significance, and the sustainability challenges it faces in the modern era. Bridal Dari, a traditional craft deeply rooted in Haryana's cultural heritage, embodies the artistry and creativity of local artisans. This paper explores how sustainable practices can be integrated into the production and promotion of Bridal Dari, ensuring its preservation for future generations while also addressing socio-economic and environmental concerns. Through a combination of historical analysis, fieldwork, and sustainability frameworks, this study aims to shed light on the intersection of tradition, craftsmanship, and sustainability in the context of Bridal Dari.

EXPLORING THE DIVERSITY AND ECOLOGICAL FUNCTIONS OF MACROBENTHOS IN ASAN WETLAND**RUCHIKA CHAUHAN*****Department of Zoology and Environmental Science, Gurukula Kangri (Deemed to be University), Haridwar (Uttarakhand)**

The macrobenthic community plays a crucial role in maintaining the ecological balance of wetland ecosystems like Asan Wetland. This study investigates the biotic characteristics of macrobenthos in Asan Wetland and their role in sustaining ecosystem functions. Through field surveys and laboratory analyses, we identified key macrobenthic species, assessed their abundance, diversity, and distribution patterns, and evaluated their functional roles in nutrient cycling, sediment stabilization, and food web dynamics. Total 20 species were observed under the three phyla during the study period i.e. Annelida (9 genera), Mollusca (6 genera), and Arthropoda (5 genera). Annelida was dominant group followed by Mollusca and Arthropoda. Seasonal variation is seen in macrobenthic general species and their distribution patterns. Maximum community of Macrobenthos were observed during the winter and minimum communities during the monsoon season. Our findings reveal a diverse assemblage of macrobenthos in Asan Wetland, including various species of aquatic insects, mollusks, and crustaceans. These organisms contribute significantly to nutrient recycling processes by mediating nutrient fluxes between water and sediment compartments. Additionally, their burrowing activities play a vital role in sediment stability and oxygenation, influencing the overall health of the wetland ecosystem. Understanding the biotic characteristics and ecological functions of macrobenthos in Asan Wetland is crucial for effective wetland management and conservation strategies.

Key words: Asan wetland, bio accumulation, Garhwal Himalaya, macrobenthos.

MORPHOMETRIC STUDIES IN STEVIA A NATURAL SWEETENER AFTER THE TREATMENT WITH ETHYL METHANE SULPHONATE**DR. RUKHSHANA PARVEEN****Assistant Professor, Gautam Buddha Mahila College, Gaya, Magadh University, Bodhgaya**

Stevia rebaudiana Bertoni is a herbaceous perennial plant. *Stevia* is likely to become a major source of high potency alternative natural and sustainable sweetener for the growing natural food market in whole world including India. Present study was focused on two varieties of *Stevia*. Variety SRB-123 as well as Var. SRB-128 of *Stevia rebaudiana* Bertoni after treating with different concentrations of Ethyl Methane Sulphonate were observed for morphometric analysis, when the plant attained maturity. In present investigation various morphological mutants showing a wide range of variabilities were recorded in M₁ and M₂ generation. Positive and significant relationship were observed in plant height, leaf size and root growth. A negative and significant relationship were noticed regarding inflorescence number.

Keywords:- *Stevia*, Sweetener, Ethyl Methane Sulphonate, Inflorescence.

MOLECULAR DIVERSITY ANALYSIS IN ASHWAGANDHA GENOTYPES USING EST-SSR, SSR AND ISSR MARKER**RUKOO CHAWLA¹, HEMLATA SHARMA²****¹Ph.D. Research Scholar, Department of Genetics and Plant Breeding, MPUAT, Udaipur Rajasthan, India,****²Associate Professor and Head of Department, Department of Genetics and Plant Breeding, MPUAT, Udaipur Rajasthan, India**

Ashwagandha is garnering significant attention from researchers and pharmaceutical industries worldwide for its remarkable pharmacological properties. There are a fairly limited number of papers on the genetic diversity of *W. somnifera*, even though numerous molecular markers have been designed as significant tools for diversity analysis. To investigate the population structure and genetic diversity among 80 accessions. We utilized a total of 90 primers. Among these, 43 primers successfully amplified, comprising 13 EST-SSRs, 19 SSRs (cross-transferability) and 11 ISSRs. Notably, 25 of these amplified markers exhibited polymorphism, consisting of 9 EST-SSRs, 5 SSRs and 11 ISSRs. These polymorphic markers were pivotal in analyzing the genetic variation within the studied genotypes. The average Polymorphism information content (PIC) was 0.719. The maximum PIC value observed was ISSR marker- UBC 826 (0.892) while minimum was SSR primer- CAMS-117 (0.466). The Unweighted Pair Group Method with Arithmetic Mean (UPGMA) cluster analysis with SSR, EST-SSR and ISSR primers divided the 80 accessions into 4 major clusters. The findings of the principal component analysis-based 2-D plot were found in agreement with UPGMA-based clustering. Based on findings from this research, potential markers were identified. It is concluded that more than one type of marker system should be used for better genetic resolution of the genome and potential use for genotypic characterization. Prior to thorough field testing, the validation of differences between the investigated ashwagandha accessions using various molecular approaches can be used as a predictor of heterosis in parental crossings.

ROLE OF BIOTECHNOLOGY IN MITIGATING NEUROLOGICAL DISORDERS***RUPA YADAV¹, NIYAJ AHAMAD² AND ROOHE HASEEN²****¹Department of Biotechnology, Shri Ramswaroop Memorial University, Lucknow (U.P.), India****²Department of Molecular Biology & Biotechnology, ANDUAT, Kumarganj, Ayodhya (U.P.), India**

Neurological disorders, encompassing a broad spectrum of conditions affecting the brain and nervous system, pose significant challenges to healthcare systems globally. Despite advancements in understanding these disorders, effective treatments remain elusive, necessitating innovative approaches. Biotechnology emerges as a promising avenue in mitigating neurological disorders by leveraging interdisciplinary techniques spanning genetics, molecular biology, and neurology. This abstract explores the pivotal role of biotechnology in addressing neurological disorders, elucidating key strategies and recent advancements.

Keywords: Biotechnology, Neurological disorders, Genetics, Molecular biology, Neuroscience, Therapeutics, Biomarkers, Gene therapy, Stem cells, Drug development, Precision medicine.

RESPONSE OF SEAWEED EXTRACTS ON GROWTH AND YIELD PARAMETERS OF WHEAT (*TRITICUM AESTIVUM* L.)**RUPALI GOPWAR, R.D. RATNAPARKHI, SWATI BHARAD, S.K. BURGHATE, P.R. PADGHAN AND J.N. PARMAR****Department of Agril. Botany, Dr. PDKV., Akola**

The present investigation was laid out in randomized block design with three replications consisted of ten different treatments of seaweed extract with net plot size 6X2.00 m² and gross- 6X2.40 m². The two foliar applications were given at tillering and heading stage along with seed treatment to assess the response seaweed extract on growth and yield parameters of wheat in order to recognize the suitable concentration of seaweed extract for improving growth and yield. Observations on morphological parameters and physiological parameter were recorded. Result obtained from this study confined that, seed treatment with foliar application seaweed extract at adequate concentration can be successfully used for desired improvement in growth and yield of wheat. The field performance revealed that, the treatments viz. T3: Seed treatment with seaweed extract @ 3 ml/kg seed & foliar application of seaweed extract (CP*) @ 4ml/l litre at tillering & heading stage, T9: Foliar application of seaweed extract (CP*) @ 4ml/litre water at tillering stage & heading stage, T2: Seed treatment with seaweed extract @ 3ml/kg seed & foliar application of seaweed extract (CP*) @ 2ml/litre water at tillering & heading stage, recorded superior performance for plant height, number of tillers per meter, number of grains per spike, spike length, grain weight per spike, 1000 grain weight, grain yield per plot, chlorophyll content, leaf area index, dry matter content, protein content. Multilocation testing of these top ranking effective treatments will be useful to identify the most effective treatments for commercial exploitation.

Keywords- Seaweed extract, Wheat, Seed treatment**THE DEPTH-WISE DISTRIBUTION OF HEAVY METALS (PB, CR AND CD) IN DIFFERENT SEWAGE AND NON-SEWAGE IRRIGATED SOILS OF PRAYAGRAJ****RUPESH KUMAR OJHA*, DINESH MANI, VIPIN SAHU, DEVI PRASAD SHUKLA, HIMANCHAL VISHWAKARMA, JEETENDRA VERMA AND MANOJ KUMAR****Sheila Dhar Institute of Soil Science, Department of Chemistry, University of Allahabad, Prayagraj, Uttar Pradesh, India**

The aim of current study to evaluate the status of heavy metals (Pb, Cr and Cd) in sewage and non-sewage irrigated sites of Prayagraj (U.P.) India. Representative soil samples were collected from various depth i.e. 0-10, 10-20, 20-30 and 30-40 cm from Naini, Daraganj, Rajapur and Preetam Nagar. After analysis it was found that highest concentration of Pb, Cr and Cd in surface soil (0-10 cm) at Naini site i.e. 4.34, 3.96 and 2.65 mg kg⁻¹ and 1.21, 1.14 and 1.02 mg kg⁻¹ in sewage and non-sewage irrigated soil respectively. Lowest concentrations of Pb, Cr and Cd were observed in (30-40 cm) depth at Naini site i.e. 2.68, 2.09 and 1.50 mg kg⁻¹ and 0.59, 0.50 and 0.48 mg kg⁻¹ in sewage and non-sewage irrigated soil respectively. Almost same pattern was observed in Preetam Nagar site-highest concentration of Pb, Cr and Cd in surface soil (0-10 cm) i.e. 1.91, 1.82 and 1.47 mg kg⁻¹ and 0.75, 0.61 and 0.54 mg kg⁻¹ in sewage and non-sewage irrigated soil respectively. Lowest concentrations of Pb, Cr and Cd were observed in (30-40 cm) depth at Preetam Nagar site i.e. 1.02, 0.98 and 0.51 mg kg⁻¹ and 0.40, 0.15 and 0.10 mg kg⁻¹ in sewage and non-sewage irrigated soil respectively. Thus, it may be concluded that high concentration of heavy metals in surface soil (0-10 cm) will reduce the proper growth of plants and affect the availability of other elements essential to plants.

Keywords: Concentration, depth-wise, heavy metals and sewage irrigated soils.**GLOBAL MILLETS: A SUSTAINABLE SOLUTION FOR FOOD SECURITY AND NUTRITION*****RUTVIK G. RABADIA¹, VATSAL S. RANPARIYA², HARSH A. KAMANI² AND SHUBH H. LUNAGARIYA¹****¹Under Grad. Scholar, ²Assistant Professor, Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat,**

Food security has become a major issue around the globe. Even today food is not accessible to every person of this world. United Nations has set a target food for everyone by 2030, but still, we are very far away from the target. Millets are four season crops, which is cultivated globally but post-green revolution era, their cultivation has significantly declined due to more accentuation on rice, wheat and maize. This lack of nutrients in diet lifestyles welcomes numerous diseases like cardiovascular diseases, obesity and diabetes. Millets are unique for their richness in dietary fibers, antioxidants, protein, carbohydrates and minerals. Their gluten-free nature also makes them suitable for individuals with dietary restrictions, contributing to diversified and balanced diets. Despite their numerous advantages, millets face challenges such as limited research and development investments, lack of infrastructure for processing and marketing, and shifting dietary preferences towards processed foods. By promoting the cultivation of diverse crop species, including millets, agricultural systems become more resilient to climate change-induced stresses such as droughts, pests, and diseases. Moreover, millets can contribute to soil health and carbon sequestration, thus mitigating the impacts of agriculture on climate change. The present global spectacle of climate alternate has forced us to sustain our natural resources. In this case, millets are the ones that are cultivated in poor soils. The resurgence of interest in millets, particularly spearheaded by initiatives like "Shree Anna," signifies a crucial shift towards sustainable agriculture and improved nutrition globally. Further more, the value chain analysis identifies key challenges and opportunities within the millet sector. In conclusion, the global promotion of millets presents a promising strategy for achieving food security, improving nutrition, and fostering sustainable agriculture in the face of climate change. Embracing millets as part of diversified food systems can contribute to building resilient communities and a healthier planet.

Keywords: Millets, Food Security, Antioxidants, Sustainable Agriculture.

SEASONAL INCIDENCE OF FALL ARMY WORM *SPODOPTERA FRUGIPERDA* (J E SMITH) ON MAIZE**S A PATIL¹, D R KADAM² AND K V DESHMUKH^{3*}**¹PG Student, Department of Entomology, AC, Latur (MS) India²Associate Professor, Department of Entomology VNMKV, Parbhani^{3*}Assistant Professor of Entomology, AC, Nandurbar 425412 (MS) India

Investigation on seasonal incidence of fall army worm *Spodoptera frugiperda* on maize was undertaken at the Department of Entomology, VNMKV, Parbhani. The studies were done during kharif on the maize variety Komal. Laval incidence was observed from 31st SMW (Standard Meteorological Week) i.e. fifth week of July and to till 43rd SMW i.e. fourth week of October with a peak incidence observed (4.05 larvae/ plant) during 39th SMW. Thereafter larval count showed declining trend (1.9 larvae/ plant) during 42nd SMW. Larval infestation also recorded in % age and under observation highest infestation 38.98% during 39th SMW i.e. fourth week of September. The correlation between larval incidence and weather parameters was showed negatively non-significant with minimum temperature, evening relative humidity and rainfall, whereas positive relationship was observed with maximum temperature and bright sunshine hours. The correlation with morning relative humidity evaporation with FAW population wher positively and negativity significant respectively evaporation was negative significant.

Keywords: Seasonal incidence, *S. frugiperda*, fall armyworm, maize, weather parameters, temperature, humidity, *Zea mays*, rainfall, evaporation, standard meteorological week

COMPARATIVE ANTIBACTERIAL ACTIVITY OF COW, BUFFALO AND GOAT URINE AGAINST *STAPHYLOCCUS AUREUS***S M KARAMUNGE, M K PATIL, A. V. BHOSALE, R. D. SURYAWANSHI, P. V. PATIL****Department of Veterinary Pharmacology and Toxicology, College of Veterinary and Animal Sciences, Udgir, Maharashtra Animal and Fishery Science University, Nagpur, Maharashtra, India**

The research study was carried out to evaluate *in vitro* antibacterial activity of *Azadirachta indica* and *Curcuma longa* in aqueous and different urine solvents of cow, buffalo and goat against multi-drug resistant strain of *Staphylococcus aureus* by agar well diffusion method and compared the results with standard antibiotic, vancomycin. The mean zone of inhibition of fresh urine (10.17±0.17, 9±0.58 and 9.5±0.76), photoactivated urine (9.33±0.89, 8.67±0.33 and 8.67±0.33), urine distillate (8.67±0.33, 8±0.58 and 7.67±0.33) of cow, buffalo and goat respectively and decoction of fresh urine (8.67±0.33, 9.67±0.33, 11.67±0.67 and 9.67±0.33, 9±0.58, 12±0.58), photoactivated urine (9.67±0.33, 11.33±0.67, 12±0.58 and 9±0.58, 9.67±0.33, 10±0.58), urine distillate (12.67±0.33, 12±0.58, 12.33±0.88 and 10±0.58, 10±0.58, 10.33±0.67) of cow, buffalo, and goat with *A. indica* and *C. longa*. The aqueous extract of *A. indica* (11.33±0.33, 11.33±0.33, 12±0.58) and *C. longa* (12.17±0.17, 11.67±0.33, 11.83±0.17) in cow, buffalo and goat research study. The standard antibiotic, vancomycin showed 16.83±0.44 to 17.83±0.17 against *S. aureus*. Among all solvents and extracts, urine distillate extract of *A. indica* showed highest zone of inhibition. The minimum inhibitory concentration of cow urine distillate extract of *A. indica* required to reduce the growth of *S. aureus* was found to be 31.25 µg/ml.

Key words: Cow urine, buffalo urine, goat urine, MDR, *A. indica* and *C. longa*, agar well diffusion method, MIC, photoactivated urine, distillate urine

SOLID STATE FERMENTATION AN ECONOMIC APPROACH TO LIPASE PRODUCTION IN TRAY-BIOREACTOR BY *TRICHODERMA HARZIANUM***¹S SHUBHA, ²C MRUDHULA AND ³G P SANTOSH**¹Senior Microbiologist and Head All India, Coordinated Project on Energy in Agriculture and, Agrobased Industries (Bioconversion Technology) MARS, UAS, Dharwad²Research Scholar Department of Microbiology, College of Agriculture, UAS, Dharwad³Junior Microbiologist, All India Co-ordinated, Project on Energy in Agriculture and Agrobased Industries (Bioconversion Technology) MARS, UAS, Dharwad

The experiment was conducted at AICRP on EAAI (Bioconversion Technology) MARS Dharwad, University of Agricultural Sciences Dharwad. An attempt was made to produce Lipase in tray bioreactor using fungus strain *Trichoderma harzianum*. Agricultural residues which were locally available viz., sugarcane bagasse, wheat bran, paddy husk and coffee husk and combinations with Sugarcane bagasse was done. Lipase produced from the pure sugarcane bagasse showed higher activity of 10.08 U/g dss than wheat bran, paddy husk and coffee husk, sugarcane bagasse+ wheat bran, sugarcane bagasse + paddy husk and sugarcane bagasse + coffee husk. Furthermore, the influence of carbon and nitrogen supplements was investigated. Addition of carbon sources was found to be ineffective, while lipase activity remarkably increased by supplementation of bagasse with adequate amount of nitrogen source. Among the nitrogen supplements, peptone followed by urea performed better as suitable nitrogen source with increased lipolytic activity of 11.84 and 11.23 U/g dss were achieved respectively. In addition, locally available vegetable oils were used as inducers of Lipase activity viz., groundnut, coconut, castor, sunflower and olive oils. The results indicate that olive oil, groundnut oil and coconut oil increased lipolytic activity of lipase with an average value of 12.86, 11.86 and 10.98 U/g dss, respectively.

Key words: Lipase; Enzyme activities; Solid state fermentation; *Trichoderma harzianum*; Tray bioreactor; Sugarcane Bagasse; vegetable oils

EFFECT OF NUTRIENT SOLUTION (NPK) ON BIOCHEMICAL CHANGES AND YIELD OF HYDROPONIC MAIZE FODDER CULTIVAR**S. A. DHAGE, U. S. GAIKWAD, Y. B. KANDALKAR, R. G. NIMASE, D. K. KAMBLE****Dept. Animal Husbandry and Dairy Science, Post Graduate Institute, MPKV Rahuri, Dist: Ahmednagar, Mahatma Phule Krishi Vidyapeeth Rahuri, Ahmednagar. M.S., India**

An experiment was conducted to study the effect of Nutrient solution (NPK) 19:19:19 on Amylase activity and Starch concentration in hydroponic maize cultivar (frican tall, ganga safed-2, manjari composite and panchganga) with effect of different level of Nutrient (NPK) solution spray 19:19:19 and evaluated on 0 day, 7th day and 14th day of growth periods. It was observed that alpha amylase activity (mg of maltose release/g. of sample/min) for African tall, Ganga safed-2, Manjari composite and Panchganga were 1.13, 1.19, 0.93, and 1.07 mg of maltose release/g of sample/min, respectively at 0 day i.e. sprouted grain in hydroponic maize fodder. The amylase activity was 2.40, 2.49, 2.17, 2.31 and 1.95, 2.06, 1.80, 1.90 mg of maltose release/g of sample/min. respectively for African tall, Ganga safed-2, Manjari composite and Panchganga at 7th and 14th day of growth. It was concluded that the higher percentage of starch were recorded for African tall, Ganga safed-2, Manjari composite and Panchganga were 64.60, 60.38, 54.70 and 65.69 respectively at 0 day i.e. sprouted grain in hydroponic maize fodder. The starch (%) were 49.29, 43.28, 32.19, 50.56% and 46.59, 48.37, 41.15, 30.46 %, respectively for African tall, Ganga safed-2, Manjari composite and Panchganga at 7th and 14th day of growth. During growth i.e. germination period there was decline in DM and starch content, however, higher amylase activity (1.19% and 2.49%) at 0 and 7th day but slightly decreased at 14th day (2.06%) in ganga safed-2 and higher total sugar content (8.66%, 10.21% and 11.24%) at 0, 7th and 14th day in african tall variety. Nutrient solution affected significantly on plant enzyme activity and total sugar concentration. Application of 0.75% of NPK in african tall can yield more fodder as compared to other varieties.

Keywords: Hydroponics, Amylase activity, Starch Concentration, nutrient solution, sprouted.**AGRONOMIC BIOFORTIFICATION OF PEARL MILLET WITH ZINC USING NANO FERTILIZER IN ZINC DEFICIT VERTISOLS OF INDIA****S. B. PATIL^{1*}, G. N. SASALATTI¹, R. A. NANDAGAVI¹, V. G. YADAHALLI², ANURADHA KAGGOD¹ AND M.P. POTDAR¹**¹AICRP for Dryland Agriculture, RARS, Vijayapura, UAS, Dharwad, Karnataka, India²Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vijayapura, UAS, Dharwad, Karnataka, India

A field experiment was conducted to investigate the agronomic biofortification of pearl millet with zinc using nano fertilizer in zinc-deficient vertisols of India, during the *Kharif* seasons of 2021 and 2022 at the Regional Agricultural Research Station, Vijayapura, Karnataka, India. The experiment laid out a factorial randomized block design (RCBD) with two factors, replicated thrice. The treatments of the first factor consisted of soil application of a recommended dose of fertilizers (RDF), RDF + ZnSO₄ @ 10 kg ha⁻¹ (RDF + Zn¹⁰), and RDF + ZnSO₄ @ 15 kg ha⁻¹ (RDF + Zn¹⁵), while the second factor comprised control (no foliar spray, Zn₀), ZnSO₄ @ 0.5% (Zn_{0.5%}), ZnSO₄ @ 0.75% (Zn_{0.75%}), Nano-Zn @ 2 ml L⁻¹ (Nano-Zn_{2ml}), and Nano-Zn @ 4 ml L⁻¹ (Nano-Zn_{4ml}) foliar application. Zinc and iron content and uptake, protein content, and grain yield in pearl millet were evaluated. The pooled results of two years revealed that soil application of RDF + Zn₁₅ recorded significantly higher grain yield (1746 kg ha⁻¹) and stover yield (6192 kg ha⁻¹) compared to RDF alone. Soil application of ZnSO₄ had a significant effect on Zinc harvest index (ZnHI). A significant increase in total nutrient uptake by 40.58% Zn, 22.74% Fe, and 11.73% protein content in grain was observed. Foliar nutrition of zinc also significantly influenced grain and stover yield. Among foliar applications, Nano-Zn_{4ml} recorded higher grain yield (1714 kg ha⁻¹), stover yield (6080 kg ha⁻¹), nutrient content, total uptake of Zn and Fe, and protein content, followed by Nano-Zn_{2ml}. Agronomic efficiency of added zinc (AEZn) was significantly higher in foliar application Nano-Zn_{2ml} than the control. The net returns (₹ 22,257 and 22003 ha⁻¹) and benefit-cost ratio (2.33 and 2.34) were also higher with soil application of RDF + Zn₁₅ and Nano-Zn_{4ml} compared to RDF alone and no foliar sprays. It concludes that soil application of ZnSO₄ @ 15 kg ha⁻¹ with RDF and foliar application of Nano-Zn @ 4 ml L⁻¹ increase the yield, nutrient use efficiency, net returns, and benefit-cost ratio of pearl millet in zinc-deficient vertisols under rainfed conditions. Further, it improves the zinc uptake and bioavailability in gains and meets the aim of biofortification of pearl millet with zinc to elevate malnutrition.

TRENDS IN ARRIVALS AND PRICES OF CHILLI IN APMC, NANDURBAR DISTRICT OF MAHARASHTRA**PROF. S. D. PATOLE, DR. D.B. AHIRE AND DR. S. R. TATPURKAR****College of Agriculture, Nandurbar, Dist. Nandurbar, Maharashtra (India)**

The present study was conducted to access the trends in arrivals and prices of chilli in APMC, Nandurbar. The trends in arrival and prices of chilli were worked out by using exponential form of equation. The trends in arrival and prices for chilli in APMC Nandurbar during 2009-2010 to 2018-2019 were depicted. The result indicates that, significant increasing trend was found in case of arrivals and prices of green and dry chilli except arrivals of green chilli in 2014-18 and prices of dry chilli in 2018-19. Arrivals of green chilli increased with decrease in prices and prices of dry chilli increases with decreases in arrivals over period of time. The indices of chilli shown higher arrivals during harvesting period i.e end of *kharif* season with steady prices.

Keywords: Trends, CGR, arrivals, prices, APMC (Agricultural Produce Market Committee)

COMPARATIVE HETEROSIS STUDIES OF *Bt* AND NON *Bt* COTTON HYBRIDS FOR YIELD, YIELD COMPONENTS AND FIBRE QUALITY TRAITS IN AMERICAN COTTON (*GOSSYPIMUM HIRSUTUM* L.)**S. G. SHAMKUWAR^{1*}, N. V. KAYANDE¹, A. R. UIKE², M. M. GANVIR¹, G. R. SHAMKUWAR³**¹Department of Genetics and Plant Breeding, Post Graduate Institute, Dr. P.D.K.V, Akola²Department of Genetics and Plant Breeding, Post Graduate Institute, M.P.K.V, Rahuri³Zonal Agriculture Research Centre, Sindewahi, Dr. P.D.K.V, Akola.

The present investigation was carried out to estimate heterotic effects in *Bt* × *Bt* and Non *Bt* × *Bt* cotton hybrids for seed cotton yield, yield components and fibre traits. The experimental material consists of 8 F₁ hybrids, five diverse parents and two standard checks i.e. PDKV JKAL 116 and Ajeet 155. The experiment was conducted at Cotton Research Unit, Dr. PDKV, Akola, Maharashtra, India during 2019 & 2020 in randomized block design with three replications. Results showed that for seed cotton yield (kg/ha) which is the main consideration for farmers, the cross AKH 09-5 × ICAR-CICR Rajat *Bt* and AKH 09-5 × ICAR 19255 *Bt* recorded the highest 12.30% and 11.21% standard heterosis respectively over the check PDKV JKAL 116. The cross ICAR-CICR Rajat *Bt* × ICAR-CICR Suraj *Bt* resulted significant standard heterosis for no. of bolls per plant i.e. 35.83% and 34.36% over both the checks. The cross ICAR-CICR 081 *Bt* × ICAR-CICR Rajat *Bt* was found most heterotic for fibre parameters like uniformity index, elongation ratio, staple length (10.14% & 20.62%) and for fibre strength (10.57% & 21.58%) respectively over standard check PDKV JKAL 116 and Ajeet 155. It was found that the Non *Bt* × *Bt* crosses performed well for yield and its contributing trait than *Bt* × *Bt* crosses whereas *Bt* × *Bt* crosses did give good results for fibre quality parameters as compared to Non *Bt* × *Bt* crosses. The crosses recorded good heterosis for most of the characters under study over both the standard checks.

Keywords: Standard heterosis, *Bt* cotton, seed cotton yield, fibre quality, *Bt* × *Bt*, Non *Bt* × *Bt***INFLUENCE OF NANO UREA ON THE FRUIT QUALITATIVE FEATURES OF LITCHI CV. BOMBAY GROWN IN NEW ALLUVIAL ZONE OF WEST BENGAL.****S. GHOSAL¹, T.P. RATHOUR^{1*}, P. DATTA¹, NELADRI S SARKAR², DEEPA LAL³, JITENDRA GURJAR⁴, R. M. REJA¹, MOULI PAUL⁵ AND RITIK CHAWLA⁶**¹Department of Fruit Science, Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur, West Bengal²Department of Genetics and Plant Breeding, Tamil Nadu Agricultural University, Coimbatore-³ACTO (SMS) Horticulture, ICAR Central Institute for Cotton Research KVK, Nagpur-M.H.⁴Department of Horticulture, SKRAU, Bikaner, Rajasthan⁵Department of Genetics and Plant Breeding, Ramkrishna Mission Vivekananda Educational and Research Institute, Kolkata⁶Dept. of Fruit Science, College of Horticulture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, HP

Litchi, a subtropical fruit crop native to South China and Southeast Asia, is a significant crop in India, with West Bengal being one of its largest producers. Nanostructured urea fertilizer, or "Nano Urea," has been shown to boost crop output and reduce environmental pollution. This innovative approach uses nanotechnology to manufacture smaller urea particles, allowing for more efficient and targeted nutrient delivery. Nano urea has been proven to increase crop yields by up to 20% and reduce nitrogen leakage into groundwater by up to 50%. However, more research is needed to understand its long-term impacts on soil health, plant development, and environmental sustainability. There has been little research on the impact of nano urea on litchi. Keeping these principles in mind, the current experiment was conducted. The current study was conducted at Bidhan Chandra Krishi Viswavidyalaya's Horticultural Research Station, Mondouri. The experiment was designed in a Randomised Block Design, with four replications receiving one of five possible treatments. The research findings indicated that various nano urea treatments greatly enhanced the number of fruits per panicle at harvest, as well as the individual fruit weight, diameter, fruit length, and yield. Among the several treatments, Nano urea @2.0ml/l was the most successful in boosting fruit weight, fruit length, and crop output, while the control fruits recorded the least. This treatment also exhibited the highest TSS, total sugar, reducing sugar, and anthocyanin content of the fruit. These align closely with previous works in other fruit crops.

Keywords: Alluvial zone, Litchi, Bombay, Fruit quality, Nano urea**APPLIED MUTAGENESIS AN IMPORTANT TOOL FOR GROUNDNUT IMPROVEMENT****S.K. BURGHATE, P.R. PADGHAN, J.N. PARMAR, D.R. RATHOD AND S.M. SHINDE****Department of Agril Botany, Dr. PDKV., Akola, MH**

Groundnut is one among the five extensively grown oil crops of India where it is grown and utilized for extracting cooking oil, and also for confectionary under rain fed condition. As a legume, groundnut improves soil by fixing nitrogen biologically without consuming non-renewable energies and without disturbing agro-ecological balance. Aflatoxin is one of the major problems in groundnut, which hinders not only the domestic consumption but also export of groundnut since the international regulation for minimum standards for aflatoxin contamination is becoming stringent. To reduce the harmful effect of Aflatoxin and meeting other objectives, induced mutagenesis is an important breeding strategy. Mutagenesis is the process by which the genetic information of an organism is changed in a stable manner. Mutagenesis can be physical (the use of physical agents) or chemical (the use of chemical agents) to create variability. Development of high-yielding groundnut mutants through chemical mutagenesis such as seed treatment with ethyl methane sulfonate (EMS), sodium azide (NaN₃) was resulted in yield increment over untreated local varieties. Physical mutagens include electromagnetic radiation, such as gamma rays, X-rays and UV light and particle radiation such as fast and thermal neutrons, β and alpha particles were also used in ground nut improvement.

Key words: Mutagenesis Gamma rays, EMS, Aflatoxin

INSECTICIDAL ACTIVITY OF ENTOMOPATHOGENIC FUNGUS, *METARHIZIUM ANISOPLIAE* EXUDATE FOR THE MANAGEMENT OF BRINJAL ASH WEEVIL AND BITTER GOURD APHID**S GOPI^{*1}, RAMEGOWDA G. K.² NIKITA LOKAPPA TOSUR¹, NAGRAJU M. C³ AND AKSHAY KUMAR¹**^{1,3}Department of Entomology, College of Horticulture, Bengaluru (Karnataka), India.²Department of Entomology, College of Horticulture, Mysuru (Karnataka), India.

Insecticidal and repellent activity of *Metarhizium anisopliae* (Metschnikoff) exudate was evaluated against brinjal ash weevil *Myloccerus discolor* (Schonherr) and bitter gourd aphid, *Aphis gossypii* (Glover) under laboratory and polyhouse conditions, respectively. Four treatments viz., *M. anisopliae* exudate alone, same diluted with equal amount of plain water, water alone and untreated control with five replications were evaluated. Five field collected ash weevil adults of unknown age were released per replication in a pair of petri dish with 100 ml stock solution leaves are dipped for one minute and shade dried. Bitter gourd shoots infested with *A. gossypii* were sprayed to runoff using hand atomizer after population estimation. Observations were recorded on mortality of ash weevils and mean number of aphids per three leaves per sqcm after treatment. Among four treatments *M. anisopliae* exudate recoded (20%) ash weevil's mortality compared to *M. anisopliae* exudate and water (1:1) (16%) and water (8%) at three days after treatment (DAT) and 48%, 36% and 32%, respectively at 13 DAT. Control treatment registered no mortality throughout the study period. Abnormal walking behavior of adult weevils (12%) was observed in *M. anisopliae* exudate at 4 DAT. In polyhouse, lowest live aphid population per cent per three leaves per square centimeter after spray was (18.60%) in *M. anisopliae* exudate treatment which was on par with *M. anisopliae* exudate diluted with water (1:1) (24.20%) and the highest population was observed in control (54.40%) which was at par with water (46.00%) after a DAT. Significantly reduced mean aphid population was observed in *M. anisopliae* exudate (26.20%) compared to *M. anisopliae* exudate and water (1:1) (35.64%) and water alone (50.92%) compared to highest population in control (67.08%). Further, based on visual observations on bitter gourd plants shows (100%) phytotoxicity was noticed in *M. anisopliae* exudate and (50%) in *M. anisopliae* exudate and water (1:1) at 10 DAT. The present study reveals the insecticidal, repellent and phytotoxic activity of *M. anisopliae* exudate which needs to explore further for its utilization and discovery of possible candidate molecules.

Key words: Aphid, Ash weevil, Exudate, Insecticidal activity and *Metarhizium anisopliae***PHYSICO-CHEMICAL ANALYSIS OF CHHANA WHEY BEVERAGE BLENDED WITH KOKUM (*GARCINIA INDICA*) SYRUP AND HONEY.****S. H. TERDE, S. M. BAGUL, R. R. KORE****Dept. of Animal Husbandry and Dairy Science, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli**

Whey is the watery part of milk that remains after separation from the milk yogurt / coagulated product that results from acid or proteolytic enzymes mediated coagulation of milk. Whey beverages are pure water, which contains sugars, flavors, edible acids and pigments, and is sometimes carbonated with carbon dioxide gas. Kokum (*Garcinia indica*) belongs to the Cluciaceae family and is found in the tropical rainforests of the west coast of India. Kokum syrup is much appreciated as a health drink the fruit is used as an anthelmintic and cardio tonic. Kokum juice from rind is used against piles, colic problems, dysentery and diarrhea. Honey is a natural sweetener produced by honey bees. Natural honey is a sweet, flavorful liquid food of high nutritional value and immense health benefits. Henceforth considering the utilization of dairy byproduct i.e. chhana whey also the nutritional and medicinal values of Kokum (*Garcinia indica*) and honey the fresh, healthy and refreshing herbal kokum whey beverage is produced. Whey beverage was prepared from chhana whey obtained from cow milk. Honey and kokum syrup was added in chhana whey at different levels. Honey was added at two level 14 percent and 16 per cent respectively, while kokum syrup was added at different levels viz. of 10, 12.5 and 15 per cent of whey and it is represented as H₁K₁, H₁K₂, H₁K₃, H₂K₁, H₂K₂, H₂K₃ respectively. H₁K₀ and H₂K₀ are the control treatment in which kokum syrup was not added it contains only chhana whey mixed with 14 and 16 percent honey respectively. The prepared kokum whey beverage was objected to physicochemical analytical work such as total solids, fat, protein, carbohydrates, ash and pH it contained on an average total solids, fat, protein, carbohydrates, ash and pH as 22.60, 0.324, 0.537, 18.55, 1.009 per cent and 5.40, respectively. From the investigation it was concluded that the most acceptable quality whey beverage can be prepared by using honey at the rate 14 per cent of the whey and kokum syrup at the rate 12.5 per cent of whey.

Keywords : Chhana whey, Honey Kokum Syrup.**EMS AND GAMMA RAYS-INDUCED GENETIC VARIABILITY AND ITS EFFECTS ON THE QUALITATIVE AND QUANTATIVE TRAITS OF GROUNDNUT (*ARACHIS HYPOGAEAL*.)****S. K. BURGHATE, J. N. PARMAR, P. R. PADGHAN, S. M. SHINDE, D. R. RATHOD AND R. D. RATNAPARKHI****Department of Agricultural Botany, Post Graduate Institute, D. Panjabrao Deshmukh Krishi Vidyapeeth, Akola**

In order to increase genetic variability for the improvement of groundnut, mutant variety namely TAG 24, were treated with different physical and chemical mutagens. A significant effect of mutagenesis was distinctly observed in the stem lengths, roots, and survival percentage in M1 generation, similarly mutation frequency and spectrum were studied. Various qualitative and quantitative mutants were isolate in M2 & M3 generation. Furthermore, this study revealed putative mutants with variable agro-morphological traits like seed shape and color mutants were obtained. This study demonstrates the potency of EMS and gamma irradiation to induce high genetic variability that led to the emergence of certain mutations of economic importance.

Keywords: *Arachis hypogaea* L., EMS, Gamma irradiation, LD₅₀, Mutant, Genetic variability

PROFILE OF THE TRIBAL FAMILIES OF PALGHAR DISTRICT**S.K. DESHMUKH¹, M.D. LAWANKAR¹, A.E. JOSE¹ AND N.S. POTE¹****1. Ph.D. Scholar, Department of Agricultural Extension Education, PGI, Dr. PDKV, Akola**

The study was conducted in Palghar district of North Konkan Zone of Maharashtra State during the year 2018-19 and 2019-20. The present investigation was conducted in Palghar district because it has maximum tribal population in the Konkan region. Two tahasils having maximum tribal population were selected to carry out the research. According to the 2011 census two tahasils, Mokhada and Vikramgad have maximum per cent of tribal population. The total population of Mokhada is 83,453 thousand out of which 76,842 thousand i.e. 92.08 per cent is the tribal population of the area. The total population of Vikramgad is 1,37,625 thousand out of which 1,26,368 thousand i.e. 91.82 per cent if the tribal population of the area. Six villages from each tahasil ($6 \times 2 = 12$) were selected randomly to carry out the present study. Ten respondents from each village ($10 \times 12 = 120$) were selected thus the sample size was 120. The collection of primary data was carried out by interviewing the respondents personally by the investigator through personal interview. The data collected was tabulated and subjected to statistical analysis in accordance with the objectives of the study. The study was carried out to know the food consumption pattern of the tribal families considering as dependent variable. The observations were influenced by family education status, family size, annual family income, major occupation, land holding, cropping pattern, farming experience, social participation and resource availability factors as independent variables. Majority (74.16 per cent) of the respondents belonged to 'medium' family education status i.e. up to 7th standard. The average family education status of the respondents was found to be up to 5th standard. Among respondents '78.00 per cent' of the tribal family respondents have 'medium' family size i.e. up to 4-6 members in a family. Majority of the farmers (83.33 per cent) had 'medium' annual family income. The average annual family income of the tribal families was 'Rs.1,16,820/-'. Among respondents nearly half of the respondents (47.50 per cent) had 'cultivation' as their major occupation, while 33.33 per cent were 'labours', 10.00 per cent of them were engaged in 'service', '7.50 per cent' families were engaged in independent profession, only '1.66 per cent' tribal families had 'business' as their profession, and 'no respondents' were engaged in 'caste occupation'. Maximum number '68.33' per cent of the respondents belonged to 'marginal' land holding category. No respondents had more than 4 ha of land holding. The average land holding of the respondents was 0.65 ha. 'Majority' (58.33 per cent) of the respondents had 'fair' cropping pattern. The average cropping pattern score of the respondents is 5.01. 'Majority' of the tribal family respondents (40.00 per cent) had 'medium' farming experience. The average farming experience was 10 years. 'Majority' of the tribal family respondents (58.34 per cent) had 'low' social participation. 'Majority' (40 per cent) of the respondents had 'medium' resources available. Among the respondents 'majority' (59.17 per cent) of the respondents had 'satisfactory' food consumption pattern.

Keywords: Profile, Tribal, Families, Palghar**DIVERSITY ANALYSIS IN IMPROVED AND TRADITIONAL GENOTYPES OF RICE (*ORYZA SATIVA* L.).****¹S. KEERTHANA, ²P. SENTHIL KUMAR, ³GANGADHARA DOGGALLI, ⁴VINUTHA S PATIL, ⁵SANTHOSHINI ELANGO****¹Ph.D Scholar, Dept. of Genetics and Plant Breeding, UAS, Dharwad, Karnataka****²Professor, Dept. of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Chidambaram, Tamilnadu****^{3,5}Ph.D Scholar, Dept. of Genetics and Plant Breeding, UAS, Dharwad, Karnataka****⁴Ph.D Scholar, Dept. of Genetics and Plant Breeding, UAS, Raichur, Karnataka**

The experiment was done to understand diversity among the Thirty five different rice genotypes. The study was carried out in two seasons in randomized block design and evaluated for twelve yield and yield attributing characters. From this pooled diversity analysis was carried out, in that Thirty five rice genotypes were clustered into seven groups. In cluster II more number of genotypes was found and because of this a high measure of intra cluster distance were noticed. The cluster VI and VII had single genotype and thus observed with low intra cluster distance. The maximum inter cluster distance which is a measure of greater genetic diversity had been observed between the clusters I and cluster V. Hence hybridization between these clusters can be expected to produce transgressive segregants which can be utilized as effective parents. The character that contributed more for the divergence was found to be single plant yield among the twelve characters studied.

Keywords: D², Genetic divergence, Rice, Yield**TRAPPING TECHNIQUE OF STINGLESS BEE (*TETRAGONULA NR. PAGDENI*) COLONY FROM ITS NATURAL HABITAT****S. M. WANKHEDE¹, K. V. MALSHE² AND S. L. GHAVALÉ³****AICRP on Palms, Regional Coconut Research Station, Ratnagiri (M.S.), India**

The present investigation entitled "Trapping technique of Stingless bee (*Tetragonula nr. pagdeni*) colony from its natural habitat" was conducted at Regional Coconut Research Station, Ratnagiri, Maharashtra during 2021-2022 with eight treatments viz., T₁.Wooden hive/ trap @ 20x13x10 cm³, T₂.Wooden hive/ trap @ 25x15x10 cm³, T₃.Wooden hive/ trap @ 30x10x10 cm³ with roof, T₄.PVC pipe hive/trap @ two chamber 20x12 cm² and 18x10 cm², T₅.PVC pipe hive/trap @ 30x12 cm², T₆.Bamboo hive/trap @ 1 ft length' T₇.Earthen pot @ 2 litre capacity and T₈.Float Ball @ 1 litre capacity and three replications in completely randomized block design. All the traps were cleaned and resin was smeared around the entrance hole to attract the bees as well as protect the colony from any introducing enemies. PVC pipe @ 5 inch long with 25mm diameter was taken. One end of pipe was fixed at upper on back side of hive and other end was inserted in natural habitat of bee colony. Small 5 mm hole was made at lower on front side hive. All the cracks and crevices on natural habitat/ nest/ cavity were plugged with adhesive material. Observations on queen, brood cells, pollen pots, honey pots were recorded at three monthly intervals. The generated data revealed that the T4-PVC pipe hive/trap @ Two chamber (3"-20cm and 2.5"-18cm) and T5- Bamboo hive/trap @ 1 ft length

were found effective for trapping of maximum queen (0.75 nos.) than the rest of the treatments. The maximum honey cells (30.7 nos.) were recorded in T4-PVC pipe hive/trap @ Two chamber (3"-20cm and 2.5"-18cm) which found significantly superior over T6-Earthen pot @ 2 litre capacity (8.25 nos.), T7- Float Ball @ 1 litre capacity (7.0 nos.), T3- Wooden hive/ trap @ 30x10x10cm (5.75 nos.), T1-Wooden hive/ trap @ 20x13x10cm (4.25 nos.) and T2-Wooden hive/ trap @ 25x15x10cm (3.75 nos.). It was on par with T5- Bamboo hive/trap @ 1 ft length (29.5 nos.). The treatment T4-PVC pipe hive/trap @ Two chamber (3"-20cm and 2.5"-18cm) was recorded maximum pollen cells (22 nos.) was found significantly superior over T2- Wooden hive/ trap @ 25x15x10cm (5.0 nos.) and T7- Float Ball @ 1 litre capacity (5.0 nos.). It was on par with T5- Bamboo hive/trap @ 1 ft length (19.7 nos.), T1- Wooden hive/ trap @ 20x13x10cm (7.25 nos.), T6- Earthen pot @ 2 litre capacity (6.0 nos.) and T3- Wooden hive/ trap @ 30x10x10cm (5.0 nos.). The maximum brood cells (412 nos.) were observed in T4-PVC pipe hive/trap @ Two chamber @ 3"-20cm and 2.5"-18cm and it was on par with T5- Bamboo hive/trap @ 1 ft length (327 nos.). It was significantly superior over T2- Wooden hive/ trap @ 25x15x10cm (101.25 nos.), T7- Float Ball @ 1 litre capacity (80.5 nos.), T1- Wooden hive/ trap @ 20x13x10cm (69.5 nos.), T6- Earthen pot @ 2 litre capacity (59.5 nos.) and T3- Wooden hive/ trap @ 30x10x10cm (22.5 nos.).

Keywords: Capturing, Hive, Honey bee, Nests, Pollen, Pollination, Stingless bee, Traps

ASSESSMENT OF DIRECTIONAL AND SPATIAL INFLUENCE OF BUND PLANTED TEAK (*TECTONA GRANDIS* L. F.) TREES ON PRODUCTIVITY OF CHICKPEA (*CICER ARIETINUM* L.) AND ON SOIL PROPERTIES

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An investigation was undertaken to know the directional and spatial influence of bund planted teak trees on productivity of chickpea and soil bio-chemical properties. **Methodology:** The experiment was carried out on farmers field in Northern Dry Zone of Karnataka, India (Agroclimatic Zone-3 of Karnataka). Where, teak trees were planted perfectly in two direction N-S and E-W with 38 trees in each row and were of 10 years old. The experiment was laid out in a split plot design with three replications. There were 12 treatment combinations selectively randomized with one outside control. Directions from tree line (E-Eastern direction, W-Western direction, N-Northern direction and S-Southern direction) formed the main plots and distances from tree line (S_1 -2.0–7.0 m, S_2 - 7.0–12.0 m and S_3 -12.0–17.0 m) formed the subplots (the chickpea crop was sown at 2 m away from the tree line). **Results:** The study revealed significantly lower growth attributes of chickpea such as plant height, number of branches per plant, number of pods per plant and seed yield on western and eastern direction of N-S tree line compared to southern and northern direction of E-W tree line. Significantly lower growth attributes and seed yield were recorded near the tree line at distance 2-7 m (S_1) and were increased with increase in distance from tree line at distance 12-17 m growth and yield were on par with the control (without trees). Further, the study noticed higher organic carbon and NPK on western and eastern direction N-S tree line compared to southern and northern direction of E-W tree line and similarly higher organic carbon, available nutrients and soil biological properties were observed near tree line and were decreased with increase in distance from the tree line. In-all higher organic carbon and soil nutrients were recorded in bund planted field compared to the control. **Interpretation:** The study indicated significantly lower yield and yield attributes of chickpea on western and eastern direction of N-S tree line compared to E-W tree line. Hence, it is suggested to plant the trees in E-W direction which minimizes the loss due to low shade effect. Further, it was noticed lower yield near the tree line at distance 2-7 m as compared to other distance hence it is suggested to take tree management activity such as pruning or suggest to grow shade tolerant plants such as grass, rhizomes and vegetables near the tree line and in all growing trees helps in the improvement of soil fertility.

Keywords: Biological properties, Chickpea, Direction, Nutrients, Teak and Tree line

A REVIEW ON NOVEL CASSIA TORA GUM- COMPOSITION, STRUCTURE, PRODUCTION, MODIFICATION AND ITS APPLICATIONS IN THE FOOD INDUSTRY

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Cassia Tora hydrocolloid, a natural seed polysaccharide, is an important resource with numerous applications in the food industry. Cassia Tora Gum's composition and structure include galactomannan, which provides excellent thickening, stabilizing, and emulsifying properties in food processing and preservation. Cassia Tora Gum is produced by extracting the seeds and passing through a variety of processing stages to produce a high-quality gum. Chemically, Cassia Tora Gum can be modified by procedures such as carboxymethylation and cyanoethylation to improve its useful properties for specific uses. These modifications improve rheological characteristics, stability, and compatibility in a variety of systems. Overall, Cassia Tora Gum stands out as a promising natural hydrocolloid with a diverse range of applications due to its unique composition, adaptable chemistry, and advantageous qualities that meet the changing needs of the food industry. The market for Cassia Tora gum will also benefit from a growth in customers who are becoming more aware of their health, as well as a growing demand for clean label, wholesome foods.

Keyword: Hydrocolloid, Galactomannan, Polysaccharide, Thickener, Stabilizer, Food, Applications

ANTI MICROBIAL PROPERTY AND ANTI OXIDANT EFFICACY OF POMEGRANATE PEEL EXTRACT: A POTENTIAL NATURAL FISH PRESERVATIVE**S. NATH, ROHAN AHMED, S. CHOWDHURY, P. MURMU, BEAUTY RAY AND DIWAKAR KUMAR****Department of Fish Processing Technology, WBUAFS, Kolkata**

Fish, enriched with high nutritional value protein, is perishable in nature due to its high water content, thus, the food spoilage bacteria can grow easily which leads to spoilage. Beside microbial spoilage enzymatic degradation and oxidative rancidity may happen. Today's consumers prefer natural food preservation methods, due to the potential health risks associated with strong chemical additives. So, natural products, especially natural antioxidants, and antimicrobial agents such as Pomegranate has gained popularity in recent years due to its multi functionality and nutritional benefit in the human diet. Pomegranate peel and peel extract (PPE) have higher biological activity including antioxidant, antimicrobial, free radical scavenging, anti atherogenic and anti mutagenic properties. This approach may efficiently be used for food preservation for extending shelf life and food safety through the inhibition of spoilage and pathogenic bacteria without altering the nutritional quality and sensory attributes of food products. Thus, the present study is aiming at evaluating the antioxidant efficiency and antimicrobial property of Pomegranate peel extract (PPE). The total phenolic content of PPE (peel: solvent was 1:10 w/v) was found as 174.029 mg gallic acid equivalent/g indicating sound antioxidant activity. DPPH radical scavenging assay was carried out to evaluate the antioxidant properties of Pomegranate peel extracts at different concentrations (i.e., 1%, 1.5% and 2% v/v). Sample contain 2% revealed best antioxidant activity among the three extracts and its radical scavenging activity was closer to the commercial antioxidant used (BHT). There is a broad-spectrum antimicrobial activity of PPE was observed; the maximum inhibition was observed against *Bacillus subtilis* (MTCC-2389) followed by *Staphylococcus aureus* (MTCC-7443), *Escherichia coli* (MTCC-443), and *Klebsiella pneumoniae* (MTCC-3384). Thus, PPE can be a potential natural preservative agent for increasing the shelf-life of fish fillets due its promising antimicrobial and antioxidant properties.

SENSORY ATTRIBUTES OF CHHANA KHEER INCORPORATED WITH MANGO PULP (*MANGIFERA INDICA L.*) CV. ALPHONSO**S. R. LANDE, S. M. BAGUL*, S. H. TERDE****Division of Animal Husbandry and Dairy Science, Post Graduate Institute, Dr. Sharadchandra Pawar College of Agriculture, Baramati, Mahatma Phule Krishi Vidyapeeth, Rahuri, MH**

Chhana is an Indian dairy product obtained by heat and acid coagulation of milk followed by drainage of major quantity of whey. Chhana is prepared by boiling milk at about 100°C and cooling down to 82°C at which coagulation is brought out with the help of milk coagulant. The acids commonly used for coagulation are lactic acid or citric acid in both natural and chemical form. Kheer is the most common traditional dairy dessert prepared mainly on religious occasions, social functions and festivals. Kheer has developed itself according to religion and personal preference (Kadam *et al.*, 2011). This is a semi-solid cereals based dairy dessert made by cooking rice with sugar or jaggery until the rice starch is gelatinized. Milk, sugar, rice, dried fruits and flavourings are the main ingredients (Jha *et al.*, 2013). Chhana kheer enriched with processed mango pulp is a unique innovative product with taste and flavour of mango with chhana and has semi-solid consistency. For preparation of chhana kheer three factors were studied simultaneously viz., optimum percentage of sugar to be added, optimum percentage of chhana to be added and optimum percentage of mango pulp to be added during chhana kheer making on the weight by weight basis of original milk. There were two levels of sugar (6 and 8%), two levels of chhana (8 and 10%) and three levels of mango pulp (10, 15 and 20%) under study. The prepared chhana kheer was objected to sensory quality of product such as color and appearance, flavor, consistency and overall acceptability. The average highest score for the most acceptable level by the hedonic scale method of sensory evaluation colour and appearance 8.1, flavor 8.1, consistency 8.5 and overall acceptability 8.15. The most acceptable level of chhana kheer was sugar, chhana and mango pulp found in per cent was 8 per cent, 8 per cent and 20 per cent respectively ($S_2C_1M_3$).

Key words: chhana, mango pulp, chhana kheer**EFFICACY OF TRICHODERMA MEDIATED COPPER NANOPARTICLES AGAINST SEED BORNE MYCOFLORA OF CHICKPEA****S. R. RATHOD, S. T. INGLE, AND N. V. GURAV***¹M. Sc. Student, Department of Plant Pathology, Post Graduate Institute, Dr. PDKV, Akola, MH,²Associate Professor, Department of Plant Pathology, Post Graduate Institute, Dr. PDKV, Akola, MH,³PhD Scholar, Department of Plant Pathology, Post Graduate Institute, Dr. PDKV, Akola, MH,

In the present study, *Trichoderma asperellum* mediated copper nanoparticles are used to manage the different seedborne mycoflora associated with the chickpea crop. The effect of *Trichoderma asperellum* mediated CuNPs on seed germination, root length, shoot length, seedling vigour, pre and post emergence mortality of chickpea was evaluated by rolled paper towel method at 10, 50, 100, 150, 200 and 250 ppm concentrations. The seed treatment with Tr. CuNPs @ 10 ppm and 50 ppm recorded maximum seed germination, highest root length, shoot length and seedling vigour index. It also found to decrease the adverse effect of seed mycoflora on pre and post emergence mortality of chickpea. Seed treatment of Carboxin + Thiram @ 3 g/kg was equally effective in terms of improving seed germination, root length, shoot length, seedling vigour index and reducing pre and post emergence mortality of chickpea. Also, seed treatment of *Trichoderma* based copper nanoparticles at higher concentration i.e. 100, 150, 200, 250 ppm showed adverse effect on seed as it hampered the germination, root length, shoot length and seedling vigour of chickpea. Thus, seedborne mycoflora associated with chickpea can be controlled using *T. asperellum* mediated copper nanoparticles when applied as seed treatment at lower concentrations i.e. 10 and 50 ppm, respectively.

Keywords:- *T. asperellum*, copper nanoparticles, Carboxin + Thiram, chickpea.

INTEGRATED WEED MANAGEMENT APPROACH IN SUGARCANE WITH NEW GENERATION HERBICIDES AND ITS EFFECT ON SUCCEEDING COWPEA.**S.S.NOOLI¹ AND SOURABH MUNNOLLI²**¹**Scientist (Agronomy). ICAR-AICRP-Sugarcane, ARS, Sankeshwar**²**Technical Assistant (Agronomy). ICAR-AICRP-Sugarcane, ARS, Sankeshwar**

Field studies were conducted during two seasons of 2021-22 and 2022-2023 in plant cane to identify the effectiveness and optimum dose of new generation pre emergence herbicides for diverse weed flora management in Sugarcane as integrated weed management approach. The weed control treatments evaluated in field experiment were pre-emergence (PE) application of Metribuzine 70% WP @ 1250 g ha⁻¹, Sulfentrazone 28% + Clomazone 30% WP @ 2500 g ha⁻¹ (Ready mix), Clomazone 22.5 % +Metribuzine 21% WP @ 2500 g ha⁻¹ (Ready mix), Sulfentrazone 39.6% SC @ 1500 ml ha⁻¹, Clomazone 50 % EC @ 1500 ml ha⁻¹ and Atrazine 50%WP @ 2500 g ha⁻¹ (check) , Hand weeding at 30 and 60 days after planting. One inter cultivation at 90 DAP and final earthing up at 120 DAP (common in all herbicidal and hand weeding treatments) and weedy check. The uncontrolled weed competition reduced the Sugarcane yield by 32.5 %. The weed control with pre-emergence application of atrazine, metribuzine, sulfentrazone and clomazone followed by cultural operations were also not consistent. However, PE application of ready mixture of Clomazone 22.5 % + Metribuzine 21% WP @ 2500 g ha⁻¹ with one intercultivation and final earthing up was synergistic and superior in controlling weeds. The weed control efficiencies with ready-mixture of Clomazone 22.5 % +Metribuzine 21% WP at 2500 g ha⁻¹ was 92 % and yielded (136 t ha⁻¹) significantly higher as compared to other herbicide treatments except Sulfentrazone 28% + Clomazone 30% WP @ 2500 g ha⁻¹ with cultural operations which was at par with each other. The lowest yield was with untreated weedy check (97 t ha⁻¹). The results showed that, Clomazone 22.5 % +Metribuzine 21% WP or Sulfentrazone 28% + Clomazone 30% WP combination has synergistic effect, which can be used for managing diverse weed flora in Sugarcane followed by one intercultivation at 90 DAP and earthing up at 120 DAP. No phytotoxicity in Sugarcane crop and on succeeding crop was observed with new chemicals i.e., Clomazone 22.5 % +Metribuzine 21% WP @ 2500 g ha⁻¹ or Sulfentrazone 28% + Clomazone 30% WP @ 2500 g ha⁻¹.

Keywords: IWM, Phytotoxicity, Ready mix herbicide, Sugarcane, Weed Control.**NEWLY RELEASED HIGH YIELDING SUGARCANE VARIETY PHULE SUGARCANE 15012 (MS 17082)****S.S. UBALÉ, M. A. SHELAKÉ, K. D. BHOITE AND R. L. BHILARE****1Senior Research Assistant, 2. Junior Research Assistant, 3. Sugarcane Physiologist, 4. Sugarcane Specialist, Central Sugarcane Research Station, Padegaon-415 521, Tal. Phalthan, Dist. Satara**

The Phule Sugarcane 15012 sugarcane variety is developed by hybridization followed by clonal selection from the cross of high sugar recovery variety Co 94008 with high yielding variety CoM 0265. The Sugarcane variety Phule Sugarcane 15012 (MS 17082) is midlate maturing, suitable for *adsali*, *preseason* and *suru* planting and is recommended for release in western Maharashtra. The variety is drought, salt tolerant and is also best for Rasvanti. The average cane yield for *Adsali* (164.1 t/ha), *Preseason* (156.1 t/ha) and *Suru* (130.4 t/ha). The CCS yield for *Adsali* (23.7 t/ha), *Preseason* (21.6 t/ha) and *Suru* (18.8 t/ha). The ratoon cane yield is 128.5 t/ha and CCS yield is 17.7 t/ha. The variety is moderately resistant (MR) to red rot and wilt, Resistant to smut & YLD. The leaves are erect, broad, dark green without leaf sheath spines. Cane is thick (diameter 3.02 cm), unexposed yellowish green colour, exposed color light purple. It is recommended for Maharashtra State, Suitable for planting in *Adsali*, *Preseason* and *Suru* seasons. In juice quality per cent Sucrose at harvest is 20.27%, percent CCS at harvest is 14.39 %. It is Suitable for growing under medium and high fertile soil in Maharashtra under irrigated condition for three season viz., *Adsali*, *Preseason* and *Suru*. Yield and quality data in different season for *Adsali* season CCS yield (23.66 t/ha), Cane yield (164.14 t/ha), Sucrose % (20.54%) and CCS % (14.64 %). *Preseason* CCS yield (21.64 t/ha), Cane yield (156.13 t/ha), Sucrose % (20.14%), CCS %, (14.18%). *Suru* season CCS yield (18.77 t/ha), cane yield (130.38 t/ha), Sucrose % (20.13%), (CCS% 14.36%), indicated superiority over local control/standard variety to be indicated. In Adaptive trials on farmer's field during 2018-19 & 2019-20 Phule Sugarcane 15012 recorded 19.29% higher cane yield than Co 86032. Overall the variety gives the highest yield over ruling variety Co 86032 (11.09 %) and highest CCS % over the high yielding variety Phule 0265 (3.97 %). The Phule Sugarcane 15012 is widely accepted by the farmers of Maharashtra and it is supplementary to high yielding variety CoM 0265. It is also salt tolerant hence it will be beneficial to the salty soil farmers of Maharashtra and out of state. Field experiment was conducted at Central Sugarcane Research station, padegaon 2020-21 in *suru* season to study the juice quality of sugarcane genotypes. Among the eight promising entries Phule Us 15012 was found best juice quality and yield than Co 86032. Best for beverage purpose (Rasvanti).

EVALUATING THE AQUATIC ECOSYSTEM HEALTH OF RADHANAGARI TEHSIL THROUGH COMPREHENSIVE PHYSICOCHEMICAL WATER QUALITY ASSESSMENT**S. V. MADHALE, S. R. SATHE, S. P. DORUGADE, V. M. LAGADE, A. D. KAMBLE AND S. D. GORSKETWAR.****Shri. Yashawantrao Patil Science College, Solankur. (Tal- Radhanagari)**

Water quality is an important environmental concern, as the physicochemical properties of water bodies can significantly impact the health of aquatic ecosystems and surrounding biotic communities. This study aimed to analyze the physicochemical parameters of water bodies in Radhanagari Tehsil, a region in the Kolhapur district of Maharashtra, India. Water samples were collected from five different surface water sites of Radhanagari Dam, Kalamwadi Dam and Tulshi Dam, during the pre-monsoon season. Parameters such as pH, electrical conductivity, total dissolved solids, turbidity, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, nitrates, phosphates, and heavy metals were measured using standard analytical methods. The results showed that the water quality varied across the different water bodies, within some parameters exceeding the permissible limits set by regulatory authorities. Factors such as agricultural runoff, Anthropologie activities, and domestic waste were identified as potential sources of water pollution in the region. These findings of this study provide valuable insights into the water quality status of Radhanagari Tehsil and can be informative for the development of effective water management strategies and policies to protect the local water resources.

Key Ward: Physicochemical Analysis, Physical, Chemical methods, Dam surface water, Anthropologie activities.

AGRONOMIC BIOFORTIFICATION OF PEARL MILLET WITH ZINC THROUGH NANO AND CONVENTIONAL FERTILIZERS APPLICATION IN CALCAREOUS VERTISOLS IN INDIA**S. B. PATIL^{1*}, G. N. SASALATTI², R. A. NANDAGAVI¹, V. G. YADAHALLI³, ANURADHA KAGGOD¹, M. P. POTDAR¹ AND J.V.N.S. PRASAD⁴**¹**Agronomy, AICRP for Dryland Agriculture, Regional Agricultural Research Station, Vijayapura 586 101, Karnataka, India**²**Agronomy, College of Agriculture, Vijayapura 586 101, Karnataka, India**³**Soil Science, College of Agriculture, Vijayapura, UAS, Dharwad, Karnataka, India**⁴**Agronomy, AICRP for Dryland Agriculture, ICAR-Central Research Institute for Dryland, Agriculture, Hyderabad, Telangana,**

The agronomic biofortification is a promising and cost-effective measure to increase zinc concentration in grain to address zinc malnutrition since dryland soils are deficient in zinc. A field experiment was conducted over two consecutive years during the *Kharif* seasons at the Regional Agricultural Research Station, Vijayapura, Karnataka, India. The experiment laid out a factorial randomized block design (RCBD) with two factors, replicated thrice. The treatments of the first factor consisted of soil application of a recommended dose of fertilizers (RDF), RDF + ZnSO₄ @ 10 kg ha⁻¹ (RDF + Zn¹⁰), and RDF + ZnSO₄ @ 15 kg ha⁻¹ (RDF + Zn¹⁵), while the second factor comprised control (no foliar spray, Zn₀), ZnSO₄ @ 0.5% (Zn_{0.5%}), ZnSO₄ @ 0.75% (Zn_{0.75%}), Nano-Zn @ 2 ml L⁻¹ (Nano-Zn_{2ml}), and Nano-Zn @ 4 ml L⁻¹ (Nano-Zn_{4ml}) foliar application. Zinc and iron content and uptake, protein content, and grain yield in pearl millet were evaluated. The pooled results of two years revealed that soil application of RDF + Zn¹⁵ recorded significantly higher grain yield (1746 kg ha⁻¹) and stover yield (6192 kg ha⁻¹) compared to RDF alone. Soil application of ZnSO₄ had a significant effect on Zinc harvest index (ZnHI). A significant increase in total nutrient uptake by 40.58% Zn, 22.74% Fe, and 11.73% protein content in grain was observed. Foliar nutrition of zinc also significantly influenced grain and stover yield. Among foliar applications, Nano-Zn_{4ml} recorded higher grain yield (1714 kg ha⁻¹), stover yield (6080 kg ha⁻¹), nutrient content, total uptake of Zn and Fe, and protein content, followed by Nano-Zn_{2ml}. Agronomic efficiency of added zinc (AEZn) was significantly higher in foliar application Nano-Zn_{2ml} than the control. The net returns (₹ 22,257 and 22003 ha⁻¹) and benefit-cost ratio (2.33 and 2.34) were also higher with soil application of RDF + Zn¹⁵ and Nano-Zn_{4ml} compared to RDF alone and no foliar sprays. It concludes that soil application of ZnSO₄ @ 15 kg ha⁻¹ with RDF and foliar application of Nano-Zn @ 4 ml L⁻¹ increase the yield, nutrient use efficiency, net returns, and benefit-cost ratio of pearl millet in zinc-deficient vertisols under rainfed conditions. Further, it improves the zinc uptake and bioavailability in gains and meets the aim of biofortification of pearl millet with zinc to elevate malnutrition.

Keywords: Bajra, Bioavailability, Nanofertilizers, Net returns, Agronomic efficiency

ASSESSING THE EFFICACY OF INSECTICIDES AGAINST KEY INSECT PESTS OF OKRA (ABELMOSCHUS ESCULENTUS (L) MOENCH)**S.T. SONAWANE^{*1}, B. V. PATIL² AND U.B. HOLE³**^{1,2}**Department of Entomology, College of Agriculture, Badnapur, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, (M.S),**³**Govt. College of Agriculture, Nandurbar, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S), India**

The study, conducted at the Department of Entomology's experimental farm in Parbhani during the 2019-2020 *Kharif* season, aimed to evaluate chemical efficacy against okra's main insect pests, using the Parbhani Kranti variety. Employing a Randomized Block Design with eight treatments and three replications, it assessed treatments' effectiveness against aphids, leaf hoppers, whiteflies, and thrips. Acetamipride 20 SP @ 2 g/ 10 L proved most effective against aphids, followed by Thiamethoxam 25 WG @ 3 g/ 10 L and Cyantraniliprole 10.26 OD @ 10 ml/ 10 L. Thiamethoxam 25 WG @ 3 g/ 10 L excelled in reducing leaf hopper and whitefly populations, as did Cyantraniliprole 10.26 OD @ 10 ml/ 10 L against thrips. Chlorantraniliprole 18.5% SC @ 2.5 ml/ 10 L and Emamectin benzoate 5% SG @ 3 g/ 10 L resulted in the lowest fruit damage by *E. vittella* and *H. armigera*. Additionally, Cyantraniliprole 10.26 OD @ 10 ml/ 10 L, Cypermethrin 25% EC @ 3 ml/ 10 L, Thiamethoxam 25 WG @ 3 g/ 10 L, and Acetamiprid 20 SP @ 2 g/ 10 L showed reduced fruit infestation compared to the control. All insecticides were safe to moderately safe, with no significant impact on natural enemy populations. Results indicated superiority of all insecticide treatments over the control, with Chlorantraniliprole 18.5 SC @ 2.5 ml/ 10 L producing the highest okra yield (75.17 qt/ ha), and Cypermethrin 25 EC @ 3 ml/ 10 L yielding the highest Incremental Cost Benefit Ratio (ICBR) (1:15.33).

(Keywords: Okra, Aphids, leaf hoppers, whiteflies, thrips, *E. vittella*, *H. armigera*)

STUDY OF GENETIC VARIABILITY AND CORRELATION STUDIES FOR MORPHO-PHYSIOLOGICAL, YIELD AND YIELD CONTRIBUTING PARAMETERS IN SOYBEAN (GLYCINE MAX (L.) MERRILL)**S.M. SHINDE, S.D. MOON, J.N. PARMAR, S.K. BURGHATE, P.R. PADGHAN AND, R.D. RATNAPARKHI****Department of Agricultural Botany, Post Graduate Institute, D. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, MH**

An experiment entitled “Study of genetic variability for morpho-physiological, yield and yield contributing parameters in soybean (*Glycine max* (L.) Merrill)” was conducted at experimental and research field of Department of Agricultural Botany, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.) in Randomized Block Design with fifteen treatments and three replications. The fifteen (15) different genotypes obtained from Regional Research Centre were evaluated for genetic variability studies during kharif 2021. The results showed the plant height was recorded highest in KDS-753 (81.42 cm), leaf area KDS-228 (34.01 dm²), dry matter production was recorded highest in MAUS-162 (37.67g). The relative growth rate was recorded highest in KDS-344 (0.0135 g/g/day). The net assimilation rate was recorded highest in MACS-1281 (0.0135 g/dm²/day). The genotype MAUS-162 recorded highest number of pods per plant (81.78), number of seeds per pod (2.73), seed yield per plant (14.7g), 100 seed weight (15.17 g). The genotype MAUS-162 recorded significantly highest harvest index (44.58%). A wide range of variability was observed for most of the characters. The estimates of phenotypic coefficients of variation were higher than that of genotypic coefficients of variation for all characters under study. The high magnitude of GCV and PCV value for morphological and physiological traits was observed for relative growth rate, dry matter production, net assimilation rate. Moderate range of GCV and PCV observed for 100 seed weight, seed yield per plant and number of seeds per pod. Least range of GCV and PCV observed for days to maturity. The high heritability observed for 100 seed weight (98.74%), seed yield per plant (92.09%), number of seeds per pod (80.69%). Least range for heritability net assimilation rate (49.82%). The characters exhibited positive and significant correlation with seed yield per plant were total dry matter (0.756), days to maturity (0.358), number of pods per plant (0.805), number of seeds per pod (0.705), 100 seed weight (0.750). The character exhibited positive and non-significant correlation with seed yield per plant was relative growth rate (0.235). The characters exhibited negative and significant correlation with seed yield per plant were plant height (-0.603), leaf area (-0.306). The characters exhibited negative and non-significant correlation with seed yield per plant were net assimilation rate (-0.254). However, the present findings need further confirmation on multilocation basis.

Keywords: Soybean, Genetic variability, GCV, PCV, Seed yield, Harvest index.**VERTICAL FARMING AND CONTROLLED ENVIRONMENT AGRICULTURE****SACHIN KUMAR SINGH¹, DHARMENDRA KUMAR¹, SHUBHAM YADAV¹, ATUL KUMAR RAWAT¹ AND ANTRIKSH DESHWAL¹****¹Research Scholar, Department of Fruit Science, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (U.P.)**

Vertical farming and controlled environment agriculture (CEA) are innovative and sustainable solutions to address issues in traditional agriculture like land scarcity, climate change, and depletion of natural resources. This report outlines the main ideas, progress, and advantages associated with vertical farming and CEA, which involves growing plants in stacked layers or structures, usually in urban settings. Vertical farms maximize the use of space, reduce water consumption, and minimize environmental impact by using methods like hydroponics, aeroponics, and aquaponics. Expansion allows for precise control of factors like temperature, humidity, and light, leading to increased yields and quality. CEA includes a wide range of agricultural practices conducted in controlled environments, including greenhouses and indoor facilities. CEA enables year-round production regardless of outdoor conditions through the integration of advanced technologies like LED lighting, climate control, and automated monitoring. Utilizing vertical farming and CEA provides numerous advantages over traditional farming methods, especially in areas with extreme weather conditions or limited arable land. To start, these structures greatly reduce the need for land, making them practical for urban areas with limited space. In vertical farming and CEA expansion, sustainable farming practices are promoted and environmental pollution is reduced by decreasing reliance on chemical pesticides and fertilizers. Expanding the proximity of production to consumers reduces transportation costs and carbon dioxide emissions associated with food distribution. In conclusion, vertical farming and controlled environment agriculture provide solutions to improve food security, mitigate the effects of climate change, and promote sustainability. Continuing to explore and create advancements in this area provides a chance to change how we plan and consume food in the future.

Keywords: Vertical farming, controlled environment agriculture (CEA), hydroponics, aeroponics, and aquaponics**IMPACT OF BENZOPHENONE-3 ON BEHAVIOUR AND GILL OF *CYPRINUS CARPIO*****SADIYA SHAHEEN AND RESHMA SINHA****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, India**

Benzophenone-3 (BP-3) is a commonly used ultraviolet filter in skincare and other personal care products due to its ability to protect from UV radiation. However, its extensive use has raised concerns about its environmental impact. The current study intended to examine the physiological effects of benzophenone-3 on *Cyprinus carpio* through acute and chronic toxicity. 96h LC₅₀ of BP-3 was calculated to be 0.389 mg/L. A 30 day chronic assay was conducted on *cyprinus carpio* (size:12.5 ±0.1cm, weight:7±0.2g) by exposing to sublethal concentration of 0.0389 mg/L of BP-3 which is 1/10th of 96h LC₅₀. The chronic exposure to BP-3 exhibited behavioural, morphological and histopathological changes. The BP-3 stress resulted in air gulping, loss of scales, body colour fading, disrupted movements (freezing), elevated mucus secretion and hyperactivity as behavioural modification. The histological alterations of gills showed fusion and shortening of lamellae, and chondrocytes degeneration. As a result, the findings of this study offer valuable insight into potential implications associated with BP-3 exposure on aquatic organism such as common carp.

Keywords: Aquatic organisms, BP-3, Common carp, Toxicity, Stress.

ANALYSIS OF RESISTANCE AGAINST FALL ARMYWORM *SPODOPTERA FRUGIPERDA* (J.E. SMITH) ON DIFFERENT MAIZE CULTIVARS**SACHIN YADAV *, DR. S. RAMESH BABU,****Department of Entomology, Rajasthan College of Agriculture****Maharana Pratap University of Agriculture & Technology, Udaipur (Raj.)**

Maize (*Zea mays* L.) is one of the most important cereal crops in the world. It is known around the world as the "Queen of Cereals" because of its high genetic yield potential and ability to adjust. FAW attacks more than 350 different kinds of plant species and is considered to polyphagous. Host plant resistance, cultural control, biological control, biopesticides, mating disruption technologies, synthetic pesticides, and agroecological management are just a few of the many technologies and management techniques that have been developed over the years and are now available for the control of FAW. FAW neonate larvae (one-day old) were obtained from a FAW colony and were reared at the Department of Entomology, RCA, MPUAT, Udaipur (25 ± 2) °C, RH $75 \pm 5\%$) with a natural diet. The present study was carried out to variation between different maize cultivars available locally by assessing the plant damage which might be used as parameters for FAW resistance. Larval arrestment and consumed leaf area were significantly higher in the cultivars PMC-6 and local cultivar and PMC-6, respectively. At days 9, and 12 larval weight was significantly higher in PMC-6 (0.035, 0.176 respectively). The percentage of accumulated mortality and pupation of FAW of different maize cultivars was recorded maximum in HQPM-1 and sweet corn, respectively. Assimilated food weight and consumed leaf weight was recorded higher in PMC-6. Trichome density significantly difference between maize cultivars and maximum no. of trichomes were recorded in sweet corn (29.8).

Key words: Fall Armyworm, Davis score, plants damage, FAW resistance, Larval arrestment, consumed leaf area

**OPTIMIZATION OF THE THERMODYNAMIC PROPERTIES IN DYEING SILK FABRIC WITH ONION PEEL EXTRACT
SADHANA KULLOLI¹, SUVARNAGOURI Y² AND SINDHU G³**¹**Professor and Head, Department of Textile and Apparel Designing, College of Community Science, UAS, Dharwad**²**Assistant Professor, Department of Textile and Apparel Designing, College of Community Science, UAS, Dharwad**³**Ph.D Scholar, Department of Textile and Apparel Designing, College of Community Science, UAS, Dharwad**

Onion peel is regarded as waste in the food industry that consists of dye stuff known as Pelargonidin. This research study on dyeing with onion peel was carried out to explore the use of non edible natural substance. Onion peel was obtained from local market, shade dried and powdered. The dried and powdered onion peel was aqueous extracted at pH 7, analysed for its qualitative and quantitative (FTIR) characteristics. Phytochemical analysis of Onion peel extract showed the presence of Flavonoids, glycosides, tannins, anthraquinones, and Terpenoids. The Fourier Transform Infrared (FTIR) analysis indicated broad peaks of O-H stretching at 3286 cm^{-1} confirming the presence and intermolecular interaction of antrocyenin with the polymer matrix. The colour strength of different dye concentrations were tested and based on the higher colour strength value (K/S), 20 per cent dye concentration was optimized for dyeing on silk fabric. Degummed silk fabric was pre-treated with myrobolan (1,2 and 3%), simultaneously mordanted with Alum, Ferrous sulphate and copper sulphate (1,2, and 3%) and dyed with onion peel extract dye. Based on the colour strength values the dyeing time of 45 mins, temperature of 80°C and 3 per cent mordant concentration with 1:40 MLR was optimised. Results revealed that, there was increase in fabric thickness and weight of silk fabric after dyeing, but the increase was non-significant. The dyed silk fabric showed good to excellent colour fastness to washing, sunlight, rubbing and perspiration. However, dyed silk fabric showed excellent UPF protection value. Thus, it was an effort to utilize the waste material in an efficient manner which could minimize the cost of dyeing.

Keywords: non edible, natural substance, pre treatment, mordants , Onion peel

IMPACT OF BENZOPHENONE-3 ON BEHAVIOUR AND GILL OF *CYPRINUS CARPIO***SADIYA SHAHEEN AND RESHMA SINHA****Department of Animal Sciences, School of Life Sciences, Central University of Himachal Pradesh, India**

Benzophenone-3 (BP-3) is a commonly used ultraviolet filter in skincare and other personal care products due to its ability to protect from UV radiation. However, its extensive use has raised concerns about its environmental impact. The current study intended to examine the physiological effects of benzophenone-3 on *Cyprinus carpio* through acute and chronic toxicity. 96h LC_{50} of BP-3 was calculated to be 0.389 mg/L. A 30 day chronic assay was conducted on *cyprinus carpio* (size: $12.5 \pm 0.1\text{cm}$, weight: $7 \pm 0.2\text{g}$) by exposing to sublethal concentration of 0.0389 mg/L of BP-3 which is $1/10^{\text{th}}$ of 96h LC_{50} . The chronic exposure to BP-3 exhibited behavioural, morphological and histopathological changes. The BP-3 stress resulted in air gulping, loss of scales, body colour fading, disrupted movements (freezing), elevated mucus secretion and hyperactivity as behavioural modification. The histological alterations of gills showed fusion and shortening of lamellae, and chondrocytes degeneration. As a result, the findings of this study offer valuable insight into potential implications associated with BP-3 exposure on aquatic organism such as common carp.

Keywords: Aquatic organisms, BP-3, Common carp, Toxicity, Stress.

ADVANCEMENTS IN PRECISION AGRICULTURE AND INNOVATIVE TECHNOLOGIES IN VEGETABLE SCIENCE**SAGAR SAINI****Ph.D. Research Scholar Hort. Vegetable Science, Rajasthan Agricultural Research Institute (S.K.N. Agriculture University, Jobner) Durgapura, Jaipur, Rajasthan**

One recent approach gaining attention in vegetable science is precision agriculture, specifically tailored for vegetable crops. Precision agriculture involves the use of technology, data analysis, and site-specific management practices to optimize resource use and improve crop production. In vegetable science, this approach is being applied in several innovative ways: Remote Sensing and Imaging: Drones equipped with multispectral or hyperspectral cameras are used to monitor crop health, detect stress factors, and assess nutrient levels in vegetable fields. This data helps farmers make informed decisions about irrigation, fertilizer application, and pest management. Variable Rate Technology (VRT): VRT allows for precise application of inputs such as fertilizers, pesticides, and water based on real-time data and spatial variability within the field. For vegetables, this means targeting specific areas with the right amount of resources, reducing waste and environmental impact. Smart Irrigation Systems: Sensor-based irrigation systems combined with weather data and soil moisture monitoring help optimize water use in vegetable production. This not only conserves water but also prevents overwatering, which can lead to diseases and nutrient leaching. Data Analytics and Decision Support Systems: Advanced analytics and machine learning algorithms are used to process data from various sources including sensors, satellites, and historical records. These tools provide farmers with actionable insights and predictive models for better crop management strategies. Vertical Farming and Controlled Environment Agriculture (CEA): In urban areas or regions with limited arable land, vertical farming and CEA technologies are used to grow vegetables in controlled environments. This approach allows for year-round production, reduced water usage, and optimal nutrient delivery to plants.

RIVER WATER POLLUTION WITH SPECIAL REFERENCE TO HEAVY METAL POLLUTION IN THE INDUSTRIAL STRETCH OF A RIVERINE ECOSYSTEM IN WEST BENGAL, INDIA**¹SAGARIKA MUKHERJEE* AND ¹MANAS PARAMANIK****¹Epidemiology, Vector biology and Environmental monitoring Research Units, Entomology Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, Paschim Bardhaman, West Bengal, India**

Water pollution presents a formidable global challenge to humanity. Toxicity due to different pollutants along with heavy metals, exacerbated by anthropogenic activities such as industrialization and modern agricultural practices, poses significant risks to the environment, agriculture, and human health. The contamination of heavy metals such as arsenic, cadmium, lead, and mercury in ecosystems has become a pressing concern due to their bio-accumulative properties and toxicity. This study evaluated water pollution levels in River Nunia in West Bengal, India which traverses through areas impacted by various small and medium-scale industries, including mining activities. Several water quality parameters along with concentrations of six key heavy metals were analyzed across the industry-affected stretch of the river during three seasons, adhering to standard protocols. The study findings indicate that arsenic, lead, mercury, and chromium are the most abundant heavy metals in River Nunia. The highest 'water quality index' of 496.38 was observed at the site near dense urban agglomerations, signaling a severe pollution level. Maximum heavy metal pollution was found near mining industrial areas with a 'heavy metal pollution index' of 1079.11, again indicating a dangerous contamination level. Foaming is also observed on some surfaces of the river water indicating the presence of pollutants. The diversity and abundance of hemipteran insects significantly reduced in the study sites near the industrial area compared to those situated farther away. The pollution index values are consistently higher during summer and winter. Restoring riverine ecosystems requires ethical industrial practices, advanced water treatment technologies, and habitat restoration programs.

Key Words: Water pollution, Nunia river, Pollution index, Heavy metal, Mining, Biodiversity.**STRATEGIES AND TECHNOLOGIES FOR CLIMATE CHANGE ADAPTATION FOR SUSTAINABLE AGRICULTURE****SAHADEVA SINGH¹ AND VIMAL KUMAR SHARMA²****¹Galgotias University, Greater Noida, Uttar Pradesh, India****²G. D. Goenka University, Gurugram, Haryana, India**

Sustainable agriculture can improve environmental health, carbon sequestration, economic profitability, and soil and economic equity by adopting organic farming, agroforestry, natural farming, integrated pest management, system of rice intensification, cover crops and mulching, precision farming, no till or reduced tillage, integrated farming system, intercropping and crop rotation. It can reduce the application of synthetic fertilizers and pesticides in farming system.. Sustainable agriculture promotes use of solar, wind, biofuel, biogases technologies and minimizes fossil fuel requirement. Climate change impact such as drought, floods, pests and disease outbreak, and extreme weather can be minimized by adopting sustainable agriculture practices. Sustainable agriculture is helpful for increasing crop production, reducing the cost of production, minimizing risk, improving food security and nutrition, enhancing livelihood security, and maintaining natural resources and ecosystem. Sustainable agriculture faces some challenges such as lack of technology, knowledge and awareness, lack of infrastructure in irrigation, storage, marketing links and processing. The food system needs to be strengthened. By adopting various strategies such as crop diversification, diversifying farming systems, investment in infrastructure in irrigation and storage, and promoting organic farming practices, natural farming, climate resilient crops, drought resistant plating materials, strengthening market linkage and value chains and providing credit facilities in investment in sustainable agriculture practices could be helpful to overcome the challenges facing the system.

Key words: Sustainable agriculture, carbon sequestration, climate change, diversification, climate resilient

BIOLOGICAL CONTROL STRATEGIES FOR SUSTAINABLE PEST MANAGEMENT IN AGRICULTURESAHAB SINGH PIPPAL*, LAL BAHADUR SINGH¹ PRINCE MAHORE²

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Biological control, a cornerstone of integrated pest management represents a sustainable and ecologically conscious approach within modern agricultural systems. This strategy harnesses the natural interactions between living organisms to regulate pest populations and maintain a balanced ecosystem. Beneficial organisms such as predators, parasitoids, and pathogens are employed to control pest species reducing the reliance on synthetic pesticides and minimizing their potential negative impacts on the environment, non-target organisms, and human health. By introducing these natural enemies into agricultural landscapes or enhancing their populations, biological control offers long-term pest suppression while promoting biodiversity and ecosystem resilience. The Agricultural systems worldwide face significant challenges in managing pest populations while minimizing the negative environmental impacts of traditional chemical pesticides. Prolonged and indiscriminate pesticide use has led to pest resistance, harm to non-target organisms, and soil and water pollution. Achieving sustainable agriculture requires effective pest management strategies that balance crop protection with ecological conservation. Recent advances offer promising avenues for achieving sustainable agriculture. The dynamic field of pest management is witnessing a transformative shift towards sustainable solutions. Biological Control Agents have emerged as a formidable force, leveraging predatory insects, parasitoids, and microbial pathogens to curtail pest populations. Recent breakthroughs in mass rearing, formulation, and delivery methods amplify their effectiveness for large-scale implementation. Augmentation and Conservation strategies underscore the importance of releasing natural enemies while orchestrating habitat preservation to ensure persistent pest suppression. Conservation biological control takes root in enhancing the very habitats that nurture beneficial insects. Entomopathogens are microorganisms that are pathogenic to arthropods such as insects, mites, and ticks. Several species differ significantly in their biology and behavior, and hence in their ability to control the population of enemies in each environment. The proper use of entomopathogens requires a good knowledge of the biological cycle of enemies. Entomopathogens such as bacteria, fungi, nematodes, and viruses infect a variety of arthropod pests and play an important role in their management. Innovative biological control strategies within the Integrated Pest Management framework for sustainable pest management in diverse agricultural systems. It aims to unite research addressing challenges posed by traditional pesticides while promoting ecological conservation and crop protection.

Keywords: Biological control; Sustainable; Agriculture; Management.**TECHNOLOGICAL ADVANCEMENT FOR REVIVAL OF ORGANIC COTTON SECTOR IN INDIA: POLICY AND ROADMAP**SAHADEVA SINGH¹, M.V. VENUGOPALAN² AND ASHIRBACHAN MAHAPATRA^{3*}¹School of Agriculture, Galgotias University, Greater Noida, Uttar Pradesh, India²ICAR - Central Institute of Cotton Research, Nagpur, Maharashtra, India³M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Odisha, India

Cotton is vital for India's agriculture and industry constituting 70% of the textile sector's fiber consumption and 38% of exports. Cultivated over 13.0 million hectares, it sustains 60 million livelihoods. In 2021-22, India produced 34.10 million bales of cotton, exporting to 159 countries; major importers were Bangladesh, China, and Vietnam, accounting for 60% of exports. Despite its economic significance, conventional cotton farming's negative environmental impact fueled interest in organic cotton production. Demand surged globally for chemical-free organic cotton as consumers in Western countries sought sustainable textiles. Organic cotton adheres to strict standards, shunning genetically modified seeds, synthetic pesticides, and fertilizers. India's organic cotton sector revived as more farmers adopted eco-friendly methods. The global organic cotton sector is projected to grow, driven by consumer demand and government support. However, challenges in supply chain integrity, sustainable practices, marketing, and certification must be addressed for long-term viability.

Key words: Cotton, India, Organic, Production, Trade, Sustainable**ESTIMATION OF AVOIDABLE LOSSES CAUSED BY INSECT PESTS OF SORGHUM**SAIF ALI KHAN^{*1}, HEMANT SWAMI¹, NEHA GIRISH MATRA²¹Department of Entomology, Rajasthan College of Agriculture, MPUAT, Udaipur, (Rajasthan)²Department of Entomology, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri, (Maharashtra)

The investigation on "Estimation of avoidable losses caused by insect pests of sorghum" was laid out in paired plot design at Rajasthan College of Agriculture, MPUAT, Udaipur during *Kharif* 2022. There will be 26 plots (13 paired plots), out of which one set of 13 plots were provided application of insecticides at regular interval to keep the crop pests free (Protected) and another set of 13 plot were exposed to natural infestation of insect pests (Unprotected). The insect pest infestation significantly influenced the yield attributing characters and sorghum grain yield. The insect pest infestation caused reduction in mean height of plant (26.62 %), test weight of sorghum grains (25.40 %), mean grain yield per plant (14.34 %), mean grain yield per plot (13.89 %), mean of per cent chaffy spikelet's (74.78 %) and mean of shriveled grains (73.39 %) in unprotected plots.

Key words: Paired plot, chaffy spikelets, shriveled grains, sorghum, test weight.

BAMBOO: AN COMMERCIALY IMPORTANT NON TIMBER FOREST PRODUCE

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Bamboo is fast growing versatile plant, capable of providing ecological, economical and livelihood security to the people. It has been identified as poor man's timber by people throughout the world. India has abundant resources of bamboo with 136 species and 36 genera mainly concentrated in Western Ghats and "Sister States" of North-east India. They occupy 13 per cent of the total forest area of the country. It has been estimated that the internal and commercial consumption bamboo accounts for US \$ 10 billion of which the total revenue obtained from bamboo and bamboo-based products is estimated to be Rs.25,000 crores. Of this bamboo shoot accounts for Rs.7,500 crores; while other bamboo-based products accounts for Rs.17,500 crores. Out of 13.47 million tons of bamboo, about 3.14 million tons are currently being consumed for scaffolding alone all over India. Recently IPIRTI (Indian Plywood Industries Research & Training Institute) has developed a technology for making match sticks from bamboo. *Melocanna baccifera* (Muli bamboo) makes excellent matchsticks splints. The annual consumption of wood by matchstick industry in India is 2.6 million cft. The current value of bamboo used in agarbatti market is approximately Rs.135 crores. Besides agarbatti industry, bamboos are used in some other miscellaneous items such as lathis and fishing rods, which valued at Rs.186 crores. The general consumption pattern of bamboo indicates that 35 per cent is being consumed by pulp and paper industries; while rest 65 per cent is used by locals under cottage, construction, furniture and implements industries. The total production of paper and paper board is estimated to be about 3.1 million tonnes/ annum. Some of the economically important bamboo species include; *Bambusa bambos*, *B.nutans*, *B. tulda*, *Dendrocalamus asper*, *D. strictus* and so on. Bamboo is one of the best source for value addition; the various value added products produced from bamboo include; bows, arrows, flutes, musical instruments, umbrella hands, frames for cots, walking sticks, lathi, ladders, scaffolding handy gadgets, suppa, water flour mills, fishing rods, etc. They are very good species of bamboo to be raised in Agro-forestry as a source of additional income and for soil conservation. Hence, its high valued utilization not only promotes for economic development, but also saves forest resources to protect our ecological environment as a substitute of wood.

Keywords: Bamboo, NTFP, Match Splints, Agarbatti, Agro-forestry

SENSOR-BASED TECHNOLOGY IN AGRICULTURE

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Sensor-based technology in agriculture is quite exciting! It's all about using sensors to collect data and boost farming efficiency. Sensors can detect soil moisture, temperature, humidity, and even pests. This allows farmers to make better-informed decisions about irrigation, tertiary fertilization pest control. It is like giving plants a high-tech checkup. Agriculture relies heavily on sensor technologies. By giving real-time data on numerous environmental parameters, it assists farmers in optimizing their resources, increasing crop yields, and lowering expenses. It allows for precision irrigation, targeted fertilization the early detection of plant illnesses. Sensor technology enables farmers to make data-driven decisions and increase overall output. It's a game changer in modern agriculture. Sensor-based agricultural technology will be implemented in India for a variety of reasons. First and foremost, India is an agrarian country with a large farming population. Farmers may increase output and reduce waste by using sensor technologies. This is especially significant in countries like India, where water scarcity and erratic weather patterns present agricultural issues. Furthermore, sensor-based technology can help solve the issue of food security by increasing crop yields while decreasing losses due to pests, diseases, and insufficient irrigation. With a growing population and increased demand for food, adopting these technologies is critical to addressing the country's agricultural needs. Some innovative technology that we need provides benefits indeed. Examples - Soil moisture sensor, Weather sensor, Crop health sensor, Nutrient sensor, and Pest monitoring sensor. Moreover, the Indian government is actively promoting the application of this technology in agriculture with programs like Smart Village and Digital India. It assists farmers in putting this innovation into practice and promotes the use of sensor-based technology. Encouraging farming methods, higher crop yields, and better farmer livelihoods are all potential outcomes of sensor-based agriculture technology adoption in India. It's an exciting opportunity to revolutionize agriculture in the country.

Keywords - Precision irrigation, erratic weather pattern, digital India.

MELATONIN TREATMENT ENHANCES BIOACTIVE COMPOUND RETENTION, ANTIOXIDANT ACTIVITY, AND SHELF-LIFE OF BELL PEPPER (*CAPSIUM ANNUUM* L.) DURING COLD STORAGE

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Melatonin (MT), a novel signaling compound derived from tryptophan, has gained significant attention for delaying postharvest ripening and senescence in various fruits and vegetables. In the present study, the effect of MT treatment was evaluated on the postharvest shelf-life of bell pepper. Fruits were dipped in various MT concentrations (70, 120, 170, 220 $\mu\text{M L}^{-1}$) for 20 min and stored at $10\pm1^\circ\text{C}$ for 20 days. The bell pepper treated with 120 $\mu\text{M L}^{-1}$ MT significantly suppressed respiration (68.69 $\text{mL CO}_2 \text{ kg}^{-1} \text{ h}^{-1}$), weight loss (7.87%), and delayed chlorophyll degradation. Additionally, MT maintained higher firmness (15.83 N), titratable acidity (0.95%), and retained total phenol (66.35 $\text{mg GAE } 100 \text{ g}^{-1} \text{ FW}$), flavonoid (25.32 $\text{mg CE } 100 \text{ g}^{-1} \text{ FW}$) and ascorbic acid (49.83 $\text{mg } 100 \text{ g}^{-1} \text{ FW}$) content. It hindered malondialdehyde accumulation (5.69 $\mu\text{M g}^{-1} \text{ FW}$) by enhanced DPPH radical scavenging (49.21%) and antioxidant enzyme activity like superoxide dismutase (146.48 $\text{U mL}^{-1} \text{ g}^{-1} \text{ FW}$), catalase (178.57 $\mu\text{M min}^{-1} \text{ g}^{-1} \text{ FW}$), peroxidase (0.34 $\mu\text{M min}^{-1} \text{ g}^{-1} \text{ FW}$), over the control. Remarkably, these findings suggest that 120 $\mu\text{M L}^{-1}$ MT prolongs the postharvest shelf life of bell pepper by 20 days with superior sensory quality, surpassing the control by 10 days.

Keywords: Malondialdehyde, Ascorbic acid, Carotenoids, Color, Shelf-life, Sensory analysis

EGG CHORION CHARACTERIZATION AND ITS POTENTIAL USE IN STRENGTHENING MORPHO-TAXONOMY OF TWO SPECIES OF GENUS *OLEPA* WATSON, 1980 (EREBIDAE: LEPIDOPTERA)***SAINIKA JALLUNDHARA AND AMRITPAL SINGH KALEKA****Department of Zoology and Environmental Sciences, Punjabi University Patiala, India**

Insects being the largest faunal group form a major component of our biodiversity. The documentation and exploration of this group is indispensable to any scientific study and conservation. The moths and butterflies play an important role in urban landscapes as agricultural pests, night pollinators and indicators of ecological health. Lepidopterans, like most other insects are oviparous. Immature stage morphology specifically of the eggs is largely unattended for most of the lepidopteran species. The egg chorion patterns and its complexity being species specific, has a great potential for strengthening classification and systematic studies of these species. The Arctiinae moth genus *Olepa* Watson, 1980 is known for its range of distribution in Bangladesh, China, India, Israel, Nepal and Sri Lanka with 16 extant species. Even the inter and intraspecific morphological variations in adults are not well-documented, especially for genital characters. Due to such limitations, the taxonomy of the group needs immediate attention.

The present study deals with thorough investigation of the structural complexity of egg chorions and their comparative analyses, in two species namely *Olepa ricini* Fabricius, 1775 and *Olepa clavatus* Swinhoe, 1885 using scanning electron microscope (SEM). This comparative examination of egg chorion will enable the use of these exo-chorionic characters in the morpho-taxonomy of these two species, as well as aid in the formation of identification guides for future references. These findings will enrich the taxonomic database and update future pest management strategies with the aim of early potential pest detections at the level of immature stages.

Key Words: Ultrastructure, Egg Chorion, Eggs, Immatures, Taxonomy, Lepidoptera, Arctiinae.

CONSTRAINTS FACED BY PRADHAN MANTRI KRISHI SINCHAYEE YOJANA BENEFICIARIES AND SUGGESTIONS TO OVERCOME THE CONSTRAINTS.**SAKHARE P.A., PADAM, R.P., TAYDE V.V., CHAVHAN S.N.****Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani**

The present study entitled "Impact of Pradhan Mantri Krishi Sinchayee Yojana on its beneficiaries" was conducted in Gondia and Tiroda tehsils of Gondia district of Maharashtra state. A sample of 120 respondents was drawn randomly from 12 villages. From each village five beneficiaries and five non-beneficiaries were chosen from selected villages. Ex post facto research design was followed in the present investigation. In the constraints, majority of the beneficiaries reported that, lack of capital to cover the maximum area (93.33%), delay in sanctioning of PMKSY (91.67%), sometimes the equipment's supplied by PMKSY was found inferior or poor quality (86.67%), lack of awareness and knowledge about fertigation (85.00%), credit assessment is low from Gov. (83.33%), irregular power supply (83.33%), insufficient training on operation and maintenance of equipment's (81.67%), high initial investment cost (78.33%), were the major constraints. In order to overcome the constraints some suggestion were given by the beneficiaries they are as, majority of the beneficiaries said the scheme's benefits should be delivered on times (98.33%), the amount of subsidy should be increased (96.67%), standard quality of material should be provided (91.67%), Local dealers should be provided with spare parts (90.00%), Timely information should be disseminated by extension agents (86.67), The government should supply the necessary equipment at proper times (83.33%), Good quality of emitters should provide to the beneficiaries (78.33%).

Keywords – PMKSY, Impact, Beneficiaries and Non-beneficiaries, Irrigation, Har Khet Ko Paani)

HEALTH POLICY: ONE NATION & ONE HEALTH**SAKHARE P.A., SAMRIT V.B., BANGAR R.U., AND CHAVHAN S.N.****Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani**

India is moving toward the establishment of a "One Nation, One Health System," which would incorporate both conventional and modern medical practices, including homeopathy, Ayurveda, and allopathic, into medical research, teaching, and clinical practice. With the goal of creating a standardized health system, NITI Aayog is putting a lot of effort into achieving this goal. It views this kind of integration as its primary means of achieving this goal. An Integrative Health System is intended to be created by one health system policy, wherein patients would receive care from any medical system based on their pathology and the evidence that is now available to treat it. Every patient in the nation will receive a need-based, uniform, and standard therapy; the goal is to ensure that no one is denied access to therapeutic therapies that are not made impossible by factors such as availability, affordability, or accessibility (Rastogi S., Singh R.H.). One Health is a strategy for developing and carrying out laws, regulations, research, and programs that encourage collaboration and communication across many sectors in order to improve public health outcomes. In order to address health risks at the interface of animals, humans, and environment, the One Health approach is essential. The concept of "One Health" acknowledges the intimate relationship between human health, animal health, and the health of our shared environment. The World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO) came to an agreement that served as the basis for One Health's goal. In order to improve, safeguard, and defend the health of all species, it aims to promote cooperation in research and knowledge sharing at different levels across a range of disciplines, including human, animal, plant, soil, environmental, and ecosystem health.

(Keyword – Health policy, one nation, one health, NITI Aayog)

PHYSICOCHEMICAL AND ANTIOXIDANT PROPERTIES OF HONEY OF *APIS MELLIFERA* COLLECTED FROM DIFFERENT BOTANICAL ORIGIN**SAKSHI SAXENA* A.S. YADAV AND S.P.S TOMAR****Department of Entomology, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, MP**

Honey is the result of a bio-accumulation of processes that depend on biotic and abiotic factors around a bee habitat like type of plant, geographical origin, climate conditions, beekeeping practice, etc. physiochemical and antioxidant properties of honey can reveal important information about its origin. Honey samples were collected from beekeepers' apiaries of the Malwa and Chambal regions of Madhya Pradesh. The sample was collected in December during the mustard blooming season, February during the coriander blooming season and April during the multiflora (babul, berseem and eucalyptus) blooming season. The honey samples were collected in bottles and after their processing delivered for lab analysis. The proximate composition of the honey was determined by using standard methods of food analysis and procedures of BIS, FSSAI and the Association of Official Analytical Chemists. The physicochemical and antioxidant properties of honey were analyzed by using ANOVA two factors without replication. The result showed that the *A. mellifera* raw honey data falls in the range of good quality compared to BIS/FSSAI standards. This research justifies the suitability of bee hive honey produced in this region as approved enough for use in commercialization.

Keywords- Honey, *A. mellifera*, physicochemical properties, antioxidant properties,**PHYTOCOMPOUNDS PROFILING, ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF MEDICINAL PLANT *CHRYSOPOGON ZIZANIOIDES*****SAKSHI SINGH AND SWATI*****School of Applied Science and Biotechnology, Shoolini University of Biotechnology & Management Sciences, Bajhol-Solan (HP)**

Chrysopogon zizanioides is the source of the valuable aromatic "Vetiver oil" which enjoys worldwide reputation being one of the finest oriental perfumes. As an important essential oil yielding plant of India, vetiver has been grown and extensively used in the country for several centuries. The purpose of this study was to examine Antimicrobial and antioxidant activity present in *Chrysopogon zizanioides* roots extracts and different compounds present in root extracts. GC-MS analysis showed that many compound present in root extracts of *Chrysopogon zizanioides*. The major compounds class are sesquiterpenoids, monoterpenoids, esters, hydrocarbons, and a fatty acid. The results of antimicrobial tests demonstrated that the root extracts had antimicrobial properties. These antibacterial effects are effective against a variety of harmful microbes, indicating potential health benefits in combating bacterial infections. The results of the antioxidant activity tests demonstrated that the extract had powerful free radical scavenging properties, suggesting that it could find application as a natural antioxidant. The combination of strong antibacterial and antioxidant properties indicates that vetiver root extracts may offer significant health benefits.

Key Words: *Chrysopogon zizanioides*, antibacterial properties, antioxidant properties, GC-MS analysis**BIODIVERSITY STATUS OF MAJOR MEDICINAL AND AROMATIC PLANT (MAPS) OF HIMACHAL PRADESH, INDIA*****SAKSHI, *SONIKA RANI, ¹MUNIT SHARMA, AND **SONALI THAKUR*****Research Scholar, Department of Botany, Thakur PG College of Education, Dhaliara****¹Assistant Professor, Department of Botany Thakur PG College of Education, Dhaliara**

The Himalayas are highest and youngest mountain in the world. The Indian Himalayan region (IHR) is widely recognized for its rich biological diversity. Himachal Pradesh is a state in north-western India situated in the foot hills of the Himalayas. The term biodiversity refers to the abundance and diversity of life on earth. The quantity and variety of flora and fauna that co-exist in an ecosystem is known as biodiversity. The flora of Himachal Pradesh includes about 8000 species of angiosperms, 44 species of gymnosperms, 600 species of pteridophytes, 1737 species of bryophytes. More than a thousands of these species have been identified as aromatic and medicinal plants. Additionally, aromatic and medicinal plants contribute to people's economic growth and source of revenue. During the survey, a total of 60 plants in which (30) herbs, (12) shrubs, (8) trees, (8) climbers, (2) creepers are found in the sampling sites. The growing demand for aromatic and medicinal plant will need the commercial viability of some species to be cultivated. The objective of this research is to identify the species of concern and suggest sustainable management strategies for the protection of these species.

Keywords: Medicinal plants, Biodiversity, Biotic component, Healthcare, Economic growth.

SUPERVISORY MANAGEMENT OF POD FLY, *MELANAGROMYZA OBTUSA* MALLOCH (DIPTERA: AGROMYZIDAE) IN PIGEONPEA**SALEEMALI KANNIHALI^{1*}, V RACHAPPA¹, SHASHANK D U² AND SAHANA M¹**¹Department of Agricultural Entomology, University of Agricultural Sciences, Raichur, Karnataka, India²Department of Entomology, PGCA, Dr. Rajendra Prasad Centre Agricultural University, Pusa (Samastipur), Bihar 848 125, India

A field experiment was carried out during kharif 2019-20 at Zonal Agricultural Research Station, Kalaburagi, University of Agricultural Sciences, Raichur, Karnataka, India on supervisory management of pod fly in pigeonpea variety TS 3R sown on three dates viz., 20-07-2019, 05-08-2019 and 20-08-2019 under both protected and unprotected conditions. In protected plots, pod fly was managed by spraying with the recommended chemicals in package of practices *i.e.*, Imidacloprid 17.8 SL 0.20 mL + jaggary 10 g/L as first spray at 10 days after pod formation and second spray with Thiamethoxam 25 WG 0.2 g + jaggary 10 g/L at 15 days after first spray. Subsequent spray was taken up on need basis at 15 days interval whenever seed damage crossed five per cent. Results indicated that the damage was insignificant in all sowing dates before first spray in both protected and unprotected plots. However, the damage in protected plots reduced significantly compared to unprotected plots after first and subsequent sprays. Spaying was done twice on 20th July sown crop. Whereas, 5th and 20th August sown crop required three sprays. The pod damage at maturity was 24.00, 28.80 and 33.60 per cent in unprotected plots; and 9.60, 13.60 and 16.80 per cent in protected plots in the crop sown on 20th July, 5th August and 20th August, respectively. Similarly seed damage was 15.14, 19.33 and 28.24 per cent in unprotected; while it was 5.67, 7.07 and 11.55 per cent in protected plots at maturity in the crop sown on 20th July, 5th August and 20th August, respectively.

Key words: Supervisory management, Pigeonpea, Sowing dates, Pod damage, Seed damage**REVOLUTIONIZING FARMING: DIGITIZING AGRICULTURE THROUGH ROBOTS AND DRONES****SALMA KAYASTHA^{1*}, RAMAKANTA SWAIN², DEBASHIS DASH²**^{1,2}Faculty of Agriculture and Allied Sciences, C.V. Raman Global University, Bhubaneswar, India

Agriculture continues to be a major contributor to the global economy and the main source of income for rural communities in developing economies. Nevertheless, problems like pest infestations and crop failure brought on by unfavourable weather still exist. Agri-drones and other cutting-edge farming technologies or digital farming can be used to predict and prevent crop failures. Digital farming converts labour-intensive manual operations into efficient automated procedures by utilizing contemporary technologies such as sensors, robotics, and data analysis. This review examines current developments in agricultural robots or Drones, sometimes referred to as Unmanned Aerial Vehicles (UAVs) with particular attention on field scouting, autonomous weed management, and harvesting. A completely automated agricultural system is still unfeasible, despite the fact that robots are being incorporated into farming more and more in current times. To maximize profitability, sustainability, and environmental protection, agricultural production systems must be integrated with current electronic technologies or aerial robots. They perform precise, site-specific agricultural management tasks exceptionally well, particularly under demanding conditions such as tall crops or damp paddy fields. This paper also analyses various sensing and control technologies and presents an overview of the use of UAV technology in agricultural production management. The limitations of existing aerial robots for agricultural management are explored, and recommendations for further research and use are made.

Keywords – Digital Agriculture, Farming, Drones, UAV, Robots.**BIODIVERSITY, GENETIC RESOURCES AND CROP IMPROVEMENT****SALMAN KHAN*, VIRENDRA SINGH**RAJA RAM BUNKER******Ph.D. Research scholar, Department of Horticulture, RCA, MPUAT, Udaipur, Rajasthan******Associate professor, Department of Horticulture, RCA, MPUAT, Udaipur, Rajasthan**

The use of plant genetic resources (PGR) in crop improvement followed by adoption, cultivation and consumption or marketing of the improved cultivars by farmers, is one of the most sustainable methods to conserve valuable genetic resources for the future, and simultaneously to increase agricultural production and food security. The objective of this review is to summarize issues related to the use of PGR in crop improvement. Specific topics are the definition of genetic resources for crop improvement; information sources on the internet; documentation and evaluation of PGR; access to PGR, equitable sharing of profits, and material transfer agreements; impediments to the use of PGR in crop improvement; classical methods of using PGR in crop improvement (introgression, incorporation, prebreeding and wide crosses); use of landraces in breeding for specific adaptation to stress environments; the utility of molecular markers and genomic research for using PGR in crop improvement (diversity assessment, mapping of quantitative trait loci (QTL) and marker-assisted selection (MAS), advanced backcross QTL analysis and introgression libraries, association studies and direct allele selection); and gene transfer. Practical examples or experimental results are given for most aspects.

Keywords: PGR, Molecular markers, Prebreeding, QTL, MAS

STATUS OF THE FISHERY: AN ASSESSMENT FROM THE BANEER RIVER IN THE WESTERN HIMALAYA SALONI & SANDEEP KUMAR

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The current study documents the fishery status in the section of the Baneer river (the major tributary of Beas River system) originating from the Dhauladhar range of the Indian Himalayan region. The experimental fishing was performed by hiring local licensed fishermen using 5 gill nets (mesh size 1.5-3 cm; 4 metre length) during January-May, 2024. The gears were laid overnight and gathered in the early morning. The fish fauna was identified following the standard keys. The total as well as individual weight of the specimen was recorded using portable weigh balance and the catch per unit effort (CPUE) was determined following standard literature. The fish species; *Schizothorax* sp. and *Tor putitora* form the major share in the catch (kg), the former being dominant (>80 % share) in the late winter months (January-February) and later in the early summer months (March-April). The total catch was the minimum (2 kg) in the month of January and maximum (9 kg) in May. The CPUE was very low ranging from 0.3-1.8 (February-April). The total catch and CPUE registered significant ($p>0.05$) increase from late winter to early summer possibly attributed to the upstream migration of the *Tor putitora* stock from Beas River system; also witnessed by its enhanced share in the assemblage. Since the past data on the fishery of Baneer river was lacking, the current study can be considered as benchmark for future comparisons. Furthermore, the low total catches and CPUE infers the declining status of the fishery, which was validated by the questionnaire (the other aspect of the study).

Keyword: Capture fishery; CPUE; Baneer River; Fish catch

GROWTH INHIBITION ACTIVITY OF BIOGENIC SYNTHESIZED SILVER NANOPARTICLES (AG NPS) AGAINST MANGO ANTHRACNOSE (*COLLETOTRICHUM GLOEOSPORIOIDES*) DISEASE

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The advantage of technology has provided better options to combat today's hurdles. In the era of modern agriculture, the unmanageable use of pesticides and fungicides are causing severe health problems. On the other side, phytopathogens are developing more resistance against traditional chemical measures. Thus, need of time to alternative cost-effective and eco-friendly technology for the solution to this modern problem. Furthermore, nanotechnology can be utilised to resolve these challenges. The green synthesis of nanoparticles has novel surface-dependent properties like catalytic and antimicrobial activity. Therefore, in present study the evaluation of silver NPs via the biogenic method of synthesis from mango leaf was carried out. These silver NPs were used to check the inhibitory effect against anthracnose disease in in-vitro conditions. The synthesized silver NPs exhibited 432 nm Surface Plasmon Resonance with calculated band gap energy of 2.87 eV. DLS analysis found an average particle size of 64.87 nm and the zeta potential peak at -14.0 mV. The TEM analysis revealed almost spherical shapes of synthesized silver NPs with an average size of 33.90 nm. In the present study aqueous biogenic silver NPs exhibited potent anti-fungal activity against *C. gloeosporioides* growth with inhibiting areas of 4.74 ± 0.13 mm, 6.04 ± 0.19 mm, 8.29 ± 0.06 mm and 9.12 ± 0.30 mm at 50, 100, 150 and 200 ppm concentrations, respectively. This was found very significant and advisable against positive control with higher concentrations of carbendazim (1000 ppm). Thus nanotechnology could be a better alternative approach to control anthracnose disease in the field and storage condition of mango.

Keywords: Biogenic, silver NPs, anti fungal, activity, *Colletotrichum gloeosporioides*

MARVELS OF BACILLI IN SOIL AMENDMENT FOR PLANT-GROWTH PROMOTION TOWARD SUSTAINABLE DEVELOPMENT HAVING FUTURISTIC SOCIO-ECONOMIC IMPLICATIONS

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Microorganisms are inseparable part of ecosystem, having profound impacts on various aspects of human life. In agriculture, microbes are essential contributors to food production and environmental bioremediation. However, years of agricultural intensification have increased crop productions at the cost of soil health and affecting the microbial diversity, jeopardizing food security. A study in West Bengal, India, addressing these issues, examined the capability of a novel multi-strain consortium of plant growth promoting (PGP) *Bacillus* spp. for bioaugmentation of soil. These strains were isolated from the indigenous microflora of soil. Composite inoculum containing *Bacillus zhangzhouensis* MMAM, *Bacillus cereus* MMAM3, and *Bacillus subtilis* MMAM2 was prepared. This composite inoculum was introduced into an overexploited agricultural soil. The implications on the improvement of vegetative growth and yield associated traits of Glycine max (L.) Meril. plant growth was checked in pot trial condition. The findings revealed improvements in growth of plants and diversified soil microbes while using bacterial consortium in association with vermicompost. Metagenomic analysis showed consortium inoculated soil had an increase in many functional genera and metabolic pathways. This indicated that soil biological health was enhanced. This innovative bioaugmentation strategy, presents a promising path forward for sustainable agriculture. The small and marginal farmers can use the patches of over-used land for cultivation of resilient crops like soybean. Considering the role of multi-strain PGP bacterial consortia as potential bioinoculants, such technology can strengthen food security, increase agricultural productivity, and reduce side effects of past agricultural activities.

Keywords: Sustainable agriculture, novel consortium of *Bacillus zhangzhouensis*, *B. subtilis*, *B. cereus*, multi-strain PGP bacterial inoculant, microbe-assisted bioaugmentation

ADVANCEMENTS IN SEED BIOFORTIFICATION TECHNIQUES: A REVIEW**SAMEERA AFREEN¹, DR. M. RAMESH²**¹M.Sc student, Seed Science and Technology, ²Assistant Professor, Department of seed science and technology (SRTC), PJTSAU, Rajendranagar, Hyderabad

Hidden hunger, characterized by insufficient intake of essential micronutrients, remains a critical issue in many developing countries, leading to widespread stunted growth and wasting among children. In response, there is a growing global call for innovative strategies to enhance food and nutritional security. Seed biofortification have emerged as promising, cost-effective, and sustainable approaches to deliver micronutrients to populations with limited access to diverse diets and other interventions. This review provides an overview of recent advancements in biofortification techniques, focusing on their efficacy in enhancing the nutritional content of staple cereals and millets, such as rice and wheat. Various studies have demonstrated the effectiveness of seed priming with micronutrients, microbial inoculants, and other biofortification methods in improving crop yields, seed quality, and nutrient uptake. Additionally, the review discusses the importance of selecting appropriate micronutrient sources and concentrations to avoid potential toxicity while maximizing nutritional benefits. Overall, biofortification offer promising avenues for addressing hidden hunger and improving food security in resource-constrained regions, highlighting the need for further research and implementation efforts to combat malnutrition effectively.

Keywords: hidden hunger, food and nutritional security, biofortification, micronutrients.**GREEN SYNTHESIS OF ZINC NANOPARTICLES USING SELECTED PLANT LEAF EXTRACT AND COMPARATIVE ANALYSIS OF THEIR ANTIMICROBIAL ACTIVITY****SAMIKSHA SINGH AND SWATI*****School of Applied Science and Biotechnology, Shoolini University of Biotechnology & Management Sciences, Bajhol-Solan (HP)**

Green synthesis processes help in reducing the chances of environmental toxification thus, making the environment living worth. Biosynthesis approach has advantages over conventional methods involving chemical agents linked with environmental toxicity. The development of safe and eco-friendly methods for biogenetic processing is now of great interest, due to the simplicity of the processes and versatility. It has received increased attention due to growing need to develop environmentally benign technologies in material synthesis. In this study we use plant extract to synthesize nanoparticles. The nanoparticles were thoroughly characterized and demonstrated significant antimicrobial activity against fungus as well as bacteria (gram positive and gram negative). Further testing for Minimum Inhibitory Concentration (MIC) confirmed their potent antimicrobial properties. These findings suggest that zinc nanoparticles synthesized from plant leaf extract have promising potential as antimicrobial agents.

Keywords: Green synthesis, antimicrobial activity, stabilizing agent.**CONFRONTING ANTIBIOTIC RESISTANCE IN AQUACULTURE: DILEMMAS AND MITIGATION APPROACHES****SAMPA BAIDYA¹, ARUN BHAI PATEL¹, NITESH YADAV¹, SOURABH DEBBARMA²**¹College of Fishereies, Central Agricultural University, Lembucherra, India²Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University, Thoothukudi, Tamil Nadu, India

Antibiotic resistance is a significant global concern, with aquaculture being a notable contributor to the proliferation of resistant bacteria. This abstract highlights the challenges associated with antibiotic use in aquaculture and explores prevention strategies to mitigate the emergence and spread of antibiotic resistance. Aquaculture plays a crucial role in meeting the growing demand for seafood, but the reliance on antibiotics for disease prevention and treatment poses serious threats to public health and the environment. Antibiotics administered in aquaculture systems can select for resistant bacteria, which can spread through water bodies, impacting human health and ecosystems. Addressing antibiotic resistance in aquaculture requires a multifaceted approach. Firstly, there is a need for improved surveillance and monitoring of antibiotic use and resistance in aquaculture operations. This data can inform evidence-based policies and regulations to promote responsible antibiotic use. Furthermore, alternative disease management strategies, such as vaccines, probiotics, prebiotics, and phage therapy, offer promising alternatives to antibiotics in aquaculture. Integrating these alternatives into aquaculture practices can reduce reliance on antibiotics while maintaining the health and welfare of aquatic species. Additionally, promoting good aquaculture practices, including proper hygiene, biosecurity measures, and adequate water quality management, can help prevent disease outbreaks and reduce the need for antibiotics. In conclusion, addressing antibiotic resistance in aquaculture requires concerted efforts from all stakeholders, including governments, industry players, researchers, and consumers. By implementing comprehensive prevention strategies and promoting sustainable aquaculture practices, we can mitigate the threat of antibiotic resistance and ensure the long-term viability of the aquaculture industry.

Keywords: Antibiotic Resistance, Aquaculture, Prevention Strategies, Sustainable Practices, Disease Management

DOUBLING THE FARMERS INCOME**SAMPAT CHOUDHARY¹ AND AMIT KUMAWAT²**¹Research Scholar, Department of Agronomy, Rajasthan College of Agriculture, Udaipur²Assistant Professor, Department of Agronomy, College of Agriculture, Bikaner

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In India, the agriculture sector is constantly improving its structure to maximize output and ensure food security. However, a large population is leaving farmer practices because of the low-income generation, which has a direct negative impact on their lifestyle and appears to be a serious concern for food security. Adequate attention was required to secure the agricultural sector's future and the livelihoods of both farmers and consumers. In addition, the Government of India implements several initiatives at both the central and state levels, such as infrastructure development, technological innovation, policies, and institutional mechanisms. The present review focused on the past trend in farmers' incomes along with current status, innovative agricultural approaches and Indian government's recent initiatives toward doubling of farmers' income. The low income is attributed to various factors, viz. environmental, technological, market, and socio-economic status. Diversification with high value crops like vegetables, flowers, fruits and livestock enterprises will be a strong strategy to double the income of all the categories of farmers. This will also be a step towards climate resilient agriculture. Farmers should be encouraged to cultivate higher value crops through various government programmers. Moreover, farmers should also get easy and timely access to the quality seeds of different high yielding variety. Inclusion of livestock farming will reduce the dependence on agriculture and will buffer farmer's income. The average agriculture productivity is also low in Odisha compared to others state in the country. To enhance the productivity supply of quality seeds, judicious use of inputs, efficient use of modern technologies, encouragement for value addition, market linkage for getting better price for the farm produce is essential. Due care should be taken, so that all the strategies will be more realistic, locally acceptable and cost effective.

Key words: Doubling, productivity and Crop Diversification**JEWELS OF THE DESERT: THE THARPARKAR CATTLE BREED****SAMPAT KUMAR CHOUDHARY******PG Student, Department of Livestock Production and Management, College of Agriculture, SKRAU, Bikaner (334006), Rajasthan**

Tharparkar stands out as a vital milch breed within the arid regions of western India, boasting a unique resilience amidst challenging desert climates. This breed significantly contributes to the livelihoods of rural farmers, particularly in regions like Rajasthan, where it plays an essential role in animal agriculture. Its popularity among farmers stems from its ability to yield substantial quantities of milk and its capacity to support agricultural activities even in drought-prone areas. Typically, Tharparkars are managed in herds ranging from 50 to 300 animals by specialized breeders known as Maldars. When grazed on arid pastures, these cattle produce an average of approximately 1135 kg of milk per lactation, while those kept within village settings yield an average of 1980 kg. Owing to its distinctive attributes, Tharparkar has garnered significant attention from breeders across the country and has been actively utilized in crossbreeding initiatives. Crosses with various exotic breeds such as Holstein Friesian and Brown Swiss have demonstrated exceptional milk production capabilities. Extensive literature reviews indicate that Tharparkar thrives in harsh tropical climates, making it well-suited for sustainable dairy farming practices.

PERCEPTION OF FARMERS TOWARDS ZERO BUDGET NATURAL FARMING**SAMRIT V.B., SAKHARE P.A., GAIKWAD S. R. AND JADHAV H.S.****Department of Agricultural Extension Education, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani**

The present study was conducted mainly with the objective to study "Perception of Farmers towards Zero Budget Natural Farming" For the study; Latur and Beed district were selected from Marathwada region of Maharashtra. Four tehsils viz., Latur and Renapur of Latur District and Majalgaon and Ambajogai from Beed district were selected randomly and three villages from each tehsil were selected randomly. From each village ten members were randomly selected constituting the sample size 120. Ex-post-facto research design was used for the study. Farmer's perceptions are very much useful to establish the facts that how the particular region is understand about zero budget natural farming and its practices. Consequently, understanding the perception about zero budget natural farming by farmers is important as perception can shape the preparedness of these actors to adapt and change their practices. The adoption and successful implementation of new technologies by farmers in their ecosystems depend on their tendency to perceive and react favourably towards zero budget natural farming and its various practices. Majority (70.83%) of farmers had medium perception whereas; 15.84 per cent farmers had high perception about zero budget natural farming followed by 13.33 per cent of farmers had low perception level about zero budget natural farming.

(Keywords – ZBNF, Zero Budget Natural Farming, Perception, Perception of Farmers)

EFFECTS OF DIFFERENT DIETARY IRON LEVELS ON GROWTH, CONVERSION EFFICIENCIES, HEMATOLOGY AND ANTIOXIDANT STATUS OF FINGERLING INDIAN MAJOR CARP, *CATLA CATLA*

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In order to formulate environmentally friendly, sustainable aquaculture feeds, the availability of information on precise nutrient requirements of cultivable fish species is essential. Iron is an important micronutrient for animals, including fishes. Since *Catla catla* is a promising species for aquaculture, this study was conducted to estimate its requirement for dietary iron by feeding six casein-gelatin based isonitrogenous (350 g kg⁻¹ crude protein) and isoenergetic (16.7 kJ g⁻¹ gross energy) diets with varying levels of iron in the form of ferrous sulphate heptahydrate (0, 50, 100, 150, 200 and 250 mg kg⁻¹ diet). The experimental diets were hand-fed to triplicate groups of fish at 08:00, 12:00, and 16:00 hours to apparent satiety. Live weight gain, specific growth rate, feed conversion ratio, protein efficiency ratio and protein gain improved with the increase in iron levels upto 200 mg kg⁻¹ diet. Dietary iron levels influenced whole body moisture, protein and lipid content. Haematological indices such as haemoglobin (Hb), red blood cell counts (RBCs) and haematocrit (Hct), were also affected. Superoxide dismutase, glutathione peroxidase, and catalase activities responded positively up to an extent of 200 mg kg⁻¹ dietary iron. Based on statistical analyses of data on growth, FCR, haematological parameters, and antioxidant activities, a dietary iron level of 200 mg kg⁻¹ diet was considered to be suitable for optimum growth of fingerling *C. catla*.

Keywords- dietary iron; growth; haematological indices; antioxidant parameters; *Catla catla*

STUDY ON LOCAL CHICKEN ECOTYPES OF ODISHA AND EVOLVING ECO-SMART BREEDING STRATEGIES

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The present study was conceptualized with an overarching goal of undertaking an intensive institutional study of three chicken ecotypes of Odisha, namely Hansli, Vezaguda and Phulbani reared at Central Poultry Development Organization (CPDO), Bhubaneswar during 2021-23. Out of these three ecotypes, Hansli happened to be a recognized breed of Odisha and other two ecotypes i.e. Vezaguda and Phulbani were lesser known chicken types of Odisha. All the three chicken types studied were of meat type with Hansli being significantly heavier than both Vezaguda and Phulbani type. Average 8-week body weights of 494.44±17.72, 467.32±13.33 and 268.07±9.68 g were estimated for Hansli, Vezaguda and Phulbani males, respectively. Female counterparts were 394.86±10.21, 412.54±10.14 and 244.67±7.73 g, respectively. The age at first lay for Hansli, Vezaguda and Phulbani chicken were 272.25±0.71, 156.33±1.08 and 231.58±1.49 days, respectively. Average age at peak production was recorded as 285, 170 and 246 days for Hansli, Vezaguda and Phulbani chicken, respectively. Hansli chicken having edge on body weight at 40 weeks of age and Vezaguda chicken type having edge on age at first lay, but with comparable economic traits. However, Phulbani was the smallest chicken amongst three ecotypes; whereas Vezaguda was medium and comparable to Hansli. The heritability of economic traits in all three chicken population were low to moderate. Both Vezaguda and Phulbani chickens have the potentiality to get registered as separate breeds. Of late, it has been increasingly realized that local chickens are often more affordable and accessible for small-scale farmers, especially in rural areas. The cost of acquiring and maintaining indigenous chickens is relatively lower than that of commercial breeds, making them a viable option for resource-constrained farmers. Therefore, it calls for promulgating eco-smart breeding strategies for describing, conserving and improving performance of these local chickens. A five pronged breeding strategies have been delineated for this purpose viz. firstly, identification and characterization of the desirable traits of the local ecotypes, such as disease resistance, growth rate, egg production, and adaptability to local conditions with implementation of a structured breeding program; secondly, using tools like Estimated Breeding Values (EBVs) or Genomic Selection to predict the genetic potential of birds for specific traits, aiding in more accurate selection; thirdly, engaging local farmers, communities, and stakeholders in the breeding program to create awareness and build support; fourthly, introducing controlled crossbreeding with other local ecotypes or breeds that possess complementary traits for realizing hybrid vigour and fifthly, ensuring that the breeding program is economically sustainable for both farmers and the program itself and the benefits should outweigh the costs over the long term.

Key words: Ecotypes, Breed, Eco-smart, Breeding strategies, Resource constrained

LINEAR PROGRAMMING APPROACH FOR MAXIMIZATION OF NET PROFIT AND SELECTION OF IRRIGATION SYSTEM

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For long-term viability requires the application of advance technologies to improve modern agricultural practises and crop yields. This study was undertaken to optimize the automated drip irrigation system. The optimum value of various levels of attributes is calculated with the help of linear programming from the results of irrigation systems and water quality. The selection of attributes was based on plant height, number of leaves, number of branches, number of fruits and yield in respective of irrigation system, water quality and days after transplanting. The optimum value of various levels of attributes was calculated with the help of linear programming from the results of irrigation systems and water quality. The results revealed that all the independent attributes affected the plant height, number of leaves, number of fruits, number of branches and yield. The optimum value of plant height, number of leaves, number of branches, numbers of fruits and the optimum yield was higher for wireless based drip irrigation system (IS₂) with treated fruit processing waste water (WQ₂) in comparison to wired based irrigation system. Hence, the combination of treated fruit processing waste water with wireless based system is recommended.

Key words: Automated drip irrigation system, Optimization, Attributes, Water quality, Linear programming

TO ASSESS THE STATUS OF THE AREA UNDER DIFFERENT CROPS IN THE KHARIF SEASON IN CHHATTISGARH

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In the State of Chhattisgarh, nick named as Rice Bowl of India, about 80% of the population is engaged in Agriculture. It has been mostly engaged in the paddy-based mono-cropping system for a long period. So, crop diversification (a shift of area away from a less profitable crop toward more profitable ones) is one of the measures, expected to enhance the economic growth of the farmers in this State. Therefore, the present study attempts to assess the status of the area under different crops in the kharif season in Chhattisgarh, based on secondary data for the period of 19 years, i.e., 2000-01 to 2018-19. For the kharif season, the area is under crops such as pigeon pea and maize have, in general, increased over the period 2001-19. While the area under moong and sesamum over the period has decreased.

PLANTS STRATEGIES TO RESIST BIOTIC AND ABIOTIC ENVIRONMENTAL STRESSORS

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Plants exposed to a wide range of abiotic and biotic stressors which include environmental pollution and global warming pose significant threats to biodiversity and ecosystem services. Plants have evolved a variety of strategies for adapting to biotic and abiotic stressors, which include physiological, biochemical, and molecular responses such as stress hormone production, osmotic adjustment, and stress-related gene activation. Despite extensive research on how plants adapt to different stressors, there is still a lack of understanding about responses to multiple stressors and how they affect growth and development. Plants exposed to concurrent biotic and abiotic stressors such as cadmium and drought show pronounced inhibition in aboveground biomass, an imbalance in oxidative homeostasis, nutrient assimilation, and stunted root growth, revealing the synergistic interactions of multiple stressors that result in adverse physiological outcomes. The impact of elevated heavy metal and water deficit exposure goes beyond growth and development, impacting micro environmental biological diversity such as rhizosphere nutrient profile and microbiome.

Key words- Global warming, biotic and abiotic stress, biological diversity

STUDY OF POLYTENE CHROMOSOMES OF CHIRONOMIDS FROM YAMUNA RIVER, MATHURA

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Chironomids (blood worms) are known as non -biting midges one of the most dominant, widespread, and diverse aquatic invertebrate of class insecta and order diptera called two wings fly. Chironomids are closely related to mosquitoes and biting midges also known as non-biting midges. Blood worm are important contributors of carbon and energy flow to higher trophic levels. Chironomids are considered one of the most important bioindicators of water quality and have achieved importance to develop the concept of gene-mapping. Study of polytene chromosomes given us an idea of the health of an ecosystem and species identification. Polytene chromosomes are very important for understanding the organization of specific structure of interphase chromosomes, bands and interbands, dosage compensation, telomere organization, heterochromatin structure, and position effect variegation phenomenon. This study is not intended to create a through and conclusive date of the salivary gland chromosomes in the Mathura region but this study is a starting of a very significant work towards understanding a local population of Chironomus through this study

Keywords: Polytene Chromosomes, Bands, Gene-Mapping, Chironomids

GREEN SYNTHESIS OF SILVER NANOPARTICLES USED AS BIO FERTILIZER AND BIO PESTICIDES**SANGEETA CHHETRI¹, INDU SHARMA¹, BHARTI KUMARI²****Department of Microbiology, Nims Institute of Allied Medical Science & Technology (NIAMT), Department of Chemical Petroleum and Hydrogen Technology, Nims Institute of Engineering and Technology (NIET), NIMS University Rajasthan, Jaipur, Rajasthan,**

Due to its potential applications in the agriculture industry, nanotechnology is becoming a more significant area of study in science. Utilising nanotechnology to increase yields of crops and lower the toxic compounds used in crop protection is becoming more and more common. The concept of “green synthesis” describes a technique to produce silver nanoparticles that is favourable to the environment and usually involves the use of microorganisms, plant extracts, or other biodegradable elements. When compared to conventional synthesis processes, this methodology is more environmentally friendly and sustainable because it uses less energy and harmful chemicals. Silver nanoparticles have garnered significant attention recently because of their applications in a variety of fields related to human interest, including industry, agriculture, medicine, and health. They are the most widely used metallic nanoparticles, and studies have shown that they have a variety of antibacterial, antioxidant, and anticancer effects. The purpose of is to outline and explore the advancement of economically viable methods for the production and extraction of silver nanoparticles with potential applications in agriculture. Many applications for it in the management of plant diseases as well as other topics including their function as nanopesticides or nanofertilizers have been covered. Silver nanoparticles are well-known antimicrobials that have been around for a while and used for a variety of applications. Studying is being done on silver nanoparticles’ prospective applications for agricultural purposes as biopesticides and fertilisers. In their dual role as biopesticides and biofertilizers, they can help manage pests and illnesses while also promoting plant growth and nutrient uptake. They are attractive for various uses because of their antibacterial qualities, but further research is necessary to fully understand their effectiveness and any possible environmental effects.

Keywords: Silver nanoparticles, nanotechnology, Bio fertilizer, Bio pesticides, Green nanoparticles.

INVASIVE FISH SPECIES IS A THREAT TO AQUACULTURE ACTIVITY**SANGITA ROY¹ TANUSHREE BHOWMIK² SUPRATIM MALLA³****Department of Aquatic Health and Environment, College of Fisheries (Central Agricultural University, Imphal) Lembucherra, Agartala, Tripura**

Biodiversity is getting depleted alarmingly due to habitat destruction, pollution, overexploitation of aquatic resources, tourism, and the introduction of invasive exotic species along with alien pathogens and parasites. Invasive fish species are considered one of the major factors for the devastation of the freshwater ecosystem and have emerged as a great threat to the existing indigenous aquatic diversity. The occurrence of the species in the wild is reported to alter the habitat and has changed the physicochemical nature of water. For instance, a constant decline of native species biomass due to high invasion of invasive species may have a negative impact on the habitat of native species & which will be one of the great threats to global freshwater diversity. Loss and degradation of biodiversity due to invasive alien species can also occur throughout all levels of biological organization, from genetic to population, species, and community levels. Invasive alien species generally reduce the abundance of native inland water species through predation, hybridization, parasitism or competition for resources. The consumption of plant material by herbivorous fishes, the uprooting of macrophytes through digging for food or for nesting sites, and the organic enrichment, which increases turbidity and thus reduces light penetration and photosynthesis, all of which can result in the displacement of aquatic vegetation. Invasive fish species have not only a negative impact on the ecosystem but also have an impact on the local economies of the market. Non-market negative impacts due to invasive species in inland waters can include potential risks to human capital due to premature deaths, declines in social capital due to increased transaction costs, and declines in natural capital due to the loss of ecosystem services. To minimize such negative impacts, different management strategies should be done. Prevention, early detection, rapid response, and eradication are introduced species’ most common management strategies. An integrated river basin management approach to the prevention and control of invasive alien species should be implemented. Involvement of local and indigenous communities and other relevant stakeholders should be promoted at all levels for the identification, prevention and control of invasive alien species in inland water ecosystems.

Keywords: Invasive species, Biodiversity, Prevention, Freshwater

QUANTITATIVE ANALYSIS OF WASTEWATER AS AN IRRIGATION WATER SOURCE: ASSESSING QUALITY PARAMETERS**^{1*}SANGYA SINGH, ¹YM SHARMA, ¹GS TAGORE, ¹VISHAKHA RAI, ¹SUNIL UPADHAYAY, ²SHUBHAM SINGH****^{1*}Research scholar, Soil Science and Agricultural Chemistry, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur****¹Associate professor, Soil Science and Agricultural Chemistry, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur****¹Scientist, Soil Science and Agricultural Chemistry, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur****^{1,1}Research scholar, Soil Science and Agricultural Chemistry, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur****²Research scholar, Soil Science and Agricultural Chemistry, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior**

With the increasing demand for freshwater due to population growth and rising needs, wastewater emerges as a potential resource. Its utilization in crop irrigation, especially in water-scarce regions, has become common practice. However, concerns persist regarding the potential hazards associated with the quality of wastewater used for irrigation. Hence, this study aims to assess the quality of wastewater and its suitability for irrigation in peri-urban areas of Jabalpur district. This study's primary goal is to compare the water quality of the sample that was collected to irrigation standards. Analysis was done on water quality indicators such as pH, heavy metals, minerals, sodium adsorption ratio, chlorides (Cl), carbonates and bicarbonates and EC. Standard operating techniques were used to estimate these parameters, and the outcomes were contrasted with irrigation quality requirements. pH values of all sites ranged between 7.65-8.30, EC in between 347-1250 μScm^{-1} , nil carbonate whereas bicarbonate content in between 2.8-8.0 meL^{-1} , SAR values in between 0.24-1.51, Chloride content in between 0-4.5 meL^{-1} . The analysis revealed that the metal contents of the sampled wastewater were within permissible limits. The findings suggest that the quality of water from these sources meets the irrigation standards. However, regular water analysis is essential to ensure continued safety and suitability for irrigation purposes.

Keywords- Wastewater, Irrigation, Irrigation water quality**IDENTIFICATION OF PROMISING SUGARCANE (*SACCHARUM OFFICINARUM* L.) FAMILIES AND CLONES BASED ON CANE AND JUICE QUALITY TRAITS IN EARLY SELECTION STAGES****SANJAY B. PATIL¹, P. K. MALLIKARJUN^{2*}, C. R. PATIL³, N.G. HANAMARATTI⁴, P. V. PATIL⁵, B. SHIVARUDRA⁶****^{1,4}Professor, Department of Plant Breeding and Genetics, University of Agricultural Sciences, Dharwad, Karnataka, India****²Ph.D. Scholar, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India****³Professor, Department of Agricultural Microbiology, University of Agricultural Sciences, Dharwad, Karnataka, India****⁵Professor, Department of Plant Pathology, University of Agricultural Sciences, Dharwad, Karnataka, India****⁶M.Sc. Student, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India****Aim:** To identify promising sugarcane families and clones with enhanced productivity traits to improve cane and sugar production.

Methodology: The study was carried out at the Agricultural Research Station (ARS), Sankeshwar, in an augmented design-II. A total of 33 families were evaluated during the 2020-21 season for germination, seedling establishment parameters and productivity traits. Selected clones were further assessed during the 2021-22 season for cane and sugar productivity traits. **Results:** Among the evaluated families and clones, certain families such as CoVC 14062 $\times$ CoT 8201, Thirumadhuram $\times$ CoPant 97222, Co 86032 $\times$ CoSe 92423, CoVC 14062 $\times$ Co 775, MS 68/47, Co 86011 and Co 99004 exhibited significantly higher cane and sugar productivity traits compared to the commercial check Co 86032. Notably, SNK 191675, SNK 190690, and SNK 191748 clones demonstrated superior performance. **Interpretation:** This finding shows the importance of selecting appropriate parent combinations in sugarcane breeding to develop high-yielding progenies. The identified families and clones offer potential for enhancing cane and sugar production, thereby addressing the need for increased productivity in sugarcane cultivation.

Keywords: Brix%, fluff germination, promising families, seedling generation**WEED MANAGEMENT WITH NEW GENERATION HERBICIDES IN RABI LENTIL (*LENS CULINARIS* MEDIK.) IN SUB-MOUNTAINOUS AREA OF DISTRICT REASI****SANJAY KOUSHAL****KVK, Reasi, Sher-e-kashmir University of Agricultural Sciences & Technology-Jammu**

A field study was conducted during rabi, 2017-18 at KVK, Reasi, Sher-e-kashmir University of Agricultural Sciences & Technology-Jammu, Jammu & Kashmir (UT) where five herbicides as sole, and mechanical weeding (MW) or sequentially applied were evaluated for efficacies of the herbicides on controlling weeds, their influences on yield and production economics on lentil (*Lens culinaris* Medikus) variety L4147 (Pusa Ageti). Results revealed that, two hand weeding (HW) was the most effective method for weed control next to weed free. At 60 DAS however, lowest density and dry matter accumulation of all weed species were recorded with two hand weeding at 30 and 45 DAS followed by Imazethapyr (post-emergence/POE) followed by Pendimethalin. Maximum weed control efficiency (WCE) was achieved under two HW (83%) followed by Imazethapyr at 40 DAS. However, significantly highest yield (1365 kg ha⁻¹), highest pods plant⁻¹ (66.07), seeds pod⁻¹ (1.94) and nodules plant⁻¹ (8.20) were recorded under weed free followed by 2 hand weeding at 25 and 40 DAS. Among sole applications, Imazethapyr significantly suppressed both broad and grasses whereas, Pendimethalin significantly suppressed broadleaved weeds but poorly controlled the sedges and grasses but it was better than control. In the economic factor, Two hand weeding gave highest net return and benefit:cost ratio (₹ 42294.49 ha⁻¹ and 2.8) and lowest weed index (2.8) was comparatively better than all the treatments including control. This integrated treatment was found as the most profit-oriented and sustainable weed management system in lentil.

Key words: Chemical weed control, Integrated weed management, Lentil, Weed Management

IMPACT OF CLUSTER FRONTLINE DEMONSTRATION (CFLD) ON PRODUCTION AND PRODUCTIVITY OF CHICKPEA (*CICER ARIETINUM* L.) UNDER SHIVALIK FOOT HILLS OF DISTRICT REASI, JAMMU AND KASHMIR

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Chickpea (*Cicer arietinum* L.) is one of the important *rabi* pulse crops cultivated predominantly in northern India. In Jammu, it is grown in 0.11 Mha with total production of 0.11 M tonnes and yield of 1028 kg/ ha. Over the last six years, the on-going National Food Security Mission (NFSM) has been converged with multi-pronged strategies to enhance the production and productivity of pulses in the country, which results in enhanced per hectare productivity. Indian Council of Agricultural Research by taking major big step for the same by introducing conducting Cluster Frontline Demonstrations (CFLD's) nationwide through Krishi Vigyan Kendras (KVKs) with the mandate of out scaling of farm innovations through FLDs to highlight the specific benefits/ worth of technologies on farmer's fields. Krishi Vigyan Kendra, Reasi conducted cluster front line demonstration (CFLD) on chickpea, were conducted in different cluster of district of Reasi. the results reported that 34.06 per cent higher production of maize as compared to prevailing farmers practice (12.74 q/ha). The extension gaps ranged from 359 to 509 kg/ha during the period of demonstration with average 433.4 kg/ha. The technology gap shows the wide gap in the demonstration yield over potential yield of chickpea. The average technology gap was 692 kg/ha with maximum (762 kg/ha) in the year 2019-20 and minimum (611 kg/ha) in the years of 2021-22. which emphasized the need to educate the farmers through various means for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap and concluded that integrated crop management technology in chickpea has found more productive, profitable and feasible in Trikuta hills of Jammu region of Jammu and Kashmir as compared to prevailing farmers practice. Even though up to 34 per cent yield increase of chickpea crop over farmer's practices are witnessed of creating confidence and friendly relationships between farm scientists and farming community. **Key words:** CFLD, Chickpea, Krishi Vigyan Kendra, Trikuta Hills

IMPACT OF MINIMUM SUPPORT PRICE (M.S.P.) ON INDIAN AGRICULTURAL FARMING, FARMERS' INCOME, AND ECONOMY

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The Minimum Support Price (M.S.P.) policy in India has been a cornerstone of agricultural policy since its inception in the 1960s. This paper examines the impact of M.S.P. on Indian agricultural farming, farmers' income, and the economy. The M.S.P. ensures a minimum guaranteed price for farmers' produce, acting as a safety net against market fluctuations and ensuring a stable income. This stability encourages farmers to invest in agricultural inputs, leading to increased productivity and output. Additionally, M.S.P. serves as an incentive for farmers to diversify their crops, thereby promoting crop diversification and reducing dependence on a few staple crops. Furthermore, the M.S.P. has broader implications for the Indian economy. It helps in maintaining food security by incentivizing the production of essential crops, thereby ensuring availability and accessibility of food grains. Moreover, it contributes to poverty alleviation by increasing farmers' income levels, which in turn stimulates rural demand and economic growth. However, challenges such as inadequate procurement infrastructure, delays in procurement operations, and discrepancies in M.S.P. implementation need to be addressed to fully harness the potential benefits of the policy. Additionally, there is a need for periodic revision of M.S.P. in line with changes in input costs and market dynamics to ensure its effectiveness in supporting farmers' income and agricultural sustainability.

Keywords: M.S.P., minimum, benefits, agricultural inputs

AGRO-ECOLOGICAL BASES OF CONTEMPORARY WATER MANAGEMENT INNOVATIONS (CWMI) FOR ENVIRONMENT SUSTAINABILITY

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Rain water harvesting, storing, saving and sharing by farmers of dryland agro-ecosystem assume great significance in surviving water crisis that is looming large in arid and semiarid regions of India. Innovations related to judicious use of scarce water resources were evolved by farmers and refined by few non-formal researchers and NGOs activists and these are termed 'contemporary water management innovations' which are now being practiced by majority of farmers in drylands. These new non-formal innovations needed to be studied for their agro-ecological bases of contemporary water management innovations and their adoption. This study was conducted in eight villages of three mandals in Ananthapur district of Andhra Pradesh. The villages were selected purposively because of the presence of functional water sharing groups. A sample of 120 farmers was selected randomly from these villages. Focused group discussions, personal interviews, case study and Delphi technique were used for data collection and analysis. A sample of 30 mixed groups of scientists, NGOs activists and other experts were sought to enlist constraints and suggestions in diffusing these contemporary water management innovations in similar agro-ecological conditions. The major findings are: Among the sample of the farmer respondents, only 20 for users owned bore wells and shared with 100 farmers who did not own any bore wells. Water sharing has been accepted and farmers have formed and managing the water sharing institutions in villages.

Keyword: Environment sustainability, CWMI, and Agroecology

EVALUATION OF SPINETORAM 11.70 % SC AGAINST FRUIT BORER, *HELICOVERPA ARMIGERA* IN CHILLI DR. SANJAY KUMAR* DR. Y.P. SINGH¹ AND PANKAJ KUMAR MEGHWAL

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Chilli (*Capsicum annum* L.) is one of the important spices used all over the world. India is largest producer, consumer and exporter of chilli in the world. Fruit borer, *Helicoverpa armigera* is major constraint in the production of chilli which causes drastic yield loss every year in growing areas. An On Farm Trials (OFT) was conducted to evaluate Spinetoram 11.70 % SC against fruit borer. The OFT was done at 05 different locations at farmer's field of district Badaun during Kharif, 2023. The Spinetoram 11.70 % SC @ 500ml /ha was taken as treatment and Cypermethrin 10 % EC @ 750ml /ha as farmers practice. The results revealed that lowest damaged fruits was recorded in Spinetoram 11.70 % SC @ 500ml /ha treated field (3.58%) as compare to farmers practice Cypermethrin 10 % EC @ 750ml /ha (27.16%). The highest yield (335.44 Q/ha and Rs 314273 Net return/ ha) was obtained in Spinetoram 11.70 % SC treated field as compare to farmers practice Cypermethrin 10 % EC yield (259.71 q/ha and net return 228452/ha). Maximum B: C ratio 4.56 was recorded in Spinetoram 11.70 treated field as compare to farmers practice Cypermethrin 10 % B: C ratio 3.75. Spinetoram treated field gave 29.20 % more yield as compare to farmers practice.

Keywords: Spinetoram 11.70 % SC, Fruit borer, *Helicoverpa armigera*, Chilli

LIVESTOCK PRODUCTION AND AGRICULTURE ACTIVITY CONTRIBUTION OF CLIMATE CHANGES

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India's place in the CCPI 2024: India came in at number seven. Over 18% of greenhouse gas emissions caused by humans are attributable to livestock and livestock-related activities including deforestation and increasingly fuel-intensive farming methods, which account for 9% of world emissions of carbon dioxide. 35–40% of methane emissions worldwide (mostly from manure and enteric fermentation) Methane from enteric fermentation, nitrous oxide from manure management, and carbon dioxide and nitrous oxide from feed production, transportation, and processing are the primary sources of greenhouse gas emissions from dairy farms and animal production. Animal digestion results in the production of methane as a byproduct through microbial fermentation. The quantity of methane emissions from enteric fermentation is determined by the animal's digestive system, diet and management practices. Livestock manure management produces both CH₄ and N₂O emissions. Methane is produced when manure decomposes under anaerobic conditions. The quantity of manure CH₄ emissions is determined by the type of treatment or storage facility, the ambient climate and the composition of the manure. Dairy production systems are complex sources of greenhouse gas (GHG) emissions, notably of methane (CH₄), nitrous oxide (N₂O) and carbon dioxide (CO₂). Using a global life cycle assessment approach, in 2015 the sector is estimated to have emitted 1,711.8 million tonnes of CO₂ equivalent (CO₂-eq.) Total emissions have increased, by about 18 percent in 2015 relative to 2005 levels, because overall production has grown substantially in response to international demand. In 2015, emissions increased by 256 million tonnes CO₂ eq. (18 percent) above 2005 levels. Of this, 169 and 52 million tonnes CO₂ eq. are related to increase in CH₄ and N₂O emissions, respectively. This is not surprising when one considers the increase in cow numbers and average milk yield growth over the same period. The increased livestock productivity (milk yield per head) achieved since 2005 results in increased individual cow feed intake to meet higher energy demands which in turn results in higher emission rates per cow and increased CH₄ and N₂O emissions per animal. Carbon dioxide is emitted when various types of fossil fuels are combusted for energy purposes. Energy is used in various processes/activities on the farm e.g. milking, grain drying and field operations, The dairy sector has seen a continued increase in productivity and reductions in emissions intensities driven by efficiency gains in production. These changes are the cumulative benefits resulting from improvements in nutrition, genetics, reproductive performance, disease control, and improved fertilizer practices and enhanced management at herd and animal level. Reducing emissions will depend on a combination of innovative technology and farmers adopting existing best practices. Farm management practices that lower emissions, including some that improve productivity, are known and available. Yet, progress in reducing emissions is affected by the diversity in dairy production systems. Identifying ways to accelerate the rate of progress and overall results needs consideration.

SOIL ECOSYSTEM SERVICES THROUGH NATURE-BASED SOLUTIONS IN HILLY REGION OF NORTH EAST INDIA FOR AGRICULTURAL SUSTAINABILITY AND CLIMATE RESILIENCE

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Soil ecosystem services are vital components to all aspects of life and they support the production of ecosystem goods and services. Soils variety also allows a diversity of soil ecosystem services, which benefit not only humans but also soil biota and the surrounding environment. Nature-based Solutions (NbS) covers diverse practices based on indigenous knowledge. Nature-based Solutions can offer triple benefits when deployed correctly, in terms of building agricultural production and resilience, mitigating climate change, and enhancing nature and biodiversity. In North Eastern Hill (NEH) region of India, the environment, local conditions, socio-economic and socio-cultural life of different tribal communities and their rituals associated with agricultural practices have given basis for development of many indigenous farming systems which have in-built Nature-based Solutions. My presentation will deal with the soil ecosystem services like agricultural sustainability and climate resilience obtained from some of the important Nature-based farming practices of in NEH region of India such as *Zabo* farming system, *Alder* based farming system, and bun cultivation highlighting the fact that if any type of ecosystems is managed properly, they can provide effective soil ecosystem services to address the emerging challenges in agriculture.

Key words: Soil, ecological services, NbS, agricultural sustainability, food security, climate resilience, NEH region.

GENETICS OF DRY ROOT ROT RESISTANCE (*MACROPHOMINA PHASEOLINA* (TASSL.) GOID.) IN COWPEA (*VIGNA UNGUICULATA* L. WALP)

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Dry root rot is an emerging fungal disease affecting cowpea production. Wide host range and soil borne nature makes the management through chemicals difficult, while the resistant cultivars offer an economical way of managing the disease. The knowledge of mode of inheritance of resistance to dry root rot will be of an immense value to the plant breeder to choose appropriate plant breeding methods in developing dry root rot resistant cowpea genotypes. The present investigation was carried out at Department of Genetics and Plant Breeding, College of Agriculture, University of Agricultural Sciences Dharwad, Karnataka, India. Two-hundred and thirty-two cowpea genotypes were screened for dry root rot resistance during two seasons (summer-2020 and *kharif* 2020) in sick-plot, followed by screening of 36 selected genotypes under artificial epiphytotics to identify dry root rot resistant cowpea genotypes. Crosses were made between dry root rot resistant and susceptible genotypes during summer-2021. Three F₂ populations viz., Resistant × Resistant, Resistant × Susceptible and Susceptible × Susceptible crosses; their respective F₁s and parents were screened in sick-plot during Summer-2022 for their resistance against dry root rot disease. Individual plants in F₂ generation were scored as resistant and susceptible based on the symptom appearance. Ratio for dry root rot disease (resistance: susceptible) in each segregating population was tested through *Chi-square* test. Six genetic stocks viz., EC 724153, EC 724160, EC 724157, EC 738126, EC 725164 and EC 724768 were identified as novel source of resistance to dry root rot, which can be used as donors of resistance. Based on the segregation ratios of all the three populations, it was concluded that, resistance to dry root rot in cowpea is governed by three genes (A, B and C) in cowpea and epistatic interaction between the alleles of these three genes makes the plants either resistant or susceptible to the disease.

Keywords: Cowpea, Genetics, Disease resistance, Dry root rot and Inheritance

THE EFFICACY OF NOVEL INSECTICIDES AND BIO PESTICIDES AGAINST TERMITE IN WHEAT CROP IN RAJASTHAN

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The treatments comprising seed treatment with imidacloprid 600 FS + standing crop treatment with fipronil 5 SC (T₇), followed by seed treatment with imidacloprid 600 FS + standing crop treatment with imidacloprid 17.8 SL (T₆), seed treatment with fipronil 5 SC + standing crop treatment with fipronil 5 SC (T₉) and seed treatment with fipronil 5 SC + standing crop treatment with imidacloprid 17.8 SL (T₈) were found most effective against termite in wheat crop during both the years whereas alone soil application of bio pesticides viz., neem cake, *Beauveria bassiana* 1.15 WP and *Metarhizium anisopliae* 1.15 WP and seed treatment with fipronil 5 SC and imidacloprid 600 FS were found least effective in respect to termite control. However, the alone seed treatment with fipronil 5 SC (T₂) gave maximum incremental cost benefit ratio of 12.50 followed by seed treatment with fipronil 5 SC + standing crop treatment with imidacloprid 17.8 SL (T₈) with ICBR of 10.91.

EMPOWERING COMMUNITIES: THE ROLE OF HOME SCIENCE EXTENSION EDUCATION IN PROMOTING WELL-BEING AND SUSTAINABILITY

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Home science extension education is a dynamic field focused on empowering individuals and communities with knowledge and skills related to home management, nutrition, family dynamics, and consumer economics. It serves as a bridge between scientific principles and practical applications, enhancing the well-being and quality of life for individuals and families. At its core, home science extension education aims to disseminate scientific insights and best practices to diverse audiences, including homemakers, families, educators, and policymakers. Through workshops, seminars, demonstrations, and educational materials, it addresses a wide range of topics such as food preparation, nutrition, budgeting, child development, and household management. One of its key objectives is to promote informed decision-making and behavior change. By imparting knowledge on healthy eating habits, sustainable living practices, financial management, and interpersonal skills, home science extension education empowers individuals to make positive choices for themselves and their families. Moreover, it fosters community engagement and social development. Extension educators collaborate with local communities to identify their needs, develop tailored programs, and facilitate learning experiences that promote self-reliance, resilience, and inclusivity. This collaborative approach strengthens community bonds, promotes cultural exchange, and fosters a sense of belonging and collective well-being. In today's rapidly evolving world, home science extension education continues to evolve and adapt to meet emerging challenges and opportunities. It leverages technology, social media, and digital platforms to reach wider audiences and deliver innovative learning experiences. By equipping individuals and communities with essential knowledge and skills, home science extension education contributes significantly to building healthier, happier, and more sustainable societies.

BIO FINISHED UV PROTECTIVE FARM APRON FOR FARM WOMEN

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Farm women are the back bone of Indian agriculture, involved in many agriculture activities are being exposed to sunlight for prolonged periods of time, that leading to many health problems, hence suitable UV protective functional clothing is essential to increase their work efficiency and improve the health conditions of farm women. Medium weight cotton fabric treated with suitable plant extract of 20 percent owf with 8 percent citric acid in boiling temperature 1:30 MLR for 6 -8 folds through exhaust method. Treated fabric was subjected to multiple washes (upto 50th) and tested for UPF efficiency. Based on the wash durability and functional properties, the treated cotton fabric was further used for construction of farm apron and designed based on the opinion given by the set of farm women labourers. UV protective farm apron was distributed among the farm women group for wear trial and assessed for functionality, comfortability, work efficiency and durability through 4 point scale. Cotton fabric treated with custard apple leaf extract possessed excellent UV protection property even after 50 washes. The design features viz., sleeves, collar, pockets, size and fit of the apron are more appropriate for farm activities. UV protective farm apron protects skin from sharp plant parts, reduces skin allergy and rashes, soothing to skin and provides coolness during hot weather, reduce drudgery and improves working efficiency of the farm women as compared to existing clothing practices.

Key words: Functionality, Farm women, UV protective farm apron, safety and health.

SEROLOGICAL AND MOLECULAR CHARACTERIZATION OF CUCUMBER MOSAIC VIRUS (CMV) IN CUCUMBER (*CUCUMIS SATIVUS* L.) IN SOUTHERN PARTS OF TAMIL NADU

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Cucumber mosaic virus (CMV) is one of the important viruses infecting cucumber affecting yield. The typical mosaic, leaf crinkling, leaf distortion, fruit distortion and stunting of plants were observed in the major cucumber growing areas in the southern parts of Tamil Nadu. CMV sap was inoculated on cucumber and insect transmission of CMV with viruliferous aphids, *Aphis gossypii*. TAS-ELISA was performed to detect the presence of CMV in sap, insect transmitted cucumber plants and viruliferous aphids. Total RNA extracted from CMV inoculated cucumber plants (CMV-ANK isolate) were subjected to RT-PCR by using CP gene specific primers. The phylogenetic results of the CMV isolate (OL624845) of cucumber is closely related to other CMV strains of tomato crop species.

Keywords: Cucumber, CMV (*Cucumber mosaic virus*), TAS-ELISA, RT-PCR, viruliferous aphids

ECO FRIENDLY PRACTICES TOWARDS SUSTAINABLE DEVELOPMENT IN HARYANA**DR. SANTOSH KUMARI¹ AND DR. KAVITA DUA²**^{1,2}**Department of Resource Management & Consumer Science, CCSHAU, HISAR, India**

The world faces severe environmental challenges due to continuously changing lifestyles and industrial methods. The present study was conducted in two districts of Haryana state i.e. Hisar and Bhiwani. Two blocks from each district were randomly selected. Thus, total 4 villages were selected to conduct the study thus making total sample size of 300 respondents. Pre tested interview schedule was developed for the present study. Twenty five respondents having low pre-exposure knowledge and also who were willing to attend the trainings were purposively selected from each village. Knowledge was imparted to 100 respondents by imparting trainings through lecture-cum-demonstration from expert. After a period of one month, impact of trainings on these 100 respondents was assessed in terms of gain in knowledge. A well structured and pretested interview schedule was developed according to the objectives of the study. It was found that majority of respondents regarding socio economic status showed that 43.0% of respondents belong from upper middle class. Maximum of respondents (44.7.3%) had medium family education status. This shows that more than half (51.2%) of the respondents had overall low knowledge and awareness at pre-exposure stage. Highly gain in knowledge was found in awareness about ordinary products responsible for environmental degradation (9.76). Positive correlation was found in all independent variables at 1% level of significant with gain in knowledge.

Key words: Degradation, Eco friendly, Knowledge, Sustainabl**PHYTOBIOTIC AND ANALGESIC PROPERTIES OF *LAWSONIA INERMIS*: AN INNOVATION IN VETERINARY MEDICINE****SANTWANA PALAI¹, MAMTA NIKUNJ^{1*}, RITUN PATRA², SK ABDUL RASHID¹, Y. KRISHNA SWAROOP¹ & KAUTUK KUMAR SARDAR¹**¹**Department of Veterinary Pharmacology & Toxicology, ²Department of Veterinary Anatomy & Histology, College of Veterinary Science and Animal Husbandry, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India**

Background: Antibiotics prevent the spread of disease outbreaks and treat excruciating illnesses in suffering animals in both developed and underdeveloped country to obtain safer milk, meat, egg for human consumption. Several analgesics like NASIDs are used for long period that leads to toxic effects. Till date, numerous plants are undiscovered and their bioactive compounds are not established that can play essential role in treatment of critical animal diseases. **Hypothesis:** These herbal medicines can also be used as an alternative therapy for infections and inflammations. **Objective:** This work investigated the phytoconstituents present in *Lawsonia inermis* leaves contributing its function as antibiotics and analgesic. **Method:** *Lawsonia inermis* leaves were properly washed, shade dried at 37 °C, and pulverized into powder. Soxhlet extraction of dried powder at 40 °C with 70 % ethanol and concentrated using a rotatory evaporator. The ethanolic extract sample of *L. inermis* was subjected to FTIR-ATR for detection of the likely functional groups. Also, it was scanned using UV-Visible Spectrophotometer at 250nm wavelength. **Result:** The yield was 22.5 %. The FTIR analysis showed peaks at that represent thiocyanate, aromatic ring, alkyl substituted ether, aryl disulfides, respectively, which are present in phytochemical compounds known to have beneficial importance in veterinary medicine. The UV-Visible analysis of *L. inermis* confirmed peak at which proves it as a flavonoid making it an effective antioxidant and antibacterial agent naturally. **Implication:** The benefits of these phytocompounds detected from *L. inermis* have antioxidant, anticancer, hyperglycaemia, anti-inflammatory, cardiogenic, hypercholesterolaemia, insecticidal and anti-microbial properties. Thus, *L. inermis* can be used to develop novel veterinary drugs because of their profound biological activities.

Keyword: Antibiotics, NASIDs, flavonoid, UV-Visible Spectrophotometer, FTIR-ATR Spectroscopy.**BIOASSESSMENT OF SELECTED WESTERN HIMALAYAN RIVERS: A BENTHIC MACROINVERTEBRATE-BASED INTEGRATED PERSPECTIVE****SAPNA & SANDEEP KUMAR****Department of Animal Sciences, Central University of Himachal Pradesh**

Bioassessment of the rivers integrates the physical, chemical and biological aspects of aquatic ecosystem and has been proved cost effective in developing the river management strategies. The Western Himalayan Rivers, originating from the Dhauladhar range, are scarcely assessed in this regard. In the present work, bioassessment of selected eight rivers, namely Baner, Baner Khad, Gaj, Chambi, Kholi river, Rajol, Barahal khad and Dehar khad (the tributaries of the Beas river system), is carried out using widely accepted benthic macro invertebrate community based biotic indices. The community was sampled using numerous quadrates positioned in 100-200m riverine sections with the goal of exploring all conceivable microhabitats, followed by proper preservation and identification. A widely accepted biotic index for water quality and organic pollution assessment was adopted. These biotic indices were chosen with the following criteria in mind: a) broad applicability; b) being entirely presence-absence based; and c) considering both the presence-absence and abundance of the taxa. Biological Monitoring Working Party (BMWP) index detected slight organic pollution at Baner (BnS1-84; BnS2-97), moderate at Barahal khad (63) and Chambi (56) and the least at Gaj (111). Average Score per Taxa (ASPT) indicated lower level of organic pollution (6-7) at all the station except Baner (BnS1-5) and Barahal khad (BS2-5.21). Macroinvertebrate Water Quality Index (MWQI) reflected good water quality class in Baner (0.29) compared to poor (0.3-0.57) at rest of the rivers. Hilsenhoff biotic index indicated least organic pollution in Barahal khad (4.3), Baner (4.19), and Kholi River (3.3) compared to other Rivers. Ephemeroptera-Plecoptera-Trichoptera (EPT) Index indicated excellent (>42) water quality and hence slight organic pollution in all the rivers. The water quality classes and level of organic pollution detected through these indices differ for each river suggesting the proper validation of applicability in this region and development of regional index for the assessment of health of these ecosystems. Furthermore, the study suggests regular monitoring of these riverine ecosystems, which will ultimately ensure proper management.

Keywords: Bio assessment; Water quality; Organic pollution; Himalayan Rivers

THE ROLE OF MYCORRHIZAL NETWORKS IN AGROFORESTRY SOIL HEALTH AND NUTRIENT CYCLING**SARANSH KUMAR GAUTAM^{1*}, YALAL MALLESH¹, RAMAN CHOUDHARY¹, RAKESH PANDAY¹, MANMOHAN J. DOBRIYAL¹, PRABHAT TIWARI¹, AMAN KUMAR MAURYA²****Department of Silviculture and Agroforestry¹, Department of Fruit Science², Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**

Agroforestry, a sustainable land use practice combining trees with crops or livestock, is widely acknowledged for its ability to improve ecosystem services and agricultural productivity. Within these systems, mycorrhizal networks formed by the mutually beneficial relationship between plant roots and fungi play a vital role in maintaining soil health and nutrient cycling. These networks, which include various types such as arbuscular mycorrhizal fungi (AMF), ectomycorrhizal fungi (EMF), and ericoid mycorrhizal fungi (ERM), greatly influence soil structure, water retention, and nutrient uptake efficiency. They extend their hyphae into the soil, aiding in nutrient mobilization, especially phosphorus and nitrogen, which are crucial for sustaining crop growth and ecological balance. Mycorrhizal networks also contribute to carbon sequestration, organic matter breakdown, and nutrient transfer, thereby enhancing soil health and fertility. Their incorporation into agroforestry systems improves resilience against environmental stressors like drought and pollution. Additionally, mycorrhizal associations shield plant roots from pathogens and harmful substances, further enhancing soil health and system sustainability. In agroforestry, the combination of trees and crops promotes a diverse root system, enriching mycorrhizal fungal diversity and enhancing system resilience. This diversity improves nutrient cycling efficiency and preserves soil organic matter, essential for maintaining productivity. Furthermore, mycorrhizal networks facilitate nutrient exchange between plant species, optimizing nutrient management within agroforestry setups. Understanding and utilizing the potential of mycorrhizal networks are critical for improving agroforestry management practices. Future research and policies should focus on harnessing these networks to promote environmental sustainability and economic viability in agroforestry systems. By emphasizing the importance of mycorrhizal symbiosis, agroforestry can progress towards more resilient and productive land-use practices, ensuring long-term ecological and economic benefits.

Keywords: Agroforestry, Mycorrhizal Networks, Sustainable land management, Ecology.**MECHANISTIC STUDIES OF OXIDATION OF ORGANIC COMPOUNDS BY HALOGEN AND THEIR COMPOUNDS****DR. SARASWATI AGARWAL****Professor in Chemistry, JDB Government Girls College, Kota, Rajasthan, India**

The mechanistic studies of oxidation of substitution reactions and elucidation of reaction mechanism from the kinetic data have always been the most fascinating subjects in chemistry. In any kinetic investigation one may be interested to arrive at the relationship between the rate and various factors like concentration of the rate data of the reaction can be changed by merely changing the catalyst and medium in which the reaction occurs. Correlation analysis of organic reactivity is one of the important concepts of physical organic chemistry. It is the most frequently applied method for modeling structural effects on chemical reactivity. Presently, kinetic measurements have become a standard technique of investigation in several fields like photochemistry, enzyme studies, catalysis etc. Kinetic studies are of importance to synthetic chemistry as well. Thus, kinetic studies are important not only as an intellectual pursuit but increasingly in Research and Development, quality control and sometimes in analysis also. Over the years, number of complexes chromium (VI) derivatives has been synthesized and their use in synthetic organic chemistry has been enumerated. Most of these complex compounds are salts of halochromate acids with bases. The aim is to discuss the mechanism of oxidation brought about by complexes chromium (VI) derivatives.

Key words: Correlation analysis, photochemistry, oxidation.**IMPROVED NUTRIENT USE EFFICIENCY WITH NANO-FERTILIZERS: A NOVEL TECHNOLOGY****SARBASREE GOSWAMI****PhD Research Scholar, Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India**

Farmers around the world are faced with the difficult challenge of providing food for an increasing number of people each year from agricultural lands that are shrinking in proportion to the global population growth and fast urbanization. The planet is quickly running out of arable land, as evidenced by satellite photos, and food production may soon be inadequate to support the world's expanding population. Food grain output has been declining for the past ten years, raising concerns about the amount of production. With natural resources running out, agriculture is the only way we have hope for a self-sufficient future. Nanotechnology possesses the potential to augment agricultural productivity through genetic improvement of plants and animals along with cellular level delivery of genes and drug molecules to specific sites in plants and animals. Nutrient use efficiency is one of the most important concepts for evaluating crop production systems, which can be highly influenced by various factors such as fertilizer management and soil and plant-water relationships. Improving the nutrient use efficiency has been listed among today's most critical and formidable research issues. In order to improve crop growth and output while reducing cultivation costs, wastage of fertilizer, and increasing nutrient usage efficiency, nano fertilizers are crucial in agroforestry and agriculture. Nano-fertilizers provides a greater surface area for various metabolic processes to occur within the plant, which speeds up photosynthesis, raises dry matter content, and boosts crop yield. In precision agriculture, nano-fertilizers are very helpful for accurate nutrient management. Studies show that using nano-fertilizers lowers soil toxicity, lowers the possibility of negative side effects from overdose, and boosts the efficiency of nutrient use. Owing to the limited availability of arable land and water, the agricultural sector can only flourish by increasing resource use efficiency through effective use of contemporary technologies. Thus, nanotechnology holds considerable promise for advancing sustainable agriculture, especially in developing countries.

Keywords: Nano fertilizer, Agriculture, Environment sustainability, agroforestry.

BREEDING FOR ABIOTIC STRESS RESISTANCE**SARITA CHOUDHARY¹****Ph.D. Research Scholar, Maharana Pratap University of Agriculture and Technology, Udaipur**

With devastating increase in population there is a great necessity to increase crop productivity of staple crops but the productivity is greatly affected by various abiotic stress factors such as drought, salinity, high and low temperature. Abiotic stresses negatively impact plant growth, development, reproduction, and ultimately crop productivity. Physiological process such as flowering, grain filling and maturation was highly effected abiotic stresses. Plant metabolisms which include photosynthesis, enzyme activity, mineral nutrition, and respiration are affected by abiotic stress. It is necessary to understand the adaptive mechanisms of plants to identify traits associated with tolerance to abiotic stresses. Several proteins and genes involved in abiotic stress adaptation and mitigation have been integrated to develop varieties that are tolerant to abiotic stresses. Development of resistant or tolerant cultivars is one of the best options to minimize the losses due to abiotic stresses. Adoption of strategies for maximum crop stand and economic returns under stressful environments is to be followed. Broadening the genetic base (wild relatives, landraces, and exotic germplasm of crops in their hybridization programs) in search of resistance genes against various abiotic stresses is needed. Modern plant breeding methods like transgenic approach, somaclonal variation and Marker Assisted breeding have to be used in future. The genetic engineering of crop plants with stress-responsive genes has been demonstrated to enhance the adaptation to various abiotic stresses. Keywords: Abiotic stresses, Drought, Salinity, Germplasm, Marker Assisted breeding

AVOIDABLE YIELD LOSS ESTIMATION CAUSED BY ROOT-KNOT NEMATODE (*MELOIDOGYNE JAVANICA*) IN CAPSICUM WITH THE COMPARISON OF CHEMICALLY TREATED AND UNTREATED PLOTS**SARTHAK RANJAN* & DR. B. S. CHANDRAWAT*******Ph.D. Scholar, Division of Nematology, IARI, ICAR, New Delhi******Assistant Professor, Department of Nematology, SKNCOA, SKNAU, Jobner**

Capsicum (*Capsicum annum*) belongs to the family Solanaceae, it is an important temperate vegetable crop with very high demand as a fresh commodity. It is one of the major hosts for plant parasitic nematodes, mainly root-knot nematode (*Meloidogyne javanica*). Considering the usefulness of nematode in crop the following experiments were conducted during present study under protected cultivation condition to estimate the yield loss caused by root-knot nematode in capsicum by comparison of chemically treated (carbofuran 3G @ 2 kg a.i./ha) and untreated plots which had initial nematode population of 483.55 larvae per 200cc of soil. Results revealed that yield in capsicum was enhanced with the soil application of carbofuran 3G @ 2 kg a.i./ha and reduced nematode population to 394.4 larvae per 200cc soil. The experiment showed that 26.44% yield loss caused in capsicum due to root-knot nematode infection with yield of Untreated and Treated plot at 34.18 qtl/ha and 46.48 qtl/ha, respectively.

Keyword: *Meloidogyne javanica*, Yield loss estimation, Carbofuran 3G, Capsicum**INSIGHTS INTO DOMESTICATION CHANGES OF CAROTENOID AND FLOWERING PATHWAYS IN EASTERN AND WESTERN CARROTS (*DAUCUS CAROTA* L.) BY COMPARATIVE TRANSCRIPTOMICS****SARVAMANGALA S. CHOLIN*, CHAITRA C. KULKARNI, RASHMI JAKAREDDY AND CHANDAN B M****Plant Molecular Biology Lab (DBT-BIO-CARE), Centre for Biotechnology Research, College of Horticulture, University of Horticultural Sciences, Bagalkot-587103, Karnataka, India**

Carrot (*Daucus carota* L.) is revered for its carotenoids, antioxidants, and vitamins. The modern dark orange Western carrot was derived from the sequential domestications of the white-rooted wild form and cultivated Eastern carrots. Western types are higher carotenoids and *vernalization* is mandatory for flowering. Locally available Eastern cvs are low-carotenoids, have unattractive roots, and do not require *vernalization*. In India, >95 % of the seed requirements of 'Western carrots' are fulfilled by temperate nations hence seed cost is too high. Understanding the complex network of carotene and flowering pathways operating in carrots allows one to design breeding strategies to develop a high-valued Western cv. In comparative transcriptomics, we constructed *de novo* assembly from 12 RNAseq libraries involving Eastern and Western cvs 'root' and floral tissues obtained an N50 contig length of 1827bp and 17566 significant pair-wise DEGs. Larger differences were found for key domestication genes viz., carotenoid pathway, flowering pathway, photosynthesis, and defense-related genes between the cvs. In the carotenoid pathway, a higher accumulation of PSY, CRTISO, and LCYE genes was found in Western cv. While upregulation of genes that connect apocarotenoids or xanthin-mediated ABA signaling through CCD or NCED1 were observed in Eastern cv could be the reason for the difference in carotenoid accumulation among them. We constructed a putative flowering network separately for two cvs based on the *Arabidopsis* orthologs. A higher number of DEGs for CONSTANS-mediated photoperiod and Flowering locus C (FLC) repression-mediated *vernalization* responsive DEGs were found with limited genes that operate endogenously in Western cv. While in Eastern, the dominance of autonomous pathways (FLD, LD, FLK, & PABP) to repress flowering repressor, FLC in addition to age and hormone-responsive (GA & ABA) pathways that operate endogenously were observed. Understanding carotenoid and flowering pathways is crucial for quality root and seed production in carrots.

Keywords: Eastern carrot, Western carrot, domestication, carotenoid pathway, flowering network

DEVELOPMENT OF RRL AWBM MODEL AND INVESTIGATION OF ITS PERFORMANCE, EFFICIENCY, AND SUITABILITY IN PARBATI WATERSHED**SARVDA NAND TIWARI¹, VIKAS KUMAR SINGH², SHIVAM² AND MO AKRAM³****Department of Soil and Water Conservation Engineering.**¹**Research Scholar of Mahamaya College of Agriculture Engineering & Technology Akbarpur**²**Faculty of Mahamaya College of Agriculture Engineering & Technology Akbarpur**³**PG scholar Faculty of Mahamaya College of Agriculture Engineering & Technology Akbarpur, A.N.D.U.A.T. Kumarganj Ayodhya**

The current study demonstrates the potential use of RRL AWBM model for river flow modelling by developing a rainfall-runoff relationship for Parbati Watershed in India. The data of rainfall, discharge, and evaporation for 16 years (from 2005 to 2020) have been used for modelling. Model parameters were calibrated using 11 years of data and rest of the data are used for model validation. Optimum architectures of the models are selected according to the obtained evaluation criteria in terms of Nash–Sutcliffe efficiency coefficient and root mean squared error. Result of this study has been compared in favour of RRL AWBM model. The results of this study indicate that the Nash Sutcliffe Efficiency for calibration was found to be 77.20% and 65.40% for the validation period. The model performs better in estimating the hydrograph characteristics such as flow duration curve effectively. The main objective of this paper is runoff estimation and model comparison. In this study describes the use of RRL (Rainfall runoff library). These rainfall runoff model libraries have five (AWBM, TANK, SMAR, SIMHYD, SACRAMENTO) models, 8 calibration optimizer and 10 objective functions.

Keywords: Runoff, Coefficient of correlation, Efficiency index, Root mean square error, Nash–Sutcliffe efficiency.**AGNIHOTRA FARMING: AN ANCIENT SECRET TO IMPROVE AGRICULTURE*****SARYU TRIVEDI¹, HARSH A. KAMANI¹, HIMALAY R. PATEL¹, V. S. RANPARIYA¹, BANSI NIMAVAT² AND KANTHA D. ARUNACHALAM³**¹**Assistant Professor, ²Ph.D. Research Scholar and ³Dean**^{1&2}**Department of Agriculture, ^{1,2&3}Faculty of Science, Marwadi University, Rajkot, Gujarat, India**

Agriculture is a very important enterprise. It is for this reason the farmer is called “giver of food”. All business is based on agricultural production and agriculture is the backbone of our economy. This may be so, but in the present times we find that the farmers are greatly nervous, distressed and are in a miserable state. Caught in the vicious cycle of rampant use of chemical fertilizers and pesticides they are on the way to their certain downfall. The reasons for such a downfall are the decline in the fertile quality of their farmland, constantly increasing agricultural expenditure and compulsion to sell toxic food, fruits and vegetables in the market. Agnihotra farming is an ancient agricultural practice rooted in Vedic traditions, primarily found in India. It involves performing the Agnihotra ritual, which is a fire ceremony conducted at sunrise and sunset using specific ingredients like cow dung, ghee, rice, and medicinal herbs. The belief is that Agnihotra creates a harmonious environment by purifying the atmosphere, enhancing soil fertility, and promoting plant growth. Practitioners claim that it not only improves crop yield but also enhances the nutritional value and taste of the produce. Additionally, Agnihotra farming is often associated with sustainable agriculture practices, as it emphasizes the use of natural inputs and fosters a holistic approach to farming that respects the interconnectedness of all living beings and the environment. While scientific evidence supporting its efficacy is limited, Agnihotra farming continues to be practiced by those who value its spiritual and cultural significance.

Keywords: Agnihotra, ritual, vicious, holistic etc.**VARIABILITY THROUGH GENETICAL DIAGNOSIS IN TUBEROSE (*POLIANTHES TUBEROSA* L.)*****SARYU TRIVEDI¹, S. L. CHAWLA², D. P. PATEL³, V. S. RANPARIYA¹, HIMALAY R. PATEL¹ AND HARSH A. KAMANI¹**¹**Assistant Professor, Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat, India**²**Associate Professor, Department of Floriculture and Landscape Architecture, ASPEE College of Horticulture, Navsari Agricultural University, Navsari, Gujarat.**³**Ph.D. Research Scholar, Department of Genetics and Plant Breeding, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat, India**

Tuberose (*Polianthes tuberosa* L.) is also known as *Rajnigandha*, *Gul-e-chari*, *Gul-e-shabu*, *Nishighandha* and *Sugandharaja*, native of Mexico and belongs to the family Asparagaceae. The experiment was carried out in randomized block design comprising 28 tuberose genotypes with three replications. It was conducted during two successive experimental years 2021-22 to 2022-23 at Floriculture Research Farm, ACH, Navsari Agricultural University. Pratap Rajani took minimum days (9.00 days) to sprouting. A genotype Sikkim Selection was found the tallest (91.07 cm). Maximum leaves per plant was found in Arka Shringar (168.15) whereas highest leaf area was observed in Arka Prajwal (76.39 cm²). Bidhan Snigdha recorded significantly the earliest spike emergence (159.00 days) and flowering (177.33 days). The highest spike length (120.46 cm) and rachis length (44.47 cm) was observed in Sikkim Selection and Bidhan Snigdha, respectively. The highest vase life was observed by BRH-19 (8.33 days). The genotype Pune Local Single was found significantly superior (7.90) in case of number of spikes per clump. Among different genotypes, the least similarity of 0.363 was recorded between Arka Sugandhi and Bidhan Jyoti whereas Pune Local Double and Pearl Double reported the highest values of similarity coefficient (0.952). Twenty eight genotypes of tuberose were grouped into six clusters during D² analysis. The results indicated that a maximum number of diverse genotypes (19) appeared in cluster I. The cluster IV and V were second largest containing 3 genotypes while, rest of the clusters had single genotypes.

Keywords: Tuberose, vase life, spikes, rachis, bulbs, cluster etc.

EMPOWERING THE ORAON TRIBE IN SUNDARGARH DISTRICT, ODISHA: APPROACHES TO ENHANCING FOOD SECURITY, NUTRITION, AND LIVELIHOODS**SASMITA MINZ****Ph.D. Scholar, Kalinga Institute of Social Science (KISS) deemed to be University Bhubaneswar, Odisha (India)**

This paper examines strategies to empower the Oraon Tribe residing in Sundargarh District, Odisha, with a primary focus on improving food security, nutrition, and livelihood opportunities. The Oraon Tribe, like many indigenous communities, faces significant socio-economic challenges, including limited access to nutritious food, inadequate healthcare, and marginalization from mainstream development initiatives. Through a comprehensive analysis of the tribe's socio-economic context, this study identifies key obstacles to their well-being and proposes multifaceted approaches to address these challenges. Interventions encompass a range of measures, including enhancing agricultural productivity through sustainable farming techniques, promoting dietary diversity and nutrition education, improving access to clean water and sanitation facilities, and fostering income-generating activities tailored to the tribe's cultural practices and preferences. Additionally, community-based initiatives aimed at strengthening social cohesion, enhancing women's empowerment, and leveraging traditional knowledge systems are proposed to ensure the sustainability and effectiveness of interventions. By adopting a participatory and inclusive approach, this paper seeks to empower the Oraon Tribe to become self-reliant, resilient, and capable of navigating the complex dynamics of modernization while preserving their cultural heritage and ecological harmony. Ultimately, the proposed strategies aim to contribute to the holistic development of the Oraon Tribe and foster sustainable socio-economic progress in Sundargarh District and beyond.

Keywords: Oraon Tribe, Sundargarh District, Odisha, indigenous communities, food security, nutrition, livelihoods, sustainable development, community empowerment, traditional knowledge.

TO STUDY THE EFFECT OF DIFFERENT FLORAL PRESERVATIVES ON THE VASE LIFE OF CUT FLOWER GERBERA (GERBERA JAMESONII BOLUS EX. HOOKS F.) CV. RUBY RED**SATENDRA CHAUHAN AND YATENDRA SINGH****Department of Horticulture, Raja Balwant Singh College Bichpuri, Agra-283105**

An experiment was conducted in P.G. laboratory of Horticulture Department in R.B.S. College, Bichpuri, Agra in December 2021. The experiment was laid out in Completely Randomized Design (CRD) with 10 treatments and 3 replications which means total 30 vases and 90 stalk of Gerbera flower. The treatment taken under observation were distilled water (control), Sucrose (2%) and (4%), Acetic acid (100 ppm) and (200 ppm), Sucrose (2%) + $\text{Al}_2(\text{SO}_4)_3$ (200 ppm), Sucrose (4%) + $\text{Al}_2(\text{SO}_4)_3$ (300 ppm), Sucrose (2%) + Citric acid (100 ppm), Sucrose (4%) + Citric acid (200 ppm), Sodium thiosulphate (300 ppm). On analyzing data, out of different treatments Sucrose (4%) + $\text{Al}_2(\text{SO}_4)_3$ (300 ppm) shows best result and superior to all the other treatments. The stalk placed in Sucrose (4%) + $\text{Al}_2(\text{SO}_4)_3$ (300 ppm) (T_6) show minimum weight loss (26.46%), maximum head and disc diameter (7.43cm) and (4.73cm) respectively at the end of vase life. The maximum solution uptake was recorded in Sucrose (4%) + $\text{Al}_2(\text{SO}_4)_3$ (300 ppm) (68.80mL), also the number of days took to freshness, neck bend and vase life were (13.76), (14.56) and (18.29) days respectively. Although, other treatments show better result than control.

Key words: Gerbera, vase life, sucrose, aluminium sulphate, acetic acid, citric acid, sodium thiosulphate, pulsing

EVALUATION OF PROMISING MIDLATE SUGARCANE GENOTYPES FOR YIELD AND QUALITY TRAITS IN NORTH CENTRAL ZONE**SATENDRA KUMAR AND S. C. SINGH****Scientific officer (Agro) and Joint Director, UPCSAR-Genda Singh Sugarcane Breeding & Research Institute, Seorahi, Kushinagar, UP**

The evaluation of mid-late sugarcane genotypes involves assessing various characteristics and performance indicators to determine their suitability for cultivation. The performance of the crop depends on the planting methods, balanced use of fertilizer, and types of genotypes. The most important factor is the ability of genotypes to efficiently utilize the applied nutrients, especially NPK. A field experiment was conducted during 2022-23 at the research farm of Genda Singh Sugarcane Breeding and Research Institute, Seorahi, Uttar Pradesh. The experiment consisted of three promising genotypes and three check varieties for comparison, three genotypes i.e. CoSe 16455, CoP 17446 and CoSe 17452 with three zonal checks varieties i.e. Bo 91, CoP 06436 and CoP 9301, second factor two fertility levels i.e. F_1 -100 per cent recommended dose of NPK and F_2 -125 per cent recommended dose of NPK were tested in factorial randomized block design with three replications with an objective to assess the performance of promising midlate sugarcane genotypes of the advanced varietal trial (AVT). The recommended dose of N-P-K was 180-80-60 kilogram per hectare and applied as per treatment requirement. The experimental field was medium in organic carbon (0.68 per cent), low in available phosphorus (13.47 kg/ha) and low in potash (70.38 kg/ha) with a pH of 8.15. Sugarcane crop was planted on 06 March 2022 in spring planting season and harvested on 18 February 2023. The yield of mid late set of sugarcane genotypes were found significantly superior over checks for their performance. The results of mid late set of sugarcane genotypes revealed that all new midlate tested genotypes produced significantly effect on shoot population. Genotypes CoSe 16455 (148.61 thousand per ha) produced higher shoot population over all standard except CoP 06436. Genotypes CoSe 16455 (127.38 thousand per ha), CoP 17446 (123.56 thousand per ha) noted significantly higher NMC from compared two zonal checks i.e. Bo 91 and CoP 06436. Tested genotypes CoSe 16455 (94.59 t/ha) and CoSe 17452 (85.89 t/ha) produced significantly higher cane yield over all rest zonal check except CoP 06432. 125 per cent RDF obtained significantly higher shoot population (142.23 thousand per ha) and cane yield (89.21 t/ha) as compared to 100 per cent application of RDF. No significant variation was observed in germination, NMC and sucrose per cent between 100 and 125 per cent recommended dose of fertilizer application but maximum value was obtained in 125 per cent recommended dose of fertilizer applied plots. Sucrose per cent was not affected significantly by different genotypes against all checks but maximum value noted in genotype CoSe 17452 (16.74 per cent).

Key words: Promising, Evaluation, Sugarcane, Fertility level, Genotypes, productivity, quality

NANO DAP: A NOVEL APPROACH TO ENHANCING CROP YIELDS AND AGRICULTURAL SUSTAINABILITY**¹SATYA NARAYAN GURJAR AND ²RAGHUVeer CHOUDHARY****¹Farm Manager, Agriculture University, Kota, Rajasthan, ²Ph.D Scholar, Junagadh Agricultural University, Junagadh, Gujarat**

In recent years, the global agricultural sector has faced mounting challenges to meet the increasing demand for food, feed, fiber, and fuel while ensuring environmental sustainability. Addressing these challenges requires innovative approaches to enhance crop yields and agricultural productivity without compromising long-term sustainability. Nano Diammonium phosphate (DAP) has emerged as a promising solution to optimize nutrient management and improve crop performance. This paper presents a comprehensive review of the application of nano DAP in agriculture and its potential impact on crop yields and sustainability. Nano DAP, characterized by its nano-sized particles, offers several advantages over conventional fertilizers. Its nanoscale properties enable enhanced nutrient solubility, increased nutrient uptake by plants, and improved nutrient utilization efficiency. Moreover, nano DAP formulations can be tailored to deliver nutrients precisely, minimizing nutrient losses through leaching or runoff. These attributes make nano DAP an effective tool for optimizing fertilizer use and reducing environmental impacts associated with nutrient pollution. The application of nano DAP has shown promising results in various crops, including cereals, legumes, fruits, and vegetables. Studies have reported significant increases in crop yields, improvements in plant growth parameters, and enhanced resistance to environmental stressors. Furthermore, nano DAP has demonstrated potential in mitigating nutrient deficiencies and enhancing soil fertility, thereby contributing to long-term agricultural sustainability. However, the widespread adoption of nano DAP in agriculture also raises important questions regarding its safety, environmental impact, and regulatory considerations. Addressing these concerns requires further research and collaboration across interdisciplinary fields. In conclusion, nano DAP represents a novel approach to enhancing crop yields and agricultural sustainability. By harnessing nanotechnology for precision nutrient management, nano DAP has the potential to revolutionize modern agriculture and contribute to global food security in a sustainable manner.

BIODIVERSITY PRESERVING AND SUSTAINABLE DEVELOPMENT THROUGH ECOTOURISM**DR. SATYA PRAKASH VISHWAKARMA¹, DR. R. K. PRAJAPATI² AND MR. PARIKSHIT SRIVASTAVA³****¹College of Forestry & Research Station, Mahatma Gandhi Univ. of Horticulture and Forestry, Sankara, Patan, Durg, Chhattisgarh,****²Department of Forestry, IGKV, Raipur, Chhattisgarh, India****³PhD Scholar, Indian Institute of Forest Management, Bhopal, Madhya Pradesh, India**

In present time, Biodiversity is destroyed by various human activities such as settlement, plantation, poaching, and infrastructure development. Conserving biodiversity is a significant phenomenon for any country that wants to keep the balance of the environment. Human interference causes the loss of biodiversity in all fields. Ecotourism is a sub-component of the field of sustainable tourism. Ecotourism is an individual aspect of the travel and tourism industry that especially aims to improve or protect natural systems through tourism activities. Ecotourism is a term that has different meanings between different individuals. Ecotourism development creates values for sustainably using biodiversity, creating economic development opportunities. Ecotourism enterprises aim to shift the use of natural assets and biodiversity from consumption to conservation. Ecotourism involves the local community in promoting the preservation of the area's biodiversity, which in turn offers economic benefits to the community. Ecotourism is a sustainable form of tourism that involves visiting areas of nature for educational purposes, research, or engaging in environmentally sustainable activities. It supports both social and economic development in local communities. Ecotourism supports community development by providing a sustainable alternative livelihood for local individuals. The purpose of this initiative is to preserve assets, in particular biological diversity, and ensure sustainable use of these resources, which may provide substantial benefits. Provide people with an ecological experience, preserve the ecological environment, and achieve economic benefits. Developing countries have included ecotourism in their economic and environmentally friendly plans due to its potential for sustainable development.

Keywords: Ecotourism, Preservation, Biodiversity, Environment, livelihood, Sustainability development**CLONING AND SEQUENCING OF THIOREDOXIN DISULPHIDE REDUCTASE-B GENE (TRXB) OF ANAPLASMA MARGINALE****SAUMYA¹, ASIT VIJAY PATHADE¹, SOUTI PRASAD SARKHEL², ARCHANA MAHAPATRA², DAYANIDHI JENA², PRASANTA KUMAR K. MISHRA³,****¹Plant Biotechnology, Department of Genetics & Plant Breeding, I.Ag.Sc., R.G.S.C., Banaras Hindu University, Barkachha, UP****²Faculty of Veterinary and Animal Sciences, I.Ag.Sc., R.G.S.C., Banaras Hindu University, Barkachha, Uttar Pradesh, India****³Department of Veterinary Biochemistry, C.V.Sc.&A.H., Odisha University of Agriculture & Technology, Bhubaneswar**

Thioredoxin disulfide reductase (TrxB) is an essential component of the thioredoxin system, which is a flavoprotein that generates reducing equivalents for various oxidation-reduction reactions that target various cellular metabolic activities. *Anaplasma marginale* is a bacterium that causes intraerythrocytic disease in bovines known as anaplasmosis, which results in economic losses in tropical and subtropical regions worldwide. This study aimed to clone and sequence the trxB gene of *A. marginale*. To achieve this, the TrxB gene of the *A. marginale* was isolated and amplified by PCR. Cloning and expression of the TrxB gene in *E. coli* BL21 cells were done using the pLATE11 vector and the ligation-independent method. This method utilises the 3'-exonuclease activity of T4 DNA polymerase to create a 15 base 5' overhangs in the ends of the insert and complementary 5' overhangs in the vector. After sequencing, the sequence was submitted to the NCBI gene bank. The *A. marginale* TrxB gene sequence was highly similar with the *A. marginale* TrxB gene sequence retrieved from the NCBI data base (Jaboticabal strain). The 978 bp long sequence of *A. marginale* was aligned by pairwise alignment with a reference sequence retrieved from the gene bank.

Keywords: Thioredoxin disulphide reductase (TrxB), *Anaplasma marginale*, ligation independent cloning, sequencing

WETLAND MANAGEMENT: AN INSTITUTIONAL CASE STUDY**SAURABH SARKAR^{1,2*}**¹Assistant Professor, Science Research Laboratory, Department of Zoology, Gushkara Mahavidyalaya, Gushkara, West Bengal,²Director, Research & Development Cell, Gushkara Mahavidyalaya, Gushkara, West Bengal, India

Gushkara Mahavidyalaya, founded in 1965, is a renowned government-aided degree college having Science, Commerce as well as Arts streams in India. This college possesses an attractive green landscape which includes a wetland or a water body. This water body is about 1200 m² in area and 2-5 feet in depth. In early 2022, the 'Aquaculture Research & Training Unit' was initially designed, developed and proposed by Dr Saurabh Sarkar, Assistant Professor of Zoology for the sake of education, research as well as community service. The key goals for setting up the 'Aquaculture Research & Training Unit' are research, community training, education and entrepreneurship development along with increase social consciousness for sustainable development. On 18.06.2022, the Governing Body of Gushkara Mahavidyalaya gladly approved this 'Aquaculture Research & Training Unit' proposal and awarded a large water body of Gushkara Mahavidyalaya for this purpose. After that, various water quality measurement parameters like pH, transparency, nitrate and phosphate content, salinity, odor, colour, etc of the pond water were tested and studied. The whole water body or wetland was then divided into three parts for three specific purposes. The first part of the water body was considered as a pond wetland (4-5 feet depth) for pisciculture purpose, the second part of the water body (2-3 feet depth) was recognized as bog wetland and dedicated as 'Larvicidal Fish Culture Hub'. The remaining third part of the water body (2-2.5 feet depth) was supposed as a marsh wetland and had been considered for Natural Ecosystem as well as Habitat Conservation. Various exotic fish species like *Ctenopharyngodon idella*, *Cyprinus carpio*, *Hypophthalmichthys molitrix* along with indigenous major and minor carp species like *Catla catla*, *Labeo bata*, *Labeo rohita*, *Labeo calbasu*, *Puntius sophore*, *Cirrhinus mrigala*, *Puntius ticto* were cultured in the pond wetland that provides more than 150% revenue of initial investment for institution in just one year. *Poecilia sphenops*, *Poecilia latipinna* (Molly), *Poecilia reticulata* (Guppy), *Danio rerio* (Zebrafish) etc larvicidal fishes were reared and distributed to the local community (through NSS) to eradicate dengue, malaria as well as other mosquito-borne diseases for executing social responsibility of institution. The remaining water body acts as waste water management system via natural photo-remediation along with dedicated conservation site of nature and natural resources to comply environmental responsibility of institution for sustainable development.

Keywords: Wetland, Pisciculture, Larvicidal fish, Conservation, Sustainable development.

A STUDY OF BREAD WHEAT (*TRITICUM AESTIVUM* L.) GENOTYPES TO EVALUATE THE GENETIC VARIABILITY AND HERITABILITY FOR YIELD AND ITS ATTRIBUTES**SAURABH¹, S.C. GAUR^{2*}, P.N. SINGH¹, TARKESHWAR³, KARISHMA RANI¹, KAMLESH KUMAR¹, LAL BAHADUR GAUR⁴, AJAY KUMAR GAUR¹**¹Department of Genetics and Plant Breeding, B.R.D.P.G. College, Deoria (UP)²Principal, M.M.M.P.G. College Bhatpar rani, Deoria (UP)³Department of Genetics and Plant Breeding, A.N.D.U.A.&T., Ayodhya (UP)⁴Subject Matter Specialist, Krishi Vigyan Kendra, Jaunpur II (UP)

It is one of the most important staple foods as well as the most consumed cereal amongst major cereals of the world. In wheat, grain yield is considered a complex character and is dependent on its component traits. Therefore, variability existed within each component trait must be exploited by selection to realize a maximum gain in grain yield. Keeping the facts in view the current investigation was carried out at the Agricultural Research Farm of B.R.D.P.G. College (Campus), Deoria in a randomized block design (RBD) in the rabi 2022 with fifteen elite wheat cultivars obtained from Department of Genetics and Plant Breeding, B.R.D. PG. College Deoria (U.P.) to evaluate the extent of variability, heritability and genetic advance for fourteen metric traits. The analysis of variance showed a good amount of variability present among these cultivars of wheat as all the genotypes were significant for all the traits at given probability levels. The magnitude of the Genotypic Coefficient of Variation (GCV) varied from 3.98 % to 24.91 %. The GCV along with phenotypic Coefficient of Variation (PCV) was recorded highest for grain yield per plant (24.91 % and 25.28%). The all of the characters had high heritability and it was recorded highest for the number of grains per spike with plant height (99.37%) followed by test weight (98.80%), biological yield per plant (98.68%), days to 50% flowering (98.33%) and flag leaf area (97.94%). The highest genetic advance was recorded for the plant height (22.85%) and number of grains per spike (20.44%). The high heritability along with high genetic advance indicates the abundance of additive gene action in the expression of these traits and selection for such traits would be rewarding.

Keywords: grain yield, triticum aestivum, heritability, genetic advance, GCV, PCV

EVALUATION OF EFFICACY OF NEW INSECTICIDE FOR THE MANAGEMENT OF POD BORER *HELICOVERPA ARMIGERA* (HUBNER) IN URDBEAN**SAURAV GUPTA¹, NEERJA SHARMA², SANJAY Koushal³, JOGINDER SINGH⁴, ABHAY KUMAR SINHA⁵ AND SUNIL MISHRA⁶**¹Sr. Scientist Entomology, Krishi Vigyan Kendra Samba, SKUAST-J, J&K, India²Chief Scientist vegetable Science, Krishi Vigyan Kendra Samba, SKUAST-J J&K, India³Scientist, Agronomy, Krishi Vigyan Kendra Reasi, SKUAST-J, J&K, India⁴Assistant professor, Janta Vedic College, Baraut, Baghpat, U.P, India, J&K, India⁵Chief Scientist Ag. Engineering, Krishi Vigyan Kendra Samba, SKUAST-J, J&K, India⁶Sr. Scientist, Agronomy, Division of Agromony, SKUAST-J, J&K, India

Pod Borer is a very destructive and serious pest of Urdbean and causes serious damage to urdbean. They feed on leaves and tender shoots and bore into the pod to feed on seeds. One larva may feed on several fruits before completing development. In severe infestation cases, it causes about 50-90% losses in seed yield. Urdbean is the important pulse crop grown in *Kharif* season by the farmers of District Samba. Every year infestation due to Pod borer in urdbean causes huge economic loss results in low yield. Therefore, KVK-Samba had conducted On Farm Trials (OFT) during *kharif* 2020-21 and *kharif* 2021-22 at farmer's field to assess the efficacy of insecticides for the management of Pod Borer (*Helicoverpa armigera*) in urdbean. On the basis of three treatments assessed i.e. (a) Chloropyriphos 20 EC @ 2 ml per litre (Farmer's practice) (b) Cypermethrin 25EC @1.5ml./lt. of water (recommended) (c) Fame 480 SC @ 0.3ml. /lt. of water (Intervention). The results of OFT during 2020-21revealed that use of Fame 480 SC @ 0.3ml. /lt. of water was observed to be superior resulting in 90.00% reduction in damage to pods of urdbean and increased the grain yield to an extent of 56.00% over Chloropyriphos 20 EC @ 2 ml per litre followed by Cypermethrin 25EC @1.5ml./lt. of water resulting in 50.0% reduction in damage to pods of urdbean and increased the grain yield to an extent of 20.0% over Chloropyriphos 20 EC @ 2 ml per litre and the results of OFT during 2021-22 revealed that use of Fame 480 SC @ 0.3ml. /lt. of water was observed to be superior resulting in 85.96% reduction in damage to pods of urdbean and increased the grain yield to an extent of 46.15% over Chloropyriphos 20 EC @ 2 ml per litre followed by Cypermethrin 25EC @1.5ml./lt. of water resulting in 45.61% reduction in damage to pods of urdbean and increased the grain yield to an extent of 11.53% over Chloropyriphos 20 EC @ 2 ml per litre. In terms of cost benefits Chlorantraniliprole 18.5 SC was the best among all treatments. Therefore, the use of Fame 480 SC @ 0.3ml. /lt. of water can be recommended for control of pod borer under rainfed conditions of district Samba.

Keywords: Urdbean, Pod Borer, On Farm Trial, *Helicoverpa armigera*, Fame, Cypermethrin, Chloropyriphos.**DEVELOPMENT OF A FLUORESCENCE-BASED SENSOR FOR THE DETECTION OF PERFLUOROALKYL ACIDS
SAVIKRITI SAINI AND SELVA KUMAR R*****Department of Chemistry, M. M. Engineering College, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala, Haryana, India**

Perfluoroalkyl acids (PFAS) are burgeoning environmental contaminants posing significant health hazards. Because of their chemical-thermal stability and hydrophobicity, they are widely used in surfactants, coatings, adhesives, emulsifiers, lubricants, cookware, painting and building materials, making them persistent in the environment, thus requiring sensitive detection methods. Growing concerns are being raised regarding the fate, transportation, environmental behaviour, toxicity, and risk of emerging PFASs. Conventional approaches have several limitations, such as the unavailability of standards, blank contamination, in-source fragmentation, low extraction recoveries, and poor sensitivity. Therefore, susceptible and dynamic methods must be explored to cover the wide variety of newly identified PFASs. This work explores the development of an optical fluorescence sensor for the specific detection of PFOA and PFAS in various samples. The sensor design utilises fluorescent probes tailored to interact with PFOA and PFAS molecules with high sensitivity, portability, real-time monitoring capabilities, or ease of use. These interactions can alter the fluorescence properties of the probes, either by quenching or enhancing their emission. By implementing a sensitive and selective optical fluorescence sensor, this research offers a promising approach for effective environmental monitoring and safeguarding public health from PFOA and PFAS contamination.

Keywords: PFAS, PFOS, Fluorescence, Chemosensors, Quantum dots, Optical Sensor.

STANDARDIZATION OF NUTRIENT REQUIREMENT OF DRAGON FRUIT TYPES UNDER NORTHERN DRY ZONE OF KARNATAKA, INDIA*SAVITA B^{1*}, HEENA M.S², R.B. NEGALUR³, S.S.ANJUM⁴, SIDHARAM PATIL⁵ AND SONIKA C⁶¹Sr.Scientist (Soil Science), AICRP on Dryland Agriculture, RARS, Vijayapura -586101.²Scientist (Horticulture), ICAR-Krishi Vigyan Kendra, ³Principal Scientist and Head, AICRP on IFS-OFR, ARS, Mundgod⁴Scientist (Plant Pathology), AICRP on Sorghum, ⁵Asst. Professor (Soil Science), College of Agriculture, Vijayapura -586 101.⁶M.Sc (Soil Science), College of Agriculture, Dharwad -580 005, UAS, Dharwad Karnataka, India

The study was conducted during 2022-23 to assess the effect of nutrient application on growth, yield and quality attributes and to identify suitable fruit type with right dose of NPK for Dragon fruit cultivation. Treatment composed in main-plots (fruit types) F1:Red pulp type (*Selenicereus polyrhizus*) and F2: White pulp type (*Selenicereus undatus*) and sub plots (nutrient management practices-NMPs) viz, T1: control, T2 : 15kg FYM + 200:50:50g NPK /pole, T3: 15kg FYM+ 200:250:100g NPK /pole, T4: 15kg FYM+ 300:200:200g NPK /pole, T5: 15kg FYM+ 450:350:300g NPK /pole. The nutrients will be supplied as per treatment schedule in four split doses to each pillar having four plants @ 10, 10 and 30% of total, before flowering, 20, 40 and 25% at fruit set, 30, 20 and 30% at harvest and finally 40, 30 and 15% of total N, P₂O₅, K₂O after two months of harvest. The results indicated that, the growth and quality attributes like plant height (cm), number fruits per pole, fruit diameter (cm) and fruit weight (g), pulp weight (g), peel weight (g), pulp (percentage) and TSS were significantly higher in case of red pulp dragon fruit as compared to white pulp dragon fruit. Among NMPs, T4 recorded maximum plant height (cm), number of branches, number of fruits per pole, fruit diameter (cm), fruit weight (g), pulp weight (g), peel weight (g), pulp (percentage) and TSS (°Brix) as compared to T1 followed by T5 and T3. The significantly higher fruit yield was recorded in red pulp dragon fruit (5.63 t/ha) and B: C ratio was 10.8 as compared to white pulp dragon fruit (4.04 t/ha and 7.15, respectively). Among the NMPs, T4 was recorded significantly higher fruit yield (5.97 t/ha and B: C ratio (10.6) as compared to T1 (3.23 t/ha and 7.18, respectively) followed by T5 and T3.

Key words : Brix, dragon fruit, fruit diameter, nutrient management, pulp percentage and yield**EVALUATION OF BIOCHEMICAL PARAMETERS IN TWENTY-NINE TURMERIC (*CURCUMA LONGA* L.) GENOTYPES OF INDIA**

SAYAN CHOWDHURY, JAGRATI UPADHYAY, PRIYANKA MISHRA DUBEY, ITI GONTIA MISHRA, ROHIT KUMAR, VIJAY BAGARE, RATNESH KUMAR AND ROHIT KUMAR SINGH

Faculty of Agriculture, Mangalayatan University, Mandla Road, Barela, Jabalpur-483001, Madhya Pradesh, India

Turmeric is a traditional Indian spice crop, obtained from the rhizome of plant *Curcuma longa* L. (family Zingiberaceae). Curcumin is the bright, yellow chemical compound in turmeric responsible for its color and biological activity. It has various medicinal uses such as anti-inflammatory, anti-tumor, antiviral, anti-HIV, anticancer, antiparasitic and antifungal activity. Total 100 turmeric genotypes provided by All India Coordinated Research Project, Uttar Banga Krishi Vishwavidyalaya were assessed for their biochemical characteristics. The curcumin content of all genotypes was estimated and based on their curcumin content, turmeric genotypes were grouped into three classes namely high, medium and low. Biochemical characters such as antioxidant activity, total phenol and iron content of some selected genotypes from each group were estimated and any possible relationship between the above biochemical characters were explored. It was observed that curcumin content and antioxidant activities showed a positive correlation coefficient of 0.64. The significant positive correlation coefficient between total phenol content and curcumin content was 0.44 whereas between total phenol content and antioxidant activity was 0.28. So, it can be concluded from the results that there is a good correlation between curcumin content and antioxidant activity of the studied genotypes.

Keywords: Turmeric, Curcumin, Antioxidant, Phenol, Iron**PRESERVATIVE EFFECTS OF LICORICE ROOT (*GLYCYRRHIZA GLABRA* L.) EXTRACT ON QUALITY AND STORAGE STABILITY OF FISH CROQUETTE DURING FROZEN STORAGE (-18±1°C)**

SAYANI ROY*, K. C. DORA, S. CHOWDHURY, S. NATH, P. MURMU AND DIWAKAR KUMAR

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Value addition is the most promising sector in food processing industry and there is an increasing demand for such ready to eat fishery products. This study investigated the efficacy of licorice root (*Glycyrrhiza glabra* L.) extract to curtail lipid oxidation and protect sensory attributes of fish croquette prepared from *Pangasianodon hypophthalmus* during frozen storage (-18±1°C). DPPH radical scavenging assay was carried out to evaluate the antioxidant properties of two different type of extracts (i.e. Ethanolic licorice extract and Water licorice extract) at different concentrations (i.e. 0.01%, 0.04%, 0.07% and 0.1%). The 70% ethanolic solvent extracted sample (ELE) (46.12±1.04 mg GAE/g) exhibited significantly (p<0.05) higher antioxidant activity than WLE (29.22±1.01 mg GAE/g) and its radical scavenging activity was closer to the commercial antioxidant used (BHA). Four different concentrations of licorice extracts were applied i.e. T1 (0.01%), T2 (0.04%), T3 (0.07%) and T4 (0.1%) for the preparation of fish croquette and kept under frozen storage (-18±1°C) for analysis. Sampling was done at 15 days interval for 180 days. Fish croquettes treated with different concentrations of ethanolic licorice extract had significantly (P<0.05) lower TBARS, TVB-N and peroxide values compared to the control sample at the end of the frozen storage period. The T4 sample achieved the highest overall acceptability score while the control sample garnered the lowest score at the end of the storage period. All sensorial scores for the control group over the storage time were significantly (P<0.05) lower than those of the treated samples. The higher sensory score was found in T4 sample followed by T3, T2 and T1 samples. Indeed, licorice extract shows as a promising agent for mitigating rancidity and lipid oxidation in fish croquettes during frozen storage.

Keywords: Lipid oxidation, Natural preservative, Licorice, Antioxidant, Frozen storage

ANTIBIOGRAM OF SELECTED BACTERIAL PATHOGENS FROM LOCALLY PREPARED YOGHURT IN KATHMANDU VALLEY**SEEMA ADHIKARI¹, OM PRAKASH PANTA², SARDA ACHARYA^{3*}, PRADEEP SHAH⁴, RATNAA SHAKYA³**¹Department of Microbiology, Central Campus of Technology, Dharan, Nepal²Faculty, Department of Microbiology, Central Campus of Technology, Dharan, Nepal³Food Research Officer, National Food and Feed Reference Laboratory, Dept. of Food Technology and Quality Control, Nepal⁴Faculty, DAV School Kedia College, Jawalakhel, Nepal

Yoghurt is rich in its nutrient contents and a dietary product made through the bacterial fermentation of milk. The emergence of antibiotic resistance in microorganisms and the presence of such isolates in Yoghurt pose a great risk to public health. Therefore, this study was conducted to determine the antibiogram of selected bacterial pathogens of locally prepared yoghurt. A total of 120 yoghurt samples were collected and analyzed from 40 different sampling sites. *Escherichia coli*, *Salmonella* spp. and *Staphylococcus aureus* were isolated using selective media and Antibiotic Susceptibility testing was carried out by Kirby-Bauer Disk diffusion method. A total of 48 *E. coli* and 46 *S. aureus* from the samples were identified and *Salmonella* was not detected in any samples. Among isolates of *Staphylococcus aureus*, 97.22% were susceptible to chloramphenicol while 52 % were resistant to cefoxitin. Among *E. coli* isolates 100% were susceptible to Amoxicillin-Clavulanate and 92% were resistant to Ampicillin. A significant correlation chi-square was observed. There was significant association between the Antibiotics and antibiotic susceptibility pattern of *E. coli* ($p=0.02$) and *S. aureus* ($p=0.00$). Hence, routine microbial quality assessment and antimicrobial resistance monitoring should be followed to safeguard public health.

Keywords: Yoghurt, Antimicrobial Resistance, antibiotic susceptibility pattern, *E. coli*, *Staphylococcus aureus***OPTIMIZING WHEAT QUALITY AND NUTRIENT CONTENT THROUGH INTEGRATED NUTRIENT MANAGEMENT: A POT CULTURE EXPERIMENT****SEEMA HODKASHIA^{1*}, PARMOD KUMAR SHARMA², SARVENDRA KUMAR³**^{1,2}Banaras Hindu University, Varanasi, India³ICAR-Indian Agricultural Research Institute, New Delhi, India

Over the years of intensive cultivation and uneven NPK application, emerging challenges of fertiliser use in intensive wheat cultivation systems, such as nutrient mining and poor nutrient use efficiency (Mohanty *et al.*, 2020), have emerged. Recently, this area has just started to emphasise the need to manage soil and plant health by switching from inorganic to organic farming. Nevertheless, a total conversion to an organic farming system is not feasible due to the overgrowing population and its steadily rising food demands. The integrated nutrient management (INM) concept seeks to create farming systems to ensure sustainability by enhancing soil health and providing food security for future generations by improving crop quality and productivity (Sharma *et al.*, 2019). Therefore, a pot experiment study was conducted on "Optimizing wheat quality and nutrient content through integrated nutrient Management" at the Rajiv Gandhi South Campus, Banaras Hindu University, Barkachha, Mirzapur, to find out There were nine levels, with the following treatments: T₁: control, T₂: 100% RDF, T₃: 150% RDF, T₄: FYM (5t ha⁻¹), T₅: FYM (10tha-1), T₆: 100% RDF+FYM(5tha-1), T₇: 150% RDF+FYM(5t ha⁻¹), T₈: soil test-based fertiliser, T₉: soil test-based fertiliser + FYM(5t ha⁻¹). Application of 150% NPK with FYM (5t ha⁻¹) recorded the highest protein content (11.38%). We revealed significantly higher nutrient content in T₇ compared to the control. It was 1.82%, 0.53% nitrogen content, 0.38%, 0.18% phosphorus content, and 0.45%, 1.54% potassium content by grain and straw of crop, respectively. Thus, this study demonstrates that the application of the additional 50% NPK with FYM at 5 t ha⁻¹ over RDF is essential to maintaining crop quality and nutrient availability.

Keywords: Organic farming, Inorganic fertilizer, farm yard manure, wheat, soil health, integrated nutrient management.**REMOVAL OF CR (VI) FROM WASTEWATER USING POWDERED ACTIVATED CARBON (PAC), FLYASH, RICE HUSK AND SAW DUST POWDER OF AGRA CITY, U.P. (INDIA)****SEEMA KUMARI¹, VEENA KUMARI², RAVI PRAKASH³ AND R. B. SINGH⁴**^{1,2}Department of Chemistry, Agra College, Agra (U.P.) India³Department of Chemistry, B.S.A. College, Mathura, (U.P.) India⁴Scientist 'C' UGC, Department of Zoology, School of Life Sciences, Dr. Bhimrao Ambedkar University, Khandari Campus, Agra,

Hexavalent chromium, Cr(VI), is used in various industries including metallurgy, chemical, chrome plating, manufacture of stainless steel, dyes, ink and pigments, leather tanning and wood preserving. It is also used in small amounts in drilling muds, rust and corrosion inhibitors, textiles and toner for copying machines. Because of its extensive use, Cr contamination of soil and water has become a prevalent problem. The most often observed oxidation states of Cr in natural water systems are Cr⁺³ and Cr⁺⁶, Although trivalent chromium, Cr(III), is considered an essential trace element, Cr(VI) is toxic, carcinogenic, mutagenic and teratogenic. Cr(VI) exists in water as oxyanions such as chromate (CrO_4^{2-}). In an attempt to evaluate the suitability of non-conventional adsorbents such as powdered activated carbon (PAC), fly ash (FA), rice husk (RH) and saw dust (SD) for the removal of hexavalent chromium from wastewater. A comparative study was carried out using all these adsorbents. PAC, FA, SD and RH could remove 95.3, 77.6, 88.4 and 87.3% Cr(VI) at initial metal concentration 10 mg/l, pH 6.0, temperature 25°C, agitation time 2 h and adsorbent dose 10 g/l. The order of metal removal capacities for these chemical adsorbents was found to be: PAC > FA > SD > RH. The effect of various parameters affecting the adsorption such as initial metal concentration, adsorbent dose, contact time and pH was determined. Adsorption decreases with rise in metal concentration and pH but increases with increase in adsorbent dose and contact time. Equilibrium was attained in 1.5 h and the maximum removal was at pH 2. Thus, acidic medium favoured the removal of Agra City, Uttar Pradesh (India).

(Keywords: Removal Chromium, waste water, metal concentration, adsorption)

NRG-1 AS THERAPEUTIC TARGETS IN SKIN DEPIGMENTARY DISORDER: VITILIGO**SEEMA RANI****Assistant Professor, Department of Zoology, Chaudhary Bansi Lal University, Bhiwani**

Paracrine cross-talk exists between the fibroblasts of dermis and epidermal cells through secretions of various growth factors. Melanocytes present at the basement layer of the epidermis respond to various factors secreted by underlying dermal fibroblasts in the dermis to regulate the function and phenotype of the skin. Therefore the study was planned to check the expression of fibroblasts derived factor Neuregulin1 (NRG1) in vitiligo skin and its effect on melanocytes. For this study, relative gene expression at mRNA level of NRG1 in the vitiligo skin was analysed by quantitative real time PCR (qRT-PCR) and immunohistochemistry technique was used for protein analysis. Effect of different concentrations of NRG1 was checked on the cultured melanocytes by proliferation assay, melanin content assay, tyrosinase assay and on the level of melanocyte specific genes (MITF, TYR, c-KIT, DCT). Expression of NRG1 was significantly less in lesional dermis of vitiligo patients as compared to non lesional and healthy control dermis both at mRNA as well as protein level. NRG1 treatment showed significant increase in proliferation, melanin content, tyrosinase level and gene expression level of melanocyte specific genes. Treatment of NRG1 to the cultured melanocytes increases proliferation and pigmentation. Lower expression of NRG1 in the lesional dermis of vitiligo patients inhibits the melanocytes growth. Therefore this study hypothesised that low expression of NRG1 in lesional skin of vitiligo patients can have a possible role in the melanocyte loss and vitiligo pathogenesis.

MANAGEMENT OF ROOT-KNOT NEMATODE, *MELOIDOGYNE JAVANICA* IN MUNG BEAN (*VIGNA RADIATA* L.) THROUGH OIL CAKES¹SEEMA YADAV, ²S. P. BISHNOI, ³PARWATI, ⁴B. S. CHANDRAWAT AND ⁵HEMRAJ GURJAR^{1&3}Ph.D Research Scholar, Dept. of Nematology, Rajasthan College of Agriculture MPUAT Udaipur (Rajasthan)^{2&5}Assistant Professor, Division of Nematology, RARI Durgapura, SKNAU, Jobner, Jaipur⁴Assistant Professor, Department of Nematology, SKNAU, Jobner, Jaipur

The root-knot nematodes (*Meloidogyne javanica*) are considered as one of the most destructive pests of mung bean the infected plant with suppressed growth and yield. Mung bean (*Vigna radiata* L. Wilczek) being one of the important pulse crops of India. An experiment was carried out for the management of root-knot nematode, *M. javanica* in mung bean using oil cakes {(neem cakes (5.0 q./ha), neem cake (7.5 q./ha), mustard cake (5.0 q./ha), mustard cake (7.5 q./ha), castor cake (5.0 q./ha), castor cake (7.5 q./ha), mahua cake (5.0 q./ha), mahua cake (7.5 q./ha)} were added to soil. Untreated check was also maintained for comparison. The oil cakes were tested in sick field condition and found was neem cakes 7.5q./ha recorded most effective treatment with maximum plant growth characters {shoot length (cm), root length(cm), shoot weight (gm), root weight (gm), Yield (Qtl. /ha)} and minimum nematode population. The next best treatment was mustard cake 7.5q./ha followed by castor cake 7.5q./ha and mahua cake 7.5q./ha.

Key words: Mung bean, Root-knot nematode, *Meloidogyne javanica*, Oil-cakes, Neem cake, Management**TITLE OF PRESENTATION: A COMPARATIVE ANALYSIS ON HERBACEOUS DIVERSITY AND BIOMASS ESTIMATION BETWEEN COAL MINE AFFECTED AND UNAFFECTED RIPARIAN SITE****SEYIEVINO CATHERINE CHASIE¹, M. R. SINGH¹ AND NEIZO PURO¹**¹Department of Botany, Nagaland University Lumami, India

This paper focuses on comparing the diversity of herbaceous plants and their biomass, between a coal mine affected and unaffected riparian site along Tsurang River in Mokokchung district of Nagaland. The riparian site situated adjacent to coal mine drainages that drain into the river has been considered as the affected site while the unaffected/control site is located upstream of the river, away from the influence of these drainages. The results obtained from both Shannon and Simpson's diversity index shows that the unaffected site comprises greater herbaceous diversity (>2.5%) and species abundance (>0.5%) as compared to the affected site which also parallels with the results observed from estimation of seasonal herbaceous biomass as the unaffected site, on comparison, shows an increased percentage of biomass accompanied with a more even plant productivity distribution. These results indicate that coal mine leachates from the mining site may have influenced the vegetation in the affected region, highlighting the burden anthropogenic factors can create on our ecosystem. At the same time, unique findings were observed in the affected site where herbaceous plants like *Axonopus* sp, *Arundo donax* and *Mimosa pudica* exists as the dominant plants occupying the affected site, thereby leading the productivity scale in the coal mine affected riparian site. This may suggest that some plants from the existing affected riparian vegetation may have established certain levels of tolerance towards coal mine wastes thus emphasizing on the need for conservation strategies and sensitization on management of resources.

Key Words: Biomass, coal mine drainages, plant diversity, riparian zone

VERMICOMPOSTING IN SEMI-ARID SOIL: A REGIONAL AND SEASONAL APPROACH FOR TRANSFORMING TRASH TO TREASURE

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This study explores the potential of *Eisenia fetida* (Savigny) in vermicompost production within vermipits during winter months in the Rampur region of Uttar Pradesh, India. The vermipits were inoculated with 0.33 kg of *E. fetida* per pit, against the recommended rate of inoculation for assessment of real-time potential of earthworm on seasonal and regional grounds. The results revealed a significant increase in earthworm population, with three times production (4.1 kg) of the inoculated number (1.0 kg). The productivity dynamics of compost vs *E. fetida* revealed a notable threefold and fourfold effectiveness, respectively. This dual advantage signifies the success of composting process, with the increased worm population indicating enhanced decomposition. The study attributes the combination of regional and edaphic factors viz., sandy loam soil with high humus content and good water passage, facilitating earthworm survival, reproduction and decomposition of agricultural waste. The loose and perforated soil structure allowed easy penetration of earthworms, transforming the soil into fertile compost. The research emphasizes the importance of soil moisture of semi-arid ecosystems thus highlighting the seasonal significance governing earthworm activity. The study provides insights into the mechanical ability of earthworms, its sensitivity to soil compaction and the influence of high hydration of the region. Inoculation during the winter period indicates increased earthworm activity setting the stage for enhanced compost production in the upcoming hot periods of summer months. The findings suggest that optimizing vermicomposting practices with altered feeding stocks, could further improvise compost and earthworm production and productivity in subsequent seasons. The study contributes for sustainable utilization of *E. fetida* in composting, its regional and seasonal efficacy turns trash to treasure for enhanced agricultural efficacy

Keywords *Eisenia fetida*, Pit method, Seasonal activity, Vermiculture, vermicompost Production, Productivity

BIOLOGICAL CONTROL OF PHOMOPSIS BLIGHT OF BRINJAL BY USING DIFFERENT ISOLATES OF *TRICHODERMA* SPP

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The investigation was carried out in the department of plant pathology, Bundelkhand University Jhansi, U.P. during Kharif at the Organic research farm, Institute of Agriculture Sciences Karguanji, Jhansi, to evaluate the efficacy of different *Trichoderma* spp. against phomopsis blight disease of brinjal under in vitro and in vivo conditions. Bioassay of Seven *Trichoderma* spp. and one bacterial bioagent were assessed against *Phomopsis vexans* by using dual culture technique. In vitro evaluation of different *Trichoderma* spp., all the treatments are significantly effective against *Phomopsis vexans*. Minimum radial growth of *Phomopsis vexans* was recorded with *Trichoderma viride* followed by *Trichoderma harzianum*. Maximum per cent growth inhibition was recorded in case of *Trichoderma viride* followed by *Trichoderma harzianum*. During in vivo evaluation of different *Trichoderma* spp., all the *Trichoderma* spp reduced the disease intensity significantly compared to the control. Minimum per cent disease intensity was recorded in *Trichoderma harzianum* followed by *Trichoderma viride* compared to control after 60 and 90 days after transplanting (DAT). All the biocontrol agents were given significant per cent disease reduction as compared to control. The maximum per cent disease reduction was recorded by *Trichoderma harzianum* followed by *Trichoderma viride* and *Pseudomonas fluorescens*. Maximum fruit yield was recorded in *Trichoderma harzianum* followed by *Trichoderma viride* and *Pseudomonas fluorescens*. All the biocontrol agents were resulted a significant difference in yield as compared to check 18.1 t/ha. Maximum yield increase over check (60%) in *Trichoderma harzianum* followed by *Trichoderma viride* (46.60%) and *Pseudomonas fluorescens* (46.60%). The minimum yield increases were found *Trichoderma S1* treatment that is (35.46%).

Keywords: Phomopsis Blight; Brinjal; *Trichoderma* Spp.

ENHANCING DRAGON FRUIT CULTIVATION IN UDAIPUR: ADVANCED STRATEGIES THROUGH NORMALIZED PROPAGATION TECHNIQUES

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The research trail was carried out at the Horticulture farm, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur during September to December, 2022-23 under 50 % shade net house condition. The main objective of conducting this research was to normalize or standardize propagation of dragon fruit under Udaipur condition by taking into account various parameters like cutting size of dragon fruit (30 cm and 45 cm), various IBA concentration viz. 500 ppm and 1000 ppm, callusing period for one and two weeks (under normal condition without any treatment) and combinations of all. Results obtained showed that the treatment with 30 cm cutting size which was callused for one week and was treated with 1000 ppm IBA gave best results in terms days taken for sprouting, rooting percentage, number of shoots per cutting and survival percentage. Hence, it can be concluded that application of IBA @ 1000 ppm on 30 cm dragon fruit cutting callused (stored) for one week was found best for propagating dragon fruit under Udaipur condition.

Keywords: Dragon fruit propagation, Normalization, Standardization, Cutting size, IBA concentration, callusing period, Rooting percentage, Survival percentage.

PLANT DISEASES AND FOOD SECURITY IN THE 21ST CENTURY**¹RASHMI NIGAM, ²JOGINDER SINGH AND ³RAMJI LAL****¹Department of Plant Pathology, Janta Vedic College, Baraut (Baghpat)****²Department of Horticulture, Janta Vedic College, Baraut (Baghpat)****³ICAR- Indian Institute of Sugarcane Research, Lucknow, UP**

As we progress further into the 21st century, the nexus between plant diseases and food security has emerged as a critical concern for global sustainability. With the world's population projected to reach 9.7 billion by 2050, ensuring an adequate food supply has become a paramount challenge. Plant diseases pose a significant threat to agricultural productivity, which is essential for meeting the growing demand for food. This paper explores the impacts of plant diseases on food security, the underlying factors contributing to the spread of these diseases, and potential strategies to mitigate their effects. Plant diseases can devastate crop yields, leading to significant economic losses and food shortages. For instance, the 2008 outbreak of wheat stem rust, caused by the *Puccinia graminis* fungus, threatened wheat production across Africa and Asia, putting millions at risk of hunger. Similarly, *Phytophthora infestans*, the pathogen responsible for late blight, famously led to the Irish Potato Famine in the 19th century and continues to pose a threat to potato crops worldwide. The economic impact of plant diseases extends beyond immediate crop losses. Farmers face increased costs for disease management, including fungicides, pesticides, and other control measures. Additionally, the loss of crops can lead to higher food prices, affecting food accessibility for vulnerable populations. In regions where agriculture is a primary livelihood, plant diseases can exacerbate poverty and social instability. Several factors contribute to the increased prevalence and spread of plant diseases in the 21st century: Climate Change: Changes in temperature, precipitation patterns, and extreme weather events can create favorable conditions for the proliferation of plant pathogens and pests. Warmer temperatures, for example, can expand the geographic range of diseases and their vectors. Globalization: The movement of goods and people across borders facilitates the spread of plant pathogens. International trade in agricultural products can inadvertently introduce diseases to new regions, where local crops may have little resistance. Monoculture Farming: The practice of growing a single crop variety over large areas increases the vulnerability of crops to disease outbreaks. Monocultures lack genetic diversity, making it easier for pathogens to spread rapidly. Agricultural Practices: Intensive farming practices, such as the overuse of fertilizers and irrigation, can weaken plants' natural defenses against diseases. Additionally, inadequate crop rotation can lead to the buildup of soil-borne pathogens. Addressing the threat of plant diseases requires a multifaceted approach that includes scientific, technological, and policy measures: Disease-Resistant Varieties: Developing and cultivating disease-resistant crop varieties through traditional breeding and modern genetic engineering can provide a long-term solution to combating plant diseases. Integrated Pest Management (IPM): IPM strategies combine biological, cultural, physical, and chemical tools to manage plant diseases sustainably. This approach reduces reliance on chemical pesticides and minimizes environmental impact. Early Detection and Surveillance: Implementing robust monitoring systems and leveraging technologies such as remote sensing and artificial intelligence can enable early detection of disease outbreaks, allowing for timely interventions. Climate-Resilient Agriculture: Adapting agricultural practices to changing climatic conditions can enhance crop resilience. This includes developing crop varieties suited to new climate realities and adopting water-efficient irrigation practices. International Cooperation: Strengthening international cooperation and information sharing on plant disease management can help countries respond more effectively to transboundary threats. Collaborative research and capacity-building initiatives are essential. Plant diseases represent a formidable challenge to food security in the 21st century. Addressing this challenge requires a holistic approach that integrates scientific innovation, sustainable agricultural practices, and international collaboration. By investing in research and adopting resilient farming strategies, we can mitigate the impact of plant diseases and ensure a stable food supply for future generations. Ensuring food security in the face of plant diseases is not only a matter of agricultural productivity but also a critical component of global stability and well-being.

EVALUATION OF SHELF LIFE AND BIOMASS PRODUCTION OF *TRICHODERMA VIRIDE* IN VARIOUS LIQUID FORMULATIONS**SHAIK MUNNYSHA^{1*}, R.N. BUNKER¹ AND SMRITI AKODIYA¹****Department of Plant Pathology, Maharana Pratap University of Agriculture and Technology, Udaipur- (Raj.), India**

Bio-pesticides and other beneficial organism-based formulations are gained more importance in natural and organic based crop cultivation system to manage pests and diseases in present time. Although, these are highly effective in laboratory conditions but fail in field due to antagonist instability and storage issues. In this context, formulation type is critical in assisting in the resolution of stability and storage issues, as well as making a formulation very effective even in the fields. In present study, liquid/oil emulsions-based formulations of *Trichoderma* spp. were tested for their efficiency in relation to biomass and shelf life and used for the management of Isabgol wilt caused by *Fusarium oxysporum*. Four liquid broth media viz., Maltose peptone broth, Potato dextrose broth, Sabouraud dextrose broth, Molasses yeast extract were tested for maximum biomass production of *Trichoderma viride*. Among these, Molasses yeast extract broth was found most suitable with highest biomass production of *T. viride* and colony forming units (c.f.u./ml) was also recorded with maximum in Molasses yeast extract broth compare to other liquid broth media. Among various liquid formulations viz., Paraffin oil, Glycerol, Soybean oil, Groundnut oil, Sunflower oil, Molasses yeast extract, Potato dextrose broth and marketed formulation-Trichoz-L used for shelf life study of *T. viride*, maximum shelf life was retained in Paraffin oil (19×10^6 c.f.u./ml) upto 180 days of storage with 39.37 viability per cent.

Keywords: Biopesticide, antagonist, formulation, *Trichoderma viride*, colony forming units, shelf life

EFFECT OF BIOSYNTHESIZED ZN NANOPARTICLES ON YIELD AND GRAIN ZINC CONCENTRATION IN WHEAT (*TRITICUM AESTIVUM*)**SHAIK NAZMA¹ AND SUDHA T²**¹Ph.D. Scholar, Department of Agronomy, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India²Professor, Department of Agronomy, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India

The experiment was conducted during Rabi season 2022 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, Karnataka, India with an objective of studying the effect of biosynthesized Zn nanoparticles and in comparison with commercial Zn nanoparticles on yield, yield parameters and grain Zinc content. The experiment was laid out in randomized complete block design with three replications comprising of twelve treatments. The results of the experiment revealed that seed priming @500ppm and foliar spraying@500ppm at panicle initiation stage with biosynthesized Zn nanoparticles through actinobacteria recorded significantly higher grain yield (46.7 q/ha) and found on par with seed priming @500ppm foliar spraying@500ppm at panicle initiation stage with biosynthesized Zn nanoparticles through *Pseudomonas* (46.2 q/ha) and commercial Zn nanoparticles (45.9 q/ha). The yield attributing characters viz., productive spikes (259.3m²), number of grains per spike (48.5), grain weight per spike (1.83g) and test weight (42.35 g) were recorded significantly higher with seed priming @500 ppm and foliar spraying@500ppm at panicle initiation stage with biosynthesized Zn nanoparticles through actinobacteria and found on par with seed priming @500ppm and foliar spraying@500ppm at panicle initiation stage with biosynthesized Zn nanoparticles through *Pseudomonas* and commercial Zinc nanoparticles. The higher grain Zinc concentration (54.98ppm) was noticed with seed priming @500ppm and foliar spraying@500ppm at panicle initiation stage with biosynthesized Zn nanoparticles through actinobacteria and found on par with seed priming @500ppm and foliar spraying@500ppm at panicle initiation stage with biosynthesized Zn nanoparticles through *Pseudomonas* (53.8 ppm) and commercial Zinc nanoparticles (53.3 ppm).

Keywords: Biofortification, Bacteria, Zinc, Wheat, Nanoparticles and Seed priming.**STUDY OF STRUCTURAL, RECONSTITUTION, PHYSICOCHEMICAL AND FUNCTIONAL PROPERTIES OF BMPC 80****SHAILESH KUMAR MEENA^{1*}, GANGA SAHAY MEENA¹**¹Dairy Technology Division, ICAR-National Dairy Research Institute, Karnal, Haryana

High milk protein powder is extensively used on a commercial scale to produce high protein products like ice cream, yogurt, cheese, beverages, etc. The use of milk protein concentrates (MPC) increases due to its high protein and low fat and lactose content. MPC is produced from pasteurized skim milk, which is followed by evaporation (optional) and sprays drying using ultrafiltration and diafiltration to improve protein purity. MPC is produced from pasteurized skim milk employing ultrafiltration and diafiltration to improve protein purity followed by evaporation (optional) and spray drying. Based on the protein content, MPC powder is classified as low, medium and high protein powder containing 40%, 60-70% and 80% protein respectively. In this study, the milk protein concentrate was produced by using an ultrafiltration membrane to concentrate the pasteurized skimmed buffalo milk (0.80 protein to total solids ratio) followed by spray drying at 200/95 ± 5 °C. The developed MPC80 contains 96.58%, 80.04%, 1.56%, and 4.71% total solids, protein, fat and lactose respectively. Functional properties such as solubility, insolubility index, foaming capacity, foaming stability, water binding capacity, oil binding capacity and apparent viscosity were 24.76%, 13.5 ml/100ml, 38.25%, 72.73%, 4.65%, 4.21% and 27.95 mPa.s respectively. Its physical and reconstitution properties like interstitial air content, occluded air content, loose bulk density, packed bulk density, particle density, porosity, wettability, and dispersibility were 96.60 ml/100g, 109.41 ml/100g, 0.27 g/ml, 0.36 g/ml, 0.56 g/ml, 35.31%, 17.51% respectively. Scanning electron micrographs revealed extensive aggregation in MPC80 powder particles, which could be responsible for its poor solubility and dispersibility. Shear-thinning behavior was observed in UF concentrate and reconstituted MPC80 solution.

Key words: Milk protein concentrate, solubility, ultrafiltration, protein**ALLEVIATING IN VITRO SHOOT TIP NECROSIS IN KIWIBERRY****SHAKSHI****Department of Biotechnology, Dr. Ys Parmar University of Horticulture and Forestry Nauni, Solan (H P) India**

The present study was focused towards alleviation of STN problem during establishment and shoot multiplication stages of in vitro propagation in case of four kiwiberry cultivars viz. Annanasya, Dumbarton Oaks, Ken's Red and Meader Male, respectively. Some important factors considered for STN alleviation during these two stages included mineral deficiency, MS salt strength, PGRs and growth additives. Upon using modified MS (MS-2X and MS-4X), highest 45.54 per cent and 5.55 per cent in vitro establishment and lowest 56.68 and 70.32 per cent STN appearance was noticed in Dumbarton Oaks only. Besides, this HSB resulted in highest 75.29 per cent in vitro establishment in Dumbarton Oaks with no STN appearance. The combination of mT and GA₃ (EM-IV) proved to be the best leading to maximum 82.35 and minimum 58.82 per cent in vitro establishment with no STN appearance in Dumbarton Oaks and Ken's Red, respectively. During shoot multiplication, no shoot multiplication along with STN appearance was recorded in all the four cultivars on MS-2X and MS-4X modified medium. AgNO₃ at 2.50 mg/L (MM-SII) showed highest 1:2 shoot proliferation rate in all the four cultivars with lowest 26.52 per cent STN appearance in Dumbarton Oaks. Meanwhile, CH at 400 mg/L (MM-CIV) resulted in highest 1:2 shoot proliferation rate in Dumbarton Oaks with no STN appearance in all the four cultivars. PGRs combination SM-VI (MS+mT+GA₃) produced a maximum of 1:4 shoot proliferation rate in Dumbarton Oaks with no STN appearance in all the four cultivars. Overall, Dumbarton Oaks responded well towards every parameter recorded in the present study. Hence, a successful attempt towards addressing the problem of STN during initial stages of in vitro propagation has been made in kiwiberry. Further, studies are needed for successful in vitro rooting and hardening.

Keywords: STN, kiwiberry, *A. arguta*, in vitro shoot regeneration

IMPACT OF ORGANIC MANAGEMENT PROTOCOLS ON SOIL C POOLS AND MICROBIAL COMMUNITY: AN OVERVIEW**SHALINI SHARMA****Research Scholar, Department of Soil Science and Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India**

Green Revolution has been proved as a double-edged sword for the Indian agriculture system as well as for the entire globe. Although it intensified agriculture system from a food-scarce to a food-surplus country, it has also thrown several challenges in the form of declining factor productivity, depleting natural resources, low water, and nutrients, and adverse impacts on climate change as well as on human health. As Current concerns about climate change and the need to enhance C sequestration in soil is increasing, it is imperative to consider the effect of different agricultural / farming practices such as organic farming, natural farming, biochar based ecological farming, site specific nutrient management etc, on microbial responses, bio-geochemical nutrient cycling, C pools and plant and/ or microbial metabolism including enzyme activities that may affect soil organic matter turnover that will help in developing strategies for C-sequestration in soil. Soil microbial communities are engines which drive the entire energy-intensive chemical inter conversion pathways where they consume and produce a variety of chemical substrates for metabolic processes, and produce byproducts. Likewise, plant root which are very intimately intertwined with the soil microbial network also release metabolites through exudation. These wide arrays of byproducts can mirror the key biological processes occurring below ground. With the development of the efficient techniques for the functional and biochemical characterization of the Plant growth promoting Rhizobacteria (PGPR's) and its molecular identification will help us in efficiently identifying and characterizing the PGPR that will ultimately help in finding out microbial diversity of that particular area. So, by combing these two solutions (different agricultural management practices and microbial diversity) will help in mitigating the negative impact of chemical fertilizers and pesticides, rejuvenates soil, reshaping the microbial community structures and boosting crop health.

Keywords– Microbial community; soil carbon pools; organic management protocols; C- sequestration; soil organic matter

GC-MS ANALYSIS AND IN SILICO DOCKING OF ONOSMA BRACTEATUM PHYTOCHEMICALS TO TARGET ANG-1 PROTEIN**SHALLU SAINI*, HARDEEP SINGH TULI****Department of Bio-Sciences and Technology, Maharishi Markandeshwar Engineering College, Maharishi Markandeshwar (Deemed to Be University), Mullana, Ambala, India**

Onosma bracteatum belongs to family *Boraginaceae* generally knowns as 'gaozaban' is mainly distributed in India (Jammu and Kashmir, Himachal Pradesh, and Uttar Pradesh in north-western Himalayas) and in high altitude regions of Nepal. It is utilized as primary component for the composition of drugs in Unani and Ayurvedic system of medicine. *Onosma* genus is a rich source of essential bioactive phytochemicals. Naturally occurring plant products with potent growth inhibition, angiogenic and apoptosis acceptance properties, have been broadly researched to fully intent on creating drugs against various diseases. In this study, the ethanolic extract of *Onosma bracteatum*, were analysed by gas chromatography-mass spectrometry (GC–MS) to identify the important functional groups and phytochemical constituents. Further the binding affinity of selected phytocompounds from GC-MS results of ethanolic extract, were investigated against Angiopoietin 1 (Ang 1) protein which is known to be associated with angiogenesis the process of blood vessel formation. Using in silico tools MGL Tools (Autodock Tools), Biovia Discovery Studio and techniques, the docking analysis of Stigmasterol, Phytol, and Betulin against Angiopoietin 1 (Ang 1) was done. And it was observed that Stigmasterol had the highest binding affinity (-9.0 kcal/mol) for Ang 1 protein followed by Betulin (-8.4 kcal/mol) and Phytol had the lowest affinity (-4.6 kcal/mol). Based on current research, it was suggested that stigmasterol is a potential phytochemical to be tests against Ang 1 protein to inhibit angiogenesis in cancer and can be used to purpose anticancer drug.

Keywords- Angiogenesis, Angiopoietin, Affinity, Phytochemicals.

EMPOWERING FARMERS THROUGH PRECISION AGRICULTURE: A PATHWAY TO SUSTAINABLE FOOD SECURITY**SHANI GULAIYA, NANDINI SINGH, KAMALKANT YADAV*, SAHADEVA SINGH, RAVINDRA KUMAR, MANISH KUMAR AND ABHISHEK SHARMA¹****SOAG, Galgotias University, Greater Noida (UP)****¹Department of Agronomy, JNKVV, Jabalpur (MP)**

Precision agriculture, a modern farming approach, integrates technology and data analytics to optimize crop yields while minimizing resource use. This paper explores how precision agriculture empowers farmers, particularly in the context of sustainable food security. By enabling precise application of inputs such as water, fertilizers, and pesticides, precision agriculture enhances resource efficiency, reduces environmental impact, and improves farm profitability. Moreover, it equips farmers with real-time data and analytics, enabling informed decision-making and risk management. This paper discusses key technologies driving precision agriculture, including remote sensing, GPS guidance systems, and data analytics. It also highlights challenges such as high initial costs and the need for specialized knowledge, along with potential solutions to enhance adoption among smallholder farmers. Ultimately, this paper argues that precision agriculture is a transformative tool that can empower farmers, improve food security, and contribute to sustainable agricultural development. By harnessing the power of advanced technologies and data analytics, PA empowers farmers to make informed decisions that optimize crop management, irrigation, and nutrient application, paving the way for a more efficient and sustainable agricultural system.

Keywords: Precision Agriculture, Sustainable, Food Security, GPS, Modern Farming

STRATEGIES FOR MANAGING BIOTIC AND ABIOTIC STRESS IN AGRICULTURAL SYSTEMS SHALU KUMARI¹, SHASHI KUMAR GUPTA¹, BISHAWAJIT KUMAR², NAMATA KUMARI²

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Biotic and abiotic stresses pose significant challenges to global agriculture by adversely affecting crop growth, productivity, and overall sustainability. Biotic stresses arise from living organisms such as pests, pathogens, and weeds, while abiotic stresses result from environmental factors like drought, salinity, temperature extremes, and nutrient deficiencies. Effective management of these stresses is crucial for ensuring food security and environmental sustainability. Integrated Pest Management (IPM) practices combine biological, cultural, physical, and chemical methods to control pests and diseases while minimizing environmental impact. Crop rotation, resistant varieties, and biological control agents are essential components of IPM strategies. To mitigate abiotic stresses, farmers can adopt practices such as soil conservation, water management techniques (like drip irrigation and rainwater harvesting), precision agriculture technologies (including sensors and drones), and the use of stress-tolerant crop varieties developed through breeding or biotechnological approaches. Furthermore, improving soil health through organic amendments, cover cropping, and reduced tillage can enhance crop resilience to both biotic and abiotic stresses. Sustainable agricultural practices, including agroforestry, diversified cropping systems, and integrated nutrient management, contribute to long-term resilience against various stress factors. Research and innovation play key roles in developing novel stress management tools such as gene editing for pest and disease resistance, climate-resilient crop varieties, and precision farming technologies tailored to specific agroecological conditions. Technologies like remote sensing, drones, GPS-guided equipment, and sensor-based monitoring enable farmers to precisely manage inputs such as water, fertilizers, and pesticides. Advances in genetic engineering, gene editing (CRISPR-Cas9), and biotechnology allow scientists to introduce specific genes conferring resistance to pests, diseases, or environmental stresses into crop plants. Genomic selection utilizes genomic data to predict the performance of plants for stress tolerance traits. High-throughput DNA sequencing technologies are used to generate genome-wide data, which is then analysed to identify genomic regions associated with stress tolerance. Transgenic plants are generated by inserting genes encoding stress-tolerant proteins, enzymes, or regulatory factors into crop genomes. For instance, genes encoding proteins like chaperones (helps in protein folding under stress), osmoprotectants (accumulate to counter osmotic stress), or enzymes involved in antioxidant defence mechanisms (scavenging reactive oxygen species under stress) can confer tolerance to drought, salinity, heat, or other stresses. Collaborative efforts among researchers, farmers, policymakers, and industry stakeholders are essential for implementing and scaling up effective stress management strategies while promoting environmental stewardship and food system resilience in the face of evolving challenges.

Keywords: Biotic stress, IPM, Genomic Selection, Stress Tolerance,

TECH TRANSFORMATIONS IN FRUIT AGRICULTURE: A GLIMPSE INTO THE FUTURE

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Advanced technology as it intersects with the world of fruit production, processing, and consumption. In recent years, technological advancements have revolutionized every aspect of the fruit industry, leading to enhanced productivity, improved quality, and increased sustainability. One of the key areas of innovation is in precision agriculture, where technologies such as drones, satellite imaging, and IoT (Internet of Things) sensors are being utilized to monitor crops in real time. These tools enable farmers to optimize irrigation, detect diseases early, and apply fertilizers more efficiently, ultimately leading to higher yields and healthier fruits. Furthermore, advancements in genetic engineering and biotechnology have paved the way for the development of genetically modified fruits with improved traits such as disease resistance, longer shelf life, and enhanced nutritional profiles. CRISPR-Cas9 technology, in particular, has emerged as a powerful tool for targeted genome editing, offering new possibilities for crop improvement. In the realm of fruit processing and preservation, novel techniques such as high-pressure processing (HPP), cold plasma treatment, and nanotechnology-based coatings are being employed to extend the shelf life of fruits while retaining their freshness and nutritional value. These technologies help reduce food waste and ensure that consumers have access to high-quality fruits year-round. Additionally, the rise of blockchain technology is revolutionizing the fruit supply chain by providing transparency, traceability, and trust. Through blockchain-based systems, consumers can track the journey of fruits from farm to fork, ensuring food safety and authenticity. In conclusion, the convergence of advanced technologies with the fruit industry holds immense promise for a more sustainable, efficient, and nutritious future. However, it also raises important considerations regarding ethics, regulation, and consumer acceptance, highlighting the need for interdisciplinary collaboration and informed decision-making as we navigate this technological frontier.

Key words- Precision agriculture, Drones, Satellite imaging, IoT sensors, Genetic engineering, CRISPR-Cas9, High-pressure processing (HPP), Cold plasma treatment, Nanotechnology, Blockchain

NANOPARTICLES FOR RNAI-MEDIATED CROP PROTECTION AGAINST INSECT PESTS**SHARAD KUMAR MEENA^{1*} & SHREYA MISHRA²****Department of Entomology, Rajasthan Agriculture Research Institute, Durgapura, Jaipur- (Rajasthan)****Department of Entomology College of Agriculture, Jodhpur Agriculture University, Jodhpur (Rajasthan)**

This study addresses the pressing issue of crop losses due to pest infestations and explores advanced solutions using RNA interference (RNAi) and nanotechnology. Despite widespread pesticide use, crop losses remain significant, prompting the need for innovative approaches. The paper reviews RNAi technology's current status in agriculture, highlighting its potential in targeting specific pest genes with minimal environmental impact. It discusses challenges and opportunities in RNAi-based pest management, along with the use of nanomaterials to enhance crop tolerance and control pests. Novel delivery systems for dsRNA, including synthetic polymeric vectors and peptide-based nanoparticles, are evaluated for their efficacy in overcoming RNAi delivery challenges. Key RNAi targets identified for disrupting pest feeding, digestion, and overcoming insecticide resistance are discussed, along with future research directions. In conclusion, RNAi and nanotechnology offer promising, sustainable solutions for pest management in agriculture, potentially reducing crop losses and enhancing global food security.

Keywords: Crop losses, Environment, Insecticide resistance, Nanotechnology. RNAi-based pest management**CLIMATE CRISIS IN DEVELOPING NATIONS: SCIENTIFIC REPORTS INTO POLICY ACTION FOR CLIMATE RESILIENCE IN SOUTH ASIA****SHARAN KUMAR****PhD scholar, Department of Political Science, Nagaland Central University, Nagaland**

In the face of escalating climate change impacts, developing nations, particularly those in South Asia, stand at the forefront of vulnerability. This paper delves into the insights gleaned from the 2023 World Meteorological Organization (WMO) and Intergovernmental Panel on Climate Change (IPCC) reports, shedding light on the causes, impacts, and consequences of global warming and climate change. The findings underscore the urgent need for proactive measures to safeguard the planet and foster climate resilience. Focusing on the specific context of South Asian countries like Nepal, India, and others, the paper highlights the multifaceted challenges posed by climate change, projecting them as formidable obstacles to sustainable development and growth. By bridging the gap between scientific understanding and policy action, this paper advocates for the translation of scientific insights into tangible policy initiatives aimed at mitigating and adapting to the climate crisis. It emphasizes the imperative for tailored strategies that account for the unique socio-economic and environmental landscapes of developing nations, fostering collaboration among stakeholders to foster resilience and ensure a sustainable future for generations to come.

Keywords: Climate Change, Global Warming, Policy, South Asia, World Meteorological Organization, Intergovernmental Panel on Climate Change**COMPREHENSIVE ASSESSMENT OF ASCORBIC ACID LEVELS IN DIVERSE TOMATO LINES: IMPLICATIONS FOR BREEDING NUTRITIONALLY ENRICHED VARIETIES*****SHARWAN KUMAR SHUKLA¹, ASHUTOSH SINGH², AVANTIKA IYENGAR³, RAJESH KUMAR SINGH⁴****¹Assistant Professor, Department of Biochemistry, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India****²Assistant Professor, Department of Biotechnology and Crop Improvement, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India****³PG Scholar, Department of Biotechnology and Crop Improvement, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India****⁴Professor, Department of Vegetable Science, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**

The study involved a comprehensive examination of ascorbic acid levels in 24 different tomato lines, encompassing a set of released varieties, germplasm lines, and advanced breeding lines. To estimate the ascorbic acid content from tomato fruits, using 2,6-dichlorophenol indophenol (DCIP) method, a widely recognized technique for measuring ascorbic acid levels in fruits. The study focused on evaluating the ascorbic acid content at two distinct stages of tomato ripening: red and over-ripe. In red fruits, the ascorbic acid content varied across the tomato lines, ranging from 16.26 to 21.63 mg/100gm, with mean value of 19.30 mg/100gm. The lowest content was recorded in the Kashi Hemant (16.26 mg/100gm), while the highest content was found in the EC-620440 (21.63 mg/100gm). Similarly, over-ripe fruits displayed a broad range of ascorbic acid concentrations, ranging from 19.38 to 29.91 mg/100gm, with an average value of 23.28 mg/100gm. The analysis revealed that Kashi Hemant had an estimated ascorbic acid content of 19.38 mg/100 gm, whereas the highest value of 29.91 mg/100 gm was recorded in the Hisar Arun. The coefficient of variation (CV) further indicated significant diversity in ascorbic acid content among the tomato lines, with values of 19.67 for red fruits and 31.98 for over-ripe fruits. These findings underscore the potential for enhancing tomato cultivars through targeted breeding efforts focused on monitoring ascorbic acid levels at different stages of ripening, thus contributing to the development of nutritionally enriched varieties with improved health benefits.

Keywords: Tomato, germplasm, ascorbic acid, red fruit, over-ripe fruit, diversity, breeding.

MOISTURE DEPENDENT PHYSICAL PROPERTIES OF SOME SELECTED FOOD GRAINS**SHASHANK VERMA, VIJAY KUMAR SINGH, VIPUL CHAUDHARY, PRAMOD KUMAR MISHRA, ANKIT****Mahamaya College of Agriculture Engineering and Technology, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India**

The physical properties depend on moisture content of agricultural grains are important to design post-harvest equipment. Physical and engineering properties are important in many problems associated with the design of machines and the analysis of the behaviour of the product during agricultural process operations such as handling, planting, harvesting, threshing, cleaning, sorting and drying. The size, shape and physical behaviour of food grain are important in designing of harvesting, separating, sizing, grinding and oil extraction machine. Bulk density, true density and porosity (the ratio of inter granular space to the total space occupied by the grains) are used in design of storage bins and silos, separation of desirable materials from impurities, cleaning and grading and quality evaluation of the products. In the current study, to carry out the physical property of grains at different moisture level apparatus (cubical wooden boxes) are developed and fabricated and various physical properties (bulk density, true density, porosity, geometric mean diameter, sphericity and surface area) of different food grains (Wheat Paddy, Gram and Pea) were determined at five levels of moisture content i.e. 10%, 13%, 16%, 19% and 22% on wet basis. After analysis of all attributes pertaining to physical parameters, it was found that the average length, width, thickness, bulk density, true density, porosity, geometric mean diameter, sphericity and surface area increased as the increases the moisture content.

Key words: True density, porosity, food grains, moisture contents, Shape and size

EFFECT OF NANO CHITOSAN, NANO MICRONUTRIENTS AND BIO CAPSULES ON ECONOMICS OF KINNOW MANDARIN (*CITRUS RETICULATA*)**SHASHI KANT EKKA* AND SAKET MISHRA****Ph. D Scholar* and Assistant Professor, SHUATS, Prayagraj, U. P.**

An experiment was conducted during 2022–23 to assess Effect of nano chitosan, nano micronutrients and bio capsules on Economics of Kinnow mandarin (*Citrus reticulata*) was carried out at CRF, SHUATS, Prayagraj, U.P. The experimental design encompassed the time period from February to December of 2020-2021 and February to December of 2021-2022. It followed a RBD method, consisting of 15 treatments and 3 replications. Firstly, the results revealed that in relation to the economic attributes the maximum results noted significantly in the Overall, Treatment T₁₄ emerged as the most effective in terms of economics, compared to other treatments evaluated in the experiment. Depending on the various treatments, the benefit-cost ratio was found best under treatment T₁₄ with the combination of Recommended dose of fertilizer (NPK), Soil drenching of Nano chitosan (100 ppm) and Bio-capsule (500ppm), foliar application of ZnO and FeO nano particles i.e., [1.42 (2021-22), 1.6(2022-23) and 1.51 (Pooled)]. While treatment T₀ [Control (without treatment)] recorded the benefit-cost ratio i.e., i.e., [0.25 (2021-22), 0.34 (2022-23) and 0.29 (Pooled)]. Farmers can use mixture of recommended dose of fertilizer as NPK + Nano chitosan at concentration of 100 ppm along with bio-capsule and ZnO + FeO on economics of Kinnow mandarin.

Keywords: Effect, Nano chitosan, Nano micronutrients, Bio capsule, Kinnow mandarin.

IMMOBILIZATION OF SOME GLYCOSIDIC ENZYMES**SHASHI M SAGAR, SUBHADIP BANERJEE* AND AMITAVA BHATTACHARYA****Department of Agricultural Biochemistry, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India**

Enzymes are proteins that catalyse chemical reactions and reduce the amount of initial energy required. Enzymes typically work under comfortable settings like room temperature and atmospheric pressure. When isolated from their biological sources, free enzymes become amenable to destabilisation during the course of their use in industrial processes, making their efficient reuse problematic. This drawback can be overcome by increasing the stability and reactivity of the enzyme through enzyme immobilisation. Cellulase is responsible for the bioconversion of cellulose into soluble sugar. Cellulases are typically employed in a variety of industries. One of the most significant enzymes employed in industry and biotechnology is α -amylase, which converts glycogen or starch into oligosaccharides. It is very relevant to the food, fermentation, detergent, paper, and textile sectors. Immobilization of commercial amylase and cellulase enzyme on ion exchange resin carriers has been studied under various parameters and conditions to identify their activity optima. Immobilized cellulase activity was determined by measuring the amount of glucose produced from carboxy methyl cellulose by using GOD-POD assay and amylase activity was quantified by measuring the maltose production from starch via DNS assay. The retained activity of the immobilized enzymes was investigated for successive cycles of operations. Immobilization on seralite SRA-400 resin showed maximum activity which was reported to be 1.2 and 1.01 times than free enzyme respectively while retaining 52.19% and 9.76% of activity after 5 cycles of operations. Kinetic properties of the free and immobilized enzyme in their optimum conditions showed that immobilization of cellulase and amylase improved its affinity to substrate by 2.455 times and 1.989 times respectively. The results of the immobilization of the above enzymes indicate the capability and prospect of those in favour of being effectively reused and efficiently conserved by the immobilization techniques followed.

(Key words: Immobilisation, enzyme, cellulase, amylase, seralite SRA-400, seralite SRC-120, resins, GOD-POD assay and DNS assay)

THE RELEVANCE OF PINEAPPLE PEEL'S ANTIBACTERIAL ACTIVITIES AGAINST SEVERAL FOOD-BORNE PATHOGENS**SHASHI SONI¹ AND ENA GUPTA^{1*}**¹**Department of Family and Community Sciences, University of Allahabad, Prayagraj, Uttar Pradesh, India**

Medicinal plants include phytochemicals that may be advantageous in substitute of synthetic drugs and antibiotics, which can have negative side effects. Since ancient times, scientists have used plants to preserve food and treat medical conditions. In addition to their anti-inflammatory, antidiabetic, antihelminthic, and anticancer effects, the peels of *Ananas comosus*, or pineapple, have long been used in Indian traditional medicine as a crude treatment for individuals suffering from intestinal dysbiosis. In the current study, peel extract—a significant byproduct of the pineapple fruit processing industries—was prepared using methanol, acetone, and water as solvents. Three fungal strains, *Tilletia indica*, *Fusarium*, and *Alternaria*, as well as two Gram positive bacteria, *Staphylococcus aureus* ATCC 29213 and *Bacillus megaterium* ATCC 14581, and six Gram negative bacteria, *Pseudomonas aeruginosa* ATCC 27853, *Pseudomonas fluorescens* ATCC 13525, *Escherichia coli* ATCC 8739, *Enterobacter* ATCC 13048, *Shigella* ATCC 12022, and *Salmonella enterica* ATCC 35664, were used to calculate the MIC and LD50 values. The results demonstrated that the antibacterial and antifungal activity of methanol extract was the greatest among all microorganisms, with acetone and water extract coming in close second. These findings are ideal for determining the *Ananas comosus* peel's antibacterial activity and for further using it in the nutraceutical and pharmaceutical sectors.

Key words: *Ananas comosus*, antimicrobial, gut dysbiosis, bacteria, phytochemical.**IDENTIFICATION OF DESIRABLE SEGREGANTS FOR GROWTH AND YIELD ATTRIBUTES IN F₂ SEGREGATING POPULATION OF TWO SPONGE GOURD CROSSES [*LUFFA CYLINDRICAL* (L.) ROEM.]****SHASHIDHAR T R¹ AND ANNIGERI S V²**¹**Professor, Dept of Horticulture, College of Agriculture, Dharwad, UAS, Dharwad**²**Ph.D Scholar, Dept of Horticulture, College of Agriculture, Dharwad, UAS, Dharwad**

The present investigation was carried out to identify desirable segregants in sponge gourd for growth and yield attributes in F₂ population of two superior crosses HUB-1 × Pusa Chikni and HUB-8 × Kashi Divya along with parents and check in an augmented block design. In the F₂ populations of the HUB-1 × Pusa Chikni highest proportion of desirable segregants were observed for days to first harvest (26.00 %) with a mean of 42.08 days followed by number of fruits per vine (22.67 %) with a mean of 19.00, fruit yield per vine (21.33 %) with a mean of 2.62 kg/plant, fruit set per cent (20.00 %) with a mean 83.30 %, number of female flowers per vine (19.33 %) with an average of 24.00, days to female flower appearance (18.67 %) with a mean of 35.50 days, node at which first female flower appeared (16.67 %) with a mean of 8.76 and average fruit weight (15.33 %) with a mean of 139.45 g. Likewise, highest frequency of desirable segregants in F₂ populations of the HUB-8 × Kashi Divya was reported for number of fruits per vine (28.00 %) with a mean of 20.00 followed by days to female flower appearance (26.00 %) with a mean of 35.72 days, fruit set per cent (25.33 %) with a mean of 81.04 %, fruit yield per vine (24.00 %) with a mean of 3.10 kg/plant, number of female flowers per vine (22.00 %) with a mean of 26.00, node at which first female flower appeared (21.33 %) with a mean of 8.69, average fruit weight (14.67 %) with a mean of 141.78 g and days to first harvest (8.00 %) with a mean of 43.00 days. Among the 150 plant population, higher fruit yield per vine was recorded by the plant numbers 100, 93, 52, 73, 65, 42, 129, 147, 127 and 133 in F₂ segregating population of the cross HUB-1 × Pusa Chikni and plant numbers 15, 125, 42, 54, 80, 25, 35, 65, 73 and 111 in F₂ segregating population of the cross HUB-8 × Kashi Divya. Transgressive segregants represent one of the rapid methods of enhancing the yield level or any other desirable character.

Keywords: Sponge Gourd, F₂ population, Growth, Yield, Transgressive and Desirable Segregants**GENETIC VARIABILITY, CORRELATION AND DIVERSITY ANALYSIS FOR YIELD AND GRAIN QUALITY TRAITS AMONG THE ADVANCED BREEDING LINES OF RICE (*ORYZA SATIVA* L.) IN UPLAND CONDITION****SHASHIDHARA N.^{1*}, VILAS G. M.², UDAY G.³, NETHRA P.⁴ AND SAINATH K.⁵**¹**Assistant Professor, Department of GPB & Assistant seed production officer, NSP, seed unit, UAS, Dharwad**²**Masters Graduate, Department of Genetics and Plant Breeding, College of Agriculture, Dharwad, UAS, Dharwad, Karnataka**³**Scientist (Plant Breeding), All India Coordinated Research Project on Wheat, University of Agricultural Sciences, Dharwad**⁴**Assistant Professor, Department of Crop Physiology, College of Agriculture, UAS, Dharwad, Karnataka, India**⁵**Ph.D. Scholar, Department of Genetics and Plant Breeding, University of Agricultural Sciences, Raichur, Karnataka, India**

Genetic variability, correlation and diversity studies were carried out during *kharif* 2022 using sixty advanced breeding lines of rice for yield component traits and grain quality traits under upland condition. Analysis of variance revealed the presence of significant variability among the genotypes for all the traits under study. High values of GCV and PCV observed for number of productive tillers per hill and grain yield indicated the wider range of variability for these traits. High heritability coupled with high genetic advance for plant height, number of tillers per hill, number of productive tillers per hill, panicles per sqm, test weight, grain yield, grain iron content, zinc content and protein content suggested the scope for improvement of these traits through selection. Correlation analysis unveiled positive significant association of grain yield with spikelet fertility percentage and negative significant association with grain zinc content. Genetic diversity analysis using K-means clustering formed six clusters, with highest number of genotypes grouped in cluster I. The maximum inter-cluster distance was seen between cluster IV and cluster VI (7.25) showing broader genetic diversity between the genotypes of these clusters and such genotypes can serve as divergent parents in hybridization programmes to get high heterosis and superior segregants.

Keywords: Advanced breeding lines, correlation, K-means, diversity and clusters

MYCOREMEDIATION OF AZO-DYE FROM LIQUID MEDIUM**SHATAKSHI ROY, RAMAN KUMAR, SONU SHARMA AND MONU SHARMA****Department of Biosciences and Technology, Maharishi Markandeshwar (deemed to be University), Mullana, Ambala (Haryana)**

The synthetic dyes used in the textile industry severely contaminate waterways. Water pollution is a serious environmental issue in the modern world, mostly caused by manufacturing enterprises. Azo dyes are extensively utilised in different industries, such as food, printing, healthcare, and textile manufacture. Water and soil contamination in underdeveloped and emerging nations is mostly caused by the massive amount of dye-contaminated wastewater produced by dyeing processes. The azo dye produced by industry constitutes a major hazard to the environment because of its detrimental impact on human health and the aquatic ecosystem. Azo dyes are synthetic, non-biodegradable, persistent, and stubborn macromolecules. Through raising demands for chemical and biological oxygen, impeding photosynthesis, stunting plant development, getting into the food chain, causing recalcitrance and bioaccumulation, and perhaps even encouraging toxicity, mutagenicity, and carcinogenicity. The aesthetic value of water bodies is diminished by textile dyes. There are numerous physio-chemical approaches that have been proposed for mitigating azo dye. There are still some disadvantages, though, like high energy requirements, high operational costs, challenging processes, inadequate mineralization, and secondary waste generation. Azo-dyes comprising wastewater should therefore be efficiently treated using sustainable methods in order to prevent negative impacts on the environment, human health, and natural water supplies. Because of favourable effects on the environment, fungi, yeast, bacteria, and algae have gained attention as potential treatments for azo dyes. In this work, we examined the process of isolating, screening, and characterising fungi that break down Congo red from sewage, industrial effluents, and sludge samples that were gathered from various locations. Two fungal isolates were obtained with the help of enrichment culture technique and screened for their ability to degrade Congo red on potato dextrose agar containing 500ppm of Congo red. Maximum decolorization was seen in both fungal isolates at higher ppm.

Keywords: Water-pollution, Azo-dyes, Wastewater, Physio-chemical, Environment.

IMPACT OF AIR POLLUTION ON HUMAN HEALTH IN INDIA, GOVERNMENT POLICIES AND GAPS IN IMPLEMENTATION: CHALLENGES AND SUGGESTED PLAN OF ACTION**PROF SHEEBA****Head, department of Zoology, DS (PG) College Aligarh**

According to a report released by Swiss air quality monitoring body IQAir, India is declared third most polluted country in the world. Out of top fifty most polluted cities in the world, forty two are in India. Annual average PM 2.5 concentration exceeds by over ten times the limit set by WHO which is 0-5($\mu\text{g}/\text{m}^3$). This situation is extremely alarming, considering the harmful effects of pollution on human body. A study published in Lancet estimated that air pollution in India accounted for 1.7 million deaths in 2019. Major health issues associated with pollution are acute respiratory infection (ARI), chronic obstructive pulmonary disease (COPD), stroke, diabetes and cancer. Present paper reviews epidemiological studies done in India and other relevant countries in this regard. This study underscores various policies made by the government of India to curb air pollution and how to improve upon them to combat air pollution urgently and effectively.

Key words: Air pollution, health problems, most polluted countries

DOUBLING FARMERS INCOME THROUGH HORTICULTURE**DR. SHEESH PAL SINGH*, DR. SANAJAY KUMAR¹ AND DR. ANANT KUMAR²*****Krishi Vigyan Kendra, Amroha, U.P.****^{1,2}Krishi Vigyan Kendra, Badaun-II and Bulandshahar, SVPUAT, Meerut, U.P.**

Horticulture has emerged as a core sector of agriculture over the past decade, growing steadily in annual area coverage and output. In horticulture crop per unit earning capacity of farmers is much higher than in case of food grains. Most horticultural output requires specialised market linkages and connectivity, post harvest infrastructure and to make this sector more remunerative. The productivity of vegetables and fruits was negligible in case of aromatic crops and spices. Therefore, there is more need to focus on aromatic crops and spices in state programme as compared to other commodities. Honey production is a potential sector in horticulture; hence apiculture should be integrated with fruit and vegetable production for increasing the income of farmers. Apiculture also promotes pollination in cross pollinated crop and increase production and quality of produce. Productivity growth in fruits and vegetable was meagre due to non-availability of quality planting material, dwindling status of natural resources, abundance of resource poor farmers and low adoption of modern technologies. The challenge is to enhance productivity by increasing the factor productivity of all the horticultural production inputs, and at the same time sustaining it by adoption of good practices and precision farming principles. High cost of input in horticulture crops, prevalence of old and senile orchards, unorganized supply chain are the major bottle neck, therefore, adoption of organic agriculture practices and farming system approach should be promoted for decreasing input cost and ultimately increasing the income. Moreover, rejuvenation of old and unproductive orchard and organized marketing are also very important for getting remunerative income. Facilitation of micro-irrigation in horticulture sector in rain fed areas. Major thrust areas for horticulture development are cluster approach linked with post-harvest management and marketing, market intelligence to promote market led production, quality seeds and planting material, adoption of improved varieties and rejuvenation with improved cultivars, hi-tech horticulture, precision farming and high density plantations to double our farmer's income.

BIOLOGICAL CONTROL OF INSECT PESTS IN COTTON ECOSYSTEM**SHEETAL KUMAWAT, HEERA KUMARI, DR. AKHTER HUSSAIN, DR. B.L. NAGA****Sri Karan Narendra Agriculture University, College of Agriculture, Jobner, Jaipur (Rajasthan), India.**

Cotton cultivation in India faces significant challenges from arthropod pests, with 251 species identified causing economic damage ranging from 20-60%. This study explores sustainable biological control methods to mitigate pest-related losses. Natural enemies, including predators, parasitoids, and pathogens, play a crucial role in suppressing pest populations, with 368 species thriving in Indian cotton ecosystems. Various beneficial organisms, such as bats, birds, ants, wasps, and predatory insects, contribute synergistically to pest regulation. Integrated pest management (IPM) systems foster the presence of natural enemies in cotton fields, reducing reliance on pesticides. Effective strategies like strip cropping, strip intercropping, and trap cropping promote biological control by establishing insectary crops and enhancing the predator-prey balance. The study emphasizes the transition to biological control, highlighting its economic benefits with documented cost savings of 50-75% within two years. It advocates for a paradigm shift in cotton farming towards sustainable methods to ensure long-term pest management, environmental preservation, and agricultural sustainability.

COMBINING ABILITY AND HETEROSIS ESTIMATION FOR EARLINESS IN TOMATO (*SOLANUM LYCOPERSICUM* L.) UNDER OPEN AND PROTECTED CONDITION**SHEETAL RANA AND D. K. SINGH****Department of Vegetable Science, G.B. Pant University of Agriculture and Technology, Pantnagar-263 145, Uttarakhand**

In the field of tomato production and horticulture, prevailing heterosis has drawn more attention. To know the performance of F_1 hybrids in tomato for earliness and yield, an experiment was conducted involving 30 F_1 hybrids obtained from a line $\times$ tester mating design of 10 line and 3 testers. The parental lines used were Pusa Cherry 1, Punjab Red Cherry, Pant Cherry Tomato-6, Pant Cherry Tomato-7, CPCT-IARI Cherry-214, Punjab Sona Cherry, CPCT-263, Pant Cherry Tomato-8, Pant Cherry Tomato-9, Pant Cherry Tomato-10 whereas Pant Polyhouse Tomato-2, PBT-5 and PBT-9 were used as testers. Pusa Cherry 1 was used as standard check. The experiment was conducted at the Vegetable Research Centre (VRC) of the G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. Nagar, Uttarakhand. Crosses were made in spring season 2023 further evaluation was done over one seasons viz., autumn season 2023. The experiment was laid out in a randomized block design (RBD) using three replications, with a plant spacing of 60 $\times$ 45 cm under open and protected cultivation. Heterotic potential was recorded of the hybrids over parents and check for earliness. For Days to 50% flowering, among 13 parents, Pant Cherry Tomato-8 and Punjab Red Cherry were proved best under protected condition, whereas Pant Cherry Tomato-10 and Pant Cherry Tomato were proved best under open condition. Among hybrids, Pant Cherry Tomato-8 $\times$ PBT-5, Punjab Red Cherry $\times$ Pant Polyhouse Tomato-2 were found best in protected condition whereas, Pusa Cherry 1 $\times$ Pant Polyhouse Tomato-2, Pant Cherry Tomato-9 $\times$ PBT-5 were found best for open condition. Further, Punjab Sona Cherry was found good general combiner for days to 50% flowering and days to first fruit set under protected condition. These hybrids can be send for multi-location trials after their performance with suitable check, further identified depending upon performance may be released and put in public domain for their cultivation by the farmers.

CHEMICAL MUTAGENESIS TO GENERATE MUTANT FROM *RHODOCOCCUS RHODOCHROUS* PA-34 HAVING ROBUST NITRILE HYDRATASE: ENHANCING SUBSTRATE TOLERANCE FOR EFFECTIVE BIOCATALYTIC CONVERSION OF ACRYLONITRILE TO ACRYLAMIDE**SHEETAL* AND T. C. BHALLA*****Department of Biotechnology, Himachal Pradesh University, Summerhill, Shimla**

The Nitrile hydratase (NHase) enzyme plays a crucial role in converting nitriles into their corresponding amides, offering environmental friendly and sustainable solution for industrial use. Acrylamide, a very important commodity chemical used in various industries, from polymer production, oil recovery, paper, textile, mining, medical and biotechnological application to soil conditioning. This study emphasizes on the application of chemical mutagenesis to generate a promising mutant of *Rhodococcus rhodochrous* PA-34, in terms of higher substrate tolerance and enzyme activity of nitrile hydratase toward acrylonitrile and its biotransformation to acrylamide. Wild *R. rhodochrous* PA-34 was treated with N-methyl-N-nitrosoguanidine (MNNG), methyl methane sulphonate (MMS), ethyl methane sulphonates (EMS) and 5-bromouracil at different concentrations. Mutants generated with MNNG has shown higher substrate tolerance (>8%) and activity (relative >200% activity) than wild. The result demonstrated successful generation of stable mutant confirmed by several subsequent subculturing. Purified Nhase of mutant has shown two distinct band on 10% SDS PAGE having size of ~19kDa (in case of wild ~25.04kDa) of lighter α -subunit and ~26kDa (30.6kDa in wild) heavier β -subunits. Native PAGE (10%) revealed a single band of ~72kDa (86.0kDa in wild), which is suggesting that functional unit consist of one α -subunit and two β -subunit.

Keywords: Nitrile hydratase, Acrylonitrile, Acrylamide, chemical mutagenesis, N-methyl-N-nitrosoguanidine (MNNG).

IN VITRO SHOOT REGENERATION IN KIWIBERRY *ACTINIDIA ARGUTA* (SIEBOLD & ZUCC.) PLANCH EX MIQ. VAR. ARGUTA**SHEHNAJ KHAN****Department of Biotechnology, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan (HP) India**

The axillary or terminal buds of four cultivars of kiwiberry (*Actinidia arguta*) i.e., Anna, Dumbarton Oaks, Ken's Red and Meader Male were used as explants to initiate *in vitro* shoot regeneration studies. The respective explants were effectively surface sterilized by treatment T6 i.e., 70.00% ethanol (1 minute) followed by subsequent individual sterilization with 2.00% carbendazim (4 minutes), 0.10% HgCl₂ (3 minutes) and 4.00% NaOCl (2 minutes) resulting in 71.74, 77.53, 81.31 and 87.46 per cent uncontaminated explants in case of Meader Male, Anna, Ken's Red and Dumbarton Oaks, respectively. On EMC medium, the percent *in vitro* establishment rate of 58.98 (Kens's Red), 58.45 (Meader Male), 58.26 (Anna) and 56.58 (Dumbarton Oaks) with delayed STN appearance after 3-4 weeks was observed in all the cultivars. To overcome the problem of STN, MS full strength (MS f) and half strength (MS h) media were used. In MS full strength (MS f) medium, the maximum per cent STN reduction was 55.33 (Anna) followed by 54.47 (Dumbarton Oaks), 52.49 (Meader Male) and 37.68 (Ken's Red) in respective cultivar. Meanwhile, in MS half strength (MS h) medium, the maximum per cent STN reduction was 86.28 in Dumbarton Oaks followed by 81.35 in Anna, 80.22 in Meader Male and 75.23 in Ken's Red. The highest shoot multiplication rate of 1:5 was achieved on SMIV medium (MS salts + Zea @ 1mg/L) in case of Dumbarton Oaks. Therefore, amongst four cultivars, Dumbarton Oaks can be easily established under *in vitro* conditions as it responded very well with respect to parameters like surface sterilization (87.46 per cent), STN reduction during establishment (86.28 per cent) and shoot multiplication ratio (1:5). Meanwhile, Anna, Kens's Red and Meader Male showed better responses in context to *in vitro* establishment with delayed STN appearance. In addition to this, Ken's Red showed minimum STN reduction. Hence, further studies are needed to overcome this problem completely to raise healthy and a greater number of quality planting material by considering the factors associated with STN incidence.

Keyword: Kiwiberry, *in vitro* shoot propagation, STN**PROFILE OF THE BENEFICIARY FARMERS OF PROJECT ON CLIMATE RESILIENT AGRICULTURE (POCRA) OF MARATHWADA REGION****SHENDE, S. S.^{1*}, AHIRE R. D.², KADAM R. P.³****1. Ph.D. Scholar, Department of Agricultural Extension Education, VNMKV, Parbhani M.S. India. 2. Associate Dean, College of Agriculture Badnapur, VNMKV, Parbhani M.S. India 3. HOD, Department of Agricultural Extension Education, VNMKV, Parbhani M.S.**

A major challenge faced by the farmers is to cope with the changing climate. Farmers in Marathwada and Vidarbha have been facing severe drought for the past few years, all of which are affecting ground water storage and soil health, resulting in reduced agricultural productivity, adversely affecting the production of smallholder farmers. Maharashtra Project on Climate Resilient Agriculture (The Nanaji Deshmukh Krishi Sanjeevani Prakalp) project has been launched (2018-2019) by the Government of Maharashtra with the assistance of the World Bank with the aim of enabling farmers to adapt to climate change. The present investigation was carried out to find out the "Profile Of Beneficiary Farmers Of Project On Climate Resilient Agriculture (Pocra) Of Marathwada Region. The study was carried out in Osmanabad, Aurangabad, and Jalana districts of the Marathwada region during the years 2022 and 2023. An Ex-post-facto research design was used for the present investigation. The data were collected with the help of a pretested interview schedule from the beneficiaries as per their convenience at their residence home or on the farm. The results of the present investigation show that 62.19 per cent of the PoCRA beneficiaries were from the middle age group category, 36.67 per cent of the beneficiaries were educated up to secondary school, 86.66 per cent of the beneficiaries belonged to the medium annual income category, 53.33 per cent of the beneficiaries belonged to the small land holding category, and 43.33 per cent of the beneficiaries had a tube well as a source of irrigation. 76.25 cent of the beneficiaries had medium sources of information. 91.25 percent of the beneficiaries had medium extension contact, 75.83 percent had medium risk orientation, 77.50 percent had medium economic motivation, 70.00 percent had medium innovativeness, and 41.25 percent received at least one training.

Keywords: PoCRA, Innovativeness, Climate-resilient, Government, Technology**IMPACT OF STARVATION ON THE DIGESTIVE GLAND OF FRESHWATER CRAB *BARYTELPHUSA CUNICULARIS*****SHERKHANE UD*****Department of Zoology, New Arts, Commerce and Science College, Shevgaon, Ahmednagar, M.S., India**

The freshwater crab *B. cunicularis* is a commercially significant species, extensively found in various regions of Maharashtra, southern India, and Sri Lanka. In freshwater crabs and many other crustaceans, the hepatopancreas, located in the cephalothorax, serves as the primary digestive gland. This organ is crucial for the storage and mobilization of carbohydrates and lipids, akin to the liver in vertebrates and the fat body in insects. This research provides an overview of the histological organization of the hepatopancreas and examines the effects of starvation on its histology. The findings reveal that the hepatopancreas comprises numerous, blindly-ending hepatopancreatic tubules interconnected by connective tissue. These tubules are surrounded by haemal spaces containing haemocytes and apparent blood vessels. Each hepatopancreatic tubule is enclosed by a basal lamina and has a central lumen. The tubule cells are categorized into three types: R-cells, F-cells, and B-cells, with R-cells (Reserve cells) being the most prevalent, characterized by numerous cytoplasmic vacuoles. Starvation was found to reduce the number of B-cells and F-cells in the hepatopancreas.

Keywords: Starvation, Crab, Hepatopancreas, Histology.

ORGANIC DEFENSE: BIODYNAMIC TECHNIQUES AGAINST RADISH PESTS AND DISEASES**SHIKHA ARYA¹ AND PRAGYA UIKEY²**¹Department of Horticulture, College of Agriculture, J.N.K.V.V., Jabalpur, M.P.²Department of Vegetable Science, College of Agriculture, O.U.A.T., Bhubaneswar, Odisha

Radish, a member of the Brassicaceae family, is a root and leafy vegetable. Organic inputs play a significant role in enhancing nutrient availability and uptake from the soil, thereby enhancing Radish yield and quality without compromising soil properties. Biodynamic farming adheres to planting schedules and employs specific fermented herbal preparations as field sprays. The study was conducted at the Experimental Field of the Department of Horticulture, College of Agriculture, Indore, during the 2021-22 period, considering the agro-climatic and soil conditions of Northern Madhya Pradesh. It employed a Randomized Block Design Factorial with three replications, consisting of fourteen treatment combinations. These combinations included foliar spraying of biodynamic preparations (BD 500 & 501), soil drenching with Azotobactor, and soil application of vermicompost alongside the recommended dose of fertilizers for Radish variety Pusa Chetki. Results indicated that the lowest disease incidence (0.30%) was observed in treatment T14 (BD 501 @ 5.0gm + vermicompost @ 2.5 t/ha), making it the most effective treatment, followed by treatment T12 (BD 500 @ 5.0gm + vermicompost @ 2.5 t/ha) with a disease incidence of 0.52%. In contrast, the control treatment (T0) exhibited the highest disease incidence at 1.50%. Similarly, the minimum insect incidence (0.70%) was noted in treatment T14 (BD 501 @ 5.0 g + vermicompost @ 2.5 t/ha), followed by treatment T12 (BD 500 @ 5.0gm + vermicompost @ 2.5 t/ha) with an incidence of 0.91%. Conversely, the control treatment (T0) recorded the highest insect incidence at 1.89%. This improvement in pest and disease resistance in Radish might be attributed to the enhanced nutrient availability from the treatments, aiding plant growth. In conclusion, the combination of Biodynamics with vermicompost demonstrated efficacy in controlling both disease and insect incidences in Radish cultivation.

Keyword- Biodynamics, Organic farming, Radish, Vermicompost**SPECTRAL CHARACTERIZATION OF HEALTHY AND MALFORMED PANICLES OF MANGO (*MANGIFERA INDICA* L.) CULTIVARS UNDER VARIABLE PHOTON FLUX DENSITY****SHIKHA MOGRE¹, S. K. PANDEY¹, C. S. PANDEY¹ AND R.S. RAMAKRISHNAN²**¹Department of Horticulture, College of Agriculture, JNKVV, Jabalpur, (M.P.)²Department of Plant Physiology, College of Agriculture, JNKVV, Jabalpur, (M.P.)

Malformation, a physiological disorder affecting mango growth and development is subjected to various environmental influences, contributing to diversity in susceptibility. The present investigation entitled “Spectral Characterization of Healthy and Malformed Panicles of Mango (*Mangifera indica* L.) Under Variable Photon Flux Density” was carried out at Fruit Research Station, Imaliya, in the Department of Horticulture (Fruit science), College of Agriculture, JNKVV, Jabalpur, (M.P.) during 2022-23. The research was laid out in Asymmetrical Factorial Randomized Block Design (FRBD). Four trees from each variety were selected randomly with healthy and malformed panicle in each direction and replicated thrice. Total 32 panicles from each variety i.e., 96 panicles were tagged and the observation for Growth, Morphological, Physiological characteristics and characterised their spectral signatures in over 25 Indices with respect to varietal and directional influence, were recorded and statistically analysed. The mango varietal response was observed that the percentage of malformed panicles was highest in the Dashehari variety (40.27%), while Amrapali exhibits a somewhat lower susceptibility with (27.98%) and Langra proves to be more tolerant (20.69%). The study also highlights the direction of incident PAR plays important role where panicles exposed to the North direction was associated with the highest percentage of malformed panicles (35.30%), while the south direction had the lowest percentage (24.09%). It reveals that the incidence of floral malformation was consistently highest on the north-facing sides of trees and lowest on the south-facing sides. The interaction studies of varieties and directions, it was observed that the percentage of malformed panicles was highest in the north direction of the Dashehari variety (42.75%), while the south direction of the Langra variety had the lowest percentage of malformation (14.55%). These results suggest that different varieties exhibit distinct responses to environmental factors, leading to altered physiological expressions in each direction. Among all the indices derived from hyperspectral reflectance such as SIPI, SPVI, NDVI, OSAVI, NPCI, VOG and VOG2 were very promising and can be significantly used to differentiate the malformed panicles from healthy ones. The spectral characterisation differentiated healthy and malformed panicles of mango using spectral reflectance data revealed the potential of hyperspectral remote sensing to discriminate them and useful in early crop management.

Keywords: NDVI, NPCI, VOG, Remote sensing, spectral, Flux**VERMICOMPOSTING ORGANIC WASTES MANAGEMENT BY *EISENIA FETIDA*****SHIKHA SINGH^{*1}, RUDRA PRAKASH OJHA², SURY MANI PANDEY³, MOHIT SINGH⁴**¹Nehru Gram Bharati Deemed to University, Jamunipur, Prayagraj, Uttar Pradesh, India²Farm Science Center Piprakothi, Bihar, India

The worm species *Eisenia foetida* may be a widely used earthworm of financial significance and could be a valuable companion of agriculturists. With the help of particular earthworm species, vermicomposting is a green method for turning organic waste into compost. Vermicomposting, a process used by earthworms (*Eisenia fetida*) to recover plant nutrients, is a common method of managing and recycling organic waste materials. NPK (nitrogen, phosphorus, and potassium) is a nutrient that plants require. In order to produce vermicompost and worm biomass, vermicompost has gained popularity as a safe and economical method of treating a variety of organic wastes.

ARTIFICIAL INTELLIGENCE AND NANOTECHNOLOGY IN POST HARVEST SECTOR**SHIKHA TRIPATHI, NITESHWARI BAGHELE****Research Scholar in Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, U.P., India**

Human population is expanding at high pace, so providing sufficient and healthy food is emerging as a very significant problem in the near future. In view of the above scenario, increasing production efficiency and decreasing post harvest wastage and using the findings of scientific researches such as artificial intelligence and nanotechnology in horticultural products, could be counted as the best solution to this problem. Artificial technology using techniques such as satellite images for estimating postharvest damage in advance and nanotechnology using particular characteristics of nanoparticles can be a booming technology in all reducing post harvest losses. In talk of expansion of horticultural commodity shelf life, artificial intelligence and nanotechnology can help us at various grounds, such as controlling growth and development of micro organisms, introducing a new generation of packaging coverage's (Films) and controlling influence of gases and the harmful rays (UV), increasing strength, quality and packaging beauty, and using the multiple chips (Nanobiosensors) for labeling products. These techniques reduces the utilization of systemic fungicide used to protect vegetable and fruits. Nano-packing material had promising effects on physicochemical and physiological quality compared with normal packing material. Furthermore, these nano-packing materials have the advantages of simple processing and industrial feasibility in contrast with other storages, some of which are time-consuming, costly and alter color and flavor. Therefore, artificial intelligence and nano-packing may provide an attractive alternative to improve the preservation qualities of fruits, vegetables and other valuable horticultural crops at extended storage. Moreover, further researches are still needed to clarify the exact nano-packing mechanism on stored products to facilitate the application of nanotechnology over a broader range in future. Although promising results were discussed, the road to successful AI and nanotechnology in postharvest is long.

Keywords: Artificial intelligence, horticultural crops, postharvest, artificial intelligence, nanotechnology, shelf life

AWARENESS AND PERCEPTION TOWARD CLIMATE CHANGE AND HUMAN HEALTH**DR. SHIKHA VERMA¹ AND DR. BHARTI PANDEY²**¹**Assistant Professor, Department of Psychology, A.N.D.N.N.M. Mahavidyalaya, Kanpur, India,**²**Assistant Professor, Department of Home Science, A.N.D.N.N.M. Mahavidyalaya, Kanpur, India**

Objective: The purpose of this study was to gather information about people's awareness and perception of the impact that climate change has on human health. **Methodology:** We collected information from one hundred and fifty people who reside in the Kanpur Dehat District by means of a survey that follows a cross-sectional design. The interviewers collected information from each of the 150 individuals who took part in the research by employing a structured questionnaire and an observation checklist. This allowed them to acquire information from participants. **Results:** The findings of the survey showed that the bulk of the population originates from low socioeconomic backgrounds; it was found that just 2.2% of them had completed graduated or higher, and the majority of them worked as day labourers or farmers. An awareness of climate change was present among the majority of the participants (64.8%), whereas 35.2% of them were unaware of the phenomenon. 73.6%, claimed that they have experienced excessive heat as a consequence of climate change. Television was the primary source of information for 55.6% of the participants regarding climate change. A total of 81% of those who participated in the survey held the belief that deforestation was the root cause of climate change. There was a substantial correlation between awareness of climate change and factors such as age, educational level, monthly income, and occupation. More educated individuals had a greater awareness of the effects of climate change on health than those with lower levels of education. **Conclusions:** Regarding climate change, the research group held a degree of awareness that was common; nevertheless, the perception of the influence that climate change has on human health was far higher than what is typically seen.

Keywords: Awareness, Climate change, Human Health, Perception

DEVELOPMENT OF AN AI ENABLED CHATBOT FOR SWINE MANAGEMENT**SHIKHAKRATI NEGI*, RUPASI TIWARI, TAMAL CHANDRA DHARA, ANUJ CHAUHAN, TRIVENI DUTT****ICAR- Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India**

With the shift in the nature and scale of swine farming from subsistence to commercial enterprise in developing nations, there is a growing need for relevant and timely information about various aspects of swine management. The shortage of skilled and experienced individuals with proper education is a major concern in the pig farming industry (Sarma et al., 2016). Capitalizing on current market opportunities, the immense potential of the piggery enterprise, government-supported startup ecosystems, the rise of smartphone-based markets, and the promotion of digital technologies, including Artificial Intelligence through Industrial Revolution 4.0, it was deemed essential to evaluate the current status of information needs, assess the knowledge and adoption gap in scientific swine management practices, and develop a need-based, relevant, and reliable chatbot named IVRI SWINE SHRIA, catering to all stakeholders of the piggery sector. This chatbot harnesses the power of advanced Natural Language Processing (NLP) and machine learning algorithms to deliver real-time, relevant information to its users. SWINE SHRIA understands and communicates in 10 Indian languages and answers queries pertaining to various aspects of swine management, including care and management practices, breed selection, feeding strategies, general farm management, healthcare with a special focus on emerging diseases, biosecurity measures, housing, marketing, processing, training, insurance, credit facilitation, licensing, and animal welfare. Preliminary results from chatbot usability testing and the Turing test have demonstrated the chatbot's ability to be a useful and credible digital assistant for swine management. The chatbot has the potential to serve as a knowledge aid for credible and instant swine-related queries, acting as a single package for all stakeholders of the swine industry. By bridging the knowledge gap and providing timely, relevant information, this AI-enabled chatbot aims to support the growth and professionalization of the commercial swine farming sector in developing nations.

Keywords: Swine management, Chatbot, Artificial Intelligence, Natural Language Processing

EXPLORING THE ANTIFUNGAL POTENTIAL OF *GYMNEMA SYLVESTRE* LEAF EXTRACT AGAINST *ASPERGILLUS FLAVUS***SHILA NEEL^A, ANIRBAN DUTTA^A, SUPRADIP SAHA^A, AMRITA DAS^B, ADITI KUNDU^{A*}**^a**Division of Agricultural Chemicals, ICAR-Indian Agricultural Research Institute, New Delhi, India**^b**Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi, India**

Gymnema sylvestre (Retz.) R.Br. ex Sm. (Apocynaceae) is a perennial woody climber native to tropical and subtropical regions, such as India, Africa, and Southeast Asia. In folk medicine, *G. sylvestre* have been used to treat snake bites, arthritis, digestive, and enhancing laxative. Diverse biological properties of *Gymnema* extracts have been reported in literature, indicating rich source of bioactive phytochemical constituents. In this research *Gymnema* leaves is extracted with different solvents, including hexane, chloroform, ethyl acetate & methanol by conventional solid liquid extraction in order to acquire concentrated extracts. Our approach, guided by bioassays, revealed that the methanol-soluble fraction displayed the most significant efficacy in suppressing the growth of a highly aggressive strain of *Aspergillus flavus*. Optimization of extraction parameters like time, amplitude and solvent to biomass ratio was done using Response Surface Methodology (RSM) following Box-Behnken design. We tentatively characterized the bioactive compounds from the methanol extract using UPLC-QTOF-ESI-MS/MS. Furthermore, molecular docking studies confirmed the antifungal efficacy of the chloroform extracts, indicating favourable interactions with specific target proteins involved in sterol biosynthesis, thereby correlating with the inhibition of fungal ergosterol production. These findings underscore the significant potential of phyto-compounds from *G. sylvestre* for applications in the food and pharmaceutical industries.

Keywords- Bio-efficacy, extraction, phyto-chemicals, Molecular docking**ANALYSIS OF CARBON EMISSION AND CARBON SEQUESTRATION IN RURAL AREAS OF DHARWAD DISTRICT, KARNATAKA****SHILPA CHANNALLI P¹, RENUKA S. SALUNKE² AND P. L. PATIL³**¹**Ph.D. Scholar, Department of Family Resource Management, College of Community Science, UAS, Dharwad, Karnataka, India**²**Professor, Department of Family Resource Management, College of Community Science, UAS, Dharwad, Karnataka, India.**³**Professor and Vice-Chancellor, University of Agricultural Sciences, Dharwad, Karnataka,**

The measurement of carbon emission and calculation of carbon sequestration study was conducted at Timmapur and Mummigatti village of Dharwad district, Karnataka in India to measure the carbon emission level through Air Quality Monitor and CO meter for one year. The carbon sequestration was assessed by non-destructive method. The annual mean concentration of CO₂ in Mummigatti village (1301.2 ppm) was higher than Timmapur village (1020.4 ppm) and also the annual mean concentration of CO was exceeding in Mummigatti village (65.6 ppm) than Timmapur village (34.7 ppm). Annual mean concentration of PM_{2.5} and PM₁₀ were more in Mummigatti village (118.8 µm³ and 168.2 µm³ respectively) then compared to Timmapur village (73.9 µm³ and 121 µm³ respectively). During the observation period, the maximum carbon emission concentration was measured in summer season and the minimum in rainy season. The largest value of carbon sequestration was seen in *Tamarindus indica* (489.31 gm) in Mummigatti village and *Azadirachta indica* (443.78 gm) in Timmapur village. The carbon emission at Mummigatti village was greater than Timmapur village because of rural people's day-to-day activities. The trees with higher age and DBH have more carbon sequestration which could help in mitigate the effects of carbon emitted in the village.

Keywords: Carbon emission, Carbon sequestration, Carbon dioxide (CO₂), Carbon monoxide (CO), Particulate Matter (PM_{2.5} and PM₁₀), DBH.**A COMPREHENSIVE REVIEW OF MICROPROPAGATION RESEARCH IN *BERGENIA CILIATA*: A VALUABLE THERAPEUTIC RESOURCE OF INDIAN HIMALAYAS****SHILPA * AND MUNISH SHARMA******Department of Plant Sciences, School of Life Sciences, Central University of Himachal Pradesh, Shahpur Campus, Kangra (HP)**

Bergenia ciliata, famously known as Pashanbhed or Zakhmehayat is a resilient miracle herb of Himalayas that holds immense potential for its remarkable therapeutic properties. Phytochemical studies proved that this herb contains many bioactive compounds that show broad spectrum of pharmacological activities including anti-urolithiatic, antioxidant, antibacterial, antiviral, antidiabetic, antipyretic, anticancerous and cardio-protective activity. Hence there is a considerable demand of this plant. However, the sustainable propagation of this species remains a challenge due to various environmental threats and slow growth rates in conventional cultivation methods. *In vitro* micropropagation emerges as a promising alternative for mass multiplication, conservation, and genetic improvement of this plant. The Present review summarizes the recent advancements in micropropagation studies on *Bergenia ciliata*. This comprehensive review emphasizes on key methodologies, including culture techniques, growth hormone optimization, and media formulations, employed for efficient plant regeneration and multiplication. Furthermore, the study discusses the significance of acclimatization protocols in ensuring the successful transfer of *in vitro* propagated plants to natural conditions. The potential application of biotechnological approach in conservation efforts, sustainable utilization and genetic enhancement of *Bergenia ciliata* are discussed, along with the challenges and future directions in this field. This compilation aims to provide valuable insights for researchers interested in harnessing the potential of *in vitro* techniques for the propagation and preservation of this ecologically and economically significant plant species.

Keywords: *Bergenia ciliata*, pharmacology, *in vitro* micropropagation, acclimatization, conservation.

PIONEERING AGRICULTURAL TRANSFORMATION: UNLEASHING THE POWER OF IOT AND AI FOR SMART FARMING AND SUSTAINABLE HARVESTS**SHILPI SINDHU, BHARAT GARG, SHIKHA YASHVEER, ANITA VERMA, REENA RANI****Department of Molecular Biology and Biotechnology, College of Biotechnology, CCS HAU, Hisar -125004, Haryana, India**

Agriculture is essential to the advancement of human civilization. Agriculture provides a living for the majority of people in developing and poor countries. Farmers have numerous obstacles in agriculture, such as obtaining expert guidance, monitoring crops, and using manual ways to do vital farming chores such as irrigation, among others. Agriculture-related problems have consistently slowed down the nation's progress. Intelligent agriculture is the only approach that can solve this issue. Utilising the natural resources in a variety of environments is essential for achieving higher yields through Smart Agriculture (SA). Agriculture automation and intelligence are addressed by Smart Agriculture. The automation of picture analysis using computer vision and deep learning models, the Internet of Things (IoT), and associated technologies will be one potential answer to the aforementioned challenges with agriculture and food demand. SA makes use of specialised sensors and algorithms to make sure that crops receive the exact nutrients they require for maximum yield and sustainability. SA entails gathering precise sensors data from fields regarding the condition of soil, plants, crops, and climate. From manned or unmanned satellites or airborne platforms, high-resolution photographs of crops are acquired, which are then processed to extract data for upcoming decisions.

Keywords: Smart Agriculture, Agriculture automation, Internet of Things (IoT), Artificial Intelligence (AI)**ANALYZING THE BIOACTIVE CONSTITUENTS OF BLACK TURMERIC (*CURCUMA CAESIA*) ESSENTIAL OIL USING GAS CHROMATOGRAPHY-MASS SPECTROMETRY (GC-MS)****SHILPI * AND MUNISH SHARMA******Department of Plant Sciences, School of Life Sciences, Central University of Himachal Pradesh, Shahpur Campus, Kangra (HP)**

Curcuma caesia, popularly known as Black turmeric or Kali Haldi is a perennial medicinal herb that has been recognized for its therapeutic potential. It belongs to the member of the Zingiberaceae family and characterized by its dark purplish-black rhizomes, which possess camphor-like aroma accompanied with gently bitterness. Due to the presence of bioactive compounds such as curcuminoids, sesquiterpenes, monoterpenes, and phenolic, this herb exhibits a variety of pharmacological actions such as analgesic, antibacterial, antioxidant, anticancer and anti-inflammatory. These attributes have led to an increasing interest in this botanical extract for potential health use. The aim of this study was to assess the chemical composition of rhizomes of *C.caesia* collected from two different locations i.e Bilaspur (Himachal Pradesh) and West Bengal. The rhizome essential oils were extracted by hydrodistillation and analyzed by GC-MS (Gas Chromatography Mass Spectrometry). Our study showed variation in essential oil composition among the rhizomes procured from different locations. The results from our study indicated that among all volatile essential oil components, curzerenone (Sesquiterpene) and Camphor, a prominent monoterpene having therapeutic potential were present as major components in all samples. Bilaspur sample contained Camphor (28.3%) followed by Curzerenone (15%). However, West Bengal sample was reported to contain Curzerenone (37%) followed by Camphor (11%). We successfully studied the variability among essential oil composition in rhizomes of *C. caesia* which may be due to different geographical location and environmental factors. In order to unveil the full therapeutic potential of this underutilized botanical gem, more research is needed.

Keywords: Kali Haldi, Underutilized crop, Essential oil, Monoterpene, Sesquiterpene**INTEGRATED MANAGEMENT OF NUTRIENT, WEED, DISORDER, PEST-DISEASE AND PLANT PROTECTION****SHINDE. V. B., PAGARE. Y. D. & MANE. Y. C.****COLLEGE OF AGRICULTURE, LATUR (VNMKV, PARBHANI)**

The present study entitled "Knowledge and adoption of integrated nutrient management practices among soybean growers" was conducted in purposively selected Ausa, Ahmadpur and Latur tahsils of Latur district of Maharashtra state. From every tahsils, four villages were selected randomly. Accordingly, from these 12 villages 120 soybean growers were selected randomly (from each village 10 soybean growers) for the study. Ex post facto research design was followed in the present investigation. Data were collected with the help of pre-tested structured interview schedules consisting the information about selected characteristics of Soybean growers viz. farming experience, education, family size, land holding, annual income, social participation, extension contact, mass media exposure, economic motivation, market orientation, innovativeness along with the information about dependent variables namely knowledge and adoption of integrated nutrient management practices among soybean growers. Majority (69.17%) of the soybean growers had medium farming experience, belonged to high school level education category viz., 29.17 per cent, more than two third (67.50%) belonged to medium category of family size, around half (48.33%) of the soybean growers were having 2.01 to 4.00 ha. of land and had a place with semi- medium land holding category, around two-third (65.00%) of the soybean growers had medium annual income (between ₹.1,12,737 to ₹.2,80,263), two-third (66.67%) of the soybean growers had medium social participation, majority (68.34%) of soybean growers were belonged to medium category of extension contact, medium category of mass media exposure (70.00%), medium category of economic motivation (75.83%), medium market orientation (65.84%), more than two third (67.50%) of soybean growers were having medium innovativeness and larger part of the soybean growers (59.17%) found in medium category of knowledge about INM practices. Regarding adoption of INM practices it was found that, highest (55.83%) of the soybean growers belonged to medium adoption category followed by low (29.17%) and high (15.00%) adoption category.

Keywords – Profile, knowledge, adoption, constraints, suggestions, Integrated Nutrient Management practices, Soybean growers.

EFFICACY OF SOME INDIGENOUS PRODUCTS AND BIO-PESTICIDES IN THE MANAGEMENT OF BRINJAL SHOOT AND FRUIT BORER (*LEUCINODES ORBONALIS* GUENEE)**SHIV SHANKAR KUMAWAT, B. GANGWAR, PRADEEP KUMAR, A. K. CHAUDHARY****Department of Entomology, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (U.P)**

An experiment was conducted to observe the efficacy of some indigenous products and bio-pesticides in the management of Brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee) on brinjal during Kharif season, 2023-24 at Organic Research Farm Kargua ji, Department of Entomology, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (Uttar Pradesh). The experiment was laid out in Randomized block design with nine treatments replicated thrice along with a control plot to check the efficacy of selected biopesticides against brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee). In the series of shoot infestation, the efficacy of treatments on first spray showed that per cent shoot infestation was minimum in treatment T₄ Bt. 2.0 kg/ha, followed by T₈ *Beauveria bassiana* 2.0 lit/ha, T₇ NSKE 5%, T₁ Neem oil 5% *Metarizium anisoplae* 1.5 lit/ha, T₂ *Metarizium anisoplae* 1.5 lit/ha T₃ Verticillium lecanii 2.0kg/ha., T₅ Castor oil 5% and T₆ Karanj oil 10% as compare to T₉ control. All the treatments were found effective and significantly superior over the control. Based on per cent fruit infestation on brinjal, minimum fruit infestation was observed in treatment T₄ Bt. 2.0 kg/ha, followed by T₈ *Beauveria bassiana* 2.0 lit/ha, T₇ NSKE 5%, T₁ Neem oil 5% *Metarizium anisoplae* 1.5 lit/ha, T₂ *Metarizium anisoplae* 1.5 lit/ha T₃ Verticillium lecanii 2.0kg/ha., T₅ Castor oil 5% and T₆ Karanj oil 10% as compare to T₉ control. All the treatments were found effective and significantly superior over the control. Same trend of effectiveness of treatments was found in both the cases i.e. in shoot infestation as well as in fruit infestation.

Keywords: Brinjal, Bio-efficacy, Bt., *Beauveria bassiana*, Neem oil.**FROM SATELLITE TO FARMGATE: REMOTE SENSING'S JOURNEY IN HORTICULTURE”****¹SHIVALI SHARMA, ¹GAURAV SHARMA, ³SUNNY SHARMA****¹Ph.D. Scholar, Dept. of Fruit science, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh****¹Professor and Head, Horticulture, Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh****²Department of Fruit science, School of Agriculture Lovely Professional University, Phagwara Jalanadhar**

The practice of learning about an object or region of the real world at a distance without having to have direct physical touch with it is known as remote sensing. Remote sensing is the process of detecting, logging, and processing energy that is reflected or emitted, then using the data for analysis and application. Ground, aerial, and space-based platforms equipped with remote sensing technology have the capacity to offer comprehensive details regarding the spectral, spatial, and temporal aspects of vegetation health and vigour. This capability holds significant implications for applications related to estimating crop yield. For increasing production of fruit, vegetable, floriculture etc., frequent supervision of orchard is crucial which is exceedingly laborious because of large area coverage. One of the newest and most sophisticated technologies to be developed is remote sensing, which can collect precise data on a wide range of characteristics needed by the horticultural industry. The accessibility of remotely captured information from diverse sensors across multiple platforms, featuring an extensive array of spatiotemporal, radiometric, and spectral resolutions, positions remote sensing as conceivably the most superior data source for expansive applications and scholarly investigation. Remote sensing is becoming known as major component of precision horticulture for its ability to recognize and define crop health. Chlorophyll, carotenoids, and other photosynthetic pigments can change with time, and this dissimilarity can cause physiological stress in trees, which can be shown by changes in spectral reflectance. A vital part of infield automation in horticulture is vision-based fruit detection. Acquiring precise information about the precise locations of individual fruits in a field allows for effective yield estimation and mapping. This holds significant value for growers, fostering the optimal use of resources and enhancing returns per unit area and time. In the grand scheme, the current outlook underscores the continuous growth of remote sensing as an essential element in the future of lucrative horticulture production.

Keywords: Remote sensing, fruit production, precision horticulture, mapping, resolutions**DEMONSTRATION OF CHILLI (*CAPSICUM ANNUUM* L.) HYBRIDS FOR GROWTH, YIELD AND MAJOR INSECT AND DISEASES PROBLEM IN NORTHERN DRY ZONE OF KARNATAKA****SHIVALINGAPPA HOTKAR¹, SHUBHA S² AND KUSHAL³****Junior Pathologist, All India Co ordinate Research Project on Safflower ARS, Annigeri****Assistant Professor (Horticulture), Agriculture College, Vijayapur****Senior Microbiologist and Head All india Coordinated Project on Energy in Agriculture and Agrobased Industries (Bioconversion Technology) MARS, Dharwad**

Chilli hybrids are demonstrated in farmers' fields of Hadagali and Arakeri blocks of Vijayapura district on nearly 50 ha area, for the year 2019-20 and 2020-21 under on farm testing trials. Arka Kyati, Arka Meghana and local variety were used in this study. Arka Kyati recorded highest growth characters like plant height (47.24 cm), number of fruits/plant (78.30), fruit weight (5.31 g) and fruit length (10.19 cm) followed by Arka Meghana with 48.54cm; 67.50; 5.20g and 10.10 cm respectively, whereas local hybrid recorded the lowest values for all the traits. Arka Kyati took the minimum number of days for 50 per cent flowering (43). Arka Kyati hybrid recorded the highest per plant yield (413.00 g) and total yield/ha (15.47 t/ha) followed by Arka Meghana (388.90 g; 13.26 t/ha). Arka Kyati recorded lowest thrips and Powdery mildew incidence (16.25% and 7.89%) whereas local check recorded the lowest yield of 11.98 t/ha and highest thrips and powdery mildew incidence (20.36% and 13.28%). In the case of benefit cost ratio, Arka Kyati recorded the highest B:C ratio of 2.37 with the net profit of Rs. 1,89,616. Arka Kyati hybrid is performed well and increased yield of 17.30 per cent.

Keywords: Chilli hybrids, Arka Kyati, Arka Meghana and Powdery mildew.

STRESS AMELIORATIVE PROPERTIES OF 24-EPIBRASSINOLIDE (EBL) IN TOMATO PLANTS AGAINST ROOT KNOT NEMATODE INFECTION**SHIVAM JASROTIA^{1*} AND PUJA OHRI²**^{1*}Department of Biosciences, Chandigarh University, Gharuan, Mohali, Punjab, India²Department of Zoology, Guru Nanak Dev University Amritsar, Punjab, India

The steroidal plant hormones, Brassinosteroids (BRs), are nearby found to be omnipresent in the plant kingdom. They are generated by a wide variety of plants, ranging from lower to higher. Nearly every component of the plant, viz. flower buds, pollens, fruits, seeds, leaves, vascular cambium, roots, and shoots, has shown the evidence of producing them. They are necessary for plants to grow and develop normally as well as to control some aspects of plant growth under biotic and abiotic stress. Root knot nematodes (RKNs) are thought to be one of the most economically significant species in the animal kingdom. RKNs exhibit parasitism over a wide range of plant species, which puts plants at serious risk. Stress regulatory property of 24 – Epibrassinolide (EBL) was analysed in tomato cultivars against root knot nematode, *Meloidogyne incognita*. Pre-sowing treatment with varying doses of EBL was given to uniformly sized, sterilised tomato seeds, and they were then let to germinate under carefully monitored circumstances. Following appropriate germination, second stage juveniles of *Meloidogyne incognita* were introduced into the seedlings. After five and seven days of nematode inoculation, parameters such as percent germination, plant height/weight, gall numbers, stress indices, specific antioxidant enzymes, and antioxidants along with photosynthetic pigments were analysed. After evaluating the level of stress indices in the experiments, an overall improvement in enzyme specific activities and antioxidants as a result of EBL treatment demonstrated the amelioration of stress in plants that was clearly visible.

Keywords: Stress amelioration, Brassinosteroids, root knot nematodes, antioxidants.**AGRICULTURAL EXTENSION STRATEGIES TO MITIGATION AGAINST THE EFFECTS OF CLIMATE CHANGE****SHIVAM SINGH¹, UMA RASHMI², PAWAN KUMAR GUPTA³, AKASH⁴, MANI PRAKASH SHUKLA⁵**²Teaching Associate, & ^{1,3,4&5}Research Scholar, Department of Agricultural Extension Education,

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Climate change, rapid population growth, and fierce competition for resources pose significant threats to both human and animal survival. The consequences of climate change, such as pollution, global warming, rising sea levels, altered rainfall patterns, and water scarcity, are putting immense pressure on leaders and communities to adapt and prepare for disasters. To tackle these challenges, it's crucial to employ research-backed technologies and prudent resource management practices. Effective strategies for mitigating these challenges include sustainable land management practices like agroforestry and diversifying agricultural enterprises. Additionally, restoring degraded land through various methods such as reseedling, crop rotation, and terracing can help improve land productivity. Other important measures include irrigation, fish farming, cultivating drought-resistant crops, and enhancing livestock feed efficiency. Education and advocacy also play vital roles in addressing climate change. Incorporating climate change education into school curricula and advocating for sound environmental policies through professional networks are important steps. Moreover, promoting resource conservation, water harvesting, tree planting, and investing in energy-efficient and eco-friendly technologies are crucial for sustainable development. Furthermore, establishing tree nurseries and providing community education on climate change are essential for raising awareness and fostering local resilience. Implementing practices like nursery sowing of crops optimized for available moisture can also contribute to better agricultural outcomes.

Key words: Agriculture, climate change, extension, mitigation strategies, resource conservation.**EFFECT OF PRUNING METHODS ON GROWTH, YIELD AND QUALITY OF BELL PEPPER (*CAPSICUM ANNUUM* L. VAR. GROSSUM) UNDER NATURALLY VENTILATED POLYHOUSE****SHIVAM* AND DR. S. K. BAIRWA****^{*}Ph.D. Scholar, Division of Vegetable Science, (AUJ) COA Jodhpur, Mandore (Rajasthan)^{**}Assistant Professor, Department of Horticulture, RARI, Durgapura, Jaipur (Rajasthan)

The bell pepper, often known as sweet pepper or shimla mirch (*Capsicum annum* L. var. grossum). India is well known around the world as the second-largest producer of vegetables of the world. Pruning of bell pepper plants enhances fruit production by redirecting energy towards fruit development, improves airflow, and aids in disease and pest management by removing diseased or damaged foliage. An experiment conducted at SKNCOA Jobner-Jaipur, Rajasthan, aimed to assess the impact of pruning methods on bell pepper growth, yield, and quality under naturally ventilated polyhouse conditions. The experiment comprised four pruning methods (Control, Single Stem Pruning, Double Stem Pruning, and Four Stem Pruning). Results indicated that Single Stem Pruning significantly increased plant height (10.72 %), root length (24.57 %), fruit volume (34.34 %). Double Stem Pruning showed enhancements in leaf area (21.47 %), chlorophyll content (13.33 %), TSS (16.71 %) and phenol (15.27 %) while, earliest in days to first flower appearance (16.05 %) and days to first harvest (17.23 %). Four Stem Pruning yielded higher fruit weight (24.01 %), number of fruits/plant (17.84 %), number of marketable fruit/plant (20.13 %), yield/plant (17.72 %), yield per hectare (17.79 %), and lesser number of galls per plant of root-knot nematode (37.25 and RKI-4) as compared to control. Based on the results of the experiment, it can be concluded the growing of bell pepper crop under naturally ventilated polyhouse conditions with four stem pruning method could be recommendable for farmers it fetched significantly higher yield.

Keyword: Fruit development, Airflow, (Single, Double & Four) Stem pruning, root-knot nematode, RKI.

NUTRIENT-RICH MILLET AND OAT-BASED FERMENTED BEVERAGE: PHYSIOCHEMICAL PROPERTIES AND PROBIOTIC VIABILITY ASSESSMENT

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Cereal and millet-based fermented beverages have increased attention due to their nutritional benefits. These beverages are often rich in dietary fiber, vitamins, and minerals, contributing to digestive health, immune function, and overall well-being. Additionally, with the growing popularity of plant-based diets and lactose intolerance awareness, these beverages provide a viable alternative to traditional dairy-based probiotic drinks. Moreover, their versatility allows for various flavor profiles and formulations, appealing to a diverse consumer base. Furthermore, the sustainability aspect of utilizing cereals and millets aligns with the increasing demand for eco-friendly food options, as these grains typically require less water and land than conventional crops. In this regard, an effort was made to develop a millet and oat-based composite beverage utilizing the bacterial strain *Lactobacillus plantarum*. This study aimed to develop a millet and oat-based composite beverage (MOCB) and assess its physiochemical properties alongside probiotic survivability. The beverage base comprised 60% oat, 33% millet, 6% dates, and 1% inulin, fermented with a commercial *Lactobacillus plantarum* (2%) at 37°C for 7 hours. Following fermentation, xanthan gum was incorporated to enhance colloidal stability. Analysis revealed the beverage's composition: total solids ($13.25 \pm 0.12\%$), protein ($1.24 \pm 0.05\%$), fat ($0.35 \pm 0.05\%$), carbohydrate ($10.30 \pm 0.43\%$), and dietary fiber ($1.20 \pm 0.15\%$). Probiotic survivability during simulated gastric digestion was maintained at 10^8 CFU/ml. Additionally, the beverage exhibited a medium glycemic index, registering at 57. Conclusively, the developed MOCB presents a promising alternative in functional beverages, offering favorable physiochemical attributes and substantial probiotic viability, thus holding potential for integration into a balanced diet regimen.

Keywords: Functional food, glycemic index, Non-dairy, Probiotic

MINIMUM SUPPORT PRICES AND ITS IMPACT ON DIVERSIFICATION DECISIONS OF FARMERS IN INDIA

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Minimum Support Price (MSP) is an integral component of Agriculture Price Policy of India. It targets to ensure support price to farmers and affordable price to consumers through public distribution system (PDS). Agricultural situation in India has undergone sea change after the green revolution period, but the agriculture price policy has more or less remained same. With demand–supply situation undergoing sea change over the last couple of decades or so, the agriculture price policy needs a relook. Treating MSP as a safety net, in this study, we explore the farmers' awareness of MSP of crops grown by them, across crops and states, with the hypothesis that awareness is the bare minimum requirement for policy interventions to have any impact. The present study focusses on farmer's awareness about Minimum Support Price (MSP) and its impact on diversification of crops grown in India by collecting nationally representative data from National Sample Survey Office. The data revealed that only 23.72 and 20.04 per cent of farmers in the rural agricultural households in India are aware of MSP of crops grown by them in kharif and rabi season, respectively. From the results of probit model, it is inferred that MSP needs to be backed up by effective procurement coupled with awareness creation by extension system to enable a greater number of farmers to take benefit of this safety net. The study also explored the relationship between farmer's awareness about MSP and decision to go for crop specialization using Heckman selection model. The study shows that farmer's knowledge of MSP had not led to specialization.

Keywords: MSP, Probit model, PDS, Diversification, Farmer

CORRELATION AND PATH COEFFICIENT ANALYSIS IN WHEAT (TRITICUM AESTIVUM L EM THELL)

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Twenty genotypes of bread wheat were planted inside B.R.D P.G college, Deoria (U.P.) under three spaces between rows (2.5cm and 0.25m) using split plots system in randomized complete block design with three replications to evaluate grain yield and some of its components (plant height, number spikes, number of grains/spike, biological yield, 1000 grain weight and harvest index), and genotypic and phenotypic path coefficient analysis among grain yield and its components. The results showed that 2.5cm row space gave highest means for biological yield, number spikes and grain yield. The grain yield at this row space was 0.615% and 0.2373% higher than that at 2.5 and 0.25m row space respectively. Some genotypes significantly outperformed for larger number of traits including grain yield, came in the forefront of it PBW-343, Black and K-1006 followed by the genotypes HD-3086, PBW-107, DBW-14 and Raj-4120. It was shown that the yield/unit area had significant positive genotypic and phenotypic correlations with plant height, biological yield, number of grains/spike, 1000 grain weight and harvest index, and phenotypically with number of spikes per unit area. It was revealed from path coefficient analysis that number of grains/spike and harvest index had higher genetic and phenotypic direct effects and indirect effects through some other traits on grain yield, followed in importance by biological, this is useful in the reliability of these three traits as selection criteria for higher yield performance in breeding programs.

Key words: bread wheat, path coefficient, correlations.

BIOCHEMICAL PATHWAYS IN MUSTARD**SHIVANI CHOUDHARY AND DR. ANUBHUTI SHARMA****Directorate of Rapeseed Mustard Research Centre, Bharatpur, Rajasthan**

The plastid FA synthesis method influences seed oil chain length (up to 18 carbons) and saturated FA concentration. The first committed enzyme in the process is acetyl-CoA carboxylase (ACCase). One of the most important metabolic pathways in oil seeds is the production of triacylglycerols (TAGs), the primary storage form of lipids (fats). This process occurs in the endoplasmic reticulum of seed cells and consists of multiple critical stages. The following is a summary of the main metabolic processes in oil seeds. Acetyl CoA Synthesis: The creation of acetyl-CoA is the first step in lipid biosynthesis. Acetyl-CoA is a byproduct of carbohydrate metabolism, namely glycolysis and the citric acid cycle. Acetyl-CoA is transformed into fatty acids by a sequence of biochemical processes known as fatty acid synthesis (De Novo Lipogenesis). This process is most commonly seen in plant cell plastids. Long-chain saturated or unsaturated fatty acids are typically generated. Glycerol-3-Phosphate formation: Glycerol-3-phosphate is an important precursor for the production of TAG. It can be made from dihydroxyacetone phosphate, a glycolysis intermediate. The final step in the synthesis of triacylglycerol (TAG) is the esterification of glycerol-3-phosphate with three fatty acids to create a triacylglycerol (TAG) molecule. An enzyme termed glycerol-3-phosphate acyltransferase catalyses the esterification process. TAGs are subsequently stored in oil bodies or lipid droplets, which are specialised cellular organelles. TAGs are lipids that are stored in oil bodies. During germination, oil bodies provide energy for the growing plant embryo. This pathway is essential for oil accumulation in seeds, making them a valuable source of vegetable oils for cooking, industrial applications, and biofuel production. The specifics of these channels may vary per plant species, but the fundamental concepts are universal throughout oil seed plants.

PHYSICO-CHEMICAL ANALYSIS OF HONEY OF DISTRICT KINNAUR, HIMACHAL PRADESH***SHIVANI SERAIK KEPRATE AND DR. MAHENDER SINGH THAKUR****Department of Biosciences, H.P.U**

Physicochemical analysis of honey involves a comprehensive examination of its physical and chemical properties to assess its quality and authenticity. These tests provide valuable information about the composition, purity, and nutritional value of honey. By conducting a thorough physicochemical analysis, researchers and producers can ensure that the honey meets regulatory standards, detect any adulteration or contamination, and guarantee its quality to consumers. The results of these analyses are crucial for both the honey industry and consumers to make informed decisions about the product. The aim of the present study was to analyse physico-chemical properties of honey samples collected from different regions of District Kinnaur, Himachal Pradesh by using different analyses tests, viz colour, pH, moisture content, specific gravity, electrical conductivity, HMF, Fiehe's test, Ash content, free acidity, proline, total reducing sugar (TRS), sucrose and f:g ratio. About 19 honey samples were collected in air tight glass or plastic jars from different apiaries located at different locations including honey samples collected from the farmers who had extracted honey from either wild and feral colonies in District Kinnaur of Himachal Pradesh. The color of honey ranged from dark amber to water white. The pH was in the range of 3.36 ± 0.015 (H5) to 5.7 ± 0.009 (H1). Electrical Conductivity was found in the range 0.066 ± 0 mS/cm (H13, H17) to 0.923 ± 0.015 mS/cm (H5). Moisture content was found in the range $17.1 \pm 0\%$ (H18) to $23.1 \pm 0\%$ (H5). Specific gravity was found in the range 1.21 ± 0.03 (H5) to 1.453 ± 0.03 (H13). Ash Content was found in the range $0.219 \pm 0.011\%$ (H13) to $0.492 \pm 0\%$ (H19). Free acidity ranged from 25.13 ± 0.18 meq/kg (H11) to 39.11 ± 0.01 meq/kg (H5). HMF was found to be within range in all honey samples i.e. less than 80mg/kg and all were negative for Fiehe's Test. Highest value of proline was found to be 457.72 ± 0.03 mg/kg in H15. TRS was found to be in the range $76.34 \pm 0.03\%$ (H16) and $86.87 \pm 0.02\%$ (H6). F:G ratio was found to be in the range of 1.04 ± 0.04 (H13) to 1.46 ± 0.01 (H5). Sucrose was found to be in the range of $1.34 \pm 0.02\%$ (H13) to $4.36 \pm 0.03\%$ (H1). Honey was found to be of good quality as most of the analysed parameters were within limit range of FSSAI (2018).

Keywords: honey, physicochemical, kinnaur**A STUDY ON HOSTEL STUDENTS SATISFACTION AND THEIR IMPACT ON FOOD HABITS ONLINE FOOD****¹SHIVANI SINGH, ²MUKTA SINGH, ³SEEMA SONKAR AND ⁴PRAGYA MISHRA****Ph.D Scholar¹, Associate Professor³, and Teaching Associate⁴, Department of Food Science & Nutrition, C.S.A University of Agriculture & Technology, Kanpur, UP****²Associate Professor, Banaras Hindu University, Varanasi, UP**

The Covid -19 pandemic has affect the traditional system face to face change into online in every field. In food purchasing and consumption behavior has replaced & prefer to online food. During Covid -19 pandemic, online food market has vast to purchase the food items. Food is a basic need to fulfill the requirement of the body. The online food has available within hour with reasonable price. The objective of study the hostel girls has most prefer food delivery services, which type of meals to order in frequency and their impact to health. The study found that Zomato food delivery service has most prefer to order within a week and lunch time the food items mostly ordered. The impact of health of online food has adverse effect to gain weight, metabolic disorder. Conclusion of the study that online food delivery system has dramatic change in food world. The frequency of ordered fast food items adverse impact to health.

Key words: Covid -19, online food, Zomato Service, Health,

UNLOCKING THE THERAPEUTIC POTENTIAL OF HIBISCUS FLOWER EXTRACT: FROM PHYTOCHEMICAL ANALYSIS TO NANO DERIVATIVES FOR ANTIBACTERIAL, ANTIFUNGAL, AND ANTIOXIDANT APPLICATIONS

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This study begins with the phytochemical analysis of Hibiscus flower extract to identify key elements such as phenols, flavonoids, and other secondary metabolites. These compounds are known for their health benefits, including anti-inflammatory, antibacterial and antioxidant properties. Using advanced extraction and analysis, this study revealed the unique composition and concentration of bioactive compounds, providing insight into the medicinal potential of Hibiscus flower extract. Flower extracts have significant anti-inflammatory properties as well as anti-inflammatory activity against many diseases. These effects are due to the presence of phenolic compounds and other bioactive molecules in the extract. This study investigated the effectiveness of the extract against bacteria such as *E.coli*, *Staphylococcus aureus*, *Pseudomonas*, *Listeria monocytogenes* as well as *Bacillus cereus* and various strains of fungi including *Rhizopus*, *Aspergillus flavus*, *Aspergillus niger* and *Penicillium*. The results showed the extract's potential as an alternative to antibiotics. The results showed the extract's potential as an alternative to antibiotics. The antioxidant properties of Hibiscus flower extract are also a subject of research. Antioxidants play an important role in neutralizing free radicals that can damage cells and cause many diseases. The extract is rich in flavonoids and anthocyanins, which have been shown to have strong antioxidant activity. This study estimated the extract's ability to reduce oxidative stress and protect cells from damage by in vitro assays such as DPPH. Synthesis and properties. Nano-sized particles provide a unique advantage due to increased surface area and improved performance. Hibiscus flower extract-zinc oxide nanoparticles are synthesized using green chemistry methods by using the extract as a reducing agent and stabilizer. The antibacterial and antifungal properties of hibiscus flower extract-ZnO nanoparticles were evaluated against various microbial species. The study found that nanoparticles exhibited better antibacterial properties compared to pharmaceuticals, possibly because they were able to disrupt microbial cell membranes and inhibit metabolic processes. The antioxidant properties of the nanoparticles were also evaluated, demonstrating their potential as bifunctional agents, including antibacterial and antioxidant. Features are fully evaluated. The findings demonstrate the potential of Hibiscus flower extract as a source of bioactive compounds with significant antibacterial, antifungal and antioxidant properties. In addition, the incorporation of Hibiscus flower extract into ZnO nanoparticles improves their performance and opens new avenues for use in medicine and pharmacy. Further research is recommended to investigate the full potential of Hibiscus flower extract and its Nano derivatives in various fields such as medicine, cosmetics and food preservation.

Keywords: Hibiscus, Nanoparticles, Phytochemicals, Antimicrobial

EVALUATION OF VARIOUS MAIZE VARIETIES AGAINST FALL ARMYWORM, [*SPODOPTERA FRUGIPERDA* (J.E. SMITH)] IN MADHYA PRADESH, INDIA

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Maize is one of the important cereal crops grown in India. The fall armyworm, *Spodoptera frugiperda* (J.E. Smith), a new invasive insect species, has occurred in serious proportions, causing significant damage to maize crop and thus posing a serious threat to maize production in the country. In the present experiment, twelve different varieties were sown on July 17th, 2021, and July 17th, 2022, during both consecutive years. The number of larvae and damaged plants were counted from randomly selected ten plants to find out the less susceptible variety of maize against fall armyworm at weekly intervals, starting from germination up to the harvest of the crop. Observations for FAW were also recorded using the visual scoring method. The results revealed that barely any variety was found to be completely resistant to fall armyworm. Based on average data from both the Kharif 2021 and Kharif 2022 years for mean larval population, mean plant damage percent, and leaf damage scoring, all the varieties were categorized for their reaction in order to interpret the results. Statistical categorization revealed that the varieties JM 218 and NWMH-2002 showed reduced susceptibility. Conversely, a group of varieties known as moderately susceptible included DKC-9141, Maize 3845, PAC 740, Yashoda Gold, PM 303, Maize Ranker, Maize 5402, and Maize 3046. Finally, it was determined that Sona 5101 and M-909 were highly susceptible varieties. This resistance significantly reduces the need for pesticide applications, thereby minimizing environmental impact and production costs.

Keywords: leaf damage, larval population, plant damage, susceptibility, *Zea mays*, lepidoptera, screening

INSECTS AS BIOINDICATORS: VALUABLE TO MONITOR THE EFFECTS OF CLIMATE CHANGE**SHIVANI SUMAN^{1*}, NAVEEN¹, N. S. BHADAURIA² AND A. K. BADAYA³**¹Ph.D. Research Scholar, Department of Entomology, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India.²Professor, Department of Entomology, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh, India.³Principal Scientist (Entomology), RVSKVV- Krishi Vigyan Kendra, Dewas, Madhya Pradesh, India

Environmental contamination directly threatens ecosystems, necessitating environmental monitoring as a part of ecosystem management and prediction. The concept of "bioindication" does not have a conventional significance; instead, it refers to a rising problem in the evaluation of conservation measures. Different life forms are very susceptible to environmental changes that affect their fundamental processes, like metabolism, growth, and reproduction. As indicators for biological parameters, taxonomic variety, or natural change, bioindicators are commonly used. Despite surviving the Cretaceous and Permian mass extinctions, arthropods are the most successful invertebrate group. They are the primary organisms taking part in ecosystem activities. In addition, insects are sensitive to temperature changes and react quickly, making them good bioindicators for tracking the effects of climate change. Biomonitors and bioindicators are crucial components for evaluating environmental change. While biomonitors are used to collect quantitative information on the quality of the environment, bioindicators can be used to determine the quality of changes that are occurring. In this review article, we've addressed the value of insects as a resource for evaluating contaminants and monitoring pollution in the environment. We have mainly concentrated on insects as significant indicators of changes in the quality of the air, water, and soil. The majority of insects, including beetles, honeybees, and butterflies, are employed in this study as biological indicators since they are sensitive to even the slightest changes in the environment and are also used to monitor different environmental contaminants.

Keywords: climate change, bioindicator, biomonitor, insects, ecosystem, environment, monitoring, pollution**ANTHROPOGENIC IMPACT OF HABITAT ECOLOGICAL PARAMETERS ON PLANKTON DIVERSITY IN PONG RESERVOIR****SHIVANI AND AMIT KUMAR SHARMA**¹Department of Animal Science, Central University of Himachal Pradesh

Water quality plays a vital and key role in estimating the diversity and abundance of phytoplankton in freshwater ecosystem. The water quality of freshwater body is rapidly deteriorating by various anthropogenic activities and diverse emancipations from the population growth, urbanisation and industrialisation. The aim of present research work was to estimate the anthropogenic impact of habitat ecological parameters on plankton diversity in Pong Reservoir. The water quality and plankton diversity of a Pong reservoir was studied between October 2023 to March 2024 in two sampling zones. Some physico-chemical parameters like turbidity, dissolved oxygen and biological oxygen demand showed a slight increase in April. Multi-correlation was calculated between physico-chemical parameters and phytoplankton density. Total twenty-six genera of phytoplankton were recorded and represented by five groups, Bacillariophyceae (11 genera), Chlorophyceae (10 genera) Myxophyceae (3 genera), Euglenophyceae (1 genera) and Xanthophyceae (1 genera). Total of 15 species of zooplankton were observed during the February to April included 5 species of Cladocera, 4 species of Copepoda, 3 species of Protozoa, and 3 species. Dissolved oxygen showed direct influence on distribution of plankton and also showed positive correlation with phytoplankton diversity. Finally, it can be concluded that human activities including river bed mining, construction of dam and barrages had negatively impacted the water quality and plankton diversity. Still, these kinds of activities to be checked regularly and can be controlled.

Keywords: Habitat Ecological, Anthropogenic, Plankton, Pong Reservoir.**ISCHEMIC HEART DISEASE: A GROWING THREAT TO GLOBAL HEALTH****SHOVA MAGAR**

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Ischemic heart disease (IHD), also known as coronary artery disease, remains a leading cause of morbidity and mortality worldwide. Characterized by a restricted blood flow to the heart muscle due to narrowed arteries, IHD can lead to angina (chest pain), heart attack, and heart failure. This review explores the key risk factors associated with IHD, including traditional factors like dyslipidemia (abnormal blood fats), hypertension (high blood pressure), diabetes, and smoking, as well as emerging risk factors such as chronic inflammation, air pollution, and psychosocial stress. The current diagnostic strategies for IHD, encompassing clinical evaluation, electrocardiography (ECG), stress testing, and imaging techniques like coronary angiography, are discussed. Additionally, the paper highlights the importance of preventive measures like lifestyle modifications (healthy diet, regular exercise, smoking cessation) and pharmacological interventions with medications like statins and antiplatelet drugs. Finally, the review briefly touches upon emerging treatment options such as coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) for patients with established IHD.

Keywords: Ischemic heart disease, coronary artery disease, angina, heart attack, risk factors, diagnosis, prevention, treatment, lifestyle modifications, medication.

NITROGEN MANAGEMENT FOR ENHANCED MAIZE YIELD: A STUDY ON NDVI AND SPAD DYNAMICS**SHIVASHANKAR K^{1*}, M. P. POTDAR², AISHWARYA GOLSHETTI³, ADITYA KAMALAKAR KANADE⁴, GURUPADA BALOL⁵, D. P. BIRADAR⁶, K. K. MATH⁷ AND KIRAN EMMIGANUR¹**¹Ph. D. (Agronomy), Department of Agronomy, COA, Dharwad, UAS, Dharwad²Professor (Agronomy), Department of Agronomy, COA, Dharwad, UAS, Dharwad³Ph.D. scholar, Dept. of Agronomy, College of Agriculture, VC Farm Mandya, UAS, Bengaluru⁴Ph. D. scholar, Department of Agronomy, Mahatma Phule Krishi Vidyapith, Rahuri⁵Scientist (Plant Pathology), AICRP on MuLLARP, UAS, Dharwad⁶Professor (retd.) (Agronomy), Department of Agronomy, COA, UAS, Dharwad⁷Professor (retd.) Dept. of SS & AC, College of Agriculture, Dharwad, UAS, Dharwad

Maize, a vital cereal crop globally, is often termed the "super plant" due to its C4 photosynthetic pathway, enabling it to thrive in diverse temperature conditions. However, achieving optimal growth requires balanced nutrient application, particularly nitrogen. Mismanagement of nitrogen can have adverse environmental effects, making it crucial to study its impact on maize yield. A study was conducted at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, during the rabi 2020-21 season to assess maize yield and yield attributes under varied nitrogen levels. The experiment utilized a Randomized Complete Block Design with nine treatments, ranging from 0 to 200% of the recommended dose of nitrogen (RDN) at 25% intervals. The study monitored the Normalized Difference Vegetation Index (NDVI) and Soil Plant Analysis Development (SPAD) values to understand the crop's greenness and chlorophyll content dynamics concerning nitrogen levels. NDVI values increased up to 58 days after sowing (DAS) and then declined, with the highest values observed under 200% RDN. Similarly, SPAD values peaked 48 DAS (rabi) and declined thereafter, showing the highest values with 200% RDN. The application of higher nitrogen levels significantly increased NDVI and SPAD values, indicating better chlorophyll content and leaf greenness. These findings align with previous studies showing that nitrogen application enhances chlorophyll production, thereby influencing crop growth and biomass. Yield parameters such as number of rows per cob, number of grains per row, test weight, grain yield, straw yield, and harvest index were significantly higher with 200% RDN compared to other treatments, though 175% RDN showed similar results. Understanding the dynamics of NDVI and SPAD values under different nitrogen levels can aid in developing strategies for real-time nitrogen management. By identifying threshold levels of these indices, farmers can optimize nitrogen application, leading to improved maize yields while mitigating environmental impacts.

Key words: Maize, SPAD, NDVI, Dynamics, Yield

FUTURE FRONTIERS IN VEGETABLE SCIENCE: SUSTAINABILITY AND INNOVATION**SHIVRAJ YADAV****School of Agricultural Sciences and Technology, BBAU- Lucknow (UP.)**

Vegetable science stands at the forefront of addressing critical challenges in agriculture, nutrition, and environmental sustainability. This abstract delves into the potential advancements and innovations shaping the future of vegetable production, with a focus on sustainability, resilience, and nutritional enhancement. The development of climate-resilient vegetable varieties is poised to revolutionize agriculture in the face of climate change. These varieties, engineered for traits like drought tolerance and heat resistance, promise to ensure stable yields and food security in increasingly unpredictable climates. The integration of precision agriculture techniques, including drones, sensors, and data analytics, offers immense potential to optimize resource use, monitor crop health, and enhance productivity in vegetable farming. Such advancements not only boost efficiency but also contribute to environmental conservation by minimizing water and chemical inputs. Genetic engineering, particularly utilizing CRISPR-Cas9 technology, presents exciting prospects for developing vegetables with enhanced nutritional profiles, improved disease resistance, and extended shelf life. These innovations address consumer health concerns and contribute to reducing food waste along the supply chain. Furthermore, the rise of vertical farming, hydroponics, and urban agriculture initiatives underscores a shift towards sustainable and localized vegetable production. These practices minimize land use, conserve water, and reduce transportation emissions, promoting food system resilience and community food security. Advancements in biological pest control methods, coupled with strategies for waste reduction and circular economy principles, further enhance the sustainability of vegetable production systems. Integration of blockchain technology enhances supply chain transparency, ensuring food safety and consumer trust. In conclusion, the future of vegetable science lies in a convergence of innovative technologies, sustainable practices, and collaborative efforts. Embracing these advancements promises a more resilient, nutritious, and environmentally sustainable vegetable supply for generations to come.

Keywords- Vegetable science, Sustainability, Innovation, Resilience, Climate-resilient varieties, Precision agriculture, Genetic engineering, CRISPR-Cas9, Vertical, farming, Urban agriculture

THE SILENT THREAT: UNVEILING THE MECHANISMS AND MANAGEMENT OF CORONARY ARTERY DISEASE**SHOVA MAGAR****Sharda University**

Coronary artery disease (CAD), the underlying cause of ischemic heart disease, stands as a global health crisis. This progressive condition arises from a buildup of fatty deposits (atherosclerosis) within the coronary arteries, restricting blood flow to the heart muscle. This abstract delves into the complex mechanisms driving CAD, exploring factors like dyslipidemia (abnormal blood fat levels), chronic inflammation, and endothelial dysfunction (impaired artery lining function). The impact of traditional risk factors like hypertension, diabetes, smoking, and a sedentary lifestyle are also addressed. The abstract further explores diagnostic approaches, highlighting the role of clinical evaluation, electrocardiography (ECG), stress testing, and advanced imaging techniques such as coronary angiography and computed tomography angiography (CTA) in identifying and characterizing CAD severity. Effective management strategies are then outlined, emphasizing the importance of preventive measures like lifestyle modifications (healthy diet, regular exercise, weight management) and smoking cessation. Pharmacological interventions with medications like statins, antiplatelet drugs, and blood pressure medications are discussed as crucial tools for managing CAD and reducing cardiovascular events. Finally, the abstract briefly mentions revascularization procedures, including coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI), employed to improve blood flow to the heart in patients with advanced CAD.

Keywords: Coronary artery disease, atherosclerosis, ischemic heart disease, risk factors, diagnosis, prevention, management, lifestyle modifications, medications, revascularization, CABG, PCI.

MICRONUTRIENTS ENHANCE TOMATO PRODUCTIVITY ON PLASTIC HOUSE IN MID HILLS CONDITION OF NEPAL**SHOVA SHRESTHA¹, SANDEEP TIMILSINA²**¹**NARC, National Soil Science Research Centre, Khumaltar, Lalitpur, Nepal**²**NARC, Horticulture Research station, Malepaten Pokhara Nepal**

Tomato (*Lycopersicon esculentum*) is one of the major commercial vegetable crops in Nepal. Open field cultivation during autumn winter is common in Terai, inner Terai and foot hills whereas cultivation inside plastic house in summer-rainy season in the hills is getting popularity which is sold as off-season product fetching higher prices. Plastic house cultivation is popular and emerging farming practice for Nepalese farmer in vegetable production. It is one of the viable alternatives for quality tomato production. The nutrients like N,P, K, Ca, Mg and S are requires in large amount and B, Fe Mn, Cu, Zn and Mo are essential in small amount for tomato production. Mineral composition of tomato depends on the amount and type of nutrients taken from the growth medium such as soil. Inadequate amount of nutrient availability can show deficiency symptom and influence the yield and quality of tomato. A field experiment in plastic house was carried out in Horticulture Research station Malepaten, Pokhara to compare the effect of micronutrients and their combination in major nutrients in tomato production and soil productivity. Srijana, a popular tomato hybrid among commercial producers, was purposively selected. Eight treatments including recommended dose of major nutrients with compost and combination of micronutrients were laid out in randomized complete block design and replicated thrice. Recommended dose of fertilizer with farm yard manure in combination with zinc, boron, calcium, magnesium showed the highest tomato yield (53ton ha⁻¹) and highest number of fruit per plant. Micronutrient enhances the yield of tomato as well as soil fertility gradients.

Key words: Tomato, Midhills, Plastic House, Micronutrients

POPULATION DYNAMICS ON MAJOR INSECT PESTS OF GREEN GRAM**SHRADHA PARMAR^{1*}, DR. A. K. SAXENA², DR. S. B. DAS³ AND MANEESHA¹**¹**PhD. Scholar, Division of Entomology, RVSKVV, Gwalior (M.P.)**²**Professor, Department of Entomology, JNKVV, Jabalpur (M.P.)**³**Professor and Head, Department of Entomology, JNKVV, Jabalpur (M.P.)**

Field experiment was carried out for the study of population dynamics of insect pests on green gram [*Vigna radiata* (L.)] at integrated farming system unit, Jabalpur (M.P.) during *kharif* season 2022-23. The result revealed that the lowest population of whitefly and jassid was observed in 36th and 43rd standard meteorological mean (SMW) respectively with the mean of 2 adult / plant and 2.34 adult / 6 leaves respectively and the highest population of whitefly (*Bemisia tabaci*) and jassid (*Empoasca kerri*) were observed in 37th SMW with the mean of 6.87 adult / plant and 6.56 adult / 6 leaves respectively when the maximum and minimum temperatures, morning and evening relative humidity, wind speed, rainfall, sunshine, evaporation, morning and evening vapor pressure and rainy days were 30.5⁰c, 24.2⁰c, 91%, 79%, 5.4Km/hr, 118.0mm, 4.3hr, 3.5mm, 22.6mm, 22.9mm and 4 days respectively. Correlation studies revealed that the whitefly showed significant positive correlation with wind speed ($r = 0.67$) and showed non-significant correlation with maximum and minimum temperature, morning and evening relative humidity, rainfall, sunshine, evaporation, morning and evening vapor pressure and rainy days. While jassid showed significant positive correlation with evening relative humidity ($r = 0.72$), wind speed ($r = 0.71$) and rainy days ($r = 0.69$) and showed non-significant correlation with maximum and minimum temperatures, morning relative humidity, rainfall, sunshine, evaporation, morning and evening vapor pressure.

Keywords: Significant, Population dynamics, Insect pests, Green gram, Correlation

HEALTH RISKS TO AGRICULTURAL COMMUNITIES: IMPACT OF B. PSEUDOMALLEI CONTAMINATION IN SOIL AND WATER SOURCES IN GOA, INDIA**SHRADHA R. GAONKAR , RAJESHWAR NAIK, RAJESH NAIK, SHAILESH KAMAT, ALKA SAGAR**^aDepartment of Microbiology, Royal Hospital, 403601, Goa, India^bMaharaja Agrasen Himalayan Garhwal University, India^cRoyal Hospital Director, 403601, Goa Medical College, Goa, India
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Burkholderia pseudomallei, the etiological agent responsible for the potentially life-threatening condition known as melioidosis, has been identified in few farmers in Goa, India, marking the documented evidence of its presence in this region. Melioidosis, an infectious disease prevalent in tropical and subtropical regions, is caused by the soil-dwelling bacterium *Burkholderia pseudomallei*. In areas such as South West India, where heavy rainfall is common, most human infections occur during these periods, although the reasons behind this seasonal trend remain incompletely understood. Despite India being among the countries projected to have a high burden of melioidosis, there is limited information available regarding the environmental presence of *B. pseudomallei* and the factors influencing its distribution. This study sought to address this gap by investigating the prevalence of *B. pseudomallei* in infected farmers from South Goa India. This case series study investigates the epidemiological factors, clinical manifestations, and drug susceptibility patterns of 12 microbiologically confirmed cases of melioidosis at South Goa Tertiary care hospital, over a 3 years period. The diagnosis of *Burkholderia* infection was established through culture of blood or specific body fluids (such as joint fluid aspirate or pus aspirate) on Ashdown's medium/Sheep Blood agar. The study reveals that *Burkholderia* infection is most frequently observed in middle-aged and elderly individuals, with predominance among males and a notable association with diabetes mellitus. Field workers like paddy field farmers represent the most common occupational group affected by this infection. Monobactams are frequently effective against *Burkholderia* strains; however, there is an emerging challenge posed by strains resistant to ceftazidime, highlighting the need for vigilant clinical management strategies.

Keywords: *Burkholderia pseudomallei*, farmers, ceftazidime, antibiotic resistance, melioidosis**GEOETHICS AND ITS IMPLICATION IN NEPALESE CULTURE****SHREE PRASAD VISTA**

National Soil Science Research Centre, NARC, Khumaltar, Nepal

Geoethics is a branch of ethics that focuses on the ethical considerations related to geological and Earth science activities, including research, exploration, extraction of resources, and environmental management. It deals with questions about how humans interact with the Earth, how we use its resources, and how we impact its ecosystems. Geoethics aims to promote responsible behavior and decision-making in the context of geological and Earth science. Geoethics consists of the research and reflection on those values upon which to base appropriate behaviours and practices where human activities intersect the Geosphere. Geoethics deals with the ethical, social and cultural implications of Earth Sciences research and practice, providing a point of intersection for Geosciences, Sociology and Philosophy. Geoethics represents an opportunity for Geoscientists to become more conscious of their social role and responsibilities in conducting their activities. Geoethics is a tool to influence the awareness of society regarding problems related to geo-resources and geo-environment. Geoethics is guided by several key principles and Nepalese society has several traditions related to cultural use of soil and such values highlights importance of soil in the society and encourage to conserve soil for future generation. Promoting geoethics is another way of promoting culture and its values in the Nepalese society. By integrating geoethics principles into cultural norms and practices, Nepal can foster a harmonious relationship between human activities and the environment, ensuring sustainable development while preserving its unique cultural and natural heritage.

Keywords: Geoethics, Geothical principles, Nepalese culture, society, values, etc.**Novel approaches for the management of stored grain insect pests****Shreya Mishra^{1*} & Sharad Kumar Meena²****Department of Entomology College of Agriculture, Jodhpur Agriculture University, Jodhpur (Rajasthan)****Department of Entomology, Rajasthan Agriculture Research Institute, Durgapura, Jaipur-(Rajasthan)**

The solution to the global food crisis and improvement of the food security situation may be reached by increasing food production and preventing losses during the food supply chain. Most of the scientific efforts so far have aimed to increase the yield of crops. However, food losses during storage and the supply chain may reach levels of 20-40%. One of the most significant factors responsible for the global food crisis is grain losses during storage which are largely caused by pest insects. During the off-season, when fresh food is not available, humans have to consume stored grain food. Unfortunately, these stored grains are later infested with many pests. Food storage is very much susceptible to infestation with several pests which can cause extensive post-harvest losses, spoilage, and less demand in markets, causing a huge economic crisis. Hence, successful management of stored grain pests becomes necessary to prevent these from insect pests. The management of stored grain insect pests is followed with traditional approaches and it needs to get advancement. Therefore, some new methods are required to maintain the quality and economic value of stored grains. The purpose of this presentation is to review some novel approaches for the management of stored grain insect pests.

Keywords: Food-crisis, Stored grain pests, Traditional approaches, Novel approaches, Management

FLORAL BIOLOGY AND POLLINATION STUDIES IN GAILLARDIA FOR SUSTAINABLE FLOWER PRODUCTION IN BREEDING PROGRAM**SHREEDEVI BADIGER^{1*}, BALAJI KULKARNI., MALLIKARJUN AWATI., HARISH B, M, SATISH D, ANASUBAI HOSAGOUDAR*****Ph.D. Scholar, Dept. of Floriculture and Landscape Architecture, Collage of Horticulture, Bagalkot****Dean and Professor of Floriculture and Landscape Architecture, Collage of Horticulture, Bagalkot****Associate Professor of Crop Physiology, Collage of Horticulture, Bagalkot****Ph.D. Scholar, Dept. of Vegetable Science, CSKHPKV Palampur Himachal Pradesh****Associate Professor, Dep. of Genetics and Plant Breeding Collage of Horticulture, Bagalkot****Assistant Professor of Floriculture and Landscape Architecture, Collage of Horticulture, Bagalkot**

Gaillardia the 'Blanket Flower' that belongs to Asteraceae family and native of South-Western United State and Mexico and being predominantly propagated through seeds. In this study, the pollen viability (acetocarmine test), pollen germination rate (agar medium test), stigma receptivity, anther dehiscence and flower morphology were studied. Among four petri plates containing pollen samples, two petri plates were examined immediately after the collection, while the other two were stored for one week. Likewise, pollen germination test was carried out in two duration viz., after 24 hours and one week of incubation. Data revealed that pollen viability was higher in the samples which were sown immediately with acetocarmine with percentage pollen viability of 95.53%. On the other hand, the pollen stored for one week measured 48.25% of pollen viability. The percentage germination of pollen after 24 hours was 81.45%, while 10.20% after one week. Contrasting to the common feature of Asteraceae family gaillardia lacks pistillate flowers in ray florets and being highly cross pollinated. Hence, we examine the stigma receptivity and anther dehiscence by manual crossing technique in different time durations like 8 am to 1pm in one hour intervals. Results shown that more number of seed setting was observed for the pollination done during 11am thereby confirming the stigma receptivity that start by 9am and till up to 12pm. Minimum seed setting was observed at 8am and 1pm. Anther dehiscence was from 9 am predominantly controlled by sunlight and total inhibition of anther dehiscence in cloudy weather were noticed. Concluding that Knowledge regarding the pollen viability, pollen germination and flower biology of this species will practically benefit plant breeders and conservation purposes, since gaillardia is found in the wild, and as of now, the species has been recorded only in the northern parts of Karnataka.

Key words: Gaillardia flower, Acetocarmine, Agar media and crossing kit.**EXPORT COMPETITIVENESS OF TOMATO FROM INDIA: MARKOV CHAIN APPROACH****SHREESHAIL RUDRAPUR^{1*} AND DEEPA HIREMATH²****¹Assistant Professor, Dept. of Agril. Economics, COA, NAU, Waghai-394730****²Assistant Professor, Dept. of Agril. Economics, COA, NAU, Bharuch-393010****Navsari Agricultural University (NAU), Navsari, Gujarat, India-396445**

India is the second largest producer of tomatoes in the world after China contributing around 10 per cent of the world's total tomato production and it has got a lot of demand in the international market. The study was conducted to know the growth and stability in the area, production, productivity, and export of Indian tomatoes. The study also aimed to analyse the changing direction and magnitude of India's tomato export to different countries. The study is based on secondary data collected from different sources over a period of 15 years (2006-07 to 2020-21). Compound annual growth rate analysis and instability index analysis were used to work out the growth and instability in the area, production, productivity, and export of Indian tomatoes. To analyse the direction of trade to different export destinations and to workout export projections, the Markov chain analysis/transition probability matrix through linear programming was used. The findings of the study revealed that there was positive growth in the area, production, productivity, and even export of tomatoes from India but growth rates as well as instability were found to be more in export compared to area, production, and productivity. The results of the Markov chain analysis/transition probability matrix showed that other minor countries pooled under the category 'others', Bangladesh and UAE were more stable importers of Indian tomatoes whereas Nepal and Oman were found not at all stable countries with no retention of trade.

Keywords: Compound growth rate, Export, Markov chain analysis, Tomato**NOVEL APPROACHES FOR THE MANAGEMENT OF STORED GRAIN INSECT PESTS****SHREYA MISHRA^{1*} & SHARAD KUMAR MEENA²****Department of Entomology College of Agriculture, Jodhpur Agriculture University, Jodhpur (Rajasthan)****Department of Entomology, Rajasthan Agriculture Research Institute, Durgapura, Jaipur-(Rajasthan)**

The solution to the global food crisis and improvement of the food security situation may be reached by increasing food production and preventing losses during the food supply chain. Most of the scientific efforts so far have aimed to increase the yield of crops. However, food losses during storage and the supply chain may reach levels of 20-40%. One of the most significant factors responsible for the global food crisis is grain losses during storage which are largely caused by pest insects. During the off-season, when fresh food is not available, humans have to consume stored grain food. Unfortunately, these stored grains are later infested with many pests. Food storage is very much susceptible to infestation with several pests which can cause extensive post-harvest losses, spoilage, and less demand in markets, causing a huge economic crisis. Hence, successful management of stored grain pests becomes necessary to prevent these from insect pests. The management of stored grain insect pests is followed with traditional approaches and it needs to get advancement. Therefore, some new methods are required to maintain the quality and economic value of stored grains. The purpose of this presentation is to review some novel approaches for the management of stored grain insect pests.

Keywords: Food-crisis, Stored grain pests, Traditional approaches, Novel approaches, Management

SOIL MOISTURE, TEMPERATURE AND WATER PRODUCTIVITY OF COTTON AFFECTED AS DIFFERENT IRRIGATION LEVELS AND MULCHES**SHRI RAKESH¹ AND SAMPAT CHOUDHARY²**¹Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan²Department of Agronomy, Rajasthan College of Agriculture, MPUAT, Udaipur

A field experiments were conducted consecutively for two years during kharif season of 2019 and 2020 at Instructional Farm, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner to study the effect of irrigation levels and mulches on growth, yield and water productivity of American cotton (*Gossypium hirsutum* L.) in Arid Western Rajasthan. The present study on American cotton was undertaken using 'RCH-650 BG-II' variety with five level of irrigation (0.30 PE, 0.45 PE, 0.60 PE, 0.75 PE through drip irrigation and 0.75 IW/CPE ratio through surface irrigation) and four mulches (no mulch, dust mulch, straw mulch and polythene mulch). Results of the investigation revealed that crop irrigated at 0.60 PE through drip irrigation recorded significantly higher physical and economical water productivity as compared to irrigation level of 0.30, 0.45 PE through drip irrigation and 0.75 IW/CPE ratio (Surface irrigation), it was at par with drip irrigation level of 0.75 PE during both the years and pooled result basis. Further, increase in irrigation water also increase soil moisture content at 0-15 cm and 15-30 cm soil depth and reduce soil temperature. Higher soil moisture content was maintained under plot irrigated at 0.75 PE followed by 0.60 PE through drip irrigation. Among mulch treatments, straw mulch proved effective in terms of physical and economical water productivity over no mulch, dust mulch and polythene mulch. Whereas, polythene mulch plot observed higher soil moisture and higher soil temperature followed by straw mulch during both the years. Straw mulch observed lower soil temperature as compared to no mulch, dust mulch and polythene mulch.

Keywords: Cotton, Irrigation, Mulch, WP, Temperature and Moisture**COMPARATIVE PERFORMANCE OF BIO-INTENSIVE AND INSECTICIDE DEPENDENT MODULES OF PINK BOLLWORM MANAGEMENT IN BT TRANSGENIC COTTON****SHRILAKSHMI R.G AND UDIKERI S. S.*****Department of Entomology, College of Agriculture, Dharwad. University of Agriculture sciences, Dharwad, Karnataka, India**

Cotton (*Gossypium hirsutum* L) is a significant commercial crop, playing a spectacular role in India's economy. In recent years, pink bollworm, *Pectinophora gossypiella* (Saunders) has emerged as a serious problem causing severe damage to cotton in several parts of our country especially in south and central cotton-growing zones for Cry1Ac and Cry2Ab endotoxins. Thus, the study was conducted at ARS Dharwad Farm, Dharwad during 2018-19 and 2019-20 to check efficacy of bio-intensive IPM module along with insecticide optional. The module (M2) having components viz., seed treatment with imidacloprid 70 WS @ 10 g/kg, maize as eco-friendly crop. Installation of pheromone traps and spraying of Thiodicarb 75 WP at flowering, Profenophos 50 EC at peak boll formation and Lamda cyhalothrin 5 EC after 100 DAS, recorded least infestation of PBW from 60 DAS to 165 DAS in both the seasons. Module- M2 found to be superior over other modules by recording least mean flower damage, green boll and locule damage of 7.10, 15.11 and 10.49 (pooled) percent respectively. Further, the highest no. of good bolls (29.28/pl), good kapas (15.27q ha⁻¹) and maximum B:C ratio (2.26 in 2018-19 and 2.16 in 2019-20) observed the M2 module. The bio intensive IPM module (M3) performed well next to insecticide module (M2), yielding 12.65 q ha⁻¹ of good kapas and having a B:C ratio of 2.11 and 2.01 in 2018-19 and 2019-20, respectively. Thus, the M2 module was proven to be an excellent way for managing the PBW population. Even if the yield and BC ratio in the M3 module are lower, it has been determined to be a sustainable strategy when considering the environmental implications.

SPATIAL ANALYSIS OF RICE CROP HARVEST INDEX (HI) USING GIS: ENHANCING AGRICULTURAL SUSTAINABILITY AND FOOD SECURITY**SHRUTI NAMDEO*¹ AND LOKESH KUMAR TINDE²**¹Research Scholar, Department of Rural Technology and Social Development, Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur, Chhattisgarh, India²Assistant Professor, Department of Rural Technology and Social Development, Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur, Chhattisgarh, India

Rice cultivation plays a critical role in global food security, making it imperative to optimize crop productivity and sustainability. The Harvest Index (HI), a key indicator of yield efficiency, provides valuable insights into crop performance and resource allocation. The research was carried out at the total 6 villages of Bilaspur District, Chhattisgarh state, India. A total of 20 GPS point locations was selected for map preparation. This study explores the application of Geographic Information Systems (GIS) in analysing and mapping the Harvest Index of rice crops, facilitating informed decision-making and resource management for agricultural sustainability. HI area was categorized into five categories as very high, high, moderate, low, and very low. HI maps has derived by the raster calculator indicated that the major portion of the study area are under moderate area (56.4%) and only a small portion of research area are under high (26.3%) and very high (17.3%). Through case studies, spatial modelling techniques, and policy implications, attendees will gain a deeper understanding of how GIS can enhance the resilience and productivity of rice farming systems, contributing to global food security goals.

Key words: Bilaspur District, Harvest Index (HI), Rice crop, Remote Sensing & GIS.

THE ROLE OF TECHNOLOGY FOR SUSTAINABLE CAVE TOURISM WITH SPECIAL REFERENCE TO JHARKHAND SHRUTI KHALKHO AND DR. ARPANA PREMI LINA ORAON

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Cave tourism is a popular activity that can generate significant economic benefits for local Indigenous communities in Jharkhand which is a home of impressive cave formation including the region of Hazaribagh, Chatra, Simdega and the adjoining areas. However, it is important to manage cave tourism in a sustainable way to protect the cave environment and to ensure that visitors have a positive experience. Technology can play a significant role in promoting sustainable cave tourism in India especially in Jharkhand. Caves are delicate ecosystems, and tourism can have a negative impact on them if not managed carefully. Technology can help to minimize the negative impacts of tourism and promote sustainable practices. This paper reviews a range of innovative technologies that can be used for sustainable cave tourism in Jharkhand, including virtual reality (VR), augmented reality (AR), sensors, smartphones, block chain, artificial intelligence (AI), and social media. These technologies can be used to monitor environmental conditions, manage visitor flows, improve energy efficiency, make caves more accessible, and educate visitors about sustainable tourism practices. The research was conducted using a mixed-methods approach, including a literature review, interviews with cave tourism experts, and a case study of a popular cave tourism destination. The paper also discusses how these technologies can be used to promote sustainable cave tourism. For example, block chain technology can be used to create a secure and transparent system for tracking visitor tickets and reservations. AI can be used to create personalized visitor experiences and to provide visitors with information about the cave in a variety of languages. Social media can be used to promote sustainable cave tourism practices and to engage with potential visitors. By using innovative technologies, cave managers can promote sustainable cave tourism practices and provide visitors with a memorable and enjoyable experience. Thus the cave tourism industry in Jharkhand can continue to grow and thrive while also protecting caves and the communities that depend on them.

Keywords: Cave Tourism, Sustainability, Technology, Promotion

EFFECTS OF GRAPHENE ON ANTHRACENE-CONTAMINATED SOIL OF *TRIGONELLA FOENUM-GRÆCUM* SHRUTI SUMAN* AND RAM PRASAD**

Department of Botany, Mahatma Gandhi Central University, Motihari, Bihar, India

The long-term use of chemical fertilizers had numerous harmful effects on farmland and has significantly affect agriculture's sustainable development. Graphene, a unique and effective nanomaterial is used in plant-soil applications to improve plant nutrient uptake, reduce chemical fertilizer pollution by relieving inadequate soil nutrient conditions, and enhance soil absorption of nutrient components. We investigated the effects of graphene amendment on soil contaminant, *Trigonella foenum-graecum* growth, and soil physicochemical parameters. Graphene increased adsorption capacity to enhance the efficiency of environmental clean up processes. In this study, we mainly focus on the phytoremediation of polycyclic aromatic hydrocarbon-contaminated soil (Anthracene) with the help of graphene. Graphene is applied as a soil conditioner to enhance the process of phytoremediation and seedling growth of fenugreek plants and their biomass, morphological and biochemical analysis.

Keywords: Phytoremediation; graphene; anthracene; soil contaminant; nutrient uptake

EVALUATION OF LOCAL GENOTYPES OF BRINJAL FOR SHOOT AND FRUIT BORER INCIDENCE UNDER SHADE NET HOUSE IN CENTRAL DRY ZONE OF KARNATAKA

DR. SHRUTI, P. G., DR. PRAKASH KERURE, DR SRINIVASA V, DR MAHANTESH P S

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Brinjal (*Solanum melongena* L.) is an important vegetable which belongs to the family *Solanaceae* and has chromosome number of $2n = 2x = 24$. It is one of the major and principal vegetable crop widely grown in both temperate (during warm season) and tropical regions of the world. Though many varieties and hybrids have been emerged for consumption, still local genotypes or local varieties still hold greater importance with respect to its fruit quality, taste, organoleptic traits. Brinjal shoot and fruit borer (*Leucinodes orbonalis*) is a major concern in cultivation of Brinjal in Karnataka. Keeping their adverse impact on quality production, fifteen brinjal genotypes were evaluated for shoot and fruit borer resistance at College of Horticulture, Hiriya, under Central Dry zone of Karnataka during Kharif 2023-24. The research was conducted under shade net house. Results revealed wide range of variations among genotypes for important morphological characters viz., leaf, petiole, mid-rib, prickliness (spiny), fruit shape, colour and fruit yield. The genotypes, Rampur brinjal, Melavanki local, Malapur local and Mysore local showed tolerance with minimum mean infestation of shoot borer ranging from 21 to 23.50 per cent with significantly higher fruit yield. Resistance against brinjal shoot and fruit borer depicted a significant importance for the breeders as well as for the commercial growers of this crop. On the basis of these findings, the superior genotypes viz., Rampur local (egg shaped & Green with Purple striped fruit, non-spiny), Melavanki local (egg shaped & purple with white striped fruit, spiny), Malapur local (egg shaped & green with white striped fruit, spiny) and Mysuru local (cylindrical shaped and light green fruit with non-spiny) could be recommended for commercial cultivation in the state of Karnataka and adjoining areas of the similar agro-climatic conditions.

Keywords: Brinjal, *Solanum melongena*, shoot and fruit borer, yield

PHENOTYPIC ASSESSMENT OF PARENTS AND DEVELOPED BRINJAL F₁S FOR BACTERIAL WILT RESISTANCE IN NORTHERN ZONE OF KARNATAKA**DR. SHRUTI, P. G., DR. HANCHINAMANI, C. N. DR SARVAMANGALA CHOLIN AND DR MAHANTESH P S**
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Bacterial wilt in brinjal, caused by *Ralstonia solanacearum*, is highly diverse and the identification of new sources of resistance for the incorporation of multiple and complementary resistance genes in the same cultivar is one of best strategy for durable and stable resistance. Identification and development of high yielding resistant varieties is of prime important aspect. The investigation on “Phenotypic assessment of parents and developed brinjal F₁s for bacterial wilt disease resistance in Northern zone of Karnataka” was carried out during 2018-2019 at KRCCH Arabhavi, UHS Bagalkot during summer with 11 parents, 24 F₁ crosses and 2 commercial checks. Field screening of brinjal genotypes to bacterial wilt disease incidence was carried out as per the method adopted by Winstead and Kelman (1952). Under natural disease pressure conditions each plant in each plot was observed for appearance of bacterial wilt disease symptoms. Among 11 parents and 24 F₁ crosses, HUB -5, HUB -6, HUB -8, HUB -10, HUB -11, Acc-10, CO-2, HUB-26, HUB-13, HUB-1 x CO-2, HUB-1 x HUB-26, HUB-1 x HUB-13, HUB-5 x CO-2, HUB-5 x HUB-13, HUB-6 x CO-2, HUB-6 x HUB-26, HUB-6 x HUB-13, HUB-8 x CO-2, HUB-8 x HUB-13, HUB-10 x CO-2, HUB-10 x HUB-13, HUB-11 x CO-2, HUB-11 x HUB-26, HUB-11 x HUB-13, Acc -10 x HUB-26, Acc-10 x HUB-13 with commercial checks Mahy Super 10 and Manjari were highly resistant with 0 % infestation, due to presence of hyper sensitive genes, so these crossed stock could be further utilized as base source for crop improvement in brinjal for the development of bacterial wilt resistant varieties.

Key notes –bacterial wilt, brinjal, crosses, resistance, susceptibility**ISOLATION, SCREENING AND CHARACTERIZATION OF CELLULOSE PRODUCING BACTERIA****SHRUTI, DR. SANTHOSH, G. P.*, DR. SHUBHA, S.****Department of Microbiology, University of Agricultural Sciences Dharwad (UASD)**

Cellulose is considered as one of the most prevalent polymeric compounds in nature, and it is presented in all plants and manufactured by various microorganisms. Bacterial cellulose, an exopolysaccharide produced by bacteria, has unique structural and mechanical properties and is highly pure compared to plant cellulose. The current study aims to isolate and select the bacterial isolate that produces bacterial cellulose. Eight samples of rotten fruits were taken from local market, Dharwad city, Karnataka. A modified HS medium was used to isolate the bacteria from rotten fruit samples. Seventy bacterial isolates were obtained from all samples, where the rotten apple gave the highest number of isolates, while rotten sapota gave the lowest number of isolates. The two steps of screening were carried out to select the best cellulose-producing bacterial isolates. Results from the primary screening indicated that only 24 isolates showed fluorescence with fluorescent brightener dye when observed under UV light. The second screening step confirmed the results of the first step, as the results indicated that only 24 isolates showed the ability to produce bacterial cellulose when grown in HS broth media. The results showed that the isolates BCI 5, BCI 16, BCI 22 were superior in its ability to produce bacterial cellulose than other isolates. The local isolates BCI 5, BCI 16, BCI 22 were chosen as the efficient isolates that produces bacterial cellulose. The morphological and biochemical characteristics of the efficient isolates indicated that the isolates belong to the *Acetobacter* spp.

Key words: *Acetobacter* spp, Bacterial cellulose, HS medium and Rotten fruits**ORGANIC MULCHING: FOSTERING SOIL HEALTH AND STRENGTHENING FOOD SECURITY*****SHUBH H. LUNAGARIYA¹, HARSH A. KAMANI², HIMALAY R. PATEL² AND RUTVIK G. RABADIYA¹**¹Under Grad. Scholar and ²Assistant Professor, Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat, India

India, with nearly three-fourths of its population dependent on agriculture for sustenance, faces significant challenges in meeting its food requirements due to its ever-increasing population. Enhancing soil health is crucial for improving agricultural productivity in this context. Soil, being a non-renewable natural resource, requires proper management to ensure sustainable development from an agricultural standpoint. Mulching, derived from the German word "molsch" meaning "easy to decay," has been utilized since ancient times as a ground cover. It encompasses both organic materials (such as wood chips, leaves, hay, straw, etc.) and inorganic materials (like plastic films, rocks, etc.). Mulching has shown effectiveness in improving soil health by reducing evaporation, enhancing moisture retention, regulating temperature, increasing nutrient availability, suppressing weeds, controlling pests and diseases, among other benefits. While organic mulch materials are commonly used to enhance soil health in arable systems, the global importance of inorganic plastic mulch has risen in recent decades. However, extensive use of plastic mulch can pose soil and environmental hazards, potentially compromising agricultural productivity and sustainability. Therefore, it is essential to monitor agricultural soil health concerning different mulching materials and local environmental conditions to ensure sustainable development and desirable food production outcomes. Organic mulching remains a viable and sustainable option for improving soil health and productivity. The choice of mulching material should consider factors such as crop type, management practices, and climatic conditions. Employing low-cost, eco-friendly, and biodegradable organic mulching materials can contribute significantly to sustainable soil health and productivity in agricultural systems.

Keywords: Mulch, Organic mulch, soil health, food security, sustainability

PRECISION IRRIGATION TECHNOLOGIES AND THEIR APPLICATIONS IN NIGELLA PRODUCTION: ADVANTAGES, LIMITATIONS, AND FUTURE PROSPECTS***SHUBHAM AHIRWAR¹, REENA NAIR², JYOTI LOHARE³, DHARMENDRA VIJAYVERGIYA⁴**^{1,3,4}**Ph.D. Scholar, Department of Horticulture, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)**²**Assistant Professor, Department of Horticulture, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, MP**

Precision irrigation is a farming technique that involves applying water to crops with a high level of accuracy and control. Precision irrigation technologies have revolutionized agricultural practices, offering efficient water management solutions tailored to specific crop needs. Nigella is an annual herbaceous plant belonging to the family Ranunculaceae is an important seed spice crop has origin from Mediterranean region through west Asia to north India. This abstract explores the application of precision irrigation technologies in Nigella production, elucidating their advantages, limitations, and future prospects. For instance, drip irrigation delivers water directly to the plant root zone, optimizing water use efficiency and minimizing water wastage, while sensor-based systems enable real-time monitoring of soil moisture levels for precise irrigation scheduling. Despite their benefits, precision irrigation technologies also pose challenges such as initial investment costs, technical complexity, and site-specific adaptation requirements. However, ongoing research and innovation hold promise for overcoming these limitations and further enhancing the efficacy of precision irrigation in Nigella production.

Keywords: Water use efficiency, Crop productivity, Real-time monitoring, Sensor-based irrigation systems, Drip irrigation, Micro-irrigation, Soil moisture levels, Irrigation scheduling.

DEVELOPMENT OF AUTOMATIC IRRIGATION SYSTEM FOR VEGETABLE CROP CULTIVATION**ER. SHUBHAM DHAKAD, DR. MANJUSHREE SINGH, DR. VIPUL SHINDE, DR. ASHISH SONAWANE*****Department of Agricultural Engineering, N. M. College of Agriculture, Navsari Agricultural University, Gujarat, India**

Irrigation is a critical component in the cultivation of vegetable crops, directly influencing the growth, yield, and quality of the produce. Vegetables generally required ample amount of water from germination to harvesting. Efficient irrigation management is essential for successful vegetable cultivation which is little bit difficult for manual irrigation. By understanding the specific water needs of different vegetable crops and adopting suitable irrigation methods and practices, farmers can enhance crop yield, improve quality, and conserve water resources, that's why we were developed an automatic irrigation system for the okra crop. The cultivation of Okra (*Abelmoschus esculentus*), a versatile and valuable crop, faces challenges such as water scarcity, which significantly impacts its productivity. To address this issue, a study was conducted at the Asian Institute of Technology proposing an Arduino-based automatic irrigation system using soil moisture sensors specifically tailored for okra cultivation. This system aims to optimize water usage by scheduling irrigation based on different field capacities, ensuring adequate moisture levels for optimal plant growth and productivity. The proposed system integrates various components including Arduino Uno microcontroller, relay, moisture sensor module, water pump, and breadboard. Calibration of the moisture sensor was performed to accurately measure soil moisture levels. Okra seeds were cultivated in pots to test the system's efficacy in real-world conditions. Results demonstrated satisfactory performance in laboratory testing, with the motor activating based on soil moisture levels. However, further field experiments are warranted to validate its effectiveness under varying moisture stress conditions. This study presents a promising approach to enhance okra cultivation practices, offering potential benefits in water conservation and crop yield optimization.

Keywords: Automatic Irrigation System, Moisture Sensor, Arduino, Field capacity, okra

UNVEILING THE DRIVERS OF SULFUR AVAILABILITY IN SOILS: A MULTI-DISTRICT ANALYSIS**SHUBHAM JAISWAL^A, SANJAY TIWARI^B, VIPIN KUMAR^B, SANTOSH KUMAR SINGH^B, SATISH KUMAR SINGH^A**^a**Department of Soil Science & Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University**^b**Department of Soil Science, PGCA, Dr. Rajendra Prasad Central Agricultural University, Pusa**

This study explores the relationship between soil properties and sulfur pools in four districts of North Bihar. We analyzed 160 soil samples, including 20 deficient and 20 sufficient in sulfur. Organic sulfur dominated the total content, followed by water-soluble and sulfate. Soil pH, calcium carbonate, organic carbon, and sand fraction emerged as key determinants of sulfur forms. Notably, a consistent trend emerged across districts: total S > organic S > residual S > inorganic S > sulfate S > water-soluble S. Positive correlations between sulfur forms suggest a dynamic equilibrium. Additionally, correlation analysis revealed that sand, clay, pH, calcium carbonate, and organic carbon significantly influence the availability of various sulfur pools in these soils. This multi-district investigation provides valuable insights into understanding and managing sulfur availability for optimal crop production.

Keywords: Sulfur pools, Soil properties, Correlation analysis, Sulfur availability, Multi-district

INFLUENCE OF WEATHER PARAMETERS ON GROWTH AND YIELD OF DIFFERENT CULTIVARS OF *KHARIF* GREEN GRAM (*VIGNA RADIATA* L.) GROWN UNDER VARIABLE THERMAL REGIME

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This field experiment investigated the performance of different kharif green gram cultivars and the impact of weather conditions on their growth and yield. It is conducted at the Student's Instructional Farm of Acharya Narendra Deva University of Agriculture & Technology in Kumarganj, Ayodhya (U.P.) during the 2022 kharif season, the experiment employed a Split Plot Design with nine treatment combinations comprising three sowing dates (5th, 15th, and 25th July) and three varieties (Pusa Vaisakhi, Narendra moong-1, and SML-668). Notably, Pusa Vaisakhi exhibited the longest maturity period (80 days), followed by Narendra moong - 1 (79 days) and SML - 668 (77 days). The study also evaluates the influence of growing conditions, focusing on thermal requirements. Results indicate that optimal thermal conditions on July 5th (31.5°C) significantly promoted growth, yield attributes, and overall yields compared to July 15th and 25th (30.5°C). Additionally, the research underscores varietal disparities with Pusa Vaisakhi outperforming followed by Narendra moong - 1 and SML - 668 in growth, development, and yield. These findings emphasise the importance of comprehending varietal traits and environmental factors for enhancing kharif green gram production efficiency.

Key words: Field experiment, weather conditions, Split Plot Design, thermal requirements, yield attributes, varietal traits

CHARACTERIZATION AND EVALUATION OF *RHIZOBIUM* ISOLATED FROM ROOT NODULES OF PEA (*PISUM SATIVUM* L.) FROM DIFFERENT PEA GROWING REGIONS OF VARANASI

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Pea (*Pisum sativum* L.) is one of the important pulses grown in rabi season in eastern parts of Uttar Pradesh as a green vegetable as well as for grains. The amount of nitrogen as required by this crop is mostly dependent upon symbiotic N₂-fixation. An attempt was made to isolate native *Rhizobium leguminosarum* from different pea growing soils around Varanasi where morphological and biochemical properties of *Rhizobium* isolates were studied. Further the best ten nodulated isolates were selected to know their efficiency with varied levels of nitrogen and their effect on yield in pot experiment. The presence of the distinct bacterial colonies on YEM (Yeast Extract Mannitol) plates with circular shape, white to pink color and gummy consistency were selected for further screening through series of confirmatory tests to distinguish from *Agrobacterium*. The nodulation studies made in Leonard jar assembly showed that the *Rhizobium* isolate-6 produced the highest number of nodules per plant (11.00 plant⁻¹) and the maximum germination percentage (83.33). *Rhizobium* isolate-6 recorded highest plant height, number of leaves as compared to other isolates of *Rhizobium* at 30, 60 and 90 DAS along with highest fresh and dry weight of nodules per plant i.e. (301.500 and 123.900) mg respectively. *Rhizobium* isolate-6 recorded maximum available N (199.33 kg/ha), maximum biomass. Hence there is need for inoculating pea with effective strain of *Rhizobium* which improves symbiotic nitrogen fixation in order to reduce the use of inorganic fertilizers and to obtain higher yields. Using the above isolate can be very useful in manufacturing an efficient biofertilizer to contribute in the concentration of the soluble nitrogen in the soil improving the soil health to achieve sustainable productivity.

Keywords: *Rhizobium*, symbiotic nitrogen fixation, Biofertilizer, Sustainable

EFFECTIVENESS OF NATIVE *RHIZOBIUM* ON THE NODULATION AND GROWTH CHARACTERISTICS OF THE HOST LEGUME

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The purpose of this study was to assess the symbiotic efficacy of native *Rhizobium* isolated strains on pea morphological features, weight, and nodule count. Fresh and healthy root nodules were collected from the major pea growing regions in the Varanasi district of Uttar Pradesh in order to achieve this goal. The effects of native *Rhizobium* isolated strains in the tests were assessed using these nodules. *Rhizobium* isolates demonstrated a recognizable pattern of responses concerning colony characteristics and growth rate on various growth media in a lab study. A pot experiment conducted on the sandy clay loam soil of the research farm of Banaras Hindu University in Varanasi evaluated the impact of inoculations of *Rhizobium* isolates on nodulation, growth, and nitrogen fixation of pea. *Rhizobium* isolates R1, R2, R3, R4, R5, R6, R7, R8, R9, and R10 were used in the inoculation treatments. When the pea was 50% flowering, the *Rhizobium* isolates R6 and R7 significantly improved nodulation, growth, and nitrogen fixation. The quantity and dry weight of nodules, as well as the N content and uptake by pea shoots, all showed strong positive correlations. Therefore, in order to decrease the usage of inorganic fertilizers and increase yields, peas must be infused with an efficient strain of *Rhizobium* that enhances symbiotic nitrogen fixation. Making an effective biofertilizer can help increase the amount of soluble nitrogen in the soil and improve soil health, which will lead to sustainable productivity.

Keywords: *Rhizobium*, symbiotic nitrogen fixation, Biofertilizer, Sustainable agriculture, Soil Health

THE ROLE OF INTERNET OF THINGS (IOT) IN SUSTAINABLE AGRICULTURE: PIONEERING PRECISION AND EFFICIENCY

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The Internet of Things (IoT) is playing a transformative role in agriculture. The integration of Internet of Things (IoT) technology into agriculture is revolutionizing sustainable practices by enabling precision farming techniques, optimizing resource utilization, and enhancing crop monitoring and management. IoT sensors collect real-time data on soil moisture, nutrient levels, and weather conditions, allowing farmers to make informed decisions on irrigation and input application, minimizing waste and environmental impact. Additionally, IoT devices facilitate early detection of crop stress, diseases, and pests through drone imaging and smart farming systems, enabling timely interventions and reducing reliance on chemical treatments. Continuous monitoring of soil health and climate data supports sustainable soil management practices and adaptive farming strategies, improving resilience to climate change. Furthermore, IoT-driven supply chain management ensures food traceability and minimizes waste, contributing to efficient and transparent agricultural systems. Despite challenges such as data security and accessibility, the transformative potential of IoT in agriculture promises to drive innovation and sustainability, ensuring the long-term viability of food production while mitigating environmental impact.

Keywords: - Internet of Things (IoT), Smart farming, Sustainable Agriculture, Environment, Management.

FOOD PROCESSING ROLE IN ENSURING FOOD AND NUTRITION SECURITY

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Food and nutrition security are a global challenge and a prerequisite for a healthy and peaceful society. Food security exists when “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Nowadays, the focus of emphasis on food sustainability is mostly on nutrition, health and well-being as well as production agriculture. Within the food value chain, food processing the essential transformation of raw materials into consumable, useful, and culturally acceptable food products is a crucial connection between production and consumption. We are unlikely to be able to solve the growing difficulties in providing sustainable meals for everyone if we do not pay more attention to the role that food processing plays in ensuring a stable food supply. A key global concern is food and nutrition security, which depends on providing everyone with a sufficient supply of fresh and processed foods that are healthy, safe, and inexpensive. A rise in food production will help meet the task of feeding 9 billion people a balanced diet by the year 2050. But it will also be crucial to minimize food waste at every stage of the supply chain, from production to consumption, and to sustainably improve food safety, nutrient content, shelf life, and preservation through food processing. It is crucial to have a balanced approach to food's energy and nutritional content in a world with limited resources. Environmental sustainability is essential, and the agri-food production and food processing industries will face pressure to produce more food in larger quantities while using fewer resources. They will also need to develop novel foods that are long-lasting, easily transportable and nutritionally appropriate for promoting health and well-being. Delivering healthy diets that satisfy consumer expectations from robust and sustainable agrifood systems is necessary in a world that is changing and where natural resources are running out. The goal is to illustrate why food processing is essential to a future food supply by using multidisciplinary perspectives.

Keywords: Food, Nutrition security, Health and Shelf life

APPLICATION OF OHMIC HEATER IN FOOD PROCESSING: A COMPREHENSIVE REVIEW

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Ohmic heating is a promising technique in food processing because of its ability to heat food rapidly and uniformly. This review article provides an overview of the design, development and application of ohmic heaters in food processing industries. The fundamental concept of ohmic heating involves generating heat through electrical resistance, which is also used in other fields such as plasma physics and material science. The study reviewed significant research on ohmic heating applied in food processing, including sterilization, pasteurization, extraction, and microbial inactivation. To optimize the efficiency and safety of the ohmic heater, factors such as electrode selection, heating chamber design, and control systems are considered during its design. The article also covers advances in ohmic heating technologies, such as pulsed heating and the development of novel electrode materials. Additionally, the article highlights the challenges and prospects of ohmic heating, such as energy loss, electrode corrosion, and integration with other technologies like infrared and microwave drying. It is observed that the ohmic heater has great potential for improving food processing operations by offering rapid and uniform drying, which enhances the quality of the final dried product.

Keywords: Ohmic heating, electrode material, electrical conductivity, food processing, uniform heating.

SAFEGUARDING SUCCESS: EXPLORING PEST AND DISEASE MANAGEMENT IN OYSTER MUSHROOM CULTIVATION SHWATI PARDHI*AND ABHAY BISEN**

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In Chhattisgarh, the Oyster mushroom (*Pleurotus* sp.), locally known as "Futu or Pihari" and popularly termed as 'dhingri' in India, thrives in the temperate and tropical forests on dead or decaying wooden logs/trunks. Recognized as an economically significant crop globally, Oyster mushrooms boast high nutritional value, abundant in proteins, minerals, vitamins, and bioactive components. However, disease outbreaks pose significant threats to commercial mushroom farms worldwide, leading to substantial production losses. Common afflictions include pest, fungal, bacterial, and viral infections, exacerbated by the warm, humid conditions conducive to mushroom growth. Diseases like green & black mould, cobweb, dry bubble, yellow blotch, and soft rot commonly infect *Pleurotus* mushrooms, with environmental factors such as humidity and warm temperatures predisposing them to pathogens. Effective disease management strategies, including good hygiene and careful farm management, are essential for ensuring healthy mushroom production and minimizing losses. During on-farm trials conducted from 2018 to 2022 in Raipur District, pest and disease issues affecting Oyster mushroom cultivation were investigated. While pathogenic microorganisms were not observed, competitor moulds like *Trichoderma* spp., *Aspergillus* spp., and *Coprinus* spp. were identified, leading to reduced yields. Chemical treatments such as dichlorvos and malathion showed inhibitory effects on *Pleurotus* if used in specific spray schedules. Neem oil 3% is effective against pests/flies, proved inhibitory to *Pleurotus*. Recommendations for disease management included a single spray of dichlorvos after spawning to control pests and the use of carbendazim or lime for managing *Trichoderma* spot application. Additionally, increasing the pH of soaking water from 6 to 8 significantly enhanced yield, offering an effective, affordable and eco-friendly solution for farmers.

ODONATA UNVEILED: A REVIEW ON NEW ODONATA SPECIES DISCOVERED IN INDIA

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Odonata, commonly known as dragonflies and damselflies, represent a fascinating and diverse order of insects found throughout the world, with a rich evolutionary history dating back hundreds of millions of years. These insects are characterized by their striking, often vibrant, colors, large compound eyes, and elongated bodies. This review provides a concise overview of the various new Odonata species discovered in recent years in India. Odonata, like all living organisms, continue to evolve because evolution is a fundamental and ongoing process in the natural world. Several factors contribute to why Odonata, along with all species, are still evolving. In recent years different species have been discovered from both the suborders i.e. Anisoptera and Zygoptera of the order Odonata. Different species have been mainly discovered from Kerala, and Maharashtra. The species are identified on the basis of their external features, markings and similarities and dissimilarities from the similar species. This also covers the importance of newly found species, their ecological value and their importance in the environment as a wetland marker.

Keywords: Odonata, Species discovery, Anisoptera, Zygoptera, Ecological value, Wetland marker.

CHARTING A VOYAGE FROM MILLET GRAIN CAFETERIA TO PRIMARY PROCESSING FOR ESCALATING MILLET CULTIVATION AND CONSUMPTION

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Millet play a significant role in providing food security, especially for marginalized communities, and their cultivation is integral to sustainable agriculture and biodiversity conservation due to their minimal water and pesticide requirements. Millets have been called various names, such as "Mota Annaj," "Nutri-cereals," "coarse cereals," and "cereals of the poor". The latest addition to this list of names is "Shree Ann—the mother of all grains". With their versatility in culinary applications and nutritional benefits, millets have gained attention as an essential component of sustainable, healthy diets around the world. The purpose of the study was to introduce millet grain cafeteria of three varieties of millets viz., Foxtail millet (DHFT-109-3), proso millet (DHPM-2769) and little millet: DHLM 36-3 as well as primary processing of these millets to enhance the marketability of these millets. The study was conducted in the Belur, Alnavar and Annigeri villages of Dharwad district, Karnataka state. The sample of the study consisted of 150 farm women. The results revealed that the benefit cost ratio after primary processing of the Foxtail millet (DHFT-109-3), proso millet (DHPM-2769) and little millet: DHLM 36-3 was 1.86, 2.08 and 1.90 respectively as compare to B:C ratio of not processed Foxtail millet (DHFT-109-3), proso millet (DHPM-2769) and little millet: DHLM 36-3 (1.60, 1.82 and 1.64 respectively). The horizontal spread of millet area was observed from 21 ha to 68 ha. Overall, the cultivation, processing, and marketing of millets generated employment for rural women, enhanced food and livelihood security which in turn improved financial condition of rural women.

Key words: millets B: C ratio, processing, cafeteria

PROBIOTIC SUPPLEMENTED HERBAL WINE FROM *TINOSPORA CORDIFOLIA* AMELIORATED METABOLIC SYNDROME: AN EXPERIMENTAL STUDY**SHWETA KAMBOJ¹, GEETA SHUKLA²****Department of Biotechnology, Chandigarh Group of College, Landran, Mohali, Punjab, India****Department of Microbiology, Basic Medical Sciences (Block-1), South Campus, Panjab University Chandigarh, India**

Diet and gut microbiota are known to play a prodigious role in the initiation and progression of metabolic syndrome characterized by obesity, hyperglycemia and systemic inflammation in metabolic tissue. To attenuate the progression of experimental metabolic syndrome, bio-interventions employing probiotic supplemented herbal wine may offer an alternate prophylactic nutritional approach. Therefore, the study was designed to evaluate the prophylactic potential of probiotic supplemented herbal wine in murine metabolic syndrome. **Methods:** Sprague Dawley rats fed with high fat diet were divided into 10 groups, treated for 12 weeks and analyzed for anthropometric, biochemical parameters, oxidative stress, gut microbiome vis-à-vis histopathological alteration of vital organs. **Results:** Administration of probiotic supplemented herbal wine to animals fed with high fat diet for 12 weeks led to maximum reduction in weight gain, abdominal circumference, Body mass index and Lee's index compared with high fat diet animals. Additionally, probiotic supplemented herbal wine exhibited improved glucose tolerance, liver biomarkers, alleviated oxidative stress, enhanced anti-inflammatory response, increased fecal Bacteroidetes to Firmicutes ratio vis-à-vis beneficial gut microbiota *Lactobacillus* spp., *Bifidobacterium* spp., and decreased population of *Enterobacteriaceae*, and restored histoarchitecture of liver, colon and adipose tissue. **Conclusion:** The novelty of the present study is that the prophylactic administration of probiotic supplemented herbal wine may be used as the functional foods to combat the growing incidence of metabolic syndrome.

Keywords: High fat diet, Metabolic syndrome, Obesity, Probiotic supplemented herbal wine**IMPACT OF M.S.P. IN INDIAN AGRICULTURAL FARMING AND FARMERS INCOME AND ECONOMY****SHWETA LAURA¹, ROHIT NAIN²****¹Msc, Department of Agricultural Economics, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India****²Msc, Department of Soil Science, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana, India**

The Minimum Support Price (MSP) system plays a pivotal role in Indian agricultural farming, significantly influencing farmers' incomes and the broader economy. Implemented to ensure farmers receive remunerative prices for their produce, MSP sets a floor price for various crops, providing a safety net against market fluctuations. However, the impact of MSP on farmers' incomes and the economy is multifaceted. MSP contributes to income stability for farmers by guaranteeing a minimum price for their crops, shielding them from price volatility and ensuring a predictable revenue stream. This stability is crucial for small and marginal farmers who depend heavily on agriculture for their livelihoods. Moreover, MSP encourages farmers to cultivate crops with assured returns, thereby promoting agricultural diversification and crop rotation, which can enhance soil fertility and sustainability. MSP serves as a crucial policy tool to support farmers' incomes and stabilize agricultural markets, its efficacy depends on various factors including implementation mechanisms, procurement infrastructure, and budgetary considerations. Addressing the shortcomings of the MSP system and complementing it with measures to improve market access, infrastructure, and farmer welfare programs can enhance its positive impact on Indian agriculture, farmers' incomes, and the economy as a whole.

Keywords:- MSP, Indian agriculture, Economic impact, Market stability, Rural economy.**POPULATION DYNAMICS OF UPPER AND LOWER OF BHOPAL-BIOSTATISTICAL EVALUATION****SHWETA RANA****Assistant Professor of Zoology, Thakur PG College of Education, Dhaliara, Kangra (HP), India, 177103**

The present research work was conducted to assess the Ichthyofaunal diversity of Upper and lower lake of Bhopal. During the period of investigation the Fishes belonging to 14 families were identified, which belonged to 6 orders identified as Clupeiformes, Cypriniformes, Beloniformes, Ophiocephaliformes, Perciformes and Mastacembaliformes. In Upper lake, Cypriniformes comprised 81.88%, followed by Ophiocephaliformes comprising 8.92%. Perciformes comprised of 6.68%, while as rest of 2.55% was comprised by other orders. In lower lake, Cypriniformes comprised 81.85%, followed by Ophiocephaliformes comprising 8.92%. Perciformes comprised of 6.69%, while as rest of 2.54% was comprised by other orders. Species richness index revealed a total number of 43 in case of Upper and Lower lake. The Ichthyofaunal diversity of Upper & Lower lake of Bhopal was evaluated by using Biostatistical population dynamic tool. The results of the study revealed that the fish composition of Upper & Lower lake of Bhopal were antequely similar. However, there was significant difference between population in terms of occurrence & persistence, owing to the variation in physico-chemical parameters at various coordinates of the lakes augmented by various levels of anthropogenic interferences.

Keywords: Upper lake, Lower Lake, Anthropogenic pressure, Ichthyofauna, Population Dyanamic, Bhopal.

CONSERVATION AGRICULTURE: AN APPROACH FOR CARBON SEQUESTRATION AND CLIMATE RESILIENT FARMINGSITESH JHA¹, U P SINGH¹, NIKHIL KUMAR SINGH¹, ANURAG UPADHAYAY¹, KAJAL VERMA¹, SOMESH JHA²¹Deptt. of Agronomy, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi²College of Agriculture, Punjab Agricultural University, Ludhiana

Climate change, poverty, malnutrition, overdependence on monsoon, inequitable land distribution, limited access to capital and technology, and long-term change in weather phenomenon are the major issues limiting the agricultural production. Increasing food security, poverty alleviation, biodiversity conservation and safeguarding ecosystem services are the major key concern in present day agriculture to stabilize production and increase profitability of the farmers. Erratic rainfall, droughts, cyclones, tornadoes, hailstorms, floods, shifts in growing seasons, heatwaves, pests and diseases outbreaks, water scarcity are the result of climate change. Conservation Agriculture (CA) is an adaptive approach to overcome these issues and ensure stable production, climate mitigation, better ecosystem services and biodiversity conservation. Minimum tillage, crop cover (more than 30%) / residue retention and systemic diversification through crop rotation has helped us to reduce the Green House Gas (GHG) emission by 10-15 % reducing emission sources and sequestering net carbon in the atmosphere. CA based rice-wheat system reduces methane and nitrous oxide emissions by creating more aerobic soil environment as compared to conventional till. Rational residue retention helps in maintaining soil temperature and moisture under favourable ranges in root zone and crop canopy to better biomass accumulation. Majority of agricultural crop residues contain approximately 40-50% carbon on a dry weight basis and their rational retention helps in reducing soil erosion (from water, wind, and tillage), enhancing soil quality, organic carbon content, and activity of soil fauna. Zero till Direct Seeded Rice (ZT-DSR) followed by Zero Till Wheat (ZT-W) helps to increase the system yield by 10-15% and reduce 15-20% cost of production as compared to the conventional system. CA can increase the possibility for crop intensification due to faster turnaround time between harvest and planting. CA offers an adaptive solution to various constraints of present day agriculture, promoting stable production, climate resilience, enhanced ecosystem services, and biodiversity conservation through practices like minimum tillage, crop cover/residue retention and crop diversification.

Keywords: Conservation Agriculture, GHG emission, diversification, organic carbon**UNLOCKING THE NUTRITIONAL TREASURE TROVE OF *CORDIA MYXA*: CUTTING-EDGE INSIGHTS INTO ITS ANTIOXIDANT POTENTIAL, COMPREHENSIVE NUTRIENT PROFILE, AND MINERAL COMPOSITION**

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The plant *Cordia myxa* L., a member of the Boraginaceae family, is used to treat a variety of illnesses. It produces a spherical fruit. Although *Cordia myxa* L., or Assyrian plum, is known to be a great source of antioxidants and minerals, we are still unaware of its medicinal potential and do not consume enough of it due to seasonal availability and ignorance. Thus, the aim of the current study was to evaluate the nutritional composition, mineral and antioxidant profiling in *Cordia myxa* in different solvents viz., distilled water, ethanol and methanol at 60, 80, and 100% concentrations. Antioxidant activities of the fruit were studied through DPPH free radical scavenging activity, ferric reducing antioxidant power, metal chelating activity, and reducing capacity. The highest phenolic content (82.40 ± 2.8mg GAE/g) and DPPH activity were obtained in aqueous extract while the highest flavonoids content (179.53 ± 1.5mg QCE/g), ferric reducing antioxidant power, metal chelating activity, were obtained in 60% methanolic and ethanolic extract. This study confirmed that the antioxidant activity of *Cordia myxa* is attributed to both flavonoid and phenols. As for mineral profiling calcium 1.2±0.9 mg/100gm, phosphorus 0.22±0.02 mg/100gm, potassium 1.07±0.3 mg/100gm, Iron 0.184±0.01 mg/100gm was obtained in our study. The fruit contains several antioxidant activities which could be used for several health benefits.

Keywords: *Cordia myxa*, minerals, extract, antioxidant.**INFLUENCE OF GROWTH INHIBITORS ON GROWTH AND SEED YIELD OF OKRA**SNEHAL M. DARVE¹, S. M. GHAWADE², SWAPNALI CHAVAN³^{1,2}Ph.D. Scholar, ²Associate Professor, Department of Vegetable Science, Post Graduate Institute, Dr. P. D. K. V. Akola, MH

Okra (*Abelmoschus esculentus* L. Moench) the member of family Malvaceae is considered to have its origin in Africa. It is often cross-pollinated crop and having diploid chromosome number 2n=130. It also called as 'Lady's finger' or 'Bhendi'. Uses of growth inhibitors helped to retards the plants growth in terms of plant height and their by increases the reproductive growth traits and quality of most of the vegetable crops. Sparse work has been carried out in okra on this aspect. There is serious requirement of these techniques for quality seed production in okra. The investigation entitled "Influence of growth inhibitors on growth and seed yield of okra." was carried out during the kharif season to ascertain the effect of different growth inhibitors on growth and seed yield of okra and its quality, with a view to find out the suitable growth inhibitors and its concentration on better growth, seed yield and quality of okra. The experiment consist of growth inhibitors viz. PBZ (100,200,300 ppm), CCC (300, 400, 500 ppm), Ethrel (100, 200 300 ppm), and one treatment of control. The treatment having foliar application of growth inhibitors at 30 and 50 days after sowing was found significantly better in different characters viz., minimum plant height, internodal length, days required for first harvesting, days required for last harvesting was noted with application of growth inhibitor CCC at concentration of 500 ppm. While as far as qualitative characters of plant like, maximum number of branches per plant, length of fruit was noted with application of growth inhibitor ethrel at concentration 300 ppm. As regards to the seed yield characters of okra is concerned the maximum number of fruits per plant, diameter of fruit, number of seeds per fruit, weight of seeds per fruit, seed yield per hectare was noted with application of growth inhibitor CCC at concentration of 500ppm.

Keywords: Okra, Plant Growth Inhibitors, Seed Yield, Cycocel, Paclobutrazol, Ethrel

DEVELOPMENT OF OMEGA 3 FATTY ACID RICH HERBAL OIL POWDER USING PERILLA SEED OIL**SNIGDHA HOMROY¹ AND DR RAJNI CHOPRA²**¹PhD Scholar, Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana, India²Professor and Head, Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Haryana, India

The prevalence of cardiovascular diseases, particularly in Southern Asia, highlights the critical need for incorporating polyunsaturated fatty acids (PUFA) into daily diets. However, the average diet often lacks sufficient PUFA, necessitating alternative sources to meet nutritional requirements. Perilla oil emerges as a promising candidate due to its high PUFA content (65- 70%) and diverse bioactive compounds. However, PUFA-rich oils are susceptible to oxidation and thermal degradation, reducing their nutritional value. Oil encapsulation has recently become a practical approach to prolong the storage duration of sensitive oils. This study focuses on encapsulating PUFA-rich Perilla oil into dried oil powders to enhance oxidative stability and serve as a potential PUFA supplement. Response surface methodology (RSM)-based optimization of the wall matrix composition, including maltodextrin, whey protein, and gum arabic, led to optimal encapsulation efficiency and minimized moisture content and oxidation during lyophilization. Additionally, microfluidization enhanced matrix homogenization with core oil, resulting in improved encapsulation efficiency. At a 30% oil load, the encapsulation process achieved an efficiency of 90%, with particle sizes observed at the nanoscale due to microfluidization, facilitating enhanced bioavailability of PUFA in the gut. Furthermore, the Oxidative Stability Index (OSI) exhibited a remarkable 3.65-fold improvement. Protein analysis via the Kjeldahl method revealed a protein content of 23% in the oil powder, rendering it suitable as a supplement or additive to meet the recommended daily allowances of Linolenic acid. In conclusion, the developed encapsulated PUFA-rich Perilla oil powder presents a promising solution to address nutritional deficiencies and combat cardiovascular diseases, offering a convenient and effective means of incorporating essential fatty acids into daily diets.

Keywords: PUFA, Microencapsulation, Freeze Dry, Microfluidization, Stability**FUNGAL FABRICATION, OPTIMIZATION AND CHARACTERIZATION OF ECO-FRIENDLY AND COST-EFFECTIVE COPPER OXIDE NANOPARTICLES****SOMANI CHANDRIKA RATH¹, ABHINAV SINGH¹, RITIKA CHAUHAN¹ AND ARTI GOEL ^{*1}****Amity Institute of Microbial Technology, Amity University, Noida, India**

Fungi, the diverse kingdom of eukaryotic organisms that have captured the interest of researchers in the field of nanotechnology. The fungal intricate structure and biosynthesis capabilities offer avenues for the development of novel nanoparticles with potential applications in various domains. Recent decades have witnessed a surge in methods of synthesis of nanoparticles. Notably, fungal fabrication of nanoparticles presents efficient, eco-friendly and less toxic synthesis pathways. Fungal associates can secrete a wider array of reducing agents as compared to bacteria or algae, enabling more effective reduction and capping of nanoparticles with better control over size and morphology. Furthermore, fungal fabricated copper oxide nanoparticles (CuO-NPs) have been gaining attention due to their availability at low cost, high catalytic activity, antimicrobial, antifouling capabilities and potential applications in energy storage, sensing and environmental remediation. In the current study three fungal strains namely *Metarhizium*, *Beauveria bassiana* and *Serendipita indica* were screened intracellularly and extracellularly for their ability to synthesize CuO-NPs. *Serendipita indica* mediated synthesis of CuO-NPs emerged as a standout at pH 12, 20mL of 100mM cupric acetate precursor salt $[Cu(CH_3COO)_2]$ was mixed with 20 mL culture filtrate and the reaction mixture was heat stirred at 100°C for 75 min until the visible color change was observed. The UV-visible spectral analysis showed an absorption peak at 365nm. The mean size obtained by Dynamic Light Scattering Spectroscopy (DLS) was 179 nm and presented a negative surface charge with a value of approximately -0.09 mV. This fungal fabricated CuO-NPs from *Serendipita indica* exhibit least size amongst the other fungi and the negative zeta potential value represents the repulsive nature which helps them to adsorb other materials. These bio-compatible, small-sized and negatively charged fungal CuO-NPs exhibit remarkable catalytic properties and adsorption capabilities making them a promising and sustainable approach for efficient removal of recalcitrant organic pollutants and heavy metals from contaminated wastewater streams.

Keywords: Nanotechnology, Fungal fabrication, Copper Oxide Nanoparticles, Antimicrobial, Environment

NANOMATERIALS IN MITIGATING HEAT STRESS IN GLOBAL CLIMATE CHANGE**SONALI SANGWAN^{1*}, SHIKHA YASHVEER², POOJA SAINI¹, POONAM BANSAL¹**¹Department of Bio-Sciences & Technology, Maharishi Markandeshwar Engineering College, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala²Department of Molecular Biology & Biotechnology, College of Biotechnology, CCS Haryana Agricultural University, Hisar

Nanotechnology is a new and emerging technology, which relies on the application of nanomaterials with small radius in order to enhance abiotic-stress tolerance in plants. Its integration with agriculture has immense potential to cope with global challenges of food production, sustainability and climate change. Global climate change has enhanced abiotic stress issue especially heat stress. Nanobiotechnology provides novel set of tools to manipulate and enhance crop production using different nanomaterials like nanoparticles (NPs), nanofibres, nanoemulsions, and nanocapsules. They provide a platform to deliver agrochemicals and various macromolecules needed for plant growth enhancement and resistance to stresses. Smart delivery of agrochemicals increases the yield by optimizing water and nutrient conditions. Another added advantage is controlled release and site-directed delivery of agrochemicals. Further enhancement in quality and quantity in agriculture can be achieved by NP-mediated gene transformation and delivery of macromolecules that induces gene expression in plants. Various types of nanomaterials have been tested so far and the results have been promising in terms of productivity and quality enhancement. NPs have size dependent qualities, high surface-to-volume ratio and unique optical properties, which impart outstanding physical, chemical and biological effects. In conclusion, nanotechnology presents a multifaceted approach to climate change mitigation and adaptation in agriculture, offering innovative solutions to enhance efficiency, viability and elasticity in the face of changing environmental condition.

IMPACT OF EXOGENOUS APPLICATION OF SALICYLIC ACID AND GIBBERLIC ACID ON POST HARVEST PHYSIOLOGY OF MANGO *MANGIFERA INDICA***SONAM KUMARI SHAH*, ANAND KUMAR SINGH AND A K PAL****Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, INDIA**

The degradation in the quality of mangoes primarily arises from suboptimal practices during harvesting, handling, packaging, and storage leading to post-harvest losses. These post-harvest losses can vary significantly and potentially reaching up to 50%. The current experiment was executed at Post-Harvest Laboratory, Department of Horticulture, Institute of Agricultural Science, Banaras Hindu University, Varanasi. Our studies aimed to investigate how post harvest treatments involving salicylic acid and GA₃ impacted the preservation of mango fruit's physical and chemical qualities. Langra variety mangoes were meticulously chosen and throughout the storage period it was observed that compared to different treatments of salicylic acid, the mango fruits treated with 15 ppm GA₃ demonstrated the least weight loss, maximum specific gravity, maximum fruit length and fruit breadth and the organoleptic evaluation which typically includes aspects such as fruit color, flavor, texture, taste and overall acceptability. The spoilage loss was lowest (4.7%) in fruits that have been treated using 15ppm GA₃ and noticed maximum total soluble solids 19.58 (°Brix) upto 8 days of treatment. No noticeable difference in titratable acidity content was observed among the treated fruits and the control group. However, it's worth noting that the lowest titratable acidity value at 0.32% was recorded in the fruits treated with 15 ppm GA₃. Thus, among the different treatments, the fruits treated with 15 ppm GA₃ demonstrated the most substantial preservation of ascorbic acid content with retention of 31.4 mg/100 g of fresh weight after 8 days.

EXPLORING THE POSSIBILITY OF MAGNETIC BIOCHAR-ASSISTED PHYTOREMEDIATION OF PAHS CONTAMINATED SOIL**SONGITA SONOWAL* AND RAM PRASAD******Department of Botany, Mahatma Gandhi Central University, Motihari, Bihar, India**

Polycyclic aromatic hydrocarbons (PAHs) are toxic, carcinogenic, organic contaminants that arise into the environment due to some anthropogenic activities. Even though PAHs are arisen by natural activities although anthropogenic activities are more serious than natural activities. Exposure of PAHs into the environment degrades the aquatic system, soil quality, and causes harmful effects to other living organisms. When it enters into the food chain from the soil and aquatic system then it causes serious acute disease in humans. Therefore, it is very crucial to remove these toxic PAHs from the environment. Till now numerous technologies (adsorption, thermal degradation, physical eradication, etc) have been used to remediate this harmful compound from the environment but they have confronted many challenges like time-consuming, expensive, and causes negative impact on the environment. But phytoremediation is one of the easiest and most cost-effective technologies that not only remediate the PAHs contaminated soil but is also environmentally friendly by nature. However, some researchers claim that still phytoremediation removes pollutants from the soil by accumulating but later it causes some secondary pollution to the plant's system. Therefore, in this study, a new magnetic biochar is synthesized from the organic waste product to transform the PAHs into some essential compounds that will enhance the process of phytoremediation and reduce the chances of secondary pollution in the plant system.

RESPONSE OF MORINGA OLEIFERA TO PARTIAL ROOTZONE DRYING IRRIGATION AND REGULATED DEFICIT IRRIGATIONSONAWANE A. V.^{*1}, MANJUSHREE SINGH¹, NARWADE, A. P.² AND SHUBHAM DHAKAD²¹Assistant Professor, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat²Associate Professor, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat²Senior Research Fellow, N. M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat

Crop production technology across the globe is facing a major constraint in the form of water availability. Increase in population would increase the pressure of existing water resources which in turn would reduce the share of agricultural water. In this scenario, it is utmost necessary to produce more crops per drop using improved irrigation techniques to achieve the goal of food security. Partial root zone drying (PRD) is the new and modified version of DI which has been in practice to improve water use efficiency (WUE) by controlled draught stress. It is simply the spatial separation of dry and wet roots which could be maintained during entire crop season easily. An experiment was conducted in *rabi* seasons during 2019-20 to develop a suitable deficit irrigation strategy for drip-irrigated *Moringa oleifera*, at Dediapada taluka in tribal district of Narmada, Gujarat. Study aimed to assess the effect of five irrigation treatments on crop growth, yield and Irrigation water use efficiency (IWUE) of *Moringa oleifera*. Treatment T1 consists of Fixed Partial Root Zone Drying (FPRD), T2 consists of Alternate Partial Root Zone Drying (APRD) and T3 consists of Regulated Deficit Irrigation (RDI-1) where deliberate moisture stress was induced during flower bud development stage. While treatment T4 consists of Regulated Deficit Irrigation (RDI-2), in which moisture stress was induced during pod setting stage and treatment T5 was a drip irrigated control treatment. Results revealed that, lowest plant height was recorded in T3 treatment (310.3 cm). It was also revealed that significantly higher plant height was obtained in T2 treatments (in 395.0 cm) compared to all other treatments. Dry matter was found to be significantly higher in T2 treatment (5.5 kg/plant) while least was observed in T5 treatment. Treatment T2 recoded highest value for the yield (9.87 kg per tree) and least was obtained in T4 treatment (4.32 kg per tree). Various pod characteristics like length of pod, diameter of pod etc. were found to be superior in PRD treatments compared to RDI and control treatments. Maximum value of IWUE was observed in T2 treatment values of (0.0127 t ha⁻¹ mm⁻¹). While in T1 treatments the corresponding value was reported to be 0.0103 t ha⁻¹ mm⁻¹. In RDI treatments T3 treatment reported higher IWUE than T4 with the values of 0.0107 t ha⁻¹ mm⁻¹, during the experimental year. Lowest values for IWUE were reported in control treatment. It can be concluded from the study that PRD, especially APRD technique could be adopted efficiently in *Moringa oleifera* under drip irrigated system for better growth and yield.

Keywords: Deficit irrigation, partial rootzone drying, regulated deficit irrigation, water use efficiency,

ASSESSMENT OF ANIMAL WELFARE KNOWLEDGE AMONG DAIRY FARMERS IN MUMBAI METROPOLITAN REGIONSONAWANE NIKITA¹, SAWANT MANISH², BHANOTRA ADHITI³, RAJESH KUMAR⁴¹and ⁴MVSc Scholar, Department of Veterinary and Animal Husbandry Extension, Mumbai Veterinary College, Parel, Mumbai-012.²Associate Professor and In-charge, Department of Veterinary and Animal Husbandry Extension, Mumbai Veterinary College, Parel, Mumbai-012.³Assistant Professor, Department of Veterinary and Animal Husbandry Extension, Mumbai Veterinary College, Parel, Mumbai.

The present study was undertaken in Mumbai Metropolitan Region of Maharashtra from which three districts viz., Thane, Palghar and Raigad were purposefully selected. From each district, one block and from each block ten villages were selected randomly. Further, from each village 4 dairy farmers were selected who possessed at least five milch animals and 5 years' experience in dairy farming. Booklet on Animal Welfare Practices in dairy animals was prepared and distributed free of cost to dairy farmers to assess their gain in knowledge. Data was collected through structured interview schedule and analyzed by statistical tools such as mean, percentage and standard deviation. The analysis of data showed that majority of dairy farmers were of middle age had dairy as primary occupation whereas and had medium family size, land holding, annual income, herd size, milk production, milk sale, experience were in medium categories and had education upto higher secondary. Regarding sources of information, family members were frequently contacted in personal localite category whereas paravets in personal cosmopolite. Among ICT tools TV was frequently used tool. Booklet was developed in Marathi language for enhancing the knowledge of dairy farmers about animal welfare practices. The study revealed that before exposure to booklet (Pre-test) mean knowledge gain was 9 which enhanced to 13 after exposure to booklet (Post-test). Mean knowledge gain among dairy farmers was 4 and percent knowledge gain was 12.90. Inadequate knowledge about animal welfare practices was first constraint reported followed by lack of facilities and support from the government regarding implementation of animal welfare practices.

A STUDY ON MENSTRUAL HYGIENE KNOWLEDGE AMONG ADOLESCENT GIRLS IN RURAL AREAS**SONI KUMARI*, DR. VIJAY LAKSHMI*******Research Scholar, Department of Home Science, J. D. Women's College, Patna Patliputra University (Bihar)******Associate Professor, Department of Home Science, J. D. Women's College, Patna Patliputra University (Bihar)**

Adolescence is the main stage of psychological, physical and reproductive development that lasts from adolescence to adulthood. Adolescence becomes more challenging especially for adolescent girls because during this time they go through the process of menstruation. They should take special care of themselves during this time, so that they do not have to face any problems related to menstruation in the future. Especially regarding hygiene and health knowledge related to menstruation because proper menstrual hygiene and knowledge helps in maintaining good health during this time. Therefore, it is important to study on important issues related to menstruation, menstrual hygiene knowledge. Its main objective is to assess menstrual hygiene and knowledge of adolescent girls. A total of 400 adolescent girls were included in this study. Result: 66.25% of the adolescent girls had no information about menstruation before the onset of menstruation, 62.5% of adolescent girls in rural areas still use cloth during menstruation and 37.5% use sanitary pad. 88.5% of adolescent girls did not know where bleeding occurs during menstruation. Only 14.5% knew that bleeding occurs from the uterus. 75% of adolescent girls were not cleaning their external genitals properly during menstruation, 65.75% of the adolescent girls were using old and dirty clothes to wear during menstruation. Conclusion: Menstrual hygiene knowledge of adolescent girls was found to be very weak and poor, hence it is important to conduct assessment study on menstrual hygiene knowledge of adolescent girls.

Keywords: Adolescent girls, Menstruation, Hygiene, Knowledge.**AYURVEDA AND YOGA OF INDIA: A GLOBAL PARADIGM SHIFT****SONIYA RANI AND AMITA SHARMA****Raghunath Girls' Post Graduate College, Meerut, Uttar Pradesh**

It is believed that the origins of traditional Indian medicine date back more than 5000 years, to the Vedic era. The ancient Indian healing arts of yoga and Ayurveda are the key to creating a world that is healthier and more balanced. Yoga, an ancient discipline that began in India over 5,000 years ago, and Ayurveda, which treats complaints of the body through pressure points, provide a holistic approach to wellness that extends far beyond physical fitness. Yoga has several therapeutic advantages, including reducing anxiety, strengthening immunity, enhancing cardiovascular health, and promoting mental wellbeing. Yoga is supported by Ayurveda, the oldest holistic treatment system in the world, which offers a deep knowledge of how people are related to the cosmos. There are four Vedas, which are the Yajurveda, Atharvaveda, Samaveda, and Rigveda, as is widely acknowledged. The Vedas contain extensive information about the diseases that were common in those days, how to treat them with medicinal herbs, and the qualities of herbal medicines—including how to use, obtain, and nourish them. They also discuss the therapeutic value of medicinal herbs and how to use them to treat ailments by curing symptoms, improving human health, and tackling disease. India's yoga and Ayurvedic traditions provide a transformational tackle in a period of growing chronic diseases and raising healthcare costs. Furthermore, Ayurveda's customized approach to good health is becoming increasingly popular.

Keywords: Traditional, Ayurveda, Yoga, Vedas, Medicinal herbs**ARTIFICIAL INTELLIGENCE****SONIYA RISHI* VIKASH KUMAR MEENA******Ph.D.Research Scholar Department of Extension Education RCA ,(MPUAT) Udaipur Rajasthan**

Artificial Intelligence otherwise known as AI, it is the development and the theory of some computer systems which are able to undertake certain tasks which will normally need the intelligence of humans. The tasks that are normally in need of the human intelligence are the likes of translation of languages, making decisions recognition of speech among others. Artificial intelligence (AI) is a set of rapidly expanding disruptive technologies that are radically transforming various aspects related to people,business,society,aand the environment.With the proliferation of digital computing devices and the emergence of big data, AI is increasingly offering significant opportunities for society and business organizations. The growing interest of scholars and practitioners in AI has resulted in the diversity of research topics explored in bulks of scholarly literature published in leading research outlets. Further, the disciplinary patterns in the intellectual structure of AI research are examined with the additional objective of assessing the disciplinary impact of AI. The results of the topic modeling reveal eight key topics, out of which the topics concerning healthcare,circular economy and sustainable supply chain,adoption of AI by consumers,and AI for decision-making are showing a rising trend over the years. AI research has a significant influence on disciplines such as business, management, and accounting, social science, engineering, computer science, and matheresearch issues and deI systems are capable of adapting their behaviour to a certain degree by analysing the effects of previous actions and working autonomously.

REMOVAL OF Ni^{2+} AND Cu^{2+} FROM LIQUID MEDIUM THROUGH MICROBES**SONU SHARMA¹, MONU SHARMA², AND RAMAN KUMAR*****Department of Biosciences and Technology, Maharishi Markandeshwar (Deemed to be University), Mullana-Ambala-133207.**

Due to the damaging consequences of prolonged environmental contamination, heavy metal pollution poses an unacceptable risk to all forms of life in the environment. At low quantities, these metals are very sensitive and can accumulate in food chains, providing a severe health danger to the ecosystem and human beings. Traditional chemical as well as physical remediation procedures are inefficient and generate enormous amounts of chemical waste. Over the years, there has been an increasing interest in the balance of dangerous metals. The employment of microorganisms is both environmentally beneficial and economically viable. As a result, microbes have a range of metal sequestration processes with higher metal biosorption capabilities. Microorganisms, especially fungi, have been shown to remove heavy metals from effluent via bioaccumulation and biosorption at a cheap cost and in an environmentally beneficial manner. The main objective of our study is to isolate the nickel and copper-removing fungi and check their removal efficiency from liquid medium at different process parameters such as pH, Initial metal concentration, inoculum size, carbon sources, and nitrogen sources. In the case of Ni, maximum removal (88.9%) was shown by fungal isolate FNS2 at an initial concentration (250 ppm), pH 6, 1% inoculum size (1%), incubation time (168h), glucose (0.5%) as carbon source, and ammonium sulphate (1%) as nitrogen source. In the case of copper, maximum removal of 99.94% removal was shown by fungal isolate FCS3 at an initial concentration (250 ppm) at pH 6, inoculum size (5%), incubation time (168h), maltose (0.5%) as carbon source and peptone (0.5%) as nitrogen source. These efficient fungal isolates can be used for the removal of heavy metals from industrial effluents at the commercial level.

Keywords: Heavy Metals, Food chain, non-biodegradable, Physical-chemical techniques, Microbial- remediation, FNS2, FCS3, optimization parameters.

INVESTIGATIONS ON GENETIC VARIABILITY AND PRINCIPAL COMPONENT ANALYSIS (PCA) FOR YIELD AND YIELD ATTRIBUTES FOR *TRITICUM AESTIVUM* UNDER DROUGHT CONDITION**SOUMYA G. HONAWADI¹, S. A. DESAI², LALITA JAGGAL, MAHALAXMI K. PATIL, RATAN TIWARI, VEERESH B.A., SHIVASHANKARGOUDA PATIL², YASHAVANTHKUMAR K.J., CHETHANA C.K., ABHISHEK. K. GOWDA¹ BORANAYAKA M. B., SUMA. S. BIRADAR*⁴ SANJAY KUMAR SINGH****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

Breeding for drought tolerance in bread wheat (*Triticum aestivum* L.) stands as a paramount global imperative amid the profound shifts in climate patterns. An investigation was undertaken to elucidate the mechanisms of drought tolerance within a diverse association mapping panel comprising various genetic backgrounds. This endeavor involved the evaluation of four hundred and fifty genotypes under drought conditions, employing an alpha lattice design, at the All India Coordinated Wheat Improvement Project, MARS, University of Agricultural Sciences, Dharwad, during the rabi season of 2020-2021. The study encompassed the assessment of twenty-one traits across the genotypes under both drought and irrigated conditions to discern variability. Significantly, diverse responses were observed among the genotypes across different traits associated with drought tolerance. Notably, phenotypic variances (σ^2) outweighed genotypic variances (σ^2) across all traits, mirroring similar trends in their respective coefficients of variation. The phenotypic coefficients of variation (PCV) consistently surpassed the genotypic coefficients of variation (GCV) across traits, with values closely aligned. Traits such as leaf waxiness and tillers per meter exhibited pronounced variability under both conditions, characterized by high GCV and PCV. Conversely, traits like grain yield exhibited heightened PCV and GCV under drought conditions, indicative of substantial variability. Conversely, moderate PCV and GCV were noted for grain yield under irrigated conditions. Traits including days to heading, days to anthesis, grain filling duration, leaf waxiness, grains per spike, thousand grain weight, tillers per meter, and grain yield exhibited high heritability coupled with high genetic advance under drought conditions.

HIGH ALTITUDE SICKNESS HEALING POTENTIAL OF SELECTED HIMALAYAN TRADITIONAL FERMENTED BEVERAGES COLLECTED FROM INDO-NEPAL SINGALILA RIDGE: *IN VITRO* AND *IN SILICO* EVALUATION**SOUMYA MAJUMDER[#], SOURAV CHAKRABORTY AND MALAY BHATTACHARYA*****Molecular Biology and Tissue Culture Laboratory, Department of Tea Science, University of North Bengal, Rajarammohanpur, Siliguri, Darjeeling, West Bengal, India**

Tongba, chhyang, nigar, raksi and guras are popular traditional drinks served in northern and northeastern parts of India, Nepal and Tibetan plateau. These beverages are prepared using indigenous fermentation technique and claimed as medicinal drinks to be considered as elements of high altitude ethnopharmacology. In this research, *kodo* or finger millet and rhododendron flower based fermented beverages were collected from high-altitude villages located at Singalila ridge of the Himalayas (Indo-Nepal region) and their ethnomedicinal properties were evaluated through *in vitro* and *in silico* analysis. Parameters i.e., qualitative and quantitative determination of bioactive molecules such as total phenol, glycosides, coumarin, fatty acids, terpenoids, steroids and alkaloids; antioxidant assays (DPPH, iodometric and anti-lipidperoxidation); and antibacterial tests were considered for food-biochemical characterization. GC-MS analysis was carried out aiming for metabolomics validation of the medicinal properties. Furthermore, *in vitro* gastrointestinal digestion has been carried out to figure out bioaccessibility of these beverages in simulated human GI tract. Results revealed antioxidative phenolics and fatty acids in these beverages which may be associated to their ethnomedicinal properties. Moreover, *in silico* experiments (pharmacokinetics, ADMET and molecular docking) were designed to validate ethnomedicinal properties of these Himalayan beverages against varied high-altitude sicknesses. All query biomolecules exhibited strong binding energy in their interactions with proteins selected on the basis of their association with varied high altitude sicknesses. Overall, outcome of this research has affirmed the effectiveness of these high-altitude's traditional drinks in healing high-altitudinal diseases.

IDENTIFICATION OF POTENTIAL ANTI-BACTERIAL FOR PNEUMONIA INFECTION BY TARGETING OUTER MEMBRANE PROTEIN USING STRUCTURE-BASED SCREENING AND MOLECULAR DYNAMIC SIMULATION

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According to World Health Organization (WHO) statistics, *Klebsiella pneumoniae* is a prominent and first-line priority pathogen that causes hospital-acquired nosocomial infections in humans [1]. Drug resistance reduces the number of accessible antimicrobials, resulting in inadequate therapy for bacterial infections. As a result, there is an urgent need to identify other methods to combat bacterial resistance to antibiotics, which is a global public health concern [2]. To combat the emergence of resistance to the majority of antimicrobials, it is necessary to discover medications derived from plants, which have proven to be efficient antimicrobials owing to the existence of secondary metabolites such as terpenoids. Terpenoids, which are abundant in nature and are produced in response to microbial assault, have enormous antimicrobial potential via a variety of mechanisms including membrane disruption, anti-quorum sensing, protein synthesis inhibition, and ATP inhibition [3]. Therefore, the current study is centralized on outer membrane protein (OMP) for in-silico identification of effective drugs. From the PubChem database of a billion compounds, 3419 compounds with potential antiviral activity were chosen for screening, which resulted in four compounds with a high docking score and docking energy. When filtered on toxicological qualities, ADMET analysis demonstrated that all four compounds are safer medication candidates and that none of them posed AMES toxicity or carcinogenicity. Selected top-ranked each four compounds along with target protein (OMP) underwent molecular dynamics (MD) simulations for 100ns each to validate the docking interactions where all four compounds with pubchem CID: (6448), Pubchem CID:(93135), Pubchem CID: (157301) and Pubchem CID: (821448) are highly supported by root-meansquare deviation (RMSD), root-mean-square fluctuation (RMSF), radius of gyration (Rg), SASA (Solvent accessible Surface Area) value and Hydrogen bond analysis. The findings are likely to make a significant contribution to the field of drug development for pneumonia infections.

EFFECT OF MALTING ON COMPOSITION OF NUTRIENTS AND ANTI-NUTRIENTS IN FINGER MILLET FLOUR

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Finger millet is a rich source of protein, dietary fibre, calcium, phosphorous, iron, zinc, other minerals and vitamins along with some anti-nutrients. The anti-nutrients present in finger millet grains bind with certain minerals such as iron, calcium, zinc to form soluble as well as insoluble complex compounds. Thus, these anti-nutrients decrease the bioavailability of these minerals. Malting is a pretreatment that helps in increasing the bioavailability of nutrients through inducing hydrolytic activity. Thus to optimize the availability, digestibility and rate of absorption of all the nutrients present in the grains, malting can be an efficient process. The aim of the present study was to determine the effect of malting on nutrient and anti-nutrient composition of finger millet flour. A local variety of brown finger millet was selected to evaluate the nutritional changes during the malting process. The nutrient profile of the malted finger millet flour showed significant increase in protein (8.64 g vs. 7.52 g), carbohydrate (68.84 g vs. 67.12 g), calcium (372 mg vs. 356 mg), iron (4.42 mg vs. 4.12 mg), magnesium (143.2 mg vs. 137.1 mg) and zinc (2.54 mg vs. 2.47 mg) content and a slight decrease in fat (1.9 g vs. 1.3 g), dietary fibre (10.71 g vs. 9.98 g), sodium (3.23 mg vs. 4.67 mg) and phosphorous (216 mg vs. 231 mg) content as compared to raw finger millet flour per 100 g. The total ash content decreased insignificantly, while the potassium content increased non-significantly during malting process. Additionally, the total phenol and alkaloid contents increased during malting. Significant reductions in phytate, tannin and saponin content were observed in malted finger millet flour as compared to raw finger millet flour.

Key words: Finger millet, Malting, Nutrients, Anti-nutrients, Bioavailability

EXPLORING THE PHYTOCHEMICAL POTENTIAL OF NATURAL COMPOUNDS AGAINST SARS-COV-2 THERAPEUTICS : AN ATTEMPT TOWARDS HOLISTIC PROPHYLAXIS OR CURE

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Millions and billions of illnesses have been generated by viruses, and the SARS-CoV-2 virus caused a pandemic in 2020 with significant fatality rates because there aren't enough antiviral medications that have been approved for clinical use. As a result, the development of innovative antiviral medications utilising natural ingredients is a great substitute. Herbs like *Tinospora cordifolia* and *Withania somnifera* are considered to be among the most important in the Ayurvedic system and have been used for thousands of years for a variety of biological purposes. The intent of this research is to critically evaluate the information currently available about the medicinal use of *T. cordifolia* and *W. somnifera* as antiviral agents. *In silico* docking and *in vitro* screening against the SARS-CoV-2 virus were carried out on a number of ethanolic and methanolic extracts made from *W. somnifera* and *T. cordifolia* in the quest for novel antiviral candidates. The presence of terpenoids, alkaloids, flavonoids, saponins, and steroids have been suggested by the phytochemical screening results. In order to confirm the effectiveness and safety of phytochemicals, this review emphasizes the significance of fusing traditional knowledge with contemporary scientific research and the necessity of inclusive clinical trials. The purpose of this study is to lay the blueprint for receptor-ligand interactions provided by *in silico* docking studies, which can aid in the search for naturally occurring bioactive medicines that may be useful in treating the illness with minimal adverse effects.

Keywords: Coronavirus, SARS-Cov-2, ligand, silico docking, therapeutic, natural compound, *Tinospora cordifolia* , *Withania somnifera*

MARKETING PATTERN AND PRICE SPREAD OF POLYHOUSE AND OPEN FIELD CUCUMBER IN JAIPUR DISTRICT OF RAJASTHAN**SOURABH DADHICH^{1*}, HUBBA LAL SINGH² AND SAKSHI YADAV¹**¹M.Sc. Research Scholar, Department of Agricultural Economics, SVPUAT, Meerut (U.P.)²Professor and Head, Department of Agricultural Economics, SVPUAT, Meerut (U.P.)

In recent years, there has been concern about the effectiveness of marketing fruits and vegetables, which has resulted in high and volatile consumer price with only a minute portion of the consumer rupee flowing to the farmers. Horticultural crops are difficult to market because of their perishability, seasonality and bulkiness. Present study was an attempt to study the marketing channel and their efficiency. The Jaipur district of Rajasthan was selected purposively for the present study. A total of 26 intermediaries and 50 farmers were selected randomly. Among the total farmers, 25 growers producing cucumber in polyhouses and 25 in open field were selected randomly. The most common marketing channel engaged in marketing of polyhouse and open field cucumber in Jaipur district are following: Channel – I: Producer – Commission Agent – Wholesaler – Retailer – Consumer and Channel- II: Producer- Commission agent- Retailer- Consumer. Among both cucumber production system, in channel II the marketing cost incurred per quintal of cucumber was much lower than cost incurred in channel I. Since the marketing cost and marketing margin in channel I was higher, so the marketing efficiency was very low for that channel. At the same time in channel II was found to be lower price spread under both production systems. The most effective means of enhancing farmers' market access and reduce marketing cost through institutional means is by reinforcing cooperative societies, FPOs and shorten the marketing channel.

Keyword: Acharya approach, Shepherd approach, marketing channel, price spread and marketing efficiency.**YIELD AND NUTRIENT UPTAKE OF AEROBIC RICE UNDER CHEMICAL AND NON CHEMICAL WEED MANAGEMENT PRACTICES****SOURABH MUNNOLI¹, RAJAKUMAR, D.² SHIVASHANKAR, K³. AND AISHWARYA GOLSHETTI⁴****1. M.Sc. Research scholar, Department of Agronomy, TNAU, Coimbatore - 641 003****2. Assistant Professor, Department of Agronomy, TNAU, Coimbatore - 641 003****3. M.Sc. Research scholar, Department of Agronomy, UAS, Dharwad- 58005****4. M.Sc. Research scholar, Department of Agronomy, UAS, Dharwad- 58005**

To assess the impact of various chemical and non-chemical weed management techniques on aerobic rice, a field study was conducted at the Wetlands Farm of the Department of Farm Management, Tamil Nadu Agricultural University, Coimbatore. Pre emergence (PE) application of pendimethalin (1.0 kg ha⁻¹) + hand weeding at 40 DAS, Early post emergence (EPOE) of bispyribac sodium (25 g ha⁻¹) + hand weeding at 40 DAS, EPOE of chlorimuron ethyl + metsulfuron methyl (4 g ha⁻¹) and PE application of pendimethalin (1.0 kg ha⁻¹) *fb* EPOE of bispyribac sodium (25 g ha⁻¹) were the chemical weed management practices. *Daincha* intercropping (1:1) *fb* spreading and incorporation on 30DAS, Cowpea intercropping (1:1) *fb* spreading and incorporation on 30DAS, Coir pith mulching (5 tons ha⁻¹) on 3 DAS, Shredded coconut waste mulching (5 tons ha⁻¹) on 3 DAS and the combination of mechanical and hand weeding were the non chemical weed management practices. PE application of pendimethalin (1.0 kg ha⁻¹) on 3 DAS *fb* EPOE application of bispyribac sodium (25 g ha⁻¹) on 20 DAS recorded significantly higher nutrient uptake and grain yield. Sequential application of pendimethalin and bispyribac sodium recorded 4,128 kg ha⁻¹ grain yield which was nearly 60 per cent increment over the weedy check.

Keywords: Aerobic rice, Mulching, Sequential application of herbicides, Integrated weed management**MAXIMIZING ADSALI SUGARCANE YIELD: TAILORED DRIP IRRIGATION AND FERTIGATION STRATEGIES FOR DIFFERENT GROWTH STAGES****SOURABH MUNNOLI^{1*}, S. S. NOOLI², G. B. SHASHIDHARA³ AND S. C. ALAGUNDAGI⁴**¹Technical Assistant (Agronomy) ICAR-AICRP-Sugarcane, ARS, Sankeshwar²Scientist (Agronomy) ICAR-AICRP-Sugarcane, ARS, Sankeshwar^{3,4}Professor (Agronomy) Department of Agronomy, UAS, Dharwad

A field experiment was conducted during 2019-20 and 2020-21 at in strip block design with three drip irrigation levels as vertical strip and three fertigation levels as horizontal strip with control treatment *i.e.*, recommended package of practice under surface irrigation. Irrigation levels were drip irrigation at 0.6 ETo at germination + 0.85 ETo at tillering + 1.0 ETo at canopy establishment + 1.15 ETo at grand growth + 0.85 ETo at maturity stage (I1), drip irrigation at 0.6 ETo at germination + 1.0 ETo at tillering + 1.5 ETo at canopy establishment + 1.5 ETo at grand growth + 0.85 ETo at maturity stage (I2) and drip irrigation at 0.8 ETo at germination+ 1.0 ETo at tillering+ 1.75 ETo at canopy establishment + 2.0 ETo at grand growth +1.0 ETo at maturity stage (I3). Fertigation levels were *viz.*, 100 % recommended dose of fertilizer (RDF) (F1), 150 % RDF (F2) and 200 % RDF (F3). Pooled results indicated, drip irrigation at 0.8 ETo at germination + 1.0 ETo at tillering + 1.75 ETo at canopy establishment + 2.0 ETo at grand growth +1.0 ETo at maturity stage along with 150 per cent RDF through fertigation (I3F2) recorded significantly higher number of millable cane (1, 20,667 ha⁻¹), single cane weight (3.06 kg) and cane yield (298.4 t ha⁻¹) Similarly I₃F₂ recorded significantly higher economic parameters. I₃F₂ was found to be having yield and economic advantage over conventional cultivation practices.

Key words: Adsali sugarcane, Drip irrigation, Fertigation and Recommended dose of fertilizer.

NANOENCAPSULATION OF ESSENTIAL OIL: AN INNOVATIVE APPROACH TO CONTROL MYCOTOXIN CONTAMINATIONS IN THE FOOD SYSTEM**SOURABH SUMAN^A, SUPRADIP SAHA^A, AMRITA DAS^B, ADITI KUNDU^{A*}**^a**Division of Agricultural Chemicals, ICAR-Indian Agricultural Research Institute, New Delhi, India**^b**Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi, India**

Bioactive essential oils (EOs) provide a number of issues for the food sector when it comes to fighting different fungal diseases because of their potent smell, volatility, and questions regarding their chemical and physical stability. A possible solution to these problems is to use a nano-emulsion technology. This work uses an ionic-gelation approach to synthesise tea tree into a nano-emulsion with chitosan and investigates it as a possible antifungal agent. In order to determine which of the most prevalent compounds in Tea tree EO is responsible for its bio-efficacy, gas chromatography-mass spectrometry (GC-MS) is used. The stabilised nano-emulsion is evaluated in terms of surface properties, particle size, and stability. Using the poison food method, the antifungal efficacy of the essential oil and its nano-emulsion is evaluated against virulent strains of *Aspergillus flavus*, *Aspergillus parasiticus*, and *Penicillium expansum*. Moreover, the CN-TTEO's antifungal effectiveness is linked to the suppression of fungal ergosterol, indicating a possible inhibition of GMC Oxidoreductases and Cyt P450 Sterol 14- α -demethylase. The significant binding of the main oil components to the target fungal proteins, Cyt P450 sterol 14- α -demethylase and GMC Oxidoreductases is further confirmed by in silico study. These created nano-formulations might replace synthetic chemicals with more ecologically friendly options.

Keywords: GC-MS, Bio-efficacy, In silico analysis**COMPARATIVE METABOLOMICS AND CARDINAL BIOMOLECULES BASED MOLECULAR DOCKING OF CULTIVATED COFFEE AND ITS WILD RELATIVE****SOURAV CHAKRABORTY^{#,1&2}, ABIKSHA THAPA¹, AND MALAY BHATTACHARYA²**¹**Plant Biochemistry and Molecular Biology Laboratory, Post Graduate Department of Botany, Darjeeling Government College, Darjeeling, West Bengal, India**²**Molecular Biology and Tissue Culture Laboratory, Department of Tea Science, University of North Bengal, Raja Rammohanpur, Siliguri, Darjeeling, West Bengal, India**

The most dominantly cultivated species of coffee include *Coffea arabica* L. with another of its close wild relative *Coffea benghalensis* Roxb. growing in dry mixed forests or along the streams of Dooars areas. No previous work on *C. benghalensis* has been done and comparative metabolomics of the two allied species has been lacking with prospects of *in silico* based research of the prime biomolecular constituents. Foliage leaves of both the plant species were collected followed by preparation of extracts in methanol. GC-MS analysis was conducted to reveal the metabolomic profile of the corresponding coffee species along with bioactivity scan. The total number of detected metabolites in *C. arabica* and *C. benghalensis* was fifteen and twenty-four respectively with five common biomolecules possessing a range of biological activity from anti-oxidative, anti-proliferative, anti-microbial, anti-diabetic to hepatoprotective properties. Notably Caffeine was absent in *C. benghalensis* with >70% fatty acid derivatives. The major common phytochemicals were Mome inositol and Linoleoyl chloride, being selected for molecular docking study with no previous reports of *in silico* exploration against varied health disorders. Biosynthesis of Mome inositol initiates from glucose whereas Linoleoyl chloride proceeds through even chain fatty acid biogenesis pathway with its immediate precursor being 9,12-Octadecadienoic acid. Bioinformatic investigation based on physicochemical characterization, ADMET analysis succeeded by molecular docking of these two ligands against breast and lung cancer associated protein targets, anti-viral (HIV-AIDS, SARS-CoV-1, MERS and SARS-CoV-2) revealed interesting results validating their pharmacological efficacy. Interspecific breeding of *C. arabica* and *C. benghalensis* is a potential prospective application of this experimental observation to biologically increase the active phytochemical ingredients in the resultant hybrid. Further, comparative metabolomics affirms both the species of Coffee to possess diverse active principles that can cumulatively assist to provide immunological advantages against numerous complex disorders with minimum side effects and toxicity.

CAPTIVE BREEDING OF SINGHI, *HETEROPNEUSTES FOSSILIS* (BLOCH, 1794) FOR MASS-SCALE SEED PRODUCTION***SOURAV HALDER¹, B.K. MAHAPATRA², MAHENDRA KUMAR YADAV¹, SHRIPARNA SAXENA¹**¹**Dept. of Aquaculture, SAGE University, Bhopal, Madhya Pradesh**²**ICAR- Central Institute of Fisheries Education, Salt Lake, Kolkata, West Benga**

Heteropneustes fossilis (Bloch, 1974) commonly known as Singhi, is an indigenous catfish, highly popular among the consumers due to high protein and medical value. The main purpose for this study is to standardize the minimal hormonal dose as the fish cannot tolerate excessive hormonal dose. High hormonal dose in most cases leads to infection and mortality of the spent brooders. Artificial fecundation and fertilisation are also necessary by sacrificing the male fish in many cases. Improvised modification of some techniques like use of low hormonal dose @ 0.5ml per kg body weight of female and 0.25 ml per kg body weight of male with proper dilution with sterile water was more effective for successful induced natural breeding and up to 100% egg laying. In this technique brooders were kept in a net cage of the glass breeding chamber for easy separation of eggs during spawning. Using same breeding tank water with submersible pump water fountain were created to stimulate for natural breeding. Water level was maintained about 15cm. Ten different experiments were carried out using twenty pairs of brooders in a ratio of 2:1 in three glass chambers with the dimension of 121.91cm X 60.95cm X 30.47 cm. The rate of fertilization achieved was 85.05 $\pm$ 5.05%. The eggs hatched out within 18 to 20hrs at a temperature of 30 $\pm$ 1 $^{\circ}$ C. The spawn were fed on egg yolk, infusoria and the fry were fed on tubifex worm, mosquito larvae, chopped tubifex worms. The 30-day fry growth was around 1g. After 30 to 60 days fry was provided whole tubifex worm and mosquito larvae.

SOURCE VARIATION FOR GROWTH AND OIL PARAMETERS IN CINNAMOMUM ZEYLANICUMSOURAV MANOHARAN¹, HANUMANTHA M², JAGADISH M R³, AND VINAYAK UPADHYA⁴¹Dept. of Forest Products and Utilization, College of Forestry, Sirsi, UAS Dharwad²Asst. Professor, Dept. of Forest Products and Utilization, College of Forestry, Sirsi, UAS Dharwad³Asst. Professor, Dept. Silviculture and Agro-forestry, , College of Forestry, Sirsi, UAS Dharwad⁴Asst. Professor, Dept. of Forest Products and Utilization, College of Forestry, Sirsi, UAS Dharwad

Cinnamomum zeylanicum Blume. is an important NTFP and commercial spice yielding tree species; belongs to the family Lauraceae. The bark, leaf and immature fruit of cinnamon are widely used as spice, and the bark and leaves are also used for extraction of essential oils. The protogynous dichogamy of the cinnamon flower is a natural adaptation for cross-pollination. An enormous genetic diversity has been produced by this special type of pollination behaviour. Thus, the current study aimed to determine the extent of morphological and quality variation within and among the sources and to identify the superior source for selection of best individuals of cinnamon. For this study, 60 phenotypically superior cinnamon trees were selected among the six different natural sources among two altitudinal regions in the Uttara Kannada district, Karnataka. In this study, among the six sources, Joida source is superior in terms of the crown parameters, oil and quality parameters with highest selection index score and the least performance in terms of growth, oil and quality parameters were recorded for the trees selected from Gerusoppa source with selection index score. A novel multi traits selection index based on important traits was constructed for the selection of superior sources and best individuals. An interesting positive association of higher leaf oil content with purple flush colouration was identified and this association could be used for indirect selection in Cinnamon.

TRACKING THE GEOGRAPHICAL ORIGIN OF WOOD BY MOLECULAR MARKERSSOURAV MANOHARAN¹, HANUMANTHA M., ROOPA S. PATIL⁴ AND GANESHA B. H.¹Dept. of Forest Products and Utilization, College of Forestry, Sirsi, UAS Dharwad²Asst. Professor, Dept. of Forest Products and Utilization, College of Forestry, Sirsi, UAS Dharwad³Ph.D. Scholar, Dept. Silviculture and Agro-forestry, College of Forestry, Sirsi, UAS Dharwad⁴Assoc. Professor and Head, Krishi Vigyan Kendra, Sirsi, UAS Dharwad

Traceability is the 'ability to trace the history, application, or location of an entity by means of recorded identification'. Tracking of wood is essential to prevent the entry of illegal wood into the market. Illegal logging is believed to be one of the chief causes of worldwide deforestation and environmental degradation, and trade in illegal timber and a wood product creates market disadvantages for products from legal and sustainable forestry. The WWF estimates the global cost of illegal timber at approximately 15 billion US dollars per year. To check the illegal logging and associated trade, different certification procedures are enforced by international agencies, ensuring the legal sources of wood. In the scenario of certificates falsification, it is necessary to develop a suitable identification marker/tool for tracking the geographic origin which complements the paper certification process. Molecular markers are such tools, which are tamper-proof properties of wood that can be used as forensic tools to verify the taxonomic identity and the geographic origin of wood and wood products along the supply chain. This tracking methodology is actively being applied in the forestry industry to check for illegal substitutions along supply chains and complements paper certification methods based on genetic structure. However, despite the promise, a number of questions remain; notably, DNA extraction from dried wood and old tissue sources; generation of DNA variation to distinguish regions of origin within species; and statistical methodologies for verifying source tests. Many workers successfully extracted DNA from Oak, Teak, Black Rosewood, Ben teak, mahogany etc using three different methods: the CTAB method, the DNA sure plant mini kit (Nucleopore), and the modified CTAB method and preserved under different conditions. The quantity of DNA from wood samples by the modified CTAB method was 56 % higher than the CTAB and other DNA kit protocols. They suggested it as an effective wood DNA extraction protocol for these three species. The advancement of genetic technologies and standardising protocols for DNA isolation, DNA finger printing and blind testing will enable large-scale screening of DNA variation cheaply, routinely, quickly and with a statistical certainty that can be used in a court of law.

UNVEILING CURVULARIA TUBERCULATA-INDUCED LEAF ANOMALIES IN RHODODENDRON FERRUGINEUM: IMPLICATIONS IN CULTURAL-ECOLOGICAL CONSERVATION AND HARNESSING MICROBIAL INTERVENTION IN SOCIO-ECONOMIC ADVANCEMENT

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Rhododendron ferrugineum L., also known as "Lali Guras" in local language is the national flower of Nepal and Uttarakhand's state tree and it's naturally found in high-altitude mountain ecosystems. But recently it has been cultivated in many parts of the world for its medicinal & commercial values. Here an investigation carried out in Himachal Pradesh (Latitude: N 31° 6' 2.0088", Longitude: E 77° 10' 29.9136") identified some leaf anomalies resembling rust-like manifestations in *R. ferrugineum*. These anomalies were found to originate from the pathogenic fungus *Curvularia tuberculata* marking the first documented case of its impact on *R. ferrugineum* in India. This discovery focuses on the need of careful monitoring, disease management research, and conservation efforts to protect the cultural and ecological significance of this iconic shrub. Also, the study introduces a new aspect of Indian flora by connecting *C. tuberculata* with *R. ferrugineum*, which has historical ties to monocotyledonous crops. In this research, the pathogenic fungus is accurately identified using the traditional techniques along with modern genomic sequencing & phylogenetic analysis. To collect further information about this case, this research aligns with the United Nations Sustainable Development Goals (SDGs) by highlighting the importance of environmental preservation, conservation, and sustainable management. Also, this study highlights the complex relationship between biodiversity, cultural heritage, and the necessity for comprehensive solutions. Over all, it urges protecting *R. ferrugineum*'s heritage and emphasizes interdisciplinary approaches against ecological threats. **Keywords:** *Rhododendron ferrugineum* L., *Curvularia tuberculata*, leaf anomalies, monocotyledonous crops, high-altitude mountain ecosystems, pathogenic fungus

INVESTIGATIONS ON SALINITY TOLERANCE IN *TRITICUM AESTIVUM* L. GENOTYPES THROUGH MORPHO-PHYSIOLOGICAL AND YIELD CHARACTERISTICS IN NATURAL SALINE SOIL CONDITIONS**SRIVIJAY S. MALIPATIL, SUMA S. BIRADAR*, VISHWASGOWDA C, S. A. DESAI*, KARTHIK NARAYANASWAMY, ANILKUMAR LALASING CHAVANA, SHARADA H. B.A, NAVYA B. HULMANIA, REVANTH P. B. AND VIDYA M. N.****Department of Genetics and Plant Breeding, College of Agriculture, Shivamogga, Karnataka, India**

Salinity is one of the most important abiotic stresses affecting crop yield and quality. Wheat is regarded as a moderately salt tolerant crop; wheat species exhibit high variability that can be conveniently explored to improve wheat species for salt tolerance. Hence, the study was conducted to determine genetic variation, and screen for salt-tolerant genotypes, using various morpho-physiological and yield traits under natural saline soil conditions. Thirty-five bread wheat genotypes along with checks, were evaluated using thirteen morpho-physiological and yield traits, under control and natural saline soil conditions. The variance analysis revealed significant differences among genotypes and treatments. Correlation studies revealed that grain yield displayed a significant positive correlation with tillers per meter row under control condition, thousand-grain weight under saline condition and harvest index under both conditions. Through principal component analysis, traits and genotypes were grouped based on overall variation. The first two PCs explained 39.74% and 41.21% of the total variance under control and stress conditions, respectively. Clustering and PCA results identified genotypes UAS BW-13893, HD-3237, HPW 338, PBW-373, and HI-1605 as salt tolerant, with traits like biomass, grain yield, SPAD, germination percent, grains per spike and spikelets per spike showing significant variation. Salt-tolerant genotypes may be utilized in hybridization programs or can be directly released post-stability assessment as salt-tolerant lines. Traits with significant variation can assist in identifying salt-tolerant genotypes for future breeding efforts.

EXPLORING *TRITICUM DICOCCUM* RESPONSE TO SALINITY STRESS: INSIGHTS FROM MORPHO-PHYSIOLOGICAL AND YIELD TRAITS**SRIVIJAY S. MALIPATIL, T. HARISH VIKRAM, SUMA S. BIRADAR*, S. A. DESAI*, ROHIT KUMAR, SADASHIVA TIPPIMATH, KARTHIK NARAYANASWAMY, APOORVA K. S, MOULYA G. AND MOUNIKA N.****Department of Genetics and Plant Breeding, College of Agriculture, Shivamogga, Karnataka, India**

Salinity stands out as a crucial abiotic stress factor impacting both crop yield and quality. Among crops, wheat exhibits moderate salt tolerance. The diverse spectrum of wheat species offers ample opportunities for enhancing salt tolerance through targeted exploration and improvement efforts. Hence the aim of the study was to determine genetic variation, and screen for salt-tolerant genotypes, using various morpho-physiological and yield traits under natural saline soil conditions. Thirty-five dicoccum wheat genotypes along with checks, were evaluated using thirteen morpho-physiological and yield traits, under control and natural saline soil conditions. The variance analysis revealed significant differences among genotypes and treatments. In control conditions, traits such as plant height showed a strong positive correlation with grain yield, followed by biomass, harvest index, days to flowering, and 1000 grain weight. However, under stress, the harvest index exhibited a significant positive correlation with grain yield. Through principal component analysis, traits and genotypes were grouped based on overall variation. The first two PCs explained 49.17% and 37.54% of the total variance under control and stress conditions, respectively. Clustering and PCA results identified genotypes DIC-13, DIC-14 and DIC-49 as salt tolerant, with traits like biomass, plant height, grain weight, and thousand-grain weight showing significant variation. Salt-tolerant genotypes can be selected for hybridization or can be directly released as salt-tolerant genotypes after stability evaluation. Traits with notable variation can aid in identifying salt-tolerant genotypes in future breeding activities.

HEMATOLOGICAL CHANGES IN FISH *PANGSIUS HYPOTHAMUS* EXPOSED TO HEAVY METAL LEAD AND CADMIUM**SRUTHISREE C¹, HARSHA NAYAK², MANJAPPA N², PRAKASH PAVADI³, BHOOLESHWARI⁴**¹Zonal Agricultural and Horticultural Research Station, KSNUAHS, Shivamogga²Fisheries Research and Information Center, Hesarahatta. Bengaluru³College of Agriculture, Iruvakk, Shivamogga⁴College of Fisheries, Mangaluru

Heavy metals are found to be harmful pollutants, affecting the aquatic environment, causing acute and chronic toxicity to aquatic organisms including fish. Alteration in the haematological profile are the early symptoms of heavy metal poison to aquatic organisms. A bioassay was conducted to determine the lethal toxicity (LC50) of heavy metal, lead and cadmium on *P. hypophthalmus*. The lethal toxicity (LC50) of lead and cadmium was found to be 71.44ppm, and 30.19 ppm respectively. The results revealed that, the fish exposed to lead and cadmium had effect on fish *P. hypophthalmus*. For sublethal toxicity study, the fishes were exposed to two sublethal concentrations (i.e 1/5th and 1/10th) upto 28 days. Significant decrease in RBC count, haemoglobin content, and significant increase in WBC count were noticed in *P. hypophthalmus* exposed to lead and cadmium for a period of 28 days. From the results it was concluded that cadmium caused severe alterations in haematological parameters compared to lead. Physiological parameters such as oxygen consumption rate, O: N ratio and food consumption rate decreased significantly ($p < 0.05$) and ammonia excretion rate increased significantly ($P < 0.05$) at both the sublethal concentration of lead and cadmium that compared with that of control group. The study suggested that sublethal concentration of lead and cadmium altered the haematological, and physiological parameters and exerts stress to the fish.

Keywords: *Pangasius hypophthalmus*, lead, cadmium, toxicity

PLANT PHENOLICS: FROM AN ADAPTIVE ATTRIBUTE TO UNIVERSAL NECESSITY**SUBHADIP BANERJEE* AND AMITAVA BHATTACHARYA****Department of Agricultural Biochemistry, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India**

Upon life's progression from aquatic based ecosystem to terrestrial environment, it faced robust challenges for its survival in form of various biotic and abiotic stresses in pathogens, predation, UV radiation, heat and cold stress, osmotic stress, among others. One of the key adaptive responses to combat terrestrial challenges was the development of biosynthetic pathways for phenolics and its subsequent modification and diversification throughout the course of evolution. The phenylpropanoid pathway occupies the central position in production of plant phenolics. Further modification and variations in phenolic biosynthesis subsequently equipped plants with a plethora of phenolic compounds for use in manifold functions including, protective action from UV and oxidative stresses, reproductive and developmental processes and other physiological and biochemical functions. The diverse nature of plant phenolics and its close regulation allows plants to adapt quickly to the ever-changing surroundings. But this adaptive feature comes at a cost. Production of these phenolics and other secondary metabolites require diversion of resource flux away from primary metabolic pathways. The privilege of adaptability and resistance thus comes at trade-off to natural growth and development. Production of phenolics under environmental stress although comes at a cost of loss in economic yield, plant phenolics often carry enormous economic benefits on their own. It has been well documented about the effectivity of phenolics in amelioration of various oxidative stress induced diseases due to its antioxidative properties, its uses in pharmacological, food technology and industrial sectors.

Keywords: Phenolics, phenylpropanoid pathway, oxidative stress, resistance costs, antioxidative properties

MITIGATION STRATEGIES TO REDUCE RUMAN METHANE EMISSIONS FROM DAIRY ANIMALS**SUBHASH YADAV*, OMPRAKASH CHOUDHARY AND GOATM CHOPRA****Ph.D. Research scholar, Department of Animal Production, Rajasthan College of Agriculture (MPUAT), Udaipur.**

Enteric methane (CH₄) emission is a major contributor to greenhouse gas emissions, and also a loss of feed energy during production. The objective of this paper is to provide an update on current management practices and new dietary strategies recently proposed to reduce CH₄ emissions from ruminants. Existing mitigation strategies for dairy, e.g., the addition of ionophores, fats, use of high-quality forages, and increased use of grains, have been well researched and applied. These nutritional changes reduce CH₄ emissions by manipulating ruminal fermentation, directly inhibiting methanogens and protozoa, or by diverting hydrogen ions away from methanogens. Current literature has identified new CH₄ mitigation options. These include the addition of probiotics, acetogens, bacteriocins, archaeal viruses, organic acids, plant extracts (e.g., essential oils) to the diet, as well as immunization, and genetic selection of cows. Probiotics like *Aspergillus oryzae* was shown to reduce CH₄ by 50% as a result of a reduction in the protozoal population. Another is bacteriocin like Nisin reduced methanogenesis by 36 %. These new strategies are promising, but more research is needed to validate these approaches and to assess in vivo their effectiveness in reducing CH₄ production by dairy cows. It is also important to evaluate CH₄ mitigation strategies in terms of the total greenhouse gas budget and to consider the cost associated with the various strategies. More basic understanding of the natural differences in digestion efficiencies among animals as well as a better knowledge of methanogens and their interaction with other organisms in the rumen would enable us to exploit the potential of some of the new CH₄ mitigation strategies for dairy cattle production.

Key words: Enteric methane, dairy animals, mitigation, methane production.

BIOACTIVES OF *ALPINIA OFFICINARUM* FOR POTENTIAL ANTIFUNGAL AGENT AGAINST STORAGE PATHOGENS**SUBHRAUTPAL KARMAKAR, ADITI KUNDU* AND SUPRADIP SAHA****Division of Agricultural Chemicals, ICAR-Indian Agricultural Research Institute, New Delhi**

Alpinia officinarum is a pungent smelling aromatic plant, have been utilized as spices in Europe and other parts of the world for over 1000 years (Lim et al., 2016). It is a herbaceous perennial plant with a leafy stem reaching a height of 100-150 cm and a dark brown rhizome measuring 8-12 mm in diameter. The plant is commonly found in Southeast Asia and is cultivated in India, Vietnam and China (Tian et al., 2009). It is generally regarded as a safe spice; no report on toxicity of the plant has been reported so far. The plant commonly used as a food additive has been recognized by National Health and Family Planning Commission of China (Huang et al., 2016). In spite of close relation to ginger and turmeric, limited research has been undertaken to explore bioactive phytochemical components for potential biofunctional activities. Sequential extraction of the rhizomes was done using hexane, dichloromethane, ethyl acetate, methanol and water. Preliminary *in-vitro* efficacy of the crude extracts against two storage pathogenic fungal strains, *Fusarium verticillioides* and *Penicillium digitatum* revealed hexane soluble fraction as the most effective against the pathogens with respective EC₅₀ values of 119.21 and 140.64 µg/mL. Further, biofunctional activity of the nonpolar fraction was correlated with its chemical composition, suggesting presence of flavonoids, might have considerably contributed for its potential antifungal action. Evidence based studies exhibiting strong antifungal action of *A. officinarum* phyto-constituents against *F. verticillioides* and *P. digitatum* could be further extended to develop smart eco-benign formulation to achieve tangible outcome.

Keywords: *Alpinia officinarum*, bioactives, phytochemicals, LCMS/MS analysis, *Zingiberaceae*

GENETIC VARIATION AND CHARACTERIZATION OF LOCAL POTATO CULTIVARS IN NORTHERN WEST BENGAL: IMPLICATIONS FOR BREEDING AND GERMPLASM MANAGEMENT

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This study delves into the genetic diversity of local potato cultivars from the northern region of West Bengal, unveiling a rich tapestry of variation across 30 qualitative traits, encompassing 91 phenotypic variants. Association analyses among these traits offer valuable insights for breeders in selecting superior genotypes for further enhancement. Moreover, the elucidated genetic relatedness among cultivars aids in efficient germplasm management strategies. The findings also facilitate the characterization and identification of unique traits essential for Distinctness, Uniformity, and Stability (DUS) criteria. Notably, significant variations among fourteen genotypes are observed in seven quantitative characters, notably tuber yield, length and weight, sprout length, chlorophyll content, canopy temperature, and tuber count per plant. Tuber yield, breadth, and length emerge as pivotal traits driving genetic variance, while anthocyanin content significantly contributes to the diversification of local potato cultures, as revealed through biochemical characterization. Further, AMMI analysis identifies Jalpai as the most stable cultivar concerning anthocyanin content and tuber yield per plant. Gene expression profiling highlights key transcripts—C4H, DFR, and ANS—distinguishing white-fleshed from pigmented potato varieties. These findings collectively enrich our understanding of potato genetics and offer practical implications for breeding programs and germplasm conservation efforts.

Keywords: Genetic diversity, Local potato cultivars, Biochemical characterization, Anthocyanin content, Gene expression profiling, Germplasm conservation.

INFRARED, THERMAL AND X-RAY DIFFRACTION ANALYSIS OF CERIUM SOAPS

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The physico-chemical characteristics of cerium soaps (Caproate and caprate) in solid state were investigated by Infrared, thermal analysis and X-ray diffraction measurements. The results of Infrared analysis reveal that the fatty acids exist in dimeric state through hydrogen bonding and soaps possess partial ionic character. The result of thermal analysis, decomposition reaction was found kinetically of zero order with energy of activation 6.7 and 7.3 Kcal mol⁻¹ for cerium caproate and caprate, respectively. The X-ray diffraction measurements were used to calculate the long spacings and the results confirm the double-layer structure of cerium soaps.

COPPER TOLERANT, PLANT GROWTH PROMOTING STRAIN OF *LYSINIBACILLUS MACROIDES* (NJCT2A) ISOLATED FROM KALJANI RIVER BASIN - A PROMISING CANDIDATE TO DECREASE THE ADVERSE EFFECT OF DOLOMITE IN SOIL

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A group of bacteria was isolated from Kaljani river basin followed by characterization of their tolerance level against heavy metals. Among all the isolates, designated NJCT2a showed maximum tolerance concentration of upto 10mg/ml against copper, zinc, lead and 15mg/ml against iron and aluminum. This high tolerance ability is a very common characteristic observed in bacteria isolated from contaminated soil. Hence, to get an insight about the contamination level, AAS of the collected soil sample was done and the result revealed that our study area was highly contaminated with all the tested metals, which are generally associated with dolomite. With excess of 14% calcium carbonate and 6.17 pH value, it was evident that our study area was highly affected by dolomite, which is coming from rivers originating from southern slope of eastern Himalayan region, flowing down huge amount of dolomite debris on foothills of eastern Himalaya and polluting soil and water, thus affecting biodiversity of this region. This adverse situation can be recovered by some biological method which is safe for the environment and heavy metal tolerant plant growth promoting (PGP) bacteria are one of the sustainable approaches in this context. Our studied strain NJCT2a showed positive result for PGP traits like production of ammonia, HCN and indole acetic acid. In seed germination, NJCT2a treated seeds showed 100% germination with 850 seedling vigor index. In addition to this, susceptibility towards most of the tested antibiotics, absence of hostility against garden soil consortia, gamma hemolysis on blood agar plate and remarkable increase in all the growth parameters of NJCT2a treated plants compared to the controlled ones, makes this isolate a potential candidate to ease the dolomite induced problems in soil of this region. Furthermore, molecular characterization via 16s rRNA sequencing data identified this isolate as *Lysinibacillus macroides*.

PHYTOTOXIC POTENTIAL OF ETHYL ACETATE EXTRACT FROM OLAX SCANDENS LEAF AGAINST THE LARVAE OF MOSQUITO VECTOR OF LYMPHATIC FILARIASIS**SUDIP PARAMANIK*, MANAS PARAMANIK****Epidemiology, Vector biology and Environmental monitoring Research Units, Entomology Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, Paschim Bardhaman, West Bengal, India**

Mosquito-borne diseases exert substantial and detrimental effects on human health worldwide. Emphasizing vector management techniques that are ecologically conscious and devoid of synthetic insecticides is given priority to minimize the negative impact on the environment and human health. Innovative approaches are essential for sustainably managing mosquito populations. One such approach involves the use of phytochemicals to control vector mosquitoes. The current research aims to assess the larvicidal efficacy of ethyl acetate extract obtained from *Olex scandens* leaf against the filarial vector mosquito *Culex quinquefasciatus*. Following the standard bioassay protocols of the World Health Organization, dose-dependent larval mortalities were observed against 3rd instar larvae of *Culex quinquefasciatus*. The purified compounds obtained through thin-layer chromatography were also evaluated for their effects on third-instar larvae of both mosquitoes and non-target organisms. The most potent fraction was characterized using FT-IR and GC-MS analyses. The result of the bioassay showed 100% mortality in the 250 ppm and 200 ppm concentrations of the extract after 48 and 72 hours of exposure, respectively. While in the potent fraction, 100% mortality was observed at 100 ppm and 80 ppm concentrations after 48 and 72 hours of exposure, respectively. The LC₅₀ value was calculated as 55.7 ppm in 72 hours post-exposure of treated mosquito larvae for the solvent extract. After phytochemical analysis, the ethyl acetate leaf extract showed the existence of carbohydrates, alkaloids, flavonoids, phenols, saponins, and tannins. This study proposes that this particular plant source has the potential to become an ideal sustainable tool for managing mosquito populations.

Keywords: Vector management, *Olex scandens*, Phytochemicals, Ethyl acetate extract, *Culex quinquefasciatus*

EFFECTS OF SHORT AND LONG-TERM THERMAL STRESS ON REPRODUCTIVE FITNESS OF SPODOPTERA LITURA**SUJATHA G S¹, DODDACHOWDAPPA SAGAR^{1,2}, HEMANT KUMAR¹ AND SABTHARISHI SUBRAMANIAN¹**¹**Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi**²**ICAR- National Bureau of Agricultural Insect Resources, Bengaluru**

Tobacco cutworm, *Spodoptera litura* (Fabricius) (Lepidoptera: Noctuidae) is one of the most destructive polyphagous insect pests damaging economically important 112 species of host plants. One of the most significant abiotic factors influencing organism's nature, physiology, life history, distribution and abundance is temperature. In the current climate change scenario, environment is rapidly changing to a varying degree creating stressful conditions for different species. Temperature has a profound impact on development and growth because it directly impacts the physiology of the insects. With a changing climate, there is the potential for this insect to become an increasingly severe pest in certain locations due to increased habitat suitability and consequently it affects the local agricultural economy. In the present study, the biological and reproductive parameters of *S. litura* examined by exposing short and long-term thermal stress (42°C - 4 hours single stress and 46 °C -1 hour multiple stress) on various developmental stages (2, 4, 2 and 2 days for egg, larva, pupa and adults – multiple stress) and evaluated by recording survival rate, maturation success, female ratio, longevity, size and weight of male and female adults, GSI, eupyrene sperm count and reproductive fitness parameters comprises pre-oviposition, oviposition, post-oviposition period, total fecundity, mating success, mating frequency and fertility percent in adults emerged from the stressed stages. 1 hour at 46°C for long term was considered to be the most deleterious treatment as insects exhibited the least performance in all the parameters studied except female ratio and varied in pre-oviposition and post-oviposition period. Early developmental stages like egg and larva were the most susceptible stages to thermal stress. Present findings can be used to develop a more profound understanding on the potential for this insect to evolve in response to changing climate.

Key words: *Spodoptera litura*, thermal stress, reproductive fitness, developmental stages, Climate change.

EXPLORING THE COLD TRAPPING OF MERCURY IN THE HIGH-ALTITUDE ENVIRONMENT OF DARJEELING HILLS**SUKANYA ACHARYYA[#], SUMEDHA SAHA AND MALAY BHATTACHARYA*****Molecular Biology and Tissue Culture Laboratory, Department of Tea Science,****University of North Bengal, Raja Rammohanpur, Siliguri, Darjeeling, West Bengal, India**

Mountains, often perceived as pristine environments, are increasingly vulnerable to pollution, challenging conventional beliefs. Mercury, a potent heavy metal pollutant, accumulates in mountainous regions due to its semi-volatile nature as a consequence of the "mountain trapping effect." This phenomenon, influenced by various environmental factors, raises ecological concerns and poses risks to both flora and fauna. The study explores the mercury-tolerant bacterial populations in the Darjeeling Himalayas, serving as a potential mercury sink. It aims to establish the cold trapping effect and isolate bacteria with extreme mercury tolerance for bioremediation. All of the collection sites that included various elevations and biotopes produced flourishing bacterial communities exhibiting a very high tolerance to the heavy metal. One of the promising tolerant bacterial strains isolated from the region, MTD11E, had an MIC of 7 mg ml⁻¹ and a mercury removal capacity of 99.76%. Topsoil samples collected from various altitudes in the region confirm a mercury accumulation trend in these hills. Highest recorded mercury present in the topsoil at 6.77 mg kg⁻¹ was found at the highest point of the study area, i.e., Sandakphu with a steady increase with increase in altitude. Furthermore, accumulated mercury in collected vegetation samples indicate widespread mercury pollution, necessitating urgent attention to mitigate its environmental impact. The study area also holds substantial importance in the global tea industry further warranting the need for monitoring and investigation into this often-overlooked phenomenon.

TRACKING SLOW LEAF RUST RESISTANCE AND ITS COMPONENTS IN DURUM WHEAT (*TRITICUM DURUM* DESF.): GENETIC INSIGHTS

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Non-race specific durable resistance, characterized by the phenomenon of slow rusting has garnered increasing attention in recent years. However, such investigations remain scarce in the context of durum wheat. Therefore, the present study aims to investigate the components contributing to slow leaf rusting in durum wheat and identifying the associated genes using genic markers. The results showed wide spectrum of disease severity response indicated by AUDPC values ranging from 7.0 to 989 in durum wheat germplasm lines possessing known adult plant resistant (APR) genes. Notably, the *Lr46* gene emerged as the most prevalent among the tested genotypes, demonstrating robustness and conferring enhanced resistance to leaf rust compared to the *Lr68* gene. Intriguingly, none of the genotypes carried both genes concurrently. The identification of these genotypes holds promise for advancing the development of durable disease resistance in durum wheat, thereby offering valuable insights for breeding programs aimed at enhancing crop resilience to biotic stresses.

STABILITY OF NUTRIENT CONTENT IN INSTANT DRINK MIX FORMULATED WITH VARIABLE COMPOSITIONS OF RAW BANANA, DRUMSTICK LEAF POWDER AND WHEY PROTEIN DURING STORAGE IN DIFFERENT PACKAGING MATERIALS

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Aim: To analyse the proximate composition of instant drink mix powder with variable compositions in different packaging materials.

Methodology: Raw Banana and drumstick leaf powder were made by freeze drying technique. Whey protein was purchased from local market. Different compositions of instant drink powder were made by incorporation of raw banana, drumstick leaf powder and whey protein. These instant drinks mix powders were packed in four different packaging materials viz., PET bottles, aluminium pouches, HDPE pouches, PET + aluminium pouch to know their suitability in retention of nutrients. The proximate composition of the instant drink powder was evaluated at monthly intervals up to 240 days of storage period. **Results:** Highest crude protein (37.19 %), crude fat (3.09 %) and ash content (3.30 %) was noticed in T₁P₄ (49.5g WPC+0.5g CMC+50g PS and P4-PET bottle+ Aluminium pouch). The instant drink powder recorded the lowest moisture content-3.42% in PET +aluminium pouch. Retention of highest crude fibre-2.45%, highest crude protein- 37.19%, highest crude fat-3.09%, highest ash content-3.30%, highest carbohydrates-88.72% and highest energy value-380.14 Kcal/100g was recorded in PET bottles+ Aluminium pouch at the end of storage life. **Interpretation:** Regular use of these powders by incorporating them in daily routine or consuming it as supplementary food may fulfill daily requirement of nutrition content of our body. These powders can be made available throughout the year.

Keywords: Instant drink mix, packaging material, storage stability, freeze drying, proximate composition

NUTRACEUTICAL PROFILING OF POTENTIALLY BIOFORTIFIED ADVANCED BREEDING LINES AND MARKER TRAIT ASSOCIATION FOR ALPHA LINOLENIC ACID (ALA) IN LINSEED (*LINUM USITATISSIMUM* L.)

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The global health scenario is rapidly changing due to the negative effects of over-medication and inadequate food processing, and as a result, plant-based products are gaining more attention. Flaxseed has been a potent functional food ingredient owing to the presence of omega -3 fatty acid and SDG. Keeping these points in view, we have developed biofortified genotypes through induced mutagenesis which will serve as functional foods and aid in preventing the diseases. The genotype 44-2 (DLV7) has recorded highest SDG content of 24.2 mg/g dry matter which amounts to 40.6 percent higher than the best check with 17.2 mg/g dry matter, Flax seeds are also known for their prophylactic effect as they are rich source of w-3 and w-6 fatty acid. The genotype ILS 153 recorded highest ALA with 60.25%. (Data not shown) Molecular marker analysis revealed that the SSR markers Lua60, Lua49B, Lub14, Lu138 and Lu144a were reported to be linked to ALA content (Lua60, Lua49B), oil content (Lub14) and number of capsules per plant (Lu138, Lu144a). The microsatellite marker Lu 60 with amplicon size 200bp was linked to ALA content. High yielding and also biofortified genotypes with ALA content (60.25 %) and SDG(24.2mg/g of dry matter) along with higher yield of 747kg/ha . (DLV- 4, DLV- 6, DLV- 9 and DLV- 15) serve as a Source of functional ingredients and aid in reduction of atherogenic risk, anticancer, anti-inflammatory and laxative effects. SDG is a phytoestrogen with several pharmacological properties including cardio-protective and anti-breast cancer properties and also possess chemo preventive properties in animals and humans. Therefore these biofortified linseed varieties can be promoted as functional food or source of functional ingredients, because it contains alpha-linolenic acid and lignans both of which have positive effects in disease prevention.

THE STUDY ON MARKETING CHANNELS OF NON TIMBER FOREST PRODUCTS (NTFPS) IN SIRSI, SIDDAPUR AND YELLAPUR TALUKAS OF UTTARA KANNADA DISTRICT**SUMA R², GIRISH B. SHAHAPURMATH^{1*} AND HANUMANTHA, M¹.**¹Assistant Professor, College of Forestry, Sirsi, Uttara Kannada district, Karnataka, India²Post Graduate (FRM), College of Forestry, Sirsi, Uttara Kannada district, Karnataka, India

The study analyzed the significance of different marketing agencies involved in the marketing of NTFP's to the livelihood of the local people. Primary data and secondary data were used for the study. The Kadamba Marketing Society marketed 13 commercialized NTFP's during 2019-20 and are commercially important NTFP's. Among the NTFP's marketed, majority were medicinal plants. The 10 medicinal plants were sold to the pharmaceutical companies. The 7 NTFP's used for industrial purpose were sold to the industries. The 6 NTFP's used for edible purpose. The TSS societies marketed 23 commercialized NTFP's during 2019-20 and are commercially important NTFP's. Among the NTFP's marketed, majority were medicinal plants. The 23 NTFP's used for medicinal plants were sold to the pharmaceutical companies. The 11 NTFP's used for industrial purpose were sold to the industries. The 14 NTFP's used for edible purpose. EDC procured NTFP's *Garcinia cambogia* and *Myristica malabarica*. The medicinal plants marketed through society were sold to the pharmaceutical companies. Even though the procurement price given by the private shops and EDC for commercially important NTFP's were higher than that of the kadamba and TSS society, the indigenous people were more benefited by the marketing through the society. Because the EDC and private shops do not share their profit with the collectors, whereas the society gives certain percentage of their profit back to the primary collectors in addition to the procurement price. But the financial constraints during the lean seasons are forcing the indigenous communities to sell their products to the private shops. If the society and EDC can start the value addition units of the NTFP's with the involvement of indigenous communities, it ensures effective utilization of their free time and a better livelihood through enhancement of their income from NTFP's.

Keywords: Commercialized NTFP, indigenous people, indigenous communities, pharmaceutical companies**PEST SURVEILLANCE, REMOTE SENSING AND GIS – ROLE IN PEST MANAGEMENT****SUMAN¹, DHANSHWARI ARYA², POOJA BISHNOI³**^{1,2}Department of Entomology, Sri Karan Narendra Agriculture University, Jobner-Rajasthan, India²Department of Horticulture, Sri Karan Narendra Agriculture University, Jobner-Rajasthan, India³Division of Fruit Science, IARI, Pusa, New Delhi, India

The yield losses due to pest population can be suppressed to be greater extent if their incidence is known well in advance so that timely adoption of remedial measures is possible. This led to a concept of 'forecasting' which is an important component of the pest management strategy. Pest monitoring through field surveys and surveillance helps in forecasting the population build-up of pest. It reduces the load of pesticides application and forms the basis of Integrated Pest Management in agriculture. Forecasting methods are based on the models that utilize data on weather parameters, farmer's eye estimates, agro-meteorological conditions, remote sense crop reflectance observations etc. either separately or in an integrated manner. The visual detection of plant responses to biotic stresses with acceptable levels of accuracy, precision and speed is difficult. These responses affect the amount and quality of electromagnetic radiation reflected from crop canopies. Hence, remote sensing and GIS are the techniques involving instruments that measure and record the changes in electromagnetic radiation and provides better means of objectively quantifying biotic stresses in comparison to visual assessment methods. Agricultural production is significantly affected by biotic- living organisms, such as predator, parasites, pathogens and abiotic factors, like temperature, humidity, rainfall etc. To manage the pests, monitoring and forecasting has been an integrated part of the crop production system in developed countries. In recent years, remote sensing has become popular in pest monitoring, yield forecasting, and early warning to crop growers for timely management of potential pests in agriculture.

Keywords: Pest Surveillance, Remote Sensing, GIS, Monitoring, Forecasting, Pest management.**ISOLATION, PURIFICATION, IDENTIFICATION AND PATHOGENICITY OF THE *SCLEROTIUM ROLFSSII* CAUSING COLLAR ROT OF LENTIL****SUMAN CHOPRA****Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, College of Agriculture, Gwalior, M.P. India**

Collar rot of lentil caused by *Sclerotium rolfsii* is one of the most devastating soil borne pathogen, which is threatening the production of lentil crop. In this study associated fungus was isolated and purified on Potato Dextrose Agar medium from infected collar region and upper root portion was used for isolation of *Sclerotium rolfsii* and the infected lentil plant samples were collected from research farm of Rajmata Vijayaraje Krishi Vishwa Vidyalaya, Gwalior. On PDA medium, *Sclerotium rolfsii* grew white, dense, cottony mycelium that was fluffy. After incubating for five to seven days, the mycelium reached its primary stage of growth when it was fan-shaped, gritty, and silky white throughout the entire Petri dish. When the mycelium was young, it was hyaline, thin-walled, and sparsely septate. Initials of sclerotial were seen seven days following inoculation. The sclerotia were white throughout the primary stage, turning brown and tan to chocolate brown as they became older. Mature sclerotia were positioned in the core and periphery of petridishes, with a dimension ranging from 1.1 to 1.4 mm. They were superficially spherical to ellipsoidal. To investigate the pathogenicity of *S. rolfsii* using the soil infestation approach, pot experiments were carried out in net houses. The outcome demonstrates that *S. rolfsii* was able to infect lentil plants. Following the pathogen's re-isolation from diseased roots and stems, the collar rot pathogen as *Sclerotium rolfsii* was identified.

Keywords: Lentil, collar rot, *Sclerotium rolfsii*, isolation, purification and pathogenicity.

SILENT ASSASSINS: THE IMPACT OF NEONICOTINOIDS AND ORGANOPHOSPHATES ON BIRDS**SUMAN DASMODAK*, MANAS PARAMANIK****Epidemiology, Vector biology and Environmental monitoring Research Units, Entomology Laboratory, Department of Animal Science, Kazi Nazrul University, Asansol, Paschim Bardhaman, West Bengal, India.**

Alarmingly, more than five thousand million pounds of synthetic pesticides are used worldwide each year and these silent assassins play a significant role in the decline of bird populations. Neonicotinoids and organophosphates are prominently utilized as insecticides in agricultural fields to enhance crop yields. These insecticides infiltrate the food chain via direct exposure, contaminated water and soil and adulterated crops. Birds, positioned at the apex of the food chain, unwittingly fall prey to this stealthy infiltration. Both organophosphates and neonicotinoids are compounds that act as anti-cholinesterases, disrupting nerve impulse propagation in insects. Exposure to neonicotinoids in birds, results in diminished reproductive success, altered behaviour, and heightened mortality rates. Organophosphates also have a detrimental impact on birds, which causing defective embryos, disruption of endocrine activities, reduced brood volume, weakened immune response, sluggishness, subdued parental devotion, distortion of heat regulation and reduced proficiency in migratory activity. Moreover, the combined effects of simultaneous exposure to these pesticides amplify their toxicity. Additionally, organophosphates and neonicotinoids both have the capacity to accumulate in bird tissues, extending exposure and influencing ecosystems along the food chain. According to a study, the populations of grassland birds and insect-eating birds declined by 4% and 3% respectively annually due to the usage of these pesticides. Since birds occupy the highest trophic level, their decline disrupts the stability of the entire ecosystem. Addressing this issue requires regulatory authorities and farmers to embrace sustainable and eco-friendly alternatives, mitigating the detrimental impact of neonicotinoids and organophosphates on bird diversity and ecosystems.

Keywords: Neonicotinoids, Organophosphate, Ecosystem, Birds, food chain**IMPACT OF HEAVY METAL ON VEGETABLE CROPS****SUMAN KUMAR*, VIJAY KUMAR SINGH AND PARAMVEER SINGH****Department of Horticulture (Vegetable and Floriculture), Bihar Agricultural University, Bhagalpur, Bihar**

Environmental pollution is rapidly booming worldwide. heavy metal toxicity has become a major attention because of the enhanced environmental pollution. The soil contaminated with heavy metals like Cr, Mn, Fe, Ni, Cu, Zn, Cd, Pb and Hg has serious environmental problems since these metals are toxic to plants, animals and human being health and it also affects the nutrient status of soil, soil health, water source. These heavy metals are released into the environment through various anthropogenic activities such as mining, industrialization and agricultural activities like application of pesticides, fungicides and fertilizers, heavy metals are released into the soil, water and atmosphere. These heavy metals interfere with the physiological process and affect the plant growth and development. Accumulation of heavy metals occurs only when the vegetable crops are cultivated on the contaminated soils or wastewater used as irrigation, as a result these heavy metals enters into the food chain and cause various severe health ailments. On consumption of these contaminated vegetables for prolonged period by human beings cause major harmful ailments as a result of bio-magnification. There are Physical, Chemical and biological remediation processes to reduce the level of heavy metals from these sources.

Key words:- Pollution, anthropogenic, contaminated, bio-magnification**EFFECT OF DIFFERENT LEVELS OF IRRIGATION ON FRUIT RETENTION & BIOCHEMICAL ATTRIBUTES OF MANGO (MANGIFERA INDICA) CV. LANGRA.****SUMAN KUMARI*, RAVINDRA KUMAR, KUMARI KARUNA, NEHA SINHA, KUMARI MADHUMALA, ANKUR KUMAR RAI****Department of Horticulture (Fruit & Fruit Technology) Bihar Agricultural University, Sabour, Bhagalpur**

Mango (*Mangifera indica* L.) is one of the delectable fruit crop in world. It being one of the partially drought tolerant crop but irrigated to ensure availability of sufficient soil moisture content during the fruit development period. Dependency on rainfall not provides optimum fruit quality and also leads to crop failure. Artificial application of water at an appropriate time found effective in increasing number of fruit per panicle that ultimately increase fruit retention per panicle and also result better quality fruit of mango. In order to understand the effects of soil moisture content in mango, this experiment was carried out on uniformly grown mango trees cv. Langra in Experimental Area at BAC, Sabour, Bhagalpur during the year 2020-21. For this experiment five treatments were taken i.e. T₁-[Control], T₂-[Water requirement at 25% of EP], T₃-[Water requirement at 50% of EP], T₄-[Water requirement at 75% of EP], T₅-[Water requirement at 100% of EP], with four replications in RBD design. Our results revealed treatment T₄ performed better in respect in terms of fruit quality parameters treatment T₁ showed significant results in respect to maximum T.S.S of 19.23 °Brix, maximum T.S.S/Acid ratio of 62.31, maximum carotenoid content of 7.12 mg/100g, maximum phenol content of 2.36 mg/100g, total sugar of 11.25 per cent and non-reducing sugar of 8.87, while maximum reducing sugar of 2.86 per cent was observed in treatment T₅. But in terms of fruit retention per panicle at harvesting stage maximum number of 1.50 fruits was recorded in treatment T₄. Results reveal that the optimized cost of cultivation was found beneficial in treatment T₄ this treatment show maximum benefit: cost ratio 4.38 while minimum in T₁. On the basis of above finding it can be concluded that T₄ performed best for increasing fruit retention.

ADVANCING AGRICULTURAL SUSTAINABILITY: A COMPREHENSIVE OVERVIEW OF MODERN AGRONOMY**SUMAN YADAV****Department of Agronomy, RARI Durgapura (Jaipur)**

Agronomy encompasses a broad spectrum of scientific disciplines and practical applications aimed at optimizing agricultural productivity while ensuring sustainability and environmental stewardship. It integrates principles from soil science, crop physiology, genetics, pest management, and agricultural economics to address the complex challenges facing modern agriculture. Soil management lies at the heart of agronomy, focusing on enhancing soil health and fertility through practices such as crop rotation, cover cropping, and precision nutrient management. These strategies improve soil structure, nutrient availability, and water retention, thereby supporting healthy plant growth and higher yields. Crop production within agronomy involves the selection, breeding, and management of crops tailored to specific agroecological conditions. Agronomists leverage knowledge of plant genetics, physiology, and biotechnology to develop resilient crop varieties with improved yield potential, disease resistance, and nutritional value. They also employ innovative techniques like precision farming and remote sensing to optimize resource use and minimize environmental impact. Sustainability is a core principle in modern agronomy, guiding practices that promote long-term viability without compromising future generations' ability to meet their needs. This includes adopting agroecological approaches, reducing chemical inputs through integrated pest management, and promoting conservation tillage to mitigate soil erosion and carbon loss. Agronomy's impact extends beyond the field, influencing agricultural policies, rural development strategies, and food security initiatives. By conducting research, providing education and extension services, and fostering collaboration across disciplines, agronomists contribute to a more resilient, productive, and sustainable agricultural sector that can meet the growing demands of a changing world.

PHOSPHATE SOLUBILIZING AND PLANT GROWTH PROMOTING STRAIN OF *ROTHIA KRISTINAE* WITH EXTREME XENOBIOTIC TOLERANCE – A PROMISING CANDIDATE FOR RECLAMATION OF BIODEGRADED AND TOXIC LAND
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The tea industry is a strong backbone of the Indian economy, holding a major share in foreign exchange. Out of all the tea growing areas, Darjeeling tea holds a special place worldwide for its unmatched aroma and flavor, hence giving it the much-deserving GI tag. However, due to the acidic soil of the region, which is a prerequisite for this coveted variety of tea, available forms of phosphate take a major hit through chelation with heavy metals. Unawareness of this working principle leads to application of phosphate fertilizers that meet the same fate without any increase in available phosphate, only increasing the overall cost of production. *Rothia kristinae* (PSMR 5.7), a phosphate solubilizing bacteria isolated from the rhizospheric soil of tea, exhibited very high efficiency in not only phosphate solubilization but also other crucial plant growth-promoting abilities, both *in vitro* and *in vivo* conditions. The metabolomic study further confirmed its role as a plant growth regulator. This was further aided by commendable tolerance against pesticides and heavy metals that have never been reported before. It also demonstrated the ability to degrade complex hydrocarbons like diesel and gasoline, thus making it a promising candidate for the reclamation of degraded and toxic areas into agriculturally useful land. The isolate was also found to be non-pathogenic and mostly susceptible to antibiotics, making it safe to introduce it into the environment to harness its unabridged potential. Therefore, encapsulation and dissemination of this potent bacteria can bring about a radical shift in the nutritionally challenged and contaminated agricultural fields.

INFLUENCE OF DIFFERENT DATES OF SOWING AND NUTRIENT MANAGEMENT ON SWEET CORN**SUMIT JAT¹, SWATI KUNJAM², ANCHAL KAROL², JAGDISH CHOUDHARY³****¹M.Sc. (Ag) Agronomy, ²Ph.D Scholar, ³Associate professor, Rajasthan College of Agriculture, MPUAT, Udaipur (Rajasthan)**

Zea mays var. *saccharata*, also known as sweet corn, is primarily grown for its fruit (cob) and it is categorized as a vegetable crop. It is ranked second in terms of agronomic value for the conversion industries (freezing and canning) and fourth for vegetarian purposes. Features of this product include short growing periods i.e., 75–85 days from emergence to harvest, higher wet corn yield and marketability. One of the most important things to know about corn is when to sow it. Sweet corn is a rich source of fiber, folic acid and vitamin A, carbohydrates and 80 kilocalories of energy. Nitrogen is one of the most important nutrients that crops require to reach their maximum yield. It is also the nutrient that has the highest concentration in plants and is crucial to plant growth and yield increase. Consequently, a lack of nitrogen affects yield more than a lack of other nutrients. Due to the increasing significance of environmental issues, more attention is now being paid to biological fertilizers, which have long been used in place of chemical fertilizers. Examples of biological fertilizers include *Azotobacter*, *Azospirillum*, PSB and blue green algae (BGA). Bio-fertilizers have an advantage over chemical fertilizers, as they provide nutrients in addition to plant growth promoting substances like hormones, vitamins, amino acids etc. Among the various factors affecting the growth and yield of sweet corn, sowing date and nutrient management plays an important role. The appropriate date of sowing and nutrients through liquid biofertilizer provides better conditions for plant growth results in timely commencement of reproductive phase and formation of sink.

Keywords: Biofertilizers, Nitrogen, Carbohydrates, Corn, Sowing date

EFFECT OF GAMMA RADIATION AND ORYZALIN TREATMENT ON THE SURVIVAL AND GROWTH OF BALSAM (*IMPATIENS BALSAMINA*)SUMIT PAL¹, ANIL K. SINGH² AND ANUPAM TIWARI³¹Department of Horticulture, Narayan Institute of Agricultural Sciences, Gopal Narayan Singh University, Sasaram, Bihar, India²Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, India³Department of Horticulture, Janta Vedic College, Baraut, India

The present study was conducted at Horticulture Research Farm, Banaras Hindu University, Varanasi with a view to evaluate the effect of doses of gamma radiation (35 kR and 40 kR from 60Co source) and oryzalin (50 µmol, 100 µmol and 150 µmol) on the survival and growth of balsam (*Impatiens balsamina*). The experiment was conducted on 29 selected genotypes of balsam. Experiment was laid out in a Randomized Block Design with three replications. It was observed that survival of BDR-2 and BSV-11 was significantly increased over untreated control among all other genotypes. The maximum survival percentage of genotypes was observed with genotypes treated with low dose of gamma i.e. 35 kR (50.92 and 55.75 during M1 and M2 generation) while low survival was observed with high dose of oryzalin i.e. 150 µmol (41.86 and 53.01 during M1 and M2 generation). Five parameters were taken into the consideration to estimate the overall growth of balsam i.e. number of primary branches per plant, fresh weight of leaves (g), number of leaves per plant, diameter of stem (mm) and height of plant (cm). It was noted that genotypes viz., BDR-1, BDV-1, BS-39, BS-14, BS-23, BSW-7 etc. showed positive response to the treatments in terms of number of primary branches per plant during both consecutive years of experiment. Similarly, BSW-7 along with few other also showed positive correlation with the treatments in terms of plant height (cm) and fresh weight of leaves (g). The genotype BDR-4 had also represented the results in equal manner in terms of stem diameter (mm). The maximum growth during M1 and M2 generation observed with treatment of 50 µmol (13.01 and 13.60 in terms of number of primary branches), 50 µmol and 40kR (0.54 and 0.96 in terms of fresh weight (g) of leaf), 35kR and 50 µmol (503.42 and 476.72 in terms of number of leaves), 50 µmol (23.17 and 23.32 in terms of diameter (mm) of stem), 50 µmol and 35kR (74.18 and 97.22 in terms of height (cm) of plant). Moreover, it was observed that all the genotypes showed positive response to the treatments except in terms of survival where the decreasing trend was observed with increasing doses of the treatments.

Keywords: Gamma Radiation, oryzalin treatment, *Impatiens balsamina*.**DEVELOPMENT AND EVALUATION OF A MULTI-RESIDUE UPLC-MS/MS METHOD FOR PESTICIDE ANALYSIS IN CROP GROUP 028 (SPICES) WITH CONSIDERATION OF CROP GROUPING AND MATRIX EFFECTS**SUMIT SHEKHAR¹, SUDAMA RAM SAHU¹, MADHU TIPPANNANAVAR¹, HARSHANG TALAVIYA¹, BIJENDRA SINGH¹, BIDISHA CHAKRABARTI², NEETHU NARAYANAN¹, SUMAN GUPTA¹, ANUPAMA SINGH¹, TIRTHANKAR BANERJEE^{1*}¹Division of Agricultural Chemicals, ²CESCRA, ICAR-Indian Agricultural Research Institute, New Delhi

To streamline pesticide residue regulations, a system called "crop grouping" is being introduced. This approach allows data from studies on designated "representative crops" to be applied to other similar crops (member crops) within the same group. This translates to significant cost savings, as extensive testing is only required for a select few crops (representative crops) (US EPA, 2019). In the present study, the development and validation of a method for trace level detection and quantification of 100 pesticides on representative crop matrices under crop group 028 (spices) consisting of cumin seed (subgroup 028A, seed spices) and cardamom (028B, fruit and berry spices) have been undertaken, and the performance of the method on the respective member crops (fenugreek and tamarind, respectively) was assessed based on sensitivity, recovery, and matrix interferences. Identification and quantification of the selected pesticides were done by ultra-performance Liquid Chromatography-Tandem Mass Spectroscopy. The modified QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe), the dispersive solid phase extraction and cleanup method, was optimized using acetonitrile as the extracting solvent in the presence of anhydrous MgSO₄ and NaCl, followed by clean-up with MgSO₄, PSA, and C-18 for cumin and cardamom, respectively. Quantification using a matrix-matched calibration curve proved much more effective in reducing the matrix effect and improving recovery (69.13–119.69%) for most of the pesticides. The precision level of the method was in the range of 0.1 to 19.56% RSD, with the limit of quantification (LOQ) in the range of 0.01 to 1 µg g⁻¹ for both matrices. The global uncertainty for the determination of the pesticides at the LOQ level was in the range of 6.81 to 29.86% for cumin seed and 6.77 to 28.88% for cardamom, respectively. Predominantly mild to strong matrix suppression effects were found in cumin, while mild enhancement and mild suppression effects were found in fenugreek. On the other hand, mild to medium matrix suppression was found in cardamom and tamarind at respective LOQ levels of pesticides. The optimized methods are economic, sensitive, green (safe), and less time-consuming for monitoring 100 pesticide residues in cumin (representative crop) seed but did not perform satisfactorily in that of fenugreek seed (member crop), which necessitates reconsideration of the representative crop for crop subgroup 028A (seed spices), while the optimized method in cardamom (representative crop) performed well in tamarind, suggesting its suitability for the representative crop for subgroup 028B (fruit or berry spices).

Key words: Crop Grouping, LC-MS/MS, QuEChERS, Matrix effect

SOIL HEALTH, LAND RESOURCES, SOIL SURVEY AND LAND USE PLANNING AND MANAGEMENT**SUMITRA KUMAWAT*, SONU KUMAWAT*******Ph.D, Research Scholar, ICAR- Indian Agriculture Research Institute, New Delhi******M.Sc, Sardarkrushinagar Dantiwara Agriculture University, Gujarat**

The health of our soil, the foundation of agricultural productivity, is intricately linked to sustainable land use practices. This abstract delves into the critical interplay of soil health, land resources, soil surveys, and the imperative for integrated planning and management. Soil health stands as a cornerstone of agricultural success, influencing crop yields, biodiversity, and environmental resilience. Sustainable land use hinges on maintaining and improving soil health, achieved through practices like crop rotation, cover cropping, and reduced tillage. These approaches promote soil structure, water retention, and nutrient availability, fostering resilient ecosystems and productive farms. Land resources are finite, demanding judicious management for present and future generations. Soil surveys, through detailed assessments of soil types, properties, and spatial distributions, provide invaluable insights. They guide land use planning by identifying areas suitable for agriculture, forestry, urban development, or conservation. Modern technologies such as remote sensing and Geographic Information Systems (GIS) enhance the precision and efficiency of these surveys, aiding in sustainable resource allocation. Integrated land use planning and management emerge as imperatives for balancing agricultural productivity with environmental conservation. This involves a holistic approach, considering ecological, economic, and social dimensions. Strategies like agroforestry, precision agriculture, and zoning for conservation help optimize land use efficiency while safeguarding soil health and biodiversity. In conclusion, the sustainable management of soil health and land resources is paramount for ensuring food security, environmental sustainability, and rural livelihoods. Through comprehensive soil surveys, informed land use planning, and integrated management strategies, we pave the way for a resilient and prosperous agricultural future.

Key words:- soil health, precision agriculture, Geographic Information Systems (GIS).**ORGANIC FARMING: A SUSTAINABLE APPROACH FOR ENVIRONMENT AND HUMAN HEALTH****SUNEEL KUMAR¹, DEVESH PATHAK², HARIOM MISHRA³****Research Scholar, Department of Soil Science and Agricultural Chemistry****Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.) India****²Subject Matter Specialist, Department of Soil Science and Agricultural Chemistry, Krishi Vigyan Kendra, Amethi, (U.P.), India****³Subject Matter Specialist, Department of Agronomy, Krishi Vigyan Kendra, Basti, (U.P.), India**

Crop systems that prioritize natural farming methods and environmental conservation are known as organic farming systems. It is focused on the complete system that produces and distributes the agricultural product, not just the final product. Therefore, artificial items like pesticides and synthetic fertilizers are not used throughout the entire agricultural cycle, from production and processing to handling and delivery. As an alternative, organic farmers depend on contemporary scientific ecological knowledge and natural farming practices to conserve the environment, improve the quality of their produce, and optimize the ecosystem's long-term health and productivity. Organic methods' proponents contend that they are more environmentally friendly and sustainable. Organic farming techniques have been demonstrated in numerous studies to give even higher yields than conventional techniques. It is also possible to observe a significant difference in soil health indicators, which were greater in the organic farms and included nitrogen mineralization potential as well as microbial abundance and diversity. In addition to significantly reducing the prevalence of insects and diseases, organic farms also have healthier soil. Rural communities' economies could be revived by putting more of an emphasis on small-scale integrated farming systems. Eating organic food may lower the risk of allergic reactions, being overweight, and obesity, but there may be remaining confusion because organic food users typically lead healthier lifestyles.

Keywords: Organic Farming, Ecosystem, Environment friendly, Soil Health**PHEROMONE TRAPS A USEFUL TOOL IN INTEGRATED PEST MANAGEMENT****SUNIL KUMAR DHABHAI¹, MANOJ SINGH BHATI¹, GAURANG CHHANGANI² AND TARA YADAV²****¹Research Scholar, Department of Entomology, COA, Agriculture University, Jodhpur (Raj.)****²Assistant Professor, Department of Entomology, COA, AU, Jodhpur (Raj.)**

Food is essential for human survival and agriculture is the primary source of food. Agriculture is therefore essential to human existence. Unfortunately, many pests have a negative impact on agricultural productivity, yields and quality. Nonetheless, there are numerous techniques for controlling agricultural pests. Some of these methods including chemical application cause adverse effect to environment and human health. As a result, it is important to create eco-friendly and successful alternative management practices. Integrated Pest Management is an approach that aims to control pests in a sustainable and environmentally responsible manner by combining various pest control methods. Pheromone traps play a crucial role in this approach by helping to monitor, detect and manage pest populations effectively while minimizing the use of chemical pesticides. Pheromone trapping has developed as a viable strategy in pest management technology, bringing advancements and innovations with high potential for successful pest control. Pheromone trapping has allowed for focused monitoring and control of certain pest populations. By utilizing synthesized versions of insect-specific pheromones, traps can attract and capture pests while minimizing the impact on beneficial insects and the surrounding environment. Pheromone traps have proven to be successful in monitoring and managing a wide range of pests, including insects that damage crops, stored products.

Key words: Pheromone traps, IPM, Pest Monitoring, Mating disruption

IMPACT OF POLYMER COATED BIO-AGENT TREATMENTS ON GROWTH AND SEED YIELD OF PIGEONPEA [CAJANUS CAJAN (L.) MILLSP.] GENOTYPES

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Pigeonpea [*Cajanus cajan* (L.) Millsp.] is a vital legume crop in the semiarid tropics of Asia, Eastern Africa, and the Caribbean Islands. The availability of healthy, pathogen free seeds plays a pivotal role in achieving an optimal plant population and subsequently influencing yield parameters in pigeonpea. The field experiment was arranged using a randomized block design with a factorial concept, involving eight genotypes and three bioagents. Different pigeonpea genotypes exhibited varying performances across growth attributing traits. Genotype GRG-811 recorded notable emergence, while BSMR-736 showed higher plant height and other growth attributing traits. TS-3R demonstrated early maturity and fewer days to 50 per cent flowering. BSMR-736 also had more pods, seeds per pod and higher seed yield per plant, plot and hectare. The impact of bioagents on plant traits was prominent. The combination of polymer @ 3 ml kg⁻¹ + *Trichoderma harzianum* and *Pseudomonas fluorescens* each @ 5 g kg⁻¹ showed positive effects on traits like field emergence, plant height, primary and secondary branches and pods per primary branch. However, other bioagents did not significantly influence interactions with genotypes. Since the combination worked better than single isolates and also provides glucose oxides and growth stimulating compounds which are useful in enhancing plant growth. The study highlights the significant influence of both pigeonpea genotypes and bioagents on various plant traits, including field emergence, plant height, branching patterns, flowering time, disease incidence and seed yield. Certain genotypes like GRG-811, BSMR-736, GRG-152 and TS-3R exhibited favourable traits and bioagents, especially the combination of polymer with seed treatment *Trichoderma harzianum* and *Pseudomonas fluorescens*, showed potential to enhance plant performance. Specific bioagent treatment and pigeonpea genotypes significantly influenced the seed yield.

Effect of Nano urea application on growth and productivity of rice (*Oryza sativa* L.) under Jammu region

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A field experiment was conducted on “Effect of nano urea application on growth and productivity of rice (*Oryza sativa* L.) under Jammu region” at Research farm, Division of Agronomy SKUAST- Jammu during Kharif season of 2021 and 2022 in randomized block design (RBD) with ten treatments and three replications. The results showed that highest number of panicles m⁻², total number of grains panicle⁻¹, number of filled grains panicle⁻¹, test weight (g), grain (4190 kg ha⁻¹), straw yield (6250 kg ha⁻¹) and nutrient uptake was significantly highest under treatment T5 75% of RDN + Two foliar sprays of nano urea (AT and PI) which was at par with treatment T4 50% of RDN + Two foliar sprays of nano urea (AT and PI) and T6 100% of RDN + Two foliar sprays of nano urea (AT and PI). The lowest grain and straw yield (2558 and 3656 kg ha⁻¹) was recorded under control.

Key words: Rice, Nano urea, growth and productivity

ADVANCEMENTS IN PLANT PATHOLOGY: EXPLORING MOLECULAR INTERACTIONS, OMICS TECHNOLOGIES, AND INNOVATIVE DISEASE MANAGEMENT STRATEGIES

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Advanced plant pathology encompasses cutting-edge research and technologies aimed at understanding and managing plant diseases at a molecular level. This abstract explores the key components of advanced plant pathology, including omics technologies, molecular interactions between plants and pathogens, host-pathogen co-evolution, and innovative disease management strategies. Omics technologies, including genomics, transcriptomics, proteomics, and metabolomics, have revolutionized our ability to study plant-pathogen interactions. These high-throughput techniques allow for the comprehensive analysis of genes, gene expression, proteins, and metabolites involved in disease resistance and susceptibility. They provide insights into molecular mechanisms underlying plant defense responses and pathogen virulence strategies. The molecular interactions between plants and pathogens are intricate and dynamic. Pathogens have evolved sophisticated mechanisms to overcome plant defenses, such as effector proteins that manipulate host cell processes. Advanced plant pathology research focuses on deciphering these molecular dialogues to develop novel strategies for disease control. Host-pathogen co-evolution is a central theme in advanced plant pathology. Plants continually adapt their defense mechanisms to counter evolving pathogens, leading to a complex arms race. Understanding the genetic basis of plant resistance and pathogen virulence is essential for breeding durable resistant crop varieties and developing targeted interventions.

Keywords- Advanced plant pathology, Omics technologies, Genomics, Transcriptomics

ASSESSING AND STRATEGIZING SUSTAINABLE LIVELIHOODS FOR SMALL AND MARGINAL FARMERS IN JAMMU

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The cropping and farming systems of households in the Jammu region were analyzed based on primary data collected from a sample of 480 farmers in the year 2022-2023. The study area encompassed Jammu, Shamba, Reasi, and Udhampur districts. Predominantly, the study area exhibited cereal-based and livestock-based farming systems. Livestock and cereals served as the primary sources of farm income across all districts, while non-farm activities contributed significantly to their overall income. The research aimed to assess the livelihood diversification of rural farmers in the state of Jammu. The purposive sampling technique was employed to select sample communities, from which a total of 480 households were randomly chosen for the study. Data collection involved both quantitative and qualitative methods. The quantitative approach employed a structured questionnaire, while the qualitative approach involved the use of Participatory Rural Appraisal (PRA) tools. The study revealed that the mean age of the sampled farmers was 38.3 ± 0.6 years, falling within the range of 19 to 68 years and above. Additionally, there were more adults aged 43.8 ± 1.7 years in the range of 20 to 70 in the study area. In terms of gender distribution, males constituted 71.15% of the sample, while females constituted 28.85%. Educational levels were distributed across four categories: illiterate (63.54%), primary (20.2%), secondary (12.5%), and university (3.75%). The primary occupation for income generation within the communities was trading, whether related to farming or non-farm activities, with proportions of 90.2% and 9.8%, respectively. Household sizes ranged from a mean of 7.4 ± 0.3 individuals, constituting 27.5% of the variation. Access to land ownership, rentals, and community use stood at 73.05%, 21.22%, and 5.72%, respectively. Mechanization tools such as tractors, trolleys, ploughs, cattle, and others were used in percentages of 2.45%, 2.15%, 16.9%, 19.5%, and 59%. These findings underscore the limited access rural farmers have to productive assets, leading them to heavily rely on non-farm activities for income. The study also highlighted challenges concerning access to credit facilities within the communities. Existing groups lacked the strength to influence the market or serve as pressure groups to secure access to credit. Therefore, the study recommends that stakeholders introduce a straightforward and functional micro-credit delivery system, enhancing the farmers' ability to access loans and subsequently bolstering their economic activities. Additionally, business advisory services should be extended to enterprise groups to assist them in achieving these objectives.

Key Words: Household, education, source of income agriculture equipment and income.

ADVANCING AGRICULTURE THROUGH MODERN AGRONOMY: SUSTAINABLE PRACTICES FOR CROP PRODUCTION

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Agronomy encompasses the scientific study and practical application of agricultural principles to enhance crop production and sustainability. At its core, agronomy delves into plant genetics, soil health, and crop management strategies. By understanding the genetic makeup of plants, agronomists can develop improved crop varieties that are resistant to pests, diseases, and environmental stressors, thereby increasing yields and ensuring food security. Soil management is another crucial aspect of agronomy, focusing on maintaining soil fertility, structure, and moisture content. Techniques such as crop rotation, cover cropping, and nutrient management play key roles in optimizing soil health and productivity while minimizing environmental degradation. Agronomy also involves the judicious use of irrigation systems to provide crops with adequate water, especially in regions facing water scarcity. Additionally, agronomists study integrated pest management (IPM) approaches to control pests and diseases using environmentally friendly methods, reducing the reliance on chemical pesticides. Moreover, agronomy integrates cutting-edge technologies like precision agriculture, remote sensing, and data analytics to optimize farming practices. These advancements enable farmers to make informed decisions regarding planting schedules, resource allocation, and pest management, leading to improved efficiency and sustainability in agriculture. Overall, agronomy plays a vital role in ensuring global food security, promoting sustainable farming practices, and addressing the challenges posed by climate change and population growth.

CRISPR-CAS9: THE GENOME EDITING TOOL FOR HORTICULTURAL CROPS IMPROVEMENT

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Fruit trees, berry crops, nuts, ornamentals, aromatic, and medicinal plants are among the horticultural plants that are particularly useful for researching their genetic and biochemical characteristics. Contemporary molecular genetic technologies, particularly genome editing using CRISPR/Cas9 nucleases, are emerging in addition to conventional techniques of investigating these plants. With the help of this technology, it is now possible to modify a wide range of plant attributes, including the ability of plants to withstand biotic and abiotic stressors, alter the timing of fruit ripening and flowering, and modify both the growth and Flavor characteristics of their fruits. A time- and resource-consuming process of backcrossing and selection is used in conventional breeding strategies to improve crop qualities. This allows for the introgression of a desired trait into elite germplasm. Genome editing using CRISPR/Cas9 has been successfully applied to numerous horticultural plants. These plants have had dozens of their genes altered through the use of genome editing technologies. We've talked about the primary methods of introducing genetic constructs to plants and the constraints that make target gene editing more difficult.

Keywords: genome editing, CRISPR/Cas9, plant disease resistance, flowers longevity, fruits and berries improvement

FLORAL DIVERSITY AND ENVIRONMENTAL IMPACTS IN THE VICINITY OF GLACIAL LAKES IN WESTERN HIMALAYA, INDIA

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The Western Himalayas, a region known for its diverse ecosystems and unique geographical features, hosts a range of glacial lakes that serve as crucial habitats for a wide variety of flora and fauna. The floristic diversity along glacial lakes represents an unique ecological niche characterized by species adapted to the harsh, fluctuating conditions typical of these environments. This study explores the floristic composition, ecological roles, and conservation challenges associated with the vegetation in the vicinity of glacial lakes. Through extensive field surveys and data analysis, we have inventorized 81 plant species inhabiting the surrounding areas of these lakes, highlighting their ecological roles. Our findings reveal a significant diversity of plant life, including several rare and endemic species, underscoring the ecological importance of these aquatic ecosystems. All the specimens were identified using the most recent flora and monographs and then compared with the authentic specimens kept at the different herbaria. The exploration trips were held from early May to late October to record the plants in Western Himalaya, since the area is closed for the rest of the year due to severe snowfall. The total taxa comprise 54 genera, belonging to 27 families. Dicots are the dominating group represented 76 (93.8%) followed by Monocots 05 (6.17%). Asteraceae with 17 species and 09 genera is top ranked family in the area followed by Rosaceae (07 species, 05 genera) etc. The most dominant genera with respective to species richness are *Saussurea* (07), *Bistorta*, *Carex*, *Argentina* and *Primula* (03 each) etc. The herbaceous plants were dominant in the region with 78 species (96.2%) followed by shrubs (3.7%). The study also examines the impact of climate change and human activities on the floristic patterns, and proposes conservation strategies to protect these fragile ecosystems. This research contributes to the understanding of high-altitude biodiversity and emphasizes the need for sustainable management practices to preserve the unique floral heritage of the Western Himalaya's glacial lakes.

DIETARY DIVERSITY, NUTRITIONAL STATUS AND ASSOCIATED RISK FACTORS AMONG POSTPARTUM MOTHERS IN VIJAYANAGAR DISTRICT, INDIA

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Puerperium is a period of adjustment after pregnancy when the anatomic and physiologic changes of pregnancy are reversed and body returns to the normal state. This period starts as soon as the placenta is expelled and extends up to the period of 6 weeks. A community based cross sectional study was conducted in Vijayanagar district, India from 2021-2023. The study was conducted in Vijayanagar district of Kalyan Karnataka region and total of 810 mothers were selected from the selected area. General information schedule eliciting information on individual, familial and infant factor information were asked. Self-structured questionnaire on nutritional status, dietary survey and socio-economic status were administered on each women respondent. Anthropometric measurements such as height, weight and MUAC were measured. The factors influencing nutritional status and health status was studied. Diet survey was conducted by using 24-hour recall method. Results revealed that the postpartum mothers' nutrient consumption was less than 50% of the RDA in the majority of food groups. A highly statistically significant difference was observed among the two groups indicating very poor nutrient intake by postpartum mothers. The mean energy intake (1004.04±145.82 Vs 856.06±164.19), protein intake (26.37 ± 11.21 Vs 18.15± 5.85), carbohydrates (125.23±25.88 Vs 108.41±26.58) and fat (16.37±5.15Vs 12.84±4.79) by mothers was high when compared to other group.

Key words: Postpartum mothers, health status, dietary survey, nutritional status, puerperium, pregnancy

A CLOSER LOOK AT POLYMERIC NANOPARTICLES: A PROMISING TOOL FOR ALGAL BLOOM CONTROL USING COPPER SULFATE

SUPARNA DEB*, SHUBHAM KASHYAP*, PRADYUT BISWAS, PAYEL DEBBARMA

Algal blooms pose a significant threat to aquaculture systems, disrupting ecosystems and causing economic losses. Copper sulfate (CuSO₄) is a commonly used algicide, but its widespread application raises concerns about environmental toxicity. Polymeric nanoparticles by preparing macrosphere, offer a promising approach for targeted CuSO₄ delivery, slow release of CuSO₄, potentially improving efficacy and reducing environmental impact. This study explores the potential benefits and drawbacks of using polymeric nanoparticles for CuSO₄ delivery in algal bloom control. We delve into the targeted delivery mechanism of nanoparticles, enhancing algicidal effectiveness while minimizing harm to non-target organisms. The potential drawbacks, however, necessitate careful consideration. The environmental fate and potential unintended consequences of nanoparticles themselves need to be thoroughly investigated. We explore concerns regarding nanoparticle persistence, potential interactions with aquatic ecosystems, and the possibility of introducing new contaminants. By acknowledging both the promise and potential pitfalls of this technology, this study aims to guide responsible development and application of polymeric nanoparticles for CuSO₄ delivery in algal bloom control. Striking a balance between efficacy and environmental safety is crucial for sustainable aquaculture practices.

Key words: Polymeric nanoparticles, macrosphere, slow release, Copper Sulfate

ARTIFICIAL INTELLIGENCE IN AQUACULTURE & FISHERIES: CURRENT BREAKTHROUGH AND FUTURE HORIZON SUPRATIM MALLA^{*1}, HIMADRI SAHA¹, SURAJ KUMAR¹ & HRITAM CHOUDHURY²

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Global fisheries production is steadily rising due to the aquaculture industry. For food and nutrition security in our nation and around the world, fish is essential. For this reason, it becomes imperative to boost fish output. However, it is dwindling as a result of several illnesses that could harm the country's economy. Early detection of illness-affected fish can assist us in taking the appropriate action to stop the sickness from spreading. The integration of Artificial Intelligence with Aquaculture has emerged as a transformative force. Manual identification of fish disease is not an error-free task by amateur farmers. Therefore, a computer vision-based automated approach can be a considerable solution for the reduction of disease. The necessity of computer vision-based fish disease recognition has been investigated. Recognition of disease-affected fish at an early stage can help us take necessary steps to prevent from spreading of the disease. In this work, we have performed an in-depth analysis of expert systems that can continue with an image captured with the help of smartphones and identify the disease. Two set of features is selected then a segmentation algorithm is employed to detect the disease attacked portion from the disease-free portion.

Keywords: Fish, Aquaculture, Data, Disease, Detection

OPTIMIZING HOME WORKSTATIONS: ENHANCING ERGONOMICS FOR HEALTHIER REMOTE WORK SUPRITA PAWAR¹ AND RAJESHWARI DESAI²

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his study presents the findings of a workstation evaluation checklist designed to assess the environment, health, and safety conditions of employees working from home (WFH) before and after the implementation of interventions aimed at improving ergonomics. The checklist, administered to 30 WFH employees, focused on key factors such as posture, keyboard/pointing device setup, chair ergonomics, computer screen positioning, lighting conditions, and work techniques. Before the intervention, analysis revealed several areas of concern, including suboptimal posture, limited accessibility and adjustability of workstation components, inadequate lighting, and poor work techniques. However, post-intervention assessments showed a significant improvement in various ergonomic aspects. Notably, there was a notable increase in the adoption of ergonomic practices; with a 78.02 per cent increase observed in posture-related factors and a 49.31 per cent increase in keyboard/pointing device setup. Additionally, improvements were observed in chair ergonomics (65.02% increase), computer screen positioning (49.62% increase), lighting conditions (8.62% increase), and work techniques (55.98% increase). These findings underscore the importance of implementing interventions to enhance the ergonomic suitability of WFH environments. By addressing ergonomic risk factors and promoting healthy work practices, organizations can mitigate the potential health risks associated with prolonged sedentary work and minimize the incidence of musculoskeletal disorders among WFH employees. Moreover, fostering a supportive ergonomic culture and providing employees with the necessary knowledge and resources to optimize their home workstations can contribute to improved productivity, comfort, and overall well-being in the remote work setting. This study contributes to the growing body of research on telecommuting and remote work by highlighting the significance of ergonomics in WFH environments and demonstrating the effectiveness of targeted interventions in promoting a safe and healthy work environment. The findings offer practical insights for employers, policymakers, and occupational health professionals seeking to optimize remote work arrangements and ensure the well-being of WFH employees in the long term.

METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* IN RAW MILK OF KATHMANDU VALLEY SUPRIYA BISTA^{1*}, MUKESH NEUPANE¹, KHADGA BIKRAM ANGBUHAN¹

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Milk, a vital human nutrition source, can be contaminated by various microbial groups during production, handling, transportation, and storage, leading to various diseases and impacts on its quality and safety. The objective of this study was to analyze the physicochemical parameters as well as the microbial isolates in raw milk in Kathmandu Valley and perform the antimicrobial susceptibility pattern of those microorganisms. A total of 40 samples collected from different sites were transferred to the microbiology laboratory of GoldenGate International College. Out of the 110 bacterial isolates, 48 isolates were Gram positive and 62 isolates were Gram negative bacteria. Coagulase Negative Staphylococci (CoNS) (42%) was the most dominant bacteria, followed by *Streptococcus* spp. (6%), and *S. aureus* (5%). Gentamycin (100%), Ciprofloxacin (100%), and Chloramphenicol (100%) were most effective antibiotics against CoNS. Vancomycin (100%) was the most effective antibiotic for *S. aureus*. Vancomycin (80%) and Levofloxacin (80%) were the most effective antibiotics for *Streptococcus* spp. 50% of the *S. aureus* were sensitive for methicillin resistance (MRSA), whereas only 45% of the isolated Coagulase Negative Staphylococci (CoNS) were sensitive for methicillin resistance (MR CoNS). Different physicochemical parameters like temperature, protein, lactose, pH, fat, solid not fat, salts etc. in milk were studied. The average fat of milk was 2.5%, s.n.f was 8.0%, density was 27.3 kg/m³, protein was 3.0%, lactose was (4.5%), freezing point was 0.4°C, salt was 0.6% and pH was 7.62. The result of this experiment, notwithstanding its limitations, demonstrate that the dangerous microorganisms are rather highly contaminated in raw milk.

Keywords: Raw milk, Kathmandu, Coliform, MRSA, CoNS

INDUCED MUTATION OF CROSSANDRA CULTIVAR ARKA AMBARA USING GAMMA IRRADIATION SUPRIYA N^{1*}, B. C. PATIL², BALAJI S. KULKARNI³, THAMMAIAH N⁴, ANAND B. MASTHIHOLI⁵, SANDHYARANI NISHANI⁶ AND RAJESH A. M⁷

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The effect of induced mutation studies on crossandra has been carried out at Kittur Rani Chennamma College of Horticulture, Arabhavi. The experiment was laid out in augmented randomized complete block design with cultivar Arka Ambara using gamma treatment. The survival percentage of mutants treated with gamma rays was recorded maximum at 10 Gy (61.36%), followed by 20 Gy (56.82%) and least in 40 Gy (31.82%). The LD₅₀ for cv. Arka Ambara mutants were recorded for gamma rays @ 20 Gy. The analysis of variance indicated the existence of significant differences among the mutant populations. Changes in morphological characteristics were observed in mutagen treated plants. The parameter days taken to flower spike initiation was recorded in T₂ (Gamma rays @ 20 Gy) 140 days, maximum days taken to first harvest, rachis length, number of flowers/spike, weight of 100 flowers and flower yield per plant was recorded in T₁ (Gamma rays @ 10 Gy) i.e., 175 days, 7.6 cm, 30, 9.88 g and 156.35 g, respectively. The parameter duration of flowering and number of spikes/plant was recorded maximum in T₃ (Gamma rays @ 30 Gy) i.e., 68 days and 49, respectively. The maximum corolla tube length and peduncle length was recorded 2.7 cm and 8.5 cm, respectively in T₂ (Gamma rays @ 20 Gy). The minimum flower diameter 3.2 cm recorded by T₄ (Gamma rays @ 40 Gy) compared to control. Reduction in survival after exposure to gamma rays might be attributed to disturbances of auxin synthesis or genetic loss due to chromosomal aberrations and gene mutation. The mutagenic treated plants showed reduction in survival percent and floral characteristics with increased dosage.

Keywords: Crossandra, mutation, gamma rays, Co-60, yield, survival percent, dosage

DIGITAL MARKETING AND GROWTH OF THE MODERN INDIAN AGRICULTURE INDUSTRY

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India is an agricultural country where about one-third of the people live in some form of agricultural dependency. Over 30.02 percent of India's GDP comes from agriculture, accounting for a sizeable portion of the sector. Since the beginning of the green revolution, India's agricultural policy has assisted farmers by providing them with access to markets and financial incentives to use biochemical technologies that improve productivity, such as seeds, fertilizers, and pesticides. One of the government's most notable initiatives to sell agricultural goods online without the need for middlemen is digital marketing. In this sense, digital marketing is a breakthrough move that greatly aids farmers in selling their goods around the world. The Digital India movement set out to turn rural India into an economy enabled by technology. The agriculture marketing system has undergone significant changes in the last sixty years due to several factors including increased marketed surplus, increased urbanisation and income levels, changes in the demand structure for marketing services, and stronger ties to distant and international markets. To examine the effects of contemporary digital marketing on respondents—such as email marketing, social media, online advertisements etc., a quantitative approach was adopted. A questionnaire tool was developed through online and offline means. The findings are suggestive that the application of information and communication technology (ICT) in the agricultural sector (e-agriculture) will completely alter the agri-food chain, but it will also necessitate significant changes to farming, rural economics, and agricultural marketing. Data also indicate that ICT significantly enables small farmers to locate several consumers who are prepared to pay a premium for their goods. Few buyers interact with smallholders; most of them either pick up straight from them. Digital marketing is helping all the small ranch-holding and large ranch-holding growers (borderline, small, medium and large growers) to find multiple buyers for their produce and get advanced prices. This study aims to investigate the direct and indirect effects of digital marketing on the agriculture sector of India's future generations.

Keywords: Agri-business, Digital Marketing, Farmers, Social media, Information communication technology (ICT), e-marketing platforms, online marketplac

ASSESSMENT OF POSTURAL STRESS AND DISCOMFORT LEVEL OF WORKERS INVOLVED IN DAIRY FARMING**SURABHI SINGH¹, DABHI MUGDHA², DABHI MAYA³**¹Head, Department of RMCS, ASPEE College of Nutrition and Community Science, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar²Research Scholar, Department of RMCS, ASPEE College of Nutrition and Community Science, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar³Assistant Professor (Adhoc), Department of RMCS, ASPEE College of Nutrition and Community Science, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar

Dairy farming is one of the most important agricultural and allied sectors where workers are forced to adopt and apply awkward and poor postures to complete tasks. These workers are thus, vulnerable for developing WMSDs. Nevertheless, very limited ergonomic intervention research has been done to reduce ergonomic risk factors for developing WMSDs among them. There is a need to identify and assess the posture loads required for tasks to design effective and targeted ergonomic interventions. The present research has focussed on assessing postural stress of workers while performing various dairy farming tasks such as fodder collection, feeding, care of animals, milking and cleaning of shed etc. Objectives of the study were planned as -

1. To assess postural stress of dairy farmers during performing various activities
2. To assess discomfort level of dairy farmers while performing related activities

The present study was conducted in Banaskantha District. Multistage random sampling design was adopted for sample selection. Banaskantha district contributes highest 13.19% share of total milk production in Gujarat state. Hence, Banaskantha district was purposively selected for conducting research. Out of twelve talukas of Banaskantha district, two talukas were selected randomly. Five villages were selected randomly from each taluka. Further, thirty workers involved in dairy farming/livestock activities were selected randomly from each taluka. Hence, the total sample size was 300 women involved in dairy farming. OWAS technique was used for assessing postural stress. Body part discomfort scale was used for assessing discomfort level of dairy farmers. Descriptive statistics like frequency and percentage were calculated for analysis of data. Fodder collection was perceived very drudgery prone activity by the respondents while cleaning of animal shed and milking were perceived as moderate drudgery prone activities by the respondents. Back pain was the most prevalent musculoskeletal disease amongst respondents followed by knee pain. OWAS score was found high for fodder cutting and milking activities due to more postural load.

THE CULTIVATION OF ANGEL FISH (*PTEROPHYLLUM SCALARE*)**SURAJ BISWAS****SAGE University Bhopal, Katara Hills, Sahara Bypass Bhopal**

The cultivation of Angel Fish (*Pterophyllum scalare*) in captivity has garnered significant interest due to its aesthetic appeal and commercial viability. This abstract explores the intricacies of breeding and rearing these majestic creatures on a mass scale under controlled conditions. Key aspects of successful mass-scale production include understanding the natural habitat and behavior of Angel Fish, creating optimal environmental conditions within captivity, implementing efficient breeding techniques, and ensuring proper nutrition and health management throughout the rearing process. By mimicking the natural habitat of Angel Fish in captivity, including providing suitable water parameters such as pH, temperature, and water quality, breeders can encourage spawning behavior and increase reproductive success. Various breeding techniques such as pair formation, induced spawning through hormonal manipulation, and selective breeding can be employed to enhance productivity and genetic diversity. Moreover, meticulous attention to nutrition is paramount for the growth and development of Angel Fish fry. Offering a balanced diet rich in protein, vitamins, and minerals, along with regular feeding schedules, promotes healthy growth and reduces mortality rates. Furthermore, effective disease prevention strategies, such as quarantine protocols and routine health monitoring, are essential to mitigate the risk of infections and ensure the overall well-being of the fish population.

ARTIFICIAL INTELLIGENCE AND INTERNET OF THINGS FOR SUSTAINABLE FARMING AND SMART AGRICULTURE**SURENDAR RUNDLA*¹, HEMANT KUMAR LAMBA², KAVITA NITHARWAL³, SNEHA PANDEY⁴**^{1,3} PhD, Research scholar, Department of Ag. Economics, COA, RVSKVV, Gwalior, (MP.)² Ph.D, Research scholar, Department of Ag. Economics & management, RCA, MPUAT, Udaipur (RAJ.)⁴ Guest Faculty, Department of Ag. Economics, COA, Gwalior, (MP.)

Technologies like AI and IoT have been employed in farming for some time now, along with other forms of cutting-edge computer science. In recent years, there has been a change in focus towards considering the applications of this new technology. For thousands of years, agriculture has supplied a significant amount of human nutrition. Its most significant contribution is the broad application of efficient agricultural techniques for a variety of crop types. Modern IoT technology is starting to emerge, with the capacity to ensure high-quality production and monitor agricultural ecosystems. Smart Sustainable Agriculture continues to face formidable hurdles due to the widespread dispersion of agricultural procedures, such as the deployment and administration of IoT and AI devices, the sharing of data and administration, interoperability, and the analysis and storage of enormous data quantities. In order to identify architectural elements that could aid in the development of Smart Sustainable Agriculture (SSA) platforms, this paper first evaluates current Internet of Things technologies utilized in SSA. This study looks at the current status of SSA research and development, considers the information that is available now, and suggests an Internet of Things (IoT) and artificial intelligence (AI) framework as a place to start for SSA.

Keywords- Smart agriculture, Internet of Things (IoT), artificial intelligence (AI), smart sustainable agriculture (SSA), smart farming.

IMPACT OF INTERVENTION ON NUTRITIONAL KNOWLEDGE, ATTITUDE AND PRACTICES OF RURAL WOMEN IN DHARWAD TALUKA OF KARNATAKA STATESUREKHA SANKANGOUDAR¹, SANNAPAPAMMA K J², VINUTHA U MUKTAMATH³ RAJESHWARI DESAI⁴, RAVI Y⁵, GEETA CHANNAL⁶¹Professor & Senior Scientist, ² Professor & Head, ³ Assistant Professor & Scientist, ^{3&4} Assistant Professor & Senior Scientist⁵ and ⁶ Associate Professor

All India Coordinated Research Project-WIA, University of Agricultural Sciences, Dharwad

Women play the most important roles in maintaining and managing household-level nutritional security and they play both productive and reproductive roles in the family. The substantial transformation in the demographic, health and education has been found to have greater impact on their nutritional status. Hence the study was conducted with the objective to know the factors affecting the nutritional knowledge, attitude and practices of rural women and the role of intervention in improving their nutritional knowledge and practices. The sample of the study was 500 rural women from Dharwad taluk. The tools used were a self-structured schedule, nutritional status using BMI and standardized tool to measure knowledge, attitude and practices. An experimental design was used to study the impact of intervention including training, demonstrations, awareness campaigns along with the implementation of nutri gardens at household level. The results clearly depicts that at baseline survey majority of the women (62.00%) were having low nutritional knowledge, 30.60 percent had medium and only 7.40 percent had high nutritional knowledge. Whereas at post test only 14.50 percent were found in low knowledge category and 50.80 and 36.40 percent were upgraded to medium and high nutritional knowledge levels respectively. The results were found to be statistically highly significant at 1 % level. With respect to nutritional attitude of rural women, majority of the women (64.20%) at pretest were found to have low level of nutritional attitude, whereas at post test, majority (52.00%) were found to be in medium category, followed by high(35.20%) and low (16.80%) levels. A significant difference was observed in nutritional practice at pre and post test where majority of the women followed better nutrition practices with high dietary diversity was observed. Low SES, education and occupation were found to be the significant predictor factors of poor nutritional knowledge, practice and attitude.

ARTIFICIAL INTELLIGENCE AND INTERNET OF THINGS FOR SUSTAINABLE FARMING AND SMART AGRICULTURESURENDAR RUNDLA*¹, HEMANT KUMAR LAMBA², KAVITA NITHARWAL³, SNEHA PANDEY⁴^{1,3} PhD, Research scholar, Department of Ag. Economics, COA, RVSKVV, Gwalior, (MP.)²Ph.D, Research scholar, Department of Ag. Economics & management, RCA, MPUAT, Udaipur (RAJ.)⁴Guest Faculty, Department of Ag. Economics, COA, Gwalior, (MP.)

Technologies like AI and IoT have been employed in farming for some time now, along with other forms of cutting-edge computer science. In recent years, there has been a change in focus towards considering the applications of this new technology. For thousands of years, agriculture has supplied a significant amount of human nutrition. Its most significant contribution is the broad application of efficient agricultural techniques for a variety of crop types. Modern IoT technology is starting to emerge, with the capacity to ensure high-quality production and monitor agricultural ecosystems. Smart Sustainable Agriculture continues to face formidable hurdles due to the widespread dispersion of agricultural procedures, such as the deployment and administration of IoT and AI devices, the sharing of data and administration, interoperability, and the analysis and storage of enormous data quantities. In order to identify architectural elements that could aid in the development of Smart Sustainable Agriculture (SSA) platforms, this paper first evaluates current Internet of Things technologies utilized in SSA. This study looks at the current status of SSA research and development, considers the information that is available now, and suggests an Internet of Things (IoT) and artificial intelligence (AI) framework as a place to start for SSA.

Keywords- Smart agriculture, Internet of Things (IoT), artificial intelligence (AI), smart sustainable agriculture (SSA), smart farming.**MOLECULAR CHARACTERISATION AND CELLULOLYTIC POTENTIAL OF *BACILLUS THURINGIENSIS*- A MICROBIAL BIOPESTICIDE ISOLATED FROM THE *BRAHMINA CORIACEA* GRUBS IN DHAULADHAR RANGE**SURESH KUMAR MAHALA^{1*}, KARTHIK R², PRAKASH KUMAR³, MANOJ BHARAO SALUNKHE³, AARUSHI SHARMA², DEVIKA SHARMA² AND DAMODHARA G N⁴^{1*}Ph.D. Scholar, Department of Entomology, Maharana Pratap University of Agriculture & Technology, Udaipur, Rajasthan²Ph.D. Scholar, Department of Entomology, CSK Himachal Pradesh Agricultural University, Palampur. HP. India³M.Sc. Scholar, Department of Entomology, College of Agriculture, CSK Himachal Pradesh Agricultural University, Palampur. HP.⁴M.Sc. Scholar, Department of Sericulture, Manasa Gangotri College, Mysore, Karnataka

Gram-positive *Bacillus thuringiensis* is a commonly used biopesticide that has insecticidal characteristics and is used worldwide to combat a variety of insect pests. Although *Bacillus thuringiensis* has been recovered from soil and insects like moths and butterflies, this is the first instance of *Bacillus thuringiensis* being isolated from *Brahmina coriacea* grubs worldwide. The gut microbiota was divided using various ecotypes of *B. coriacea* that were collected from various sites in Himachal Pradesh, India. There was a strain of *Bacillus thuringiensis* found among the grubs of the Chamba district. *Bacillus thuringiensis* was able to break down cellulose in the CMC media, where the cellulolytic index was determined at 1.33. The cellulolytic bacterial strains were identified using morphology, biochemistry, and 16S rRNA gene sequencing.

Key words: *Brahmina coriacea*, *Bacillus thuringiensis*, Biopesticide, Gut microbiota, 16S Rna

THE EFFECT OF POPULATION GROWTH ON ENVIRONMENT, CLIMATE CHANGE, ENVIRONMENTAL DEGRADATION AND THE USE OF TECHNOLOGY IN THE AGRICULTURE SECTOR FOR THE SUSTAINABLE DEVELOPMENT

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The whole world including India is fighting the crisis of climate change and disbalance in natural resource managements, due to global warming and population rise. Loss of agricultural land, deforestation, water and air pollution, Environmental and biodiversity losses and over exploitation of natural resources is increasing day by day. Rapid rate of urbanization, advance housing schemes, growth in industry, agriculture, means of transportation and communication, ever expanding roads, highways and populations are increasing in India. The rate of exploitation of natural resources has multiplied several times, the pressure on natural resources has risen up to 10 times as compared to 1951. Hills, forests, rivers, ponds, lakes, cities, towns, villages, deserts, oceans, forest animals all are facing severe problems due to the rapid increase in human population. Because of industrial effluents and domestic waste, several rivers such as Yamuna, Gomti etc. have turned into mere sewage carriers. If no control is being implemented on population rise, none of the world's city in the future will remain hospitable., the biodiversity is also being destroyed and the number of endangered species of plants and animals is also increasing everyday. According to UNO, Global Hunger Index, the nutrition of food available to the people in several countries of the world, hunger was found to be a serious crisis in 44 countries, means that to feed such a huge population in 2050, the crop production of the world will have to be increased by 60-70% as compared to it in 2010, which is nearly an impossible task. Thus, population control, environment friendly development, proper usage of natural resources and their conservation are the main tools that can make a balance between population growth, food security and environment conservation.

Key words- Climate change, natural resources, biodiversity, ecosystems and global warming

IN VITRO EVALUATION OF DIFFERENT ORGANIC FORMULATIONS AGAINST ROOT AND STEM ROT OF CUCUMBER SURESH KUMAR^{1*}, N. L. MEENA² AND POKHAR RAWAL²

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In vitro evaluation of different four organic formulations viz., Neem oil (@ 0.5, 1.0, 1.5% con.), Azadirachtin (@ 0.10, 0.15, 0.20% con.), Bijamrut (@ 5, 10, 15% con.) and Jivamrut (@ 5, 10, 15% con.) were evaluated at different three concentrations against *F. oxysporum* f.sp. *radicis-cucumerinum* by using poison food technique. Among the four different organic formulations, Azadirachtin was found most effective by showing minimum mycelial growth of 47.48, 31.63 and 21.70 mm and 47.25, 64.86 and 75.89 per cent growth inhibition at 0.10, 0.15 and 0.20% concentrations, followed by Neem oil with 55.68, 45.75, 33.90 mm mycelial growth and 38.14, 49.17 and 62.33% growth inhibition 0.5, 1.0 and 1.5% concentrations. Further, Bijamrut showed 59.68, 48.93 and 39.53 mm mycelial growth with 33.69, 45.64, 56.08% growth inhibition at 5, 10 and 15% concentrations. Whereas, Jivamrut depicted highest mycelial growth 63.88, 55.83, 43.95 mm with 29.03, 37.97 and 51.17% lowest per cent growth inhibition of the pathogen at 5, 10 and 15% concentrations, respectively.

Key words: Cucumber, Root and Stem Rot, *Fusarium oxysporum* f.sp. *radicis-cucumerinum*, Jivamrut, Bijamrut

ALTERNARIA PORRI UNDER FIELD CONDITIONS

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Alternaria porri causes purple blotch, a disease that significantly impacts onion production and productivity. To mitigate yield loss and prevent fungicidal resistance, schedule- based application of fungicides is highly recommended for this economically important and export-oriented crop. Disease management modules are the most cost-effective and sustainable approach to manage plant diseases. Before implementing these modules in the field, all components were evaluated in vitro. The compatibility of T. harzianum with neem oil, as well as with contact fungicides like mancozeb, propineb at 2500 ppm, and systemic fungicides such as tebuconazole, difenoconazole and hexaconazole at 1000 ppm were tested and showed 100% mycelial inhibition. During the years 2022 and 2023, the evaluation of these modules in the field revealed that the highest yield (32.73 t/ha and 30.92 t/ha, respectively) was achieved with the lowest disease severity (31.58 % and 27.93 respectively) in an integrated module 4 and lower AUDPC values. In addition, the apparent rate of infection (ARI) was calculated to evaluate the effectiveness of these modules in managing the disease. The highest reduction of ARI was observed in model 4 with a reduction of 66.89% and 63.47%, respectively. The insights generated during this study would help in realizing higher onion yields by protecting the crop from purple blotch disease under field conditions.

Keywords: Modules, purple blotch, Absolute growth rate, Absolute rate of infection, disease control; AUDPC

MORPHOLOGICAL AND MOLECULAR IDENTIFICATION OF INVASIVE WHITEFLIES IN COCONUT, *COCOS NUCIFERA* L.**SURIYA S^{1*}, PREETHA G¹, BALAKRISHNAN N^{1A} AND SHEELA J²****^{1*}Ph.D. Scholar, Division of Entomology, Sher-e- Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, Jammu and Kashmir, India****^{1,1a}Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India****²Department of Plant Pathology, V.O.C. Agricultural College and Research Institute, TNAU, Killikulam, Vallanadu, Tamil Nadu**

Morphological characterization followed by confirmation using molecular markers is an important criterion for identification of the insect species especially for those which are tiny and have difficulty in identification. Studies on the morphological and molecular characterization of whitefly species in coconut revealed that the presence of rugose operculum with triangular lingula, compound pores with dagger like process, smaller compound pores in VII and VIII segments, single broader fluff at the posterior end of nymphs, adults measuring 2.27 - 2.59 mm length, a pair of irregular light brown bands across the wings and smaller males with long pincer-like structure at the end of abdomen for *Aleurodicus rugioperculatus* Martin. In case of *Paraleyrodes bondari* Peracchi, the presence of flower petal like ovoid facets on the puparium's abdominal compound pores and small adults with "X" shaped oblique greyish stripes on wings are the morphological identification traits. The genomic DNA of whitefly specimens were amplified for mitochondrial cytochrome oxidase gene (650 bp) and the sequences were assigned with the GenBank accession No. OK042851, OK040507, OK042272, OK037183, OK632478 and OK632470 matching with 100 per cent of the available sequences thereby confirming the whitefly species, *A. rugioperculatus* and *P. bondari*.

Key words: *Aleurodicus rugioperculatus*, Coconut, Molecular conformity, Morphological characters, *Paraleyrodes bondari*, Whiteflies.

CHARACTERISATION OF 'MALKANGIRI PONY' OF ODISHA IN ITS NATIVE TRACT**SUSANTA K. DASH¹, SANAT MISHRA² AND SURITA MAZUMDAR³****¹Professor & Head, Department of Animal Breeding & Genetics, C. V. Sc. &AH, OUAT, Bhubaneswar, Odisha****²Senior Scientist, Directorate of PME, OUAT, Bhubaneswar, Odisha****³Ph.D. Student, Department of Animal Breeding & Genetics, C. V. Sc. &AH, OUAT, Bhubaneswar, Odisha**

The 'Malkangiri Pony' is reared in the Malkangiri district of Odisha, an eastern state of India. The native tract of Malkangiri pony (*Equus caballus*) is distributed over 81.88⁰ East longitude and 18.34⁰ North latitude spread over an area of 5791 sq.km. with altitude of 177.27 m. The Chitrakonda Block of Malkangiri district and adjacent Andhra Pradesh under Eastern Ghats are the home to the small horses which are capable of undertaking long journeys at high altitudes and under undulated landscape in jungle. The breeds commonly possess valuable traits such as adaptation to harsh environmental conditions, including tolerance of parasitic and infectious diseases, drought and poor quality feed. For years, tribal communities like Gadaba, Kondh, Kotia, Kondadora and Paroja living in the isolated region depended almost exclusively on a distinctive pony for transportation and riding. An adult pony is capable of carrying 100 kg weight to undulated and elevated spot and 120 kg on plain landscape to any distance easily. About 400 numbers of Malkangiri horse / pony was studied including male and female about its physical and reproductive character. It is a small sized, strong and docile horse with elegant look. General body appearance is compact body with straight and short neck, straight & short back, sloping croup region, short and strong canon, wider hoof circumference for better grip during riding and travelling. Tail with switch of this horse is in majority of case below hock. Malkangiri ponies have wide coat colour variation. Major coat color are Bay, Chestnut, Grey and few rare color like Dun and Roan. Bay is predominant and preferred coat colour. Blaze is seen in good number of animals. Bald face in few animals are noticed along faint star. Average body weight (Kg) of male is 20.33±0.38 with a range of 18-21, whereas in case of female it is 17.98±0.29 with a range of 15-20. Similarly adult weight of male and female are within range of 153-200 (170.37±5.76) and 149-170 (159.64±4.88) kg respectively. Average height at withers (cm) of male and female are 126.71±0.39 and 123.23±0.41 respectively. Similarly average body length (cm) and girth (cm) of male is 107.92±0.21 and 122.12±0.31, on the other hand it is 105.97±0.26 and 119.34±0.34 respectively in case of female. When chest width (cm) of male is concerned it is 24.43±0.20 and 23.55±0.26 in case of female. Malkangiri pony comes to heat at around 34 to 36 months and drops its first foal at around 480 months of age. The average foaling interval in these ponies is 18 months with gestation period of 320 to 340 days. These ponies give birth a single foal during all the seasons of the year. The mares deliver the foal easily, however, assistance is provided by the owner at parturition. No instance of twinning has been recorded in the native tract. A normal new born foal of Malkangiri pony weighing around 25 kg stands itself just after birth and suckles the teats of mother within 15 to 30 minutes of birth. The reproductive performance of these ponies is quite satisfactory in the native tract.

NUCLEAR POLYHEDROSIS VIRUS (NPV): A PROMISING TOOL IN PLANT PROTECTION**SUSHILA CHOUDHARY****Department of entomology SKNCOA Jobner (Rajasthan)**

The indiscriminate use of pesticides has eliminated natural enemies from many crop ecosystems that has led many countries to consider the potential of biological control as a component of pest management. The various biocontrol agents to be used for pest management are parasitoids, predators and pathogens. The viruses, belonging to 11 families, are pathogenic to insects. Among insect pathogenic viruses, Baculoviruses are the best alternative to the chemical pesticides, environment friendly and associated with the orders of Lepidoptera Hymenoptera, Diptera, Neuroptera, Coleoptera, Trichoptera, Crustacea and mites. Nuclear Polyhedrosis Virus (NPV), belonging to the family baculoviridae, is known for high epizootic levels and is naturally occurring, self-perpetuating, safe to natural enemies due to host specificity and environmental friendly, because of its obligate nature and host specificity. Nuclear polyhedrosis viruses recorded in India from cotton bollworm *Helicoverpa armigera* (Hubner), tobacco cutworm *Spodoptera litura* Fabricius), beet armyworm *S. exigua* (Hubner), red hairy caterpillar *Amsacta moorei* (Butler), black cutworm *Agrotis ipsilon* (Hufnagel), diamond back moth *Plutella xylostella* (Linnaeus), rice moth *Corcyra cephalonica* (Stainton), armyworm *Mythmina separata* (Walker), cabbage moth *Mamestra brassicae* (Linnaeus) and potato tuber moth *Phthorimaea operculella* (Zeller) etc. The various types, structure, characteristics and production technologies of NPVs are briefly discussed in this chapter.

Keywords: Nuclear polyhedrosis virus, bio-pesticide, baculovirus, characterization, production technologies

REGENERATIVE VEGETABLE FARMING- BEGINNING OF SUSTAINABLE FUTURE**SWAPNALI S. CHAVAN¹, A. P. WAGH²****Ph.D student, 2- Professor, Department of Vegetable Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola. MH**

Conventional farming approaches has played a vital role in feeding the growing world population, this has resulted in enhanced food security. This has achieved through various advancements including mechanization, improved varieties, intensive practices etc. Among them Regenerative vegetable production is an agricultural approach that goes beyond sustainability, aiming to restore and enhance the health of both the soil and the surrounding ecosystem. By implementing regenerative practices, vegetable farmers can create thriving ecosystems, improve soil fertility, and produce nutritious crops while mitigating the negative impacts of conventional farming. As the demand for sustainable and locally sourced food continues to grow, regenerative vegetable production offers a viable solution. By adopting regenerative practices, farmers can cultivate healthier soils, increase biodiversity, and produce nutritious vegetables in an environmentally conscious manner. Consumers, policymakers, and farmers all play a crucial role in supporting and promoting regenerative vegetable production. In conclusion, regenerative vegetable production represents a paradigm shift in agriculture, addressing the pressing challenges of soil degradation, environmental impact, and food security. By prioritizing soil health, biodiversity, and sustainable practices, regenerative farmers are leading the way in cultivating healthier farms and resilient food systems. Embracing regenerative vegetable production has the potential to revolutionize our approach to agriculture, ensuring a more sustainable and nourishing future for generations to come.

Keywords- Regenerative Farming, Vegetables, sustainable farming

ROLE OF SMART TECHNOLOGIES FOR EFFICIENT MANAGEMENT OF ORNAMENTALS AND FLOWERING PLANTS UNDER PROTECTED CULTIVATION**SWAPNIL BHARTI¹, PARAMVEER SINGH², KAVITA VERMA³ AND AMRENDRA KUMAR⁴**^{1,2}**Assistant Professors (Floriculture & Landscaping), BAU, Sabour, Bhagalpur**³**Subject Matter Specialist, (Home Science), KVK, Vaishali**⁵**Assistant Professors (Vegetable Science), BPSAC, Purnea**

India's horticultural sector is heavily dependent on floriculture, which also makes a substantial contribution to the country's agricultural economy and global market presence. The cultivation of ornamental plants and high-value flower crops are taken up in relatively smaller areas inside protected structure but yield higher returns per unit area due to their high market value. These structures are typically enclosed environments where growth conditions (e.g., lighting, temperature, humidity, and irrigation) can be controlled. However, the cost of labor, agricultural inputs, unavailability of skilled manpower and inappropriate application of agricultural resources has become the major concern of the ornamental industry. Therefore, sensing and automation technologies have been introduced to reduce labor requirements and to ensure efficient management operations. These technologies have been categorized into two groups: ground based and aerial based. Precision agriculture techniques, coupled with sensor technologies, are also revolutionizing the way flowers are cultivated. By monitoring temperature, nutrient content, and moisture levels, sensors placed in the soil allow producers to optimize their fertilization and irrigation techniques. This information and technology for site-specific farming allows farmers to identify, analyze and manage the spatial and temporal variability of soil and plants for optimum profitability, sustainability, and protection of the environment. Additionally, remote sensing technologies, such as aerial imagery and drones, provide real-time data on crop health, allowing for early detection of diseases and pests. They are not only enhancing crop yields and resource efficiency but also play a crucial role in sustainable and environmentally responsible farming practices as the world faces the challenges of feeding a growing population while conserving natural resource, sensor -based agriculture stands out as a pivotal solution to address this pressing issue.

Keywords: Precision farming, Ornamental plants, Smart Agriculture, Sensor

RHIZOSPHERIC NANO-REMEDIATION SALVAGES ARSENIC GENOTOXICITY: ZINC-OXIDE NANOPARTICLES ARTICULATE BETTER OXIDATIVE STRESS MANAGEMENT, REDUCE ARSENIC UPTAKE, AND INCREASE YIELD IN PISUM SATIVUM (L.)

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This study addresses the significant challenge faced by pea (*Pisum sativum* L.) cultivation in Southeast Asia, where arsenic (As) contamination in the agro-ecosystem hampers crop yield and ontogeny. The research proposes an innovative rhizospheric nano-remediation approach utilizing biogenic zinc-oxide nanoparticles (ZnONPs) to alleviate As-genotoxicity and enhance crop productivity. Arsenic-induced stress leads to rapid oxidative bursts, causing a substantially reduced germination rate (62%), shoot length (16%), and root length (14.9%) in the negative control compared to the normal control. Reactive oxygen species (ROS) accumulation in leaves and roots (12.8 and 9-fold increase, respectively) overwhelms antioxidative defenses, resulting in membrane damage and increased electrolyte leakage (2.6-fold) in the negative control. The study reveals significant nuclear anomalies in root tip cells under As-stress, indicating severe genomic instability and increased programmed cell death (3.3-fold increase in early apoptotic cells). Applying ZnONPs effectively reduces As-toxicity by diminishing As-uptake and enhancing the antioxidant response in peas. Positive outcomes include improved flowering time (7.74-19.36% reduction in flowering delay) with increased transcript abundance of key genes (GIGANTIA, CONSTANS, and FLOWERING LOCUS T), enhanced photosynthetic activity (1.3-1.9-fold increased chlorophyll autofluorescence), increased pollen viability, and reduced genotoxicity (decreased tail DNA in comet assay) was observed. A maximum increase of 37.5% in pod number and seed zinc content (1.67-fold) was observed, while seed arsenic content decreased under ZnONPs treatment. Optimal stress-alleviation is observed up to 300 mg L⁻¹, presenting a promising avenue for sustainable agricultural practices to address the intricate challenges of arsenic contamination in pea cultivation internationally.

Keywords: Antioxidant enzymes, Delayed flowering, DNA damage, Comet assay, Programmed cell death.

SYNTHESIS OF SILVER BIO NANOPARTICLES AND THEIR EFFECTS ON BLACK SCURF OF POTATO CAUSED BY RHIZOCTONIA SOLANI

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In the present scenario, biopesticides are more approachable to control the phytopathogens in comparison to chemicals to save the environment. Furthermore, biological synthesis provides a low-cost, one-step, and environmentally benign way for producing metallic nanoparticles. The size range of silver nano-particles is 1–100 nm, antimicrobial agents, biosensors, composite fibers, cosmetics, medications, and coatings for medical etc. Nearly one third of crops get damaged, mainly due to pest infestation, microbial attacks, natural disasters, poor soil quality, and lesser nutrient availability. Green silver nanoparticles made from *Chenopodium album* and *Syzygium cumini* to check the effect of *Rhizoctonia solani*. The plant extracts and AgNO₃ reaction can be used to characterize AgNPs by monitoring the color shift of the resultant solution. The extract may have reduced the Ag⁺ ions in the solution if the color changed to a dark brown or blackish brown. Observing the synthesized AgNPs' absorption peak is another method for characterizing AgNPs. *Syzygium cumini* nano particles showed more effective against to *Rhizoctonia solani*. The study's primary goal is to safeguard agricultural crops from phyto-pathogenic fungi in order to promote sustainable development.

Keywords: Bio-nanoparticles, Sustainable Development, Agriculture, Environment, Green synthesis, plant extracts.

EFFECT OF INTERCROPS AND LIQUID BIOFERTILIZERS ON GROWTH AND YIELD OF MAIZE

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The “Queen of Cereals” moniker comes from maize (*Zea mays* L.), which is incredibly productive and adaptable when compared to other cereal crops. The maize-legume intercropping system is thought to be a good choice since it has the ability to improve soil nutrient levels, increase yield and economic benefit and naturally protect small farmers from crop failure in hazardous situations. The production of maize, a crop with high nutritional requirements, requires an active nutrient management system. With a high concentration of desired micro-organisms, a long shelf life and no contamination, liquid biofertilizer is a unique formulation that produces growth-promoting compounds like IAA. The experiment was carried out at Research Farm, RCA, Udaipur (Rajasthan) to study the effect of different intercrops and liquid biofertilizers on growth and yield of maize. The experiment consisted seven intercrops {sole maize, maize + cowpea (2:2), maize + blackgram (2:2), maize + soybean (2:2), maize + cowpea (1:1), maize + blackgram (1:1), maize + soybean (1:1)} in main plot and four liquid biofertilizers (control, *Azotobacter*, PSB, NPK consortia) in sub plot laid out in split plot design within three replication. The result revealed that sole maize showed higher plant height, dry matter accumulation and grain yield (5260 kg ha⁻¹) which was statistically at par with maize + cowpea (2:2). Among liquid biofertilizers, significantly higher plant height, dry matter accumulation and grain yield were recorded by the application of NPK consortia followed by *Azotobacter* and PSB over control.

Key words: Liquid biofertilizer, plant height, *Azotobacter*, yield

RECOMBINANT DNA TECHNOLOGY AND ITS APPLICATIONS IN FISHERIES SCIENCE**SWATI SHARMA****Swami Vivekanand Subharti University, Meerut**

Recombinant DNA technology has revolutionized fisheries science, offering a range of applications from genetic modification of fish to the development of vaccines. This chapter provides an in-depth exploration of recombinant DNA technology tools, techniques, and their applications in fisheries science. It discusses the isolation of genes, insertion into vectors, transformation into host organisms, and the expression of introduced genes. Additionally, gene transfer techniques such as microinjection, electroporation, and retroviral integration are examined, highlighting their roles in facilitating genetic modification in fish. The chapter also explores the applications of gene transfer in fisheries science, including the development of genetically modified fish with enhanced traits and the production of vaccines to combat diseases. Finally, it discusses future perspectives in the field, emphasizing the potential for further advancements in marine fish development, reproductive cycle alteration, environmental adaptability, taste and nutritional enhancement, and regulation of sexual maturation.

Keywords: Recombinant DNA technology, gene transfer, genetic modification, vaccines, gene isolation, microinjection, electroporation, retroviral integration, genetically modified fish.

OVER VIEW OF GINNING MILL WORKERS**DR. SWATI VANNUR, DR. RENUKA SALUNKE AND ADITYAARUNKUMAR BIKKANNAVAR****Department of Family Resource Management, College of Community Science, University of Agricultural Sciences, Dharwad**

Cotton is one of the major cash crops grown in the country. India is the third largest producer of cotton after China and the United States. When cotton is harvested, it is transported to ginning mill for further process. A cotton gin is a machine that quickly and easily separates cotton fibers, from their seeds. Cotton industry workers are exposed to various hazards in different departments of textile factories, especially in the ginning, spinning and weaving sections which play an important role in the high incidence of industrial health hazards. Ginning factories discharge large amounts of cotton dust, which leads to various health problems in the exposed subjects. Byssinosis and other related respiratory abnormalities are well-known occupational respiratory diseases in textile mill workers caused by cotton dust pollution (Jannet and Jeyanthi, 2006). But the health hazards among the laborers in these ginning factories have been overlooked. Hence, the present study was undertaken to study the occupational health hazards among the workers of ginning mill. A study on To know the occupational problems of women workers in ginning mill were conducted in three ginning mills of Dharwad taluka during the year 2016-2017. From each ginning mill 30 women workers were randomly selected for the study and self-structured pre tested interview schedule was administered on 90 ginning mill women workers. Personal interview technique was used to gather the general and specific information. Results revealed majority of the male and female workers frequently performed activities like separation of seeds (40), pre cleaning (34.44), and post cleaning (21.11), of cotton, carrying cotton load (12.22). Whereas most of the workers always face the problems like irritation of eyes (37.77), Irritation of ear (23.33), pain in knees (15.55), physical stress and strain (31.11). Hence we concluded that Ginning mills discharge large amounts of cotton dust and fibers. Inhalation of cotton fibers, dust at work place has created various occupational problems among workers. There is a need to create awareness among the workers for usage of personal protective devices.

Key words: Women, Occupation, Problems and Cotton

OCCUPATIONAL HEALTH AND MUSCULOSKELETAL DISORDERS AMONG COTTON TEXTILE WORKERS OF DHARWAD DISTRICT KARNATAKA**DR. SWATI VANNUR, DR. RENUKA SALUNKE AND ADITYA ARUNKUMAR BIKKANNAVAR****Department of Family Resource Management, College of Community science, University of Agricultural Sciences, Dharwad**

Occupational health is branch of community medicine which deals with the effects of occupation or work place on human health. Every occupation is associated with one or other ill effects one such occupational group is cotton textile worker. Ginning is one of the unorganized occupations of textile industries, which employs more number of women. Ginning women workers are susceptible to various health problems by the more exposure to cotton dust. Therefore a study on was conducted in three ginning mills of Dharwad taluka. From each ginning mill 30 women workers were randomly selected for the study and self-structured pre tested interview schedule was administered on 90 ginning mill women workers. Personal interview technique was used to gather the general and specific information. Results revealed that maximum per cent of the women workers belonged to the age group of 38-49 years and they were illiterate. About 70 per cent of the workers belonged to the nuclear family (41%) and had 3-4 years of work experience. More than fifty per cent of women workers were performed major activities like loading of cotton to machine and picking of cotton from gunny bag. On the whole majority of the women workers always faced problems like irritation to ear, physical stress and strain due to temperature and relative humidity, whereas 68.88 percent of women workers had experienced difficulty while communicating with others during working due to nonbearing noise in the mill. With respect to musculo-skeletal problems the workers experienced moderate pain (3.41) at lower back while performing in ginning mill. Hence the study concluded that the suggestive measures towards improving the awareness of occupational health and there by motivating the workers in use of personal protective tools would help in achieving a safe and healthy workplace environment.

Key words: occupational health, safety, ginning mill, women worker, protective tools.

ASSESSMENT OF LEVERAGING IMPACTS OF MICRONUTRIENTS, BIOFERTILIZERS AND GROWTH REGULATORS ON BIOCHEMICAL CHARACTERS OF POMEGRANATE CV. BHAGWA

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Assessment of leveraging impacts of chelated micronutrients, growth regulator and biofertilizers on biochemical characters of pomegranate (*Punica granatum* L.) cv. Bhagwa" was carried out on experimental fruit orchard of Department of Horticulture, VNМКV., Parbhani, during *Mrig bahar* in 2018-19 and 2019-20. This experiment was laid out in Factorial RBD, which is replicated twice with two factors i.e. Factor A: methods of plant propagation (P) i.e. P₁: Air layered plants, P₂: Tissue cultured plants and Factor B: different nutrients concentrations i.e. N₁: Chelated micronutrients (CM.) @ 3.0 g/lit, N₂: CM. @ 4.0 g/lit, N₃: GA₃ @ 75 ppm, N₄: GA₃ @ 100 ppm, N₅: Biomix @ 0.3%, N₆: Biomix @ 0.4%, N₇: CM. @ 3.0 g/lit and Biomix 0.3%, N₈: CM. @ 3.0 g/lit and GA₃ 75 ppm and Biomix 0.3%, N₉: CM. @ 3.0 g/lit and GA₃ 75 ppm, N₁₀: GA₃ 75 ppm and Biomix 0.3%, N₁₁: Control. The result revealed that biochemical characters of fruits regarding TSS, total sugars, reducing sugars, ascorbic acid and anthocyanin content increases with application of chelated micron. @ 3.0 g/l + GA₃ @ 75 ppm + Biomix @ 0.3% with interaction of tissue cultured plants. Whereas, acidity of fruit is reduced due to combined application of chelated micron. @ 3.0 g/l + GA₃ @ 75 ppm + Biomix @ 0.3% with interaction of tissue cultured plants. This foliar application has produced significantly superior effect on biochemical parameters.

Keywords: Bhagwa, biochemical, Chelated micronutrients, Growth regulator, Biomix, Biofertilizers

VEGETABLE STARCH: IMPLICATIONS FOR HEALTH AND SUSTAINABILITY

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Vegetable starch holds significant implications for both human health and environmental sustainability. From a nutritional standpoint, vegetable starch serves as a fundamental component of a balanced diet, providing essential carbohydrates crucial for energy production and overall metabolic function. Additionally, vegetables rich in starch often contain a plethora of vitamins, minerals, and dietary fiber, contributing to various aspects of human health such as digestive health, immune function, and disease prevention. Moreover, the cultivation and consumption of vegetable starch have profound implications for environmental sustainability. Sustainable farming practices for starch-rich vegetables can help mitigate environmental challenges like soil erosion, water pollution, and biodiversity loss associated with conventional agricultural methods. Furthermore, incorporating more vegetable starch into diets can alleviate pressure on natural resources by reducing the demand for resource-intensive animal agriculture and monocropping of cereal grains. By promoting diversified cropping systems and agroecological practices, vegetable starch cultivation can enhance soil health, conserve water, and reduce greenhouse gas emissions, thus fostering a more resilient and sustainable food system. Overall, recognizing the dual benefits of vegetable starch for human health and environmental sustainability underscores the importance of incorporating more plant-based foods into diets and supporting agricultural practices that prioritize both nutrition and ecological integrity.

Key Words: Vegetable starch, health, sustainability, nutrition, environmental impact.

ELEPHANT FOOT YAM INTERCROPPED WITH SHORT DURATION VEGETABLES: PROFITABILITY ANALYSIS.

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Intercropping, a farming practice where two or more crops are cultivated together in the same field, offers a sustainable solution to maximize land productivity and economic returns. In the case of elephant foot yam, renowned as "The king of tubers" for its nutritive and therapeutic values, intercropping presents an opportunity to optimize land usage and enhance profitability. At the Horticultural College and Research Institute in Coimbatore, field experiments spanning two seasons (2021 and 2022) were conducted to assess the economic feasibility of intercropping elephant foot yam with short-duration vegetables. The experiments included five treatments: monocropping of elephant foot yam (CS1) and intercropping with cluster bean (CS2), radish (CS3), amaranthus (CS4), and fenugreek (CS5). Each treatment was replicated four times, following a randomized block design. Results from these trials unveiled the superior profitability of intercropping systems compared to monocropping. Notably, intercropping with cluster bean emerged as the most lucrative option. In Season I, it yielded a gross return of Rs. 518,950 and a net return of Rs. 371,325, with a B:C ratio of 1:2.29. Similarly, in Season II, it generated a gross return of Rs. 429,750, a net return of Rs. 282,125, and a B:C ratio of 1:1.74. These findings underscore the economic advantages of integrating cluster bean cultivation with elephant foot yam. The success of intercropping lies in its ability to utilize resources more efficiently. Elephant foot yam, with its wider-spaced and long-duration growth pattern, provides ample opportunity to cultivate short-duration vegetables in the inter-spaces. This not only optimizes land utilization but also minimizes resource competition between crops. Moreover, intercropping systems contribute to soil health improvement and pest management, further enhancing overall farm productivity and sustainability.

Key words: elephant foot yam, economics, profitability, intercropping

EVALUATION OF DIFFERENT TOMATO (*SOLANUM LYCOPERSICUM* L.) VARIETIES FOR BEST PERFORMANCE IN WEST KAMENG DISTRICT ARUNACHAL PRADESH

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This study evaluated the performance of different tomato entries and varieties for their productivity, resistance to pests and diseases and postharvest fruit quality in West Kameng and the experimental conducted at the KVK Farm from 2022-23. Among the Four varieties of tomato in the rainy season and winter season were evaluated. Varieties that were well adapted, better yielded, disease resistant and with good fruit quality were identified. Major plant diseases observed included tomato yellow leaf curve disease (TYLCD), bacterial wilt, bacterial leaf spot, Late blight. However, late blight was the major problem during the season. The Rockey variety of Tomato was the most affected from blight in both the seasons, although its total yield was affected. Arka Abhed was one of the most susceptible varieties to blight bacterial wilt and Leaf curl Disease. Tomato Arka Abhed provided the highest fruit yield (34 t/ha), while Rockey provided the lowest (28 t/ha) in the both season. Production season clearly influenced yield, disease occurrence and severity in Rockey variety, as well as postharvest fruit qualities. The study identified better disease-resistant and yielding tomato entries suitable for both growing seasons, which can be considered and scaled up for production so that farmers in West Kameng can produce tomato all year round Tomato is an important vegetable crop and plays a major role in the food and nutrition security of the people of West Kameng. Production has increased in the recent decades but improvement in the fruit yield and quality remains suboptimal. Limited access to the best-adapted tomato varieties to the local conditions, pests and diseases are the major limiting factors for improving productivity.

Keywords: Tomato cultivars, yield, adaptation; growing season; fruit quality

A STUDY ON UTILIZATION OF ORGANIC WASTE FOR SUSTAINABLE AGRICULTURE

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Organic waste, seen as a burden, is experiencing a well-deserved makeover in the agricultural world. Traditionally, manure and crop residues were mainstays of fertilizing fields. Today, a wider range of organic materials are finding new life as valuable resources, promoting soil health and boosting crop yields. The research investigates various types of organic waste, including agricultural residues, food waste, and animal manure, and their conversion into valuable soil amendments through composting, vermiculture and anaerobic digestion. Organic waste recycling reduces the need for mineral fertilizer in agriculture and restores the lack of organic carbon in the soil. Improper management of organic waste leads to problems such as environmental pollution, eutrophication, greenhouse gas emissions, and consequences of human health. Land application of organic waste stabilized through procedures such as composting, vermicomposting, and anaerobic digestion produces organic fertilizer such as compost, which improves soil fertility and crop productivity. Utilizing organic waste in agriculture lowers the expense of landfilling, trash transportation, and the manufacturing of chemical fertilizers while also creating opportunities for rural employment. Therefore, it's time to develop such strategies that can sustain efficient and effective use of organic waste to enhance sustainable system of agriculture. Future recommendations include policy support, farmer education programs, and further research on optimizing waste conversion technologies to maximize benefits for sustainable agriculture.

Keywords: Food waste, Animal waste, Agricultural waste, Organic waste recycled

STRUCTURAL CHARACTERISATION OF ANTENNAE OF STORED GRAIN PESTS

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Humans require proper nutrients for their well- being which helps them to fight against many diseases, for energy production and for body maintenance. Grains are a good source for these nutrients as they are abundant in vitamins, proteins and minerals. Grains such as pulses are a good source of proteins. These grains can be stored for longer periods and can be also used for long period. But, unfortunately these stored grains gets infested with many pests, which makes them unsuitable for human consumption and leads to economic loss also. In order to determine the behavioral response to the different abiotic factors, these pests are collected from infested grains such as pulses and flour. These pests are more active during the month April- November and infest grains more actively, if there is no proper storage maintenance. The pests belonging to the order Coleoptera and specifically to the Genus *Tribolium* and *Callosobruchus* were found. Pulses which were infested were also observed. Different species of these both genera were also observed. The ultra structure of antennae along with head segment was observed via SEM analysis. A comparative analysis of sensillae based on sexual genders was also observed in the infested grains.

SOIL AND WATER CONSERVATION AND IRRIGATION**TAKTE P. P.¹, BAGADE A.S.² AND PAGARE Y. D.³****College of Agriculture, Latur (VNMKV Parbhani)**

In Maharashtra 84.00 per cent area under dryland agriculture. Only 16.00 per cent area has irrigation facility in Maharashtra which cannot be increased to more than 25.00 per cent of total crop area. Latur district comes under the scarcity and assured rainfall zone. Due to adverse climatic conditions and lack of irrigation facilities. The production and productivity of agriculture is low. Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani and Dryland Agriculture Research Station, Parbhani are playing major role in evolving various major dryland farming technologies in Marathwada. But the adoption of these technologies is not sufficient. Present study entitled "Adoption of dryland farming technologies" was conducted with the objectives of to study profile of the dryland farmers and their relation with adoption, to study the extent of adoption, its constraints and suggestions given by farmers. It was observed that, more than half (60.00%) of the respondents were middle aged, nearly two-fifth (39.17%) of the respondents had education level up to primary school, more than half (65.83%) of the respondents had medium size of family, nearly half (45.83%) of the respondents comes under small land holding, majority (75.83%) of the respondents had medium annual income, more than half (63.33%) of the respondents had fair cropping pattern, more than half of the respondents (63.33%) had medium social participation, more than half (52.50%) of respondents were having medium sources of information used, nearly two fifth (45.00%) of the respondents had medium contact with the extension personnel, more than half (60.00%) of the respondents had medium level of risk preference, nearly two third (65.00%) of the respondents had medium level of innovativeness, majority (65.00%) of the respondents had medium level of knowledge. The result regarding adoption of dryland farming technologies revealed that, majority (71.67%) of the respondents had medium adoption. The adoption level of farmers with respect to dryland farming technologies was positively and significantly influenced by education, size of family, annual income, size of land holding, annual income, cropping pattern, risk orientation and innovativeness. Social participation, sources of information used, extension contact and knowledge were positive and highly significant. There was negative and significant association between age and adoption. The study brought to conclusions that there should be provision of there is need to guidance by agriculture universities and Krishi Vigyan Kendra to the new dryland farming technologies, low cost implements and machineries to farmers, sufficient and timely inputs availability, guidance from experts, easy loan availability are the needs of farmers which should be considered by an extension organization, agriculture universities and the Government.

Keywords – Dryland technologies, Adoption**EVALUATION OF ELITE DUTCH ROSE VARIETIES UNDER NATURALLY VENTILATED POLYHOUSE FOR NORTHERN DRY ZONE OF KARNATAKA****TANUJA, R. N.*¹ AND SATEESH R. PATIL²****^{1,2}Department of Floriculture and Landscaping, College of Horticulture, Bagalkot University of Horticultural Sciences, Bagalkot, Karnataka, India**

A study on the performance of elite Dutch rose varieties under naturally ventilated polyhouse for Northern dry zone of Karnataka was carried out during 2022-23 at the experimental block, Department of Floriculture and Landscape Architecture, College of Horticulture, University of Horticultural Sciences, Bagalkot. The experiment was laid out in Randomized Block Design (RBD) with seven varieties and three replications. Significant variations were recorded among the varieties for all the vegetative, flowering and yield parameters. The varieties were Top Secret, Jumilia, Solar, Revival, Rock Star, Arka Pride and Arka Ivory. Various growth, flowering and yield parameters were recorded during experimental period (September 2022 – September 2023). Among all the varieties studied, the variety Jumilia was superior with respect to plant height (81.22 cm), plant spread (E -W: 46.19 cm and N -S: 45.24 cm), number of branches per plant (4.52), leaf area per plant (2893.28 cm²), stem girth (1.43 cm), days taken for first flower bud initiation (35.67 days), days taken for first flowering (60.00 days), number of flowers per plant (23.98) and number of flower stalks per m² (216.79) followed by the variety Top Secret and Solar. Hence the varieties of Dutch rose Jumilia and Top Secret found to be best suitable to grow under Northern dry zone of Karnataka in naturally ventilated polyhouse

Keywords: Dutch rose, naturally ventilated polyhouse, growth, flowering and yield**URBAN ENVIRONMENTAL MANAGEMENT IN JALGAON CITY****TAYADE PALLAVI GAUTAM, MANOJKUMAR Z. CHOPDA, S. T. INGALE¹****Department of Zoology, M. J. College (Autonomous), Jalgaon, (M.S.) India.****¹School of Environmental Science, Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon**

Jalgaon district is located in north-west region of the state of Maharashtra. The population of Jalgaon is 6,15,000 in area about 11,700 sq. km. Jalgaon rich in volcanic soil. Rapid economic development and urbanization in the past two decades have led to densely populated cities. There are many issues related to environmental pollution is only due to Rapid urbanization and industrialization. It is envisaged that an environmental centre should be established due to environmental technologies and management skills to meet the local and eventually the regional demand. In Jalgaon city number of Hospitals are sending Biomedical Waste to Mansai Construction for bio medical waste treatment. Biomedical Waste sorting, treatment, disposal done. Civil Hospital data record of communicable and non-communicable diseases, water born; respiratory diseases record monthly causes due to the environmental pollution. The human health issues due to domestic waste and open dumping waste. To solve environmental problems it is necessary to implement technologies for a healthy urban environment.

Keywords: Pollution, Biomedical waste

EXPLORING THE IMPACT AND SIGNIFICANCE OF VIROPHAGES: INSIGHTS INTO VIRAL INTERACTIONS AND EVOLUTIONTANUSHREE BHOWMIK^{1*}, ARUN SHARMA², K. PANI PRASAD¹, ARYA SINGH²¹Aquatic Animal Health Management department, COF, Lembucherra, CAU(I)²Aquatic Animal Health Management department, ICAR-CIFE, Mumbai

The conventional understanding of viruses as small, filterable agents has been questioned by the identification of giant viruses, categorized within the NCLDV (nucleocytoplasmic large DNA viruses) group. These giant viruses, exemplified by the first mimivirus found during amoebae-related pathogen studies in Bradford, England, have unique attributes that have sparked debates on the definition of viruses. Initially mistaken for a bacterium called "Bradford coccus," the mimivirus, later named Acanthamoeba polyphaga mimivirus (APMV), led to the identification of other giant viruses and the proposal of a new viral order, "Megavirales." Further complexity arose with the identification of virophages, small viruses capable of infecting giant viruses. The 1st discovered virophage, Sputnik, is approximately 50 nm in size and contains circular ds-DNA. Classified within the Lavidaviridae family, virophages commonly co-infect unicellular eukaryotic hosts alongside members of the Mimiviridae family. Unlike traditional viruses, which primarily hijack host cells for replication, virophages have a unique life cycle involving infection and reproduction within the host virus, making them parasites of viruses. Their replication within giant virus factories diminishes the production of giant virus progeny, thereby increasing host survival. Advancements in virophage research, including the recovery of 20 virophage genomes from metagenomes, have broadened our understanding of their diversity and distribution. They have been found in various environments such as lakes, soils, and aquatic habitats. Virophages have a significant impact on unicellular organism populations, such as marine protists like amoeba, as observed in environments like Antarctica's Organic Lake, where they stimulate growth rates and reduce mortality rates. Although much about virophages remains unknown, their ability to decrease viral loads and increase host cell survival has been noted. Their role in regulating viral populations and potentially disrupting the replication of other viruses suggests they may influence the dynamics of viral communities. Overall, Virophages offer valuable insights into the complex dynamics among viruses, highlighting the need for more research to grasp their ecological significance and potential uses in viral medicine.

Key words – Mimivirus, Megavirales, Sputnik, Lavidaviridae, Amoeba, NCLDV**STUDY ON *BRASSICA OLERACEA* VAR. *BOTRYTIS* (CAULIFLOWER) AND *BRASSICA OLERACEA* VAR. *CAPITATA* (CABBAGE) SEEDLINGS RESPONSE TO WEED COMPOST**TANVI TANEJA¹, MUKESH KUMAR¹, INDU SHARMA², M.K. RANA³ AND RAJ SINGH^{1*}¹Department of Bio-Sciences and Technology, Maharishi Markandeshwar (Deemed to be University), Mullana–Ambala, Haryana,²NIMS Institute of Allied Medical Science & Technology, NIMS University Rajasthan, Jaipur, Rajasthan, India³Department of Agriculture, Maharishi Markandeshwar (Deemed to be University), Mullana–Ambala, Haryana, India

Two significant issues in context of sustainable economic operations include weeds that are harmful to the environment, people and other living organisms, as well as the production and environmental costs of plant nutrition in agricultural. This study aims to acquire plant nutrition input with minimal environmental and production costs by using the weeds waste generated due to the undesirable methods adopted for the cultivation of cauliflower and cabbage. The study unites these two challenges into a common denominator. The weeds, such as *Parthenium hysterophorus*, *Solanum nigrum*, *Calotropis procera* and *Trianthema portulacastrum* were used to prepared weed compost (WC). It was used as a source of nutrients for cultivation of cauliflower and cabbage to provide nutrition to the plants. The weed compost at 100, 75, 50 and 25% concentration were used to study the germination rate, root length (cm), shoot length (cm), vigour index, number of leaves, number of roots, fresh and dry weight of 10 seedlings (g) and root to shoot length ratio of cabbage and cauliflower. These research shows that the highest value observe in 100% concentration in *Brassica oleracea* var. *botrytis* germination rate (82%), Mean germination frequency (16.4), Seed vigour index (69), root length (5.1cm), shoot length (10.8 cm), , number of leaves were 5, number of roots 15, fresh and dry weight of 10 seedlings (20 and 5g) and in *Brassica oleracea* var. *capitate* germination rate (92%), Mean germination frequency (18.4), Seed vigour index (76.33), root length (5.3cm), shoot length (7.4cm), number of leaves were 5, number of roots,19, fresh and dry weight of 10 seedlings (21and 5.2g). Root-shoot length ratio of cauliflower and cabbage varies at different concentrations. The findings revealed that adding weed organic manure to soil enhanced the plant development and yield.

Keyword: Weed compost, seed germination, *Brassica oleracea*, sustainable economic.

UNLOCKING AQUACULTURE POTENTIAL: THROUGH BIOCHAR APPLICATION IN DEGRADED INLAND SALINE SOILS FOR ENHANCED SEDIMENT AND WATER QUALITY, GROWTH METRICS, AND HEALTH PARAMETERS OF GENETICALLY IMPROVED FARMED TILAPIA (GIFT)TAO KARA^A, VIDYA SHREE BHARTI*^A CHALUNGAL THAMPI AMAL^A, SMRITI BISWAS^B, ARUN KONDURI^A, SWARAJ ADAKNEY^A, SREEDHARAN KRISHNAN^C AND RATHI BHUVANESWARI GOVINDARAJAN^D^aDepartment of Aquatic Environment Management, ICAR- Central Institute of Fisheries Education, Mumbai, India^bDepartment of Applied Aquaculture and Zoology, Barkatullah University, Bhopal, India^cICAR- Central Institute of Fisheries Education, Rohtak Centre, Haryana, India^dICAR- Central Marine Fisheries Research Institute, Kerala, India

An experiment was carried out in 500 litre capacity for 45 days, consisting two treatment (T1 & T2) and control (C), T1 = sediment + inland saline water + paddy straw biochar (PSB) at the rate of 9.0 tons / hectare and T2 = sediment + inland saline water + sugarcane bagasse biochar (SBB) at the rate of 9.0 tons / hectare and C=sediment + inland saline water. There was significant ($p < 0.05$) improvement in sediment quality parameters (water holding capacity (WHC), cation exchange capacity (CEC), organic carbon (OC), and potassium) in biochar treatments (T1 and T2) as compared to the control. Biochar improves the water quality of the culture system, with a significant increase in potassium and the same the ammonia was decrease in treatment as compared to control. Growth metrics of genetically improved farmed tilapia (GIFT) revealed enhanced weight gain (WG %), there was 5 % & 11.32 % higher weight gain in T1 and T2 respectively as compared to control. Similarly, there was significant improvement in feed conversion ratio (FCR), specific growth rate (SGR %), and enzymatic parameters ($p < 0.05$) in biochar treatments as compared to control. There was significant improvement of genetically improved farmed tilapia in hematological parameters of red blood cell (RBC), white blood cell (WBC) and Haemoglobin as compared to control, which is an important overall health indicator of well-being of any organism. In addition the biochar incorporated treatments reduced the stress enzyme superoxide dismutase (SOD) and catalase (CAT) activity of GIFT than in control. Hence, it may be concluded that inland saline soil, unsuitable for agriculture, can be converted into a productive aquaculture system through biochar amendment in sediment.

Keywords: biochar, inland saline soil, GIFT, sugarcane bagasse, paddy straw, haematological parameters**PERCEIVED EFFECTIVENESS OF BIOMIX AMONG BENEFICIARY OF TURMERIC GROWERS**TAYDE V.V.¹, BHOPALE S.S.², AND SAKHARE P.A.³**Department of Agricultural Extension Education, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani**

The present study was undertaken in the Hingoli, Aundha (Nagnath) and Basmat tehsils of Hingoli district in Marathwada region of Maharashtra state, with the goal of determining perceived effectiveness of biomix among beneficiary of turmeric growers. From each selected tehsil four villages were selected purposively, thus total 120 beneficiaries were selected purposively from 12 villages, ten beneficiary from each village. This study used an ex-post-facto research design. The majority (64.17%), of beneficiary had medium farming experience, secondary level of education (35.83%), occupation (Farming) (57.50%), semi-medium land holding (36.67%), medium annual income (65.00%), medium socio economic status (61.67%), social participation (54.17%), medium source of information (60.00%), medium level of extension contact (62.50%), medium level of risk orientation (56.67%), medium level of scientific orientation (58.33%), medium level of innovativeness (60.83%), medium level of knowledge (58.33%) and medium level of adoption (57.50%). According to findings, the majority (44.17%) of beneficiary belonged to high perceived effectiveness category while, (35.00%) from medium perceived effectiveness category and only (20.83%) beneficiary belonged to low perceived effectiveness category. Independent variable only farming experience are negative and significant relationship with perceived effectiveness, land holding, socio economic status discovered to be positive and significant relationship with perceived effectiveness of biomix among beneficiary of turmeric growers. Variables like education, occupation, annual income, socials participation, sources of information, extension contact, risk orientation, scientific orientation, innovativeness, knowledge and adoption had found positive and highly significant relationship with perceived effectiveness of biomix among beneficiary of turmeric growers. Regarding multiple regression analysis, the contribution of selected independent variables on perceived effectiveness of biomix among beneficiary of turmeric growers found to the extent of (53.78%).

(Keywords – Perceived, Effectiveness, Biomix, Beneficiary, Turmeric Growers)**SOLID STATE FAULT CURRENT LIMITER BASED EFFECTIVE FAULT CURRENT CONTROL IN POWER SYSTEM**THARANKUMAR THINAKARAN¹ AND ASHOK KUMAR LOGANATHAN²¹Department of Electrical and Electronics Engineering, SNS College of Engineering, Coimbatore, Tamil Nadu, India²Department of Electrical and Electronics Engineering, PSG College of Technology, Coimbatore, Tamil Nadu, India

The increasing technological advancements across all the sectors mandate to increase the electric power generation capacity of the country. Though the traditional methods of power generations are supporting to the great extent but the continuous demand makes us to think about all other possibilities. The renewable source based energy generations are becoming more efficient when compared to the past. The recent drastic developments in the semiconductor based intelligent electronic devices highly supports in increase in the power system efficiency. Under normal conditions the system will operate normally without any issues. During the occurrences of fault the system becomes unstable. Among various kinds of fault, the short circuit fault is more severe and it drastically increases the fault current upto 20% of the nominal current. This paper focuses on effective implementation and usage of Solid State Fault Current Limiter (SSFCL) in the existing power system during the fault conditions by maintaining the system stability. The MATLAB model is simulated for various conditions and the real time hardware model is tested under the laboratory conditions. The obtained results justifies that the SSFCL based fault current limiter is more efficient and easy for implementation.

Keywords: Fault Detection, Solid State Fault Current Limiter, Power System, Short Circuit Fault, Fault Current, Resistive Load

ARTIFICIAL INTELLIGENCE AND ROBOTICS IN HORTICULTURE**TEJENDRA KUMAR* AND ERAM PARVEEN*****Department of Horticulture, R.S.M. (P.G.) College Dhampur, Bijnor (U.P.)****Department of Zoology, R.S.M. (P.G.) College Dhampur, Bijnor (U.P.)**

The agricultural sector is undergoing a significant transformation driven by advancements in Artificial Intelligence (AI) and Robotics. Horticulture, a vital branch of agriculture concerned with the cultivation of fruits, vegetables, flowers, and ornamental plants, is poised to benefit immensely from these emerging technologies. AI, with its capabilities in data analysis, machine learning, and pattern recognition, offers a plethora of applications in horticulture. Precision agriculture techniques can be implemented through real-time monitoring of soil conditions, crop health, and environmental parameters using sensors and AI-powered analytics. This data can be used to optimize irrigation, fertilization, and pest control practices, leading to increased yields and reduced resource consumption. Robots can perform tedious and labour-intensive tasks such as seeding, transplanting, weeding, and harvesting with greater efficiency and precision. This not only alleviates the burden on human labour but also ensures consistent quality and reduces damage to delicate crops. Additionally, robots equipped with AI and machine vision can be programmed for tasks like fruit sorting and grading based on size, color, and ripeness, streamlining post-harvest processes. The integration of AI and Robotics in horticulture presents several advantages. It fosters sustainable practices by optimizing resource utilization, minimizing waste, and reducing the environmental impact of agricultural activities. Furthermore, it empowers farmers with data-driven decision-making capabilities, enabling them to adapt to changing climatic conditions and market demands. In conclusion, AI and Robotics hold immense potential to revolutionize horticultural practices. By leveraging these technologies, farmers can enhance productivity, ensure sustainability, and navigate the complexities of a growing global food demand. However, challenges such as affordability, infrastructure development, and skill development need to be addressed to ensure the widespread adoption of these advancements. As research and development progress, AI and Robotics are poised to play a pivotal role in shaping the future of sustainable and efficient horticulture.

Key Word: AI (Artificial Intelligence), Robot and Digital Horticulture.**POPULATION DYNAMICS OF MAJOR INSECT PESTS OF GREENGRAM [*VIGNA RADIATA* (L.) WILCZEK]****TEJPAL TETARWAL*¹, DR. ANIL VYAS², SACHIN YADAV¹, SIDDHARTH CHOUDHARY³****Ph.D. Scholar¹, Assistant Professor², Department of Entomology****Ph.D. Scholar³, Department of Soil Science, Rajasthan College of Agriculture****Maharana Pratap University of Agriculture and Technology, Udaipur-313001(Raj.)**

Mungbean [*Vigna radiata* (L.) Wilczek] member of family Leguminosae is one of the principal pulse crops of tropics. It is a popular crop because of its excellent nutritional quality, including its high protein content (around 24%). It can fix nitrogen from the atmosphere (30-40 kg N/ha). Rajasthan is one of the major Greengram growing state of India with 21.40 lakh ha area (46 %) and 10.97 lakh tonnes production (45 %) in the total Mungbean contribution in the country. The area under green gram has increased in the last two decades mainly because of the availability of short duration cultivars but multitude of pests still creating bottleneck in higher productivity due to infestation from germination to maturity of the crop. Therefore, our research work was focused on record the population dynamics of major insect pests of greengram which would helpful for better management practices and carried out during *Kharif*, 2022. It was observed that the major insect pests viz., Aphid, *Aphis craccivora* (Koch); Jassid, *Empoasca kerri* (Pruthi); Whitefly, *Bemisia tabaci* (Gennadius), Pod borer, *Helicoverpa armigera* (Hubner) with the effect of weather parameters. The infestation of aphid initiated in the 2nd week of August (32th SMW) and the population attained its peak with mean of 35.85 aphid per five plants during last week of August (35th SMW). The pest population of jassid occurred throughout the crop season and reached the maximum level with a mean of 24.4 jassid per five plants during 4th week of August (34th SMW). Whitefly appeared from 1st week of August (31th SMW) with minimal population of 8.28 whitefly per five plants and attained its peak population of 32.28 whitefly per five plants during last week of August (35th SMW) remained active up to 38th SMW. The infestation of pod borer was recorded first time during 3rd week of August (33th SMW) with a mean scanty population of 1.8 larvae per plants and reached maximum mean level of 8.33 larvae per five plants and pod damage with a mean of 17.67 per cent per five plants during the first week of September (36th SMW) after which it was declined in the succeeding weeks.

Keywords: Greengram, Jassid, Aphid, Pod Borer, Whitefly, Weather Parameters etc.**PHYSICO-CHEMICAL PROPERTIES OF FRESHWATER AND ZOOPLANKTON DIVERSITY OF BURAI DAM, DHULE (M.S.) INDIA****TRUPTI R. SABLE, NAMRATA G. MAHAJAN AND MANOJKUMAR Z. CHOPDA****Department of Zoology, Moolji Jaitha College (Autonomous), Jalgaon, M S, India**

Zooplanktons are one of the most useful creatures on the earth, which acts as a secondary producer in the aquatic ecosystem. The present study was undertaken to study zooplankton diversity of Burai dam situated at Dhule (MS). The dam was completed in 1983 and its water is mainly used for drinking, fish farming and agricultural purpose. Physicochemical parameters of water sample collected from Burai dam were estimated by using Octo aqua test kit and also from District Public health laboratory Dhule. Estimated value of physico-chemical parameter of water sample were within the range from October 2023 to March 2024. During the study period the presence of some species of zooplankton were observed. Burai dam provide favorable physico-chemical conditions to sustain regional diversity of zooplankton species.

Keywords: Zooplankton, Burai dam, Physico-chemical properties

INFLUENCE OF DIFFERENT NUTRIENT MANAGEMENT PRACTICES ON YIELD AND QUALITY OF BROADBEAN UNDER BLACK AROMATIC RICE-BROADBEAN CROPPING SEQUENCE

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The study on “Integrated nutrient management in black aromatic rice-broadbean cropping sequence” was undertaken at the experimental field of College of Agriculture, Central Agricultural University, Imphal, during the *kharif* and *rabi* season of 2021-22 and 2022-23. The *kharif* rice experiment was laid out in randomized block design with 8 treatments as main plot replicated three times-T₁(100% RDF), T₂(100% RDF + sesbania + azospirillum + neem powder), T₃(75% RDF + sesbania + azospirillum + Neem powder), T₄(50% RDF + Sesbania + Azospirillum + Neem powder), T₅(100% RDF + azolla + azospirillum + neem powder), T₆(75% RDF + azolla + azospirillum + neem powder), T₇(50% RDF + azolla + azospirillum + neem powder) and T₈(sesbania + azolla + azospirillum + neem powder). During *rabi* season each main plot treatment was split into three sub plot treatments with three levels of recommended dose of fertilizers viz., F₁ - control, F₂ - 50% RDF and F₃ - 100% RDF to broadbean resulting in twentyfour treatment combinations replicated three times in split plot design. The result shows that residual effect of T₅(100% RDF + azolla + azospirillum + neem powder), applied to *kharif* rice showed higher yield attributes, seed and stover yields and quality of the broadbean seed. Among the levels of RDF directly applied to *rabi* broadbean, application of 100% RDF resulted in higher values of yield attributes, seed and stover yields and quality of seed.

Keywords: Integrated nutrient management, broadbean and azolla

EFFECTIVENESS OF AI GENERATED MULTI-MEDIA TEACHING AID ON IDM IN CONTROLLING RICE BLAST: A CASE AT THADNONGIAW VILLAGE, RI-BHOI, MEGHALAYA

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Rapid advancements in Artificial Intelligence (AI) technology have brought about revolutionary shifts in a variety of industries. Constant changes in technology have led to new cultures and mode of learning. AI enhanced multi-media for learning had more positive results towards learners. The ‘Rice Blast’ is reported to be one of the commonest diseases of paddy in the ‘Rice Bowl’ region of Meghalaya at paddy fields in villages of Bhoirymbong C&RD Block of Ri-Bhoi. Multiple extension approaches such as training, demonstration, field days etc. to train farmers towards scientific management of ‘Rice Blast’ yielded unsatisfactory learning by the rice farmers. Hence, the following prognosis viz., to be able to create clear-cut & purposeful teaching objectives; be enthusiastic & interested by the learner on the subject matter; be able to communicate & skillful in using teaching aids; and be able to encourage participation of the learner, creation of AI-generated Multi-Media teaching aids for farmers have been felt. Subsequently, the preceding paraphernalia led to the three research objectives viz., (1) To understand the level of awareness of farmer on IDM of Rice Blast; (2) To create an Artificial Intelligent multi-media teaching aid for IDM of Rice Blast; and (3) To examine the effectiveness of multi-media teaching aid for IDM of Rice Blast. The study followed Exploratory Research Design. Purposive sampling method was administered in order to select 20 respondents. The scientific inquiry could unveil that majority (65%) of the respondents were in middle age groups and 55% of the respondents were female. Higher percentage (40%) of the respondents had primary level of education. Inquisitively, it was observed that more than half of the total respondents (55%) had low level of awareness on IDM of ‘Rice Blast’. The study could create an Artificial Intelligent multi-media teaching aid for Control of Rice Blast (*a.k.a* AI4CORB) using ChatGPT +4 and DALL E.3. A statistically significant effectiveness @ 0.01 level of significance on awareness and understanding on IDM of Rice Blast by respondents of the study was observed owing to the intervention of AI4CORB. The scientific inquiry recommends to establish training programs for farmers using AI based multi-media tools to enhance immersive learning and understanding of complex-abstract-cognitive domains of farming.

Keywords: Artificial Intelligence, Rice Blast, DALL E.3, ChatGPT +4, AI4CORB

IMPACT OF PYROLYSIS TEMPERATURE ON COWDUNG BIOCHAR – A PROXIMATE ANALYSIS

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Dairy industry is one of the largest industries in many developing as well as developed countries. The global cattle population increased from 928.34 million head in 2019 to 942.63 in 2023. Moreover, the global dairy market was valued at 827.4 billion U.S. dollars in 2020 and is projected to grow to about 1128 billion U.S. dollars by 2026. With such a rapid increase in the cattle population, there is a proportional increase in the amount of improper disposal of cowdung which can cause serious problems. Pyrolysis is the process of heating biomass at high temperatures under oxygen-free conditions to produce biochar. An indefinite number of biochar varieties can be produced from a single type of biomass by varying the carbonization temperature. Hence, the study was conducted to evaluate the variations in the physiochemical properties of biochar at three different temperatures (300°C, 500°C and 700°C) using cowdung as the feedstock. The changes in the biochar properties showed varying trends. A good understanding of how pyrolysis temperature affects its properties will provide a basis for biochar development and its application in various fields.

Keywords: Biochar, Pyrolysis, Cowdung, Physiochemical properties

FUNCTIONAL MEAT PRODUCTS: ENSURING NUTRITIONAL SECURITY IN CONTEXT TO NORTH EASTERN REGION OF INDIA**THAMERIDUS B. MARAK^{1*}, AJITA TIWARI¹, ANIRUDDHA ROY², ANGAM RALENG³, AND ROBIN SUBBA³**¹Department of Agricultural Engineering, Assam University, Silchar-788011²ICAR Research Complex for NEH Region, Umiam, Meghalaya-793103³Department of Processing and Food Engineering, CAU, Sikkim-737135

Meat, a rich source of essential nutrients, is a good source of protein, amino acids, fatty acids, vitamins and minerals. However, it contains saturated fatty acids and cholesterol, which contribute to chronic diseases like cardiovascular disease, cancer, and obesity. The medical and nutritional field has emphasized the risk of chronic cardiovascular disease associated with meat consumption. As a result, there is a growing demand for safe, nutritious and therapeutic meat products. Functional meat products can be improved by adding health-benefitting natural ingredients, such as Chinese chive, which is rich in antioxidants, flavonoids, and sulfides. This combination of ingredients can enhance nutritional properties, provide longer shelf life, and enhance the nutritional value of the final product. Perilla seed, a mint herb found in Meghalaya, is a rich source of antioxidant components, which are beneficial for treating asthma, seasonal allergies, and aging. Incorporating perilla seeds into meat sausages enhances sensory appeal and functionality, with higher levels of protein and polyunsaturated fatty acids (PUFA) compared to standard sausages. Chameleon plant, found in Assam, Arunachal Pradesh, Manipur, Nagaland, and Meghalaya, is a potential source of antioxidants and anti-inflammatory properties. The leaves or roots of this plant can enhance the functional and physicochemical properties of the final product. Blood fruit, abundant in southern Assam and Garo Hills, is known for its high levels of beta carotene, anthocyanin, and iron content. The addition of blood fruit pulp in sausages shows functional properties, with beta carotene, anthocyanin, total flavonoid, high iron content, fiber, and ascorbic acid, providing additional health benefits.

Keywords: Functional Food, Functional Meat Products, Indigenous herbs, Underutilized Fruits, Northeast India**IOT (INTERNET OF THINGS) IN ENTOMOLOGY****TIASANGLA JAMIR****Department of Entomology, School of Agricultural Sciences, Nagaland University, Medziphema 797106, India**

Internet-of-Things (IoT) based technologies have redesigned almost every industry including smart agriculture, which moved the industry tremendously from statistical to quantitative approaches. The IoT has revolutionized not just how we live but also how we operate. The adoption of IoT is growing quickly across many industries, whether it be agricultural, safety, or healthcare. IoT with robotics and artificial intelligence have increased the complexity of commercial farms while reducing manual works up to a great percentage. Researches conducted earlier has examined the application of contemporary methods in the agricultural industry, including IoT, sensors, cloud services, mobile computing, and big data analysis. Currently, it is found that, all over the world, around 50% of the farm produce never reaches the end consumer due to wastage. A major role has been known to be played by the insect pest and diseases that reduce the yield drastically. Mobile applications and the Internet are among the best options for bringing IPM technology to farmers of all skill levels. For example, IoT-based automated traps (Semios, Spensa) allow us to capture, count, and even characterize insects, which can upload more data to the Cloud for further analysis. This cannot be done with remote sensing. The insect pests hamper the health of the plant, reduce the biomass, and hence, productivity and production. However, this requires continuous monitoring of experts which might be extremely expensive in large farms. Further, in some developing countries, farmers face many hurdles even in reaching the experts, thus making the process too expensive and time-consuming. Therefore, in today's modern era, automatic detection and recognition of insect pests is the need of the hour to automatically detect the symptoms caused by a particular insect pest as soon as they appear on plant parts.

Keywords: IoT, robotics, automated, monitoring, detection.**NUTRITIONAL EVALUATION OF *SCHIZOTHORAX PLAGIOSTOMUS*: IMPLICATIONS FOR LOCAL DIETS AND FOOD SECURITY****TITIKSHA SHARMA, NEHA, MADHU BALA AND RAKESH KUMAR*****Department of Animal Sciences, Central University of Himachal Pradesh, Shahpur, Kangra, Himachal Pradesh**

Schizothorax plagiostomus also known as snow trout is a major cold water fish species native to the Himalayan region. This fish species belonging to the Cyprinidae family is distinguished by its sleek body and unusual pigmentation, which frequently includes silver and gold tones. It is a valuable food source for Himalayan tribes because it contains high-quality protein, vital fatty acids, vitamins, and minerals. In addition to its nutritional importance, *Schizothorax plagiostomus* is an important component of the Himalayan water body ecology, contributing to the region's biodiversity and ecological balance. The purpose of this study was to investigate the nutritional content of *Schizothorax plagiostomus* and determine its possible health benefits. The study used proven analytical procedures to properly assess the moisture, ash, and crude oil levels in samples. The moisture content was analyzed using the oven drying method and found to be **78.86%** on average. It describes the volume of water in the fish sample and is important in figuring out the total nutritional value and quality of the fish. Ash content reflective of mineral composition was analyzed using muffle furnace and was found to be **5.128%** on average. The crude oil content, significant for analyzing the lipid profile and omega-3 fatty acid concentration was analyzed using Soxhlet extraction method and was found to be **7.82%** on dry weight basis. These findings emphasize the potential of snow trout as a source for human consumption and offer insightful information on the nutritional makeup of the fish. In general, this research advances knowledge about the nutritional benefits of snow trout and how it may support a balanced diet.

ENHANCING FRUIT PRODUCTION THROUGH POLYHOUSE CULTIVATION**TITIKSHA BOHARA¹ AND NAVDEEP SINGH BHATI²**¹Department of Fruit Science, College of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat)²Department of Soil Science and Agricultural Chemistry, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat)

Polyhouse cultivation has emerged as a significant advancement in modern agriculture, offering controlled environments that optimize fruit production. These structures provide a controlled environment conducive to year round cultivation, shielding crops from adverse weather conditions and pests while allowing efficient resource utilization. Temperature, humidity, light, and irrigation can be precisely regulated, ensuring optimal conditions for fruit growth and development. This control over environmental factors often leads to improved fruit quality, higher yields, and reduced dependency on chemical inputs. The adoption of polyhouse cultivation poses challenges such as initial investment costs, technical expertise requirements, and energy consumption. Additionally, maintaining a balanced ecosystem within the polyhouse environment requires careful management to prevent the buildup of pests and diseases. The ability to extend growing seasons, mitigate climate risks, and produce high-quality fruits consistently presents opportunities for farmers to increase profitability and meet growing market demands. Advancements in technology, such as sensor-based monitoring systems and renewable energy integration, hold promise for enhancing the sustainability and efficiency of polyhouse operations. Polyhouse cultivation offers a promising avenue for enhancing fruit production by providing a controlled environment that optimizes growth conditions. Addressing challenges related to cost, expertise, and sustainability will be crucial for maximizing the potential of polyhouse technology in fruit production. Continued research, technological innovation, and knowledge-sharing initiatives are essential for realizing the full benefits of polyhouse cultivation in meeting the demands of an ever-evolving agricultural landscape.

Keywords: polyhouse cultivation, fruit production, controlled environment, environmental factors, yield optimization, quality improvement, sustainability, technology integration, climate resilience, pest and disease control, resource efficiency, market demands, innovation, agricultural advancement.

MESTA (*HIBISCUS CANNABINUS* L.): A BEST CANDIDATE FOR BIO-DIESEL AND HOPE FOR CLIMATE RESILIENT SOLUTIONS UNDER RAINFED CONDITIONS**U. K. SHANWAD¹, NAGAPPA GOVANAKOPPA², G. N. MARADDI³, G. M. HIREMATH⁴ AND B. N. ARAVINDKUMAR⁵**¹Scientist (Agronomy), ICAR-Krishi Vigyana Kendra (KVK)), Dharwad 580 005, Karnataka State, India²Head, Fodder Research and Production Unit, University of Agricultural Sciences, Dharwad, Karnataka³Professor, Department of Agriculture Extension Education, University of Agricultural Sciences, Dharwad Karnataka State⁴Professor, Department of Agriculture Economics, University of Agricultural Sciences, Dharwad, Karnataka State,^{5,3}Professor, Department of Agronomy, University of Agricultural Sciences, Dharwad, Karnataka State,

Agriculture is the backbone of India and the energy is the backbone of industry will converge at one place and bring prosperity to India. Considering the present Indian demand / consumption level of 50 million tonnes per annum of petroleum/diesel, it would be possible to consume around 10 million tonnes per annum of bio-diesel by replacing 20 per cent of diesel with bio-diesel. Now-a-days everyone is concerned with the depleting fossil fuel reserves. There is lot of speculation about the availability of "Black stuff" and the price. The price is at its height now. The world is working out on alternate renewable energy sources such as solar, wind, water, hydrogen, nuclear, plant-based oil etc., Clearly, plant based oils, commonly referred as biodiesel, have become the buzzword of the day. India being a developing country, demand for petroleum is increasing tremendously. India is importing 78 per cent of its crude oil requirements at a cost of more than Rs.1.0 lakh crores. Now, the international market is more volatile resulting in greater problems. Such situation demands that we have to find alternate energy sources to reduce imports. Sustainable alternatives include bio-fuels from non-edible oils as a means of improving energy self reliance. Bio-fuels are the excellent transportation fuels and can reduce emission of ozone depleting compounds and carbon monoxide. Karnataka is one of the potential states for growing several bio-fuel crops like Jatropha, Simaruba, Pongamia etc are all perennial tree plants, one need to wait for 5 to 6 years to get seed bearing and importance was not given for annual underutilized oil seed crops. Among several crops Mesta is the one such crop can be exploited for bio-fuel having 16 - 20 per cent oil content belongs to the family Malvaceae and comes up very well in dry lands. It is a boon to depend on annual crop like Mesta, so that seeds can be obtained for oil crushing regularly every year unlike perennial bio-fuel trees. It has good edible, industrial and medicinal properties. So far no efforts have been made to study the importance of Mesta seed oil for bio-fuel. Therefore, there is a need to develop strategies and facilities to exploit the seed yielding potential and oil content of the seeds by taking appropriate studies. In this direction, this study was conducted during kharif seasons of 2012-13 and 2013-14 at Main Agricultural Research Station, UAS, Raichur. The results revealed that out of 13 genotypes tried H-local, AMV-4 and HS-2 performed better with respect to seed yield and oil content. Later, oil was extracted and tested for its use as a biodiesel in 50 hp agricultural tractor (2WDMahindra 585DI) for tillage operations. The blends were prepared on volume basis in proportions of 20:80, 40:60 and 60:40 and designated as B20, B40, and B60 compared with petro-diesel (B0). The specific draft, fuel consumption and fuel efficiency of the tractor at three selected forward speeds 2.5, 3.5 and 4.5 km h⁻¹ were assessed during tillage operations. Results showed that the specific draft of tractor was not affected by the blends but significantly affected by the forward speed. The blends and forward speed of operation affected both the fuel consumption and fuel efficiency significantly, whereas lower fuel efficiency was found for the blends beyond B20 that was attributable to the lower energy content of the biodiesel. Among the blends tested, B20 had very similar performance with petro diesel in terms of specific draft, blend of biodiesel with petro diesel may be recommended to use in agricultural tractor for tillage operations.

Keywords: Mesta, Biodiesel, Oil content, Fuel consumption, Fuel efficiency,

UNDERSTANDING THE FARMING SYSTEMS DIVERSITY THROUGH ITS TYPOLOGY CONSTRUCTION FOR CLIMATE SMART AGRICULTURE**U. K. SHANWAD¹, M. L. JAT², SANTIAGO LOPEZ RIDAURA³, PUNITA B. C.⁴, NAGAPPA GOVANAKOPPA⁵ AND K. D. LAMANI⁶**¹Scientist (Agronomy), ICAR- KVK, University of Agricultural Sciences, Dharwad, Karnataka, India.²Director, Global Research Program - Resilient Farm and Food Systems, International Crops Research Institute for Semi Arid Tropics, Hyderabad, India³Principal Scientist, Climate Change and Food Security (CCAFS), International Maize and Wheat Improvement Centre (CIMMYT), Mexico⁴Assistant Professor, Department of Soil Science, College of Agriculture, Hanumanamatti, Karnataka , India⁵Head, Fodder Research and Production Unit, University of Agricultural Sciences, Dharwad, Karnataka, India⁶Scientist (Agronomy), AICRP on Wheat, University of Agricultural Sciences, Dharwad, Karnataka, India

Understanding farm diversity is essential to delineate recommendation domains for new technologies, but diversity is a subjective concept, and can be described differently depending on the way it is perceived. Historically, new technologies have been targeted primarily based on agro-ecological conditions, largely ignoring socio-economic conditions. In order to move towards more informed and equitable development. We examined the food security status and livelihood activities of 200 farm households (HHs- which includes 52 large, 102 mall and 46 marginal) based on stratified sampling method in Shirur village in Navalagund taluk of Dharwad district falling under Northern dry agro-climatic zone of Karnataka state in peninsular India. To have a good understanding of farming system diversity within Shirur village, a typology approach has been used. The methodology employed was a combination of quantitative analysis and participatory research. Based on a household survey, the main features differentiating farming systems were identified and used to produce descriptive statistics in order to determine the relevance of variables for the construction of typologies. After deleting near zero variance variables and correlation variables, 32 variables were included for PCA as sample size allows it. A multivariate analysis (Principal Component Analysis + Hierarchical Clustering) was used to define the number of groups. After removing incomplete data and outliers' the final number of farmers taken for study is 187. The output of the PCA + HC results showed that the possibility to divide the population in Shirur village into 4 types (Livestock oriented, large, medium young and small farmer groups). Therefore, a validation of the typology results by farmers was desired. The resulting farm types have to be conceptually meaningful, representative and easily identifiable within the target population. Thus the PCA + HC analysis included a greater number of variables describing the farm (land use, household size, cattle, fertilizer, off-farm work, hiring labour, production). This analysis emphasized the multi-dimensional potential of such a statistical approach and, in principle, its usefulness to grasp the full complexity of farming systems to identify their needs in crop and livestock technologies. A sub-sampling approach was used to test the impact of data selection on the diversity represented in the statistical approach. Our results show that diversity structure is significantly impacted according to the choice of a sub-sample of 32 variables available. The participation of local researchers, technicians and farmers was key in the co-development of this farming system typology, and this provides insight and support for targeting specific practices to specific farm types and will be served as a source for climate smart farming.

Keywords: Farming systems, socio-ecological systems, PCA, hierarchical clustering, farming typology**EFFECTIVENESS OF AGRICULTURAL EXTENSION SYSTEMS****UDAY KUMAR A*, SAVITHA B, JAGAN MOHAN REDDY M, VIDYASAGAR G E CH, SRINIVASA CHARY D*****Ph.D. Scholar, Department of Agricultural Extension Education, PJTSAU, Hyderabad**

Agriculture extension system bridges the gap between research labs to a farmer's field. Agricultural research, education and extension are said to be the most critical for promoting farm productivity and enhancing farmer's income. It can be operationalised as a combination of all the public, private and NGO led organisations which are engaged in the transfer of technology to the Agricultural stakeholders. The major reasons for the failure for the earlier extension efforts by government and voluntary organisations were most of the schemes were of short duration, activities were not properly planned and coordinated, initiatives came from the government side and not from the people. Hence, it is required to measure the effectiveness of agricultural extension systems by developing a standardised index. Based on the review of literature on the topic, 20 indicators have been identified. In the present study, Relevancy Weightage and Mean Relevancy Score have been used for selection of relevant indicators for inclusion in the final index. A total of 60 experts including academicians and agricultural extension scientists were asked to give weightage. Of which, 50 experts had responded. The indicators having Relevancy Weightage (RW) > 0.70 and Mean Relevancy Score (MRS) > 2.25 were considered for including in the index for measuring effectiveness of extension systems. These indicators could be used to study effectiveness of different extension systems.

APPLICATION OF REMOTE SENSING AND GIS IN CONCEPTUAL PLANNING FOR DRAINAGE LINE TREATMENT AND WATER HARVESTING STRUCTURES IN BAGALKOT DISTRICT OF KARNATAKA STATE, INDIA

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Bagalkot district is situated in the northern part of Karnataka State. It lies between 75° 50' 0" to 16° 10' 30" N latitudes & 75° 01' 40" to 76° 20' 0" E longitudes. The Geographical area of the district is 6,594 sq km. It consists of 6 taluks viz., Bagalkot, Badami, Bilagi, Hungund, Jamakhandi and Mudhol. Hundred years average annual rainfall of the district is 554.13mm. The important rivers are Krishna, Ghataprabha and Malaprabha. The district consists of granite and gneisses of Archean age, Sedimentary rocks of Proterozoic age and Basalts and associated sediments of Cretaceous-Eocene age. The Proterozoic sediments and basalts cover major part of the district. The district is characterized by flat topography of basalts, undulating topography of granitoids and low lying linear plateaus of sedimentary rocks. In view of low rainfall in the district, it is very much essential to harvest water, so that crops can be sustained during long dry spells. Major part of soil is black cotton-soil, which is always prone to erosion during rains. This causes loss of fertile soil from the agricultural fields. The eroded soil gets accumulated in storage structures such as tanks, Gokattas, Nala bunds and reservoirs there-by causing considerable reduction in storage capacity. It is mandatory to prepare reasonably viable plans to prevent soil erosion, scouring and siltation. Traditional methods involve huge cost and are time consuming. Remote sensing technology aids in planning the watershed developmental activities on a systematic and scientific basis. Using PAN+LISS merged satellite imageries, various thematic layers such as drainage and water bodies, land use/land cover, slope, geomorphology and soil types have been derived, which have been used for recommending suitable sites for locating water harvesting structures along drainage lines. Different drainage line treatment structures and numbers recommended across drainage lines in the study area are vegetative checks (5332), boulder checks (2457), drop structures (154), gully plugs (61), nala revetment structures (2148), rock filled dams (309) and ravine reclamation structures (28). These structures are expected to prevent soil erosion, scouring and siltation in storage structures. The different water harvesting structures are also recommended in the study area and numbers are check dams (519), nala bunds (5), percolation tanks (7), recharge pits (14) and vented check dams (48), which are expected to improve the ground water prospects and also help in utilizing water for irrigating the crops.

Keywords: Remote sensing, GIS, physiographic units, drainage, lineament, water harvesting structures

PREVALENCE OF SHIGATOXIN PRODUCING *E. COLI* (STEC) IN ANIMALS & POULTRY FECES, THEIR PRODUCTS AND HUMAN URINE SAMPLES IN BRIJ REGION

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STEC important food borne zoonotic pathogen specially O157H7 can cause spectrum of illness, from mild non bloody diarrhoea to haemorrhagic colitis, HUS and TPP. Haemolytic uraemic syndrome (HUS) in which renal failure is accompanied by haemolytic anaemia, thrombocytopenia and central nervous system manifestation complicates 2 - 7% of cases after the onset of diarrhoea. A study was conducted for ten years in between 2010-2020 to observe the prevalence of STEC in animal feces of ruminants, dogs & cats and poultry, their products and human urine samples. Prevalence was found 10.79% (264/2445), 30.00% (63/210) and 6.55% (38/580), respectively in animal and poultry feces. In animal products milk, milk products, meat and meat products prevalence reported as 5.82% (63/1082), 3.29% (53/1607), 8.05% (67/832) and 1.48% (4/270), respectively. Human urine samples were screened for the presence of STEC and prevalence was revealed 3.10% (14/451). Isolated *E. coli* were screened through mPCR for detection of virulence genes (*stx1*, *stx2*, *eaeA*, *hlyA*) of STEC. shigatoxin gene *stx1* was dominating gene in animal feces and its products with prevalence value of 3.25% and 2.24% while *stx2* was 7.2% and 0.47% respectively. In human urine samples *stx1* and *stx2* were 1.55% and 0.22%. Eleven different combinations were reported from animal feces, products and human urine with the prevalence value of *stx1*&*stx2* (14.68%), *stx1*&*hlyA* (7.53%), *stx1*&*eaeA* (7.34%), *stx2*&*hlyA* (2.18%), *stx1*&*stx2*&*hlyA* (5.35%), *stx1*,*eaeA*&*hlyA* (1.78%), *stx2*,*eaeA*&*hlyA* (0.19%), *stx1*&*stx2*&*eaeA* (0.19%) and *stx1*&*stx2*&*eaeA*&*hlyA* (1.78%). Humans also live in close contact with ruminants, dogs & cats and poultry. These food and pet animals interact closely with their owners and handlers and pose a risk. Thus the bio security system, other farm management practices & personnel hygiene remain very useful to check the cross contamination.

Key words: Prevalence, Shigatoxin *E. coli*, Animals, Poultry, Products, Human urine

FABRICATION OF BUCKWHEAT (*FAGOPYRUM ESCULENTUM*) CHAKLI, A NUTRICEREAL FOR SUSTAINABLE AND NUTRITION SECURITY**UMA N KULKARNI^A, THEJASWINI H^B AND SUMA S BIRADAR^C**^{a, b}**Department of Food and Nutrition, College of Community Science**^c**Department of Genetics and Plant breeding, University of Agricultural Sciences, Dharwad - 580 005, Karnataka, India**

Buckwheat (*Fagopyrum esculentum*), a gluten-free pseudo-cereal, is rich in protein, fiber, vitamins and minerals like magnesium and manganese. Its nutty taste enhances pancakes, noodles, salads and porridge, appealing to health-conscious individuals. Its resilience in poor soil and ability to promote biodiversity make it vital in sustainable agriculture, extending its importance beyond culinary use. The buckwheat product *chakli* mix was developed over rice flour *chakli* mix. It consists of varied ingredients, mainly buckwheat flour, roasted bengal gram flour, rice flour, ajwain, asafoetida, heated oil, salt, chilli powder, cumin seeds and sesame. Buckwheat *chakli* mix recipe was optimized with different variations of buckwheat flour and roasted bengal gram flour viz., T0(control), T1, T2, T3, T4, T5 and T6 in varying proportions of 75:25, 70:30, 65:35, 60:40, 55:45 and 50:50. All the variations were analysed for sensory profile and T2 (70:30) got highest score for the sensory parameters including appearance(8.60), color(8.80), flavour(8.80), taste(8.87), texture(8.80), overall acceptability(9.00) and acceptability index(97.90). Of the different formulations of buckwheat flour and rice flour, T0(control), T1(70:1), T2(70:2) and T3(70:3), the T1(70:1) had highest acceptability index of 93.46. Variations for ajwain and salt in the ratio T0(control), T1(0.25:2.5), T2(0.5:3.5), T3(0.75:4.5) and T4(1:5.5), revealed that T2 had highest sensory scores with descriptive characteristics of good taste, highly accepted with acceptability index(91.60) for ajwain& salt(92.35). The chilli powder(4g) and sesame(8g) expressed acceptability indices of 94.35 and 93.33 per cent respectively. The optimized buckwheat *chakli* mix with proportion of buckwheat flour (70): roasted bengal gram flour(30): rice flour (1): ajwain (0.5): salt(3.5): chilli powder(4):sesame(8) were highly acceptable from mix stored in vacuum package (VAP) compared to aluminium pouch (ALP) and had better shelf of of six months.

Key words: *Chakli* mix, Buckwheat flour, Sensory, Vacuum package, Aluminium pouch.**DIGITALIZATION OF AGRICULTURE TECHNOLOGY FOR DOUBLING THE INCOME OF FORMER'S IN INDIA****DR. UMA RASHMI & DR. MAMTA RATHORE****Teaching Associate in C.S.A.U.A.T., Kanpur**

During the green revolution in the 1960s India could achieve self-sufficiency in food grain production by using modern methods of agriculture like better quality of seeds, proper irrigation, chemical fertilizers and pesticides. As time passed, more technological advances appeared in agriculture mobile technology is playing an important role in monitoring and controlling crop irrigation system. Moisture sensors in the ground are able to communicate information about the level of moisture present at certain depth in the soil. The government of India has focused its attention on doubling the farmers income during the seven year period from 2015-16 to 2022-23 to promote farmer's welfare reduce agrarian distress and bring parity between income of farmers and those working in non-agricultural professions. India is the world's top producer of pulses, paddy & wheat respectively. The digitalization of agriculture technology describes integrating cutting-edge digital technology into the farm production system, including artificial intelligence (AI), robotics, unscrewed aviation systems, sensors and communication networks. The national agricultural research system (NARS), which includes the Indian Council of Agricultural Research (ICAR) institutes and state agricultural universities, is one of the largest agricultural research systems in the world. The digital agriculture mission 2021-25 was launched in September 2021 by Narendra Singh Tomar, Union Minister of agriculture and farmers welfare. This paper explores the digitalization of Indian agriculture to create value for the farming community and increase the opportunities to double farmer's income. It highlights the application of different digital technologies to increase form yield, improve farm-level decision making maximize resources use efficiency and ultimately enhance the income of small holder farmers. Modern agriculture is driven by continuous improvement in digital tools and data as well as collaboration among farmers and researchers across the public and private sector. The paper suggests that policy maker focus on doubling the former's income through difference stages of food production and supply chain.

Key words:- Agriculture, doubling former's income, digitalisation, digital technology, public policy**EXOGENOUS APPLICATION OF SILICON NANOPARTICLES STIMULATES THE PRODUCTION OF ESSENTIAL OIL AND THE FUNCTIONAL ACTIVITIES OF *MENTHA ARVENSIS* L. UNDER COPPER TOXICITY****UMRA AQEEL AND DR. MU NAEEM****Department of Botany, Faculty of Life Sciences, Aligarh Muslim University, Aligarh, 202002, India**

Copper (Cu) is an essential micronutrient for plants. The excessive buildup of Cu, results from various anthropogenic activities, causes agricultural land to become polluted, significantly impacting crop yield gradually. Therefore, it is urgent to investigate practical means of reducing Cu toxicity in plants. Globally, nanotechnology has generated attention due to its revolutionary impact on food security and agricultural sustainability. The effects of nanoparticles (NPs) on the growth and development of food crops have been the subject of numerous studies. In view of beneficial aspects of SiNPs, the current study was conducted to evaluate the influence of SiNPs on physiological and biochemical as well as EO's production of the *Mentha arvensis* L. under Cu toxicity. A simple randomized pot experiment was designed in Aligarh Muslim University, India, to explore the effect of various foliar concentrations of SiNPs (40, 80, 120, 160 & 200 mg L⁻¹) on the overall performance of the plant under Cu stress. The present study indicates that Cu stress reduced yield, quality and quantity of EO's and its active constituents, particularly menthol. Consequently, exogenous application of SiNPs at the applied concentration (120 mg L⁻¹) exhibited a beneficial effect, was found to be the most effective in improving Cu tolerance by strengthen antioxidant dense metabolism and other functional activities of the plant which in turn increases the menthol content in plant.

Keywords: Agriculture sustainability, Essential oil, Heavy metals, *Mentha arvensis*, Nanoparticles.

EFFECTS OF SUPER ABSORBENT HYDROGEL (SAH) ON CROP YIELD, WATER PRODUCTIVITY, AND SOIL PROPERTIES: A COMPREHENSIVE REVIEWUMASHANKER^{[1]*} AND K.V.R. RAO^[2]^{(1)*}Ph.D. Scholar, ICAR-Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh⁽²⁾Principal Scientist and Head (IDED), ICAR-Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh

Drought stands as one of the most destructive natural disasters, impacting the economic, social, and environmental fabric of nations. Prolonged drought conditions not only disrupt the soil ecosystem but also initiate processes that result in desertification and deterioration of soil quality. This causes extreme water stress, which is made worse by inefficient irrigation techniques, inadequate water management, deteriorating soil quality, and insufficient soil water-holding capacity. During a drought, the most feasible option is to manage land effectively. It's widely acknowledged that incorporating super absorbent hydrogel (SAH) into soil can enhance crop yields and water productivity during drought spells. This study aims to conduct a comprehensive review of existing literature to assess the impact of super-absorbent hydrogel (SAH) addition on crop yield, water productivity, and various soil properties (i.e., water retention, soil hydraulic conductivity, soil water infiltration, and evaporation). The findings suggest a direct relationship between SAH application and the augmentation of both crop yield and water productivity. Increases in yield and water productivity after SAH application were the highest in tuber crops, while the greatest economic benefits were observed in vegetable crops. The increase in water productivity was higher in rainfed conditions than in irrigated conditions. In addition, SAH increased water retention in soil compared to unamended soil with decreasing soil water pressure head. The application of hydrogels decreased saturated hydraulic conductivity, reduced infiltration, and decreased soil evaporation.

Keywords: Super absorbent hydrogel, Drought, Water productivity, Water holding capacity.

CONVENTIONAL AND SPECIAL BREEDING APPROACHES FOR HEAT TOLERANCE IN GARDEN PEAUPASNA CHOUDHARY¹, S.V.DWIVEDI², JYOTI DEVI³ AND ASHUTOSH RAI⁴¹Ph.D. Research Scholar, Department of Vegetable Science, ²Professor, Department of Vegetable Science, ⁴Assistant Professor, Department of Basic and Social Science, Banda University of Agriculture and Technology, Banda³Scientist, Division of Crop Improvement, ICAR - IIVR, Varanasi

The pea, or *Pisum sativum* L., is a cool-season annual legume that is earliest crops to be domesticated. Pea seeds are an excellent source of protein (22–25%) for human consumption and animal feed, it also contained complex carbohydrates and fiber components, and a wide range of vitamins, minerals, and photochemical. Heat Stress negatively affects a number of pea attributes, it results in significant yield losses. When the mean daily temperature rises from 1.4 to 2.2°C, there has been a recorded decrease in pod yield, from 11.1% to 17.5%. It is well known that high temperatures (30.5–33°C) significantly lower seed output and germination, particularly during the reproductive phase. HS during the germination and early vegetative stage led to poor emergence, limited plant growth, and negative impacts on the pea plant's physiological processes. In an effort to speed up genetic advancement, the pea research community has recently made noteworthy progress in both traditional and molecular breeding. Furthermore, there is a tremendous deal of potential for revolutionizing pea breeding with the emergence of new breeding techniques including genome editing, transgenics and genomic selection. The abstract unifies the research findings on pea improvement against heat stress and outlines future directions for increasing pea yield using breeding and cutting-edge genomic approaches.

Keywords: Breeding, Genomics, Pea, Heat stress, Temperature

ANTIOXIDANT AND PHYTOCHEMICAL PROPERTIES OF *PUNICA GRANATUM* PEELUROOSA NOOR¹ AND ENA GUPTA¹¹Department of Family and Community Sciences, University of Allahabad, Prayagraj, Uttar Pradesh, India

Punica granatum peel (pomegranate) is one of the waste products produced by fruit processing industries and contains a variety of possible constituents, including polyphenols, which give pomegranates their antioxidant qualities. The purpose of the study was to investigate the antioxidant activity of *P. granatum* peel, which was extracted using different solvent viz methanol, water, and acetone and dried using four distinct drying methods: sun, microwave, freeze, and hot air oven drying. Total phenolic content, total flavonoid content, and DPPH activity of peel were the main factors examined for antioxidant capability. Flavonoids, phenols, saponin, tannin, alkaloids, and terpenoids were the phytochemicals that were screened for. From all the drying methods, the acetone extract had the highest TFC concentration, the methanol extract had the maximum DPPH activity, and the aqueous extract of hot air oven dried peel had the highest TPC. All of these results strongly implied that the bioactive components found in pomegranate peels had powerful antioxidant properties and could be used in the creation of value-added, antioxidant-rich functional foods.

Key words: *Punica granatum*, antioxidant, phytochemical, flavonoid, functional food.

GENETIC VARIABILITY IN WOODAPPLE FRUITS IN AWADH REGION OF UTTAR PRADESH**USHA SHUKLA¹, RUBEE LATA²****Department of Horticulture, School of Agriculture Sciences and Technology, Babasaheb Bhimrao Ambedkar University, Lucknow**

Wood apple also known as *Feronia limonia* L. is a dry land fruit in the shape of pyriform, oval, oblong, 15-17 m in diameter, belongs to Rutaceae family under sub family Aurantiodeae; tribe-Citreae; sub-tribe- Balsamocitrineae, which comes under hard shelled citroid fruit tree group.. It requires a monsoon climate with a distinct dry season. It can be planted in all kinds of soil. Preponderance of wood apple seedlings are seen growing naturally at scattered/isolated areas of various agro climatic zones of Awadh region of Uttar Pradesh, India, and chance for the selection of superior genotypes are very high due to huge genetic diversity in the existing populations. In order to reveal the genetic variability in wood apple fruits, as fruit sample with shoot from diverse areas of province were collected and analysed for various physico-chemical attributes. Results of study revealed wide range of variability found with respect to fruit length, width, diameter, weight, fruit shape, leaf length, spine size, pulp weight, shell thickness, No. of seeds per fruit , pulp wt., seed wt. and fruit quality traits among the studied genotypes. This variability can be exploited for the selection of superior genotype for conservation, evaluation, utilization and a source for future breeding programme in crop improvement.

Key words- Wood apple, Genetic variability, citroid, Conservation and Genotypes**SEEDING THE FUTURE: EXPLORING AI APPLICATIONS IN AGRICULTURE****UTTKARSHA JOSHI****G. B. Pant Institute of Engineering and Technology, Pauri Garhwal, India**

AI technologies, including machine learning, computer vision, and robotics, are revolutionizing various facets of agriculture, from crop management and yield prediction to pest control and resource optimization. By leveraging vast amounts of data, AI-driven systems facilitate precise decision-making, enabling farmers to optimize resource allocation, minimize waste, and increase overall efficiency. Moreover, AI-powered drones and sensors enable real-time monitoring of crops, soil conditions, and weather patterns, empowering farmers to make timely interventions and mitigate risks. In conclusion, exploring AI applications in agriculture holds promise as a key enabler of sustainable agriculture, offering solutions to enhance productivity, optimize resource utilization, and mitigate environmental impact.

Keyword- AI in Agriculture, AI Applications, Agriculture**DEGUMMING EFFECT OF PROTEOLYTIC ENZYME DERIVED FROM TERMITE MOUND SOIL ON SILKWORM COCOON****UZMA NAAZ SHAIKH IQBAL, RIYA TIWARI, NAMRATA .G. MAHAJAN, AND MANOJKUMAR Z. CHOPDA****Department of Zoology, M. J. College (Autonomous), Jalgaon, (M.S.) India**

Silk is a queen of textile and fibres. Sericulture is an industry having a history of almost more than 2000 years. Composition of silk fibre concluded that silk is one of the best alternatives to replace synthetic fibres. Removing sericin from the periphery of silk without damage to silk fibre for obtaining better quality of silk is a major challenge in the field of silk-based biomaterials. Conventional hot-alkaline cocoon degumming techniques greatly weaken the physicochemical and mechanical properties of silk fibre, thus affecting the quality of silk fabric. Moreover, it causes massive energy waste and serious environmental pollution hence enzyme-based degumming of silk cocoon needs to be establish for sericin separation from fibroin. Current studies, which are going today, focus upon the applications of proteolytic enzymes characterized by high stability and efficiency for silk degumming. Our study aims to establish a novel cocoon self-degumming method by application of different natural protease enzyme isolated from natural source i.e., termite mound soil. The result indicated that natural proteases could also remove sericin from silk almost completely, and they caused less damage to silk fibres than hot-alkaline cocoon degumming techniques did. Fine threads of silk were separated from the silk cocoons by protease enzymes. Separated silk threads have best qualities like smoothness and strength, which enhances its industrial values. This study provides an efficient and environment friendly biological degumming method for obtaining silk fibre having good texture and upgraded gloss in a silk fibre.

Key word: silk fibre, biological degumming, termite mound soil, protease enzym**PREVALENCE OF HELMINTHS INFECTION AMONG SCHOOL CHILDREN'S IN MAKRANDWADI, DEOLA, DISTRICT OF NASHIK, M. S., INDIA****VK WAHULE¹****Department of zoology, Karm. Ramraoji Aher Arts Science and Commerce College**

The Study was designed to find out the estimation of Helminths Infection and associated factors among Z.P school children of Deola taluka in Nashik district. One school was randomly selected from Deola taluka and all the children's (n=30) of selected school were included in the study. Feecal samples were collected and examined by Kato-Katz technique. Demographic, socio- economic and health related behaviour data were obtained from parents using interviewer questionnaire. Prevalence of soil transmitted helminths was 13 (43.3%) in this study.

Keywords: Prevalence, Helminths, School Children, Deola

TRANSLOCATION PATTERN OF ANTIBIOTICS IN SOILS UNDER INCUBATION**V. DAVAMANI^{1*}, S. PAUL SEBASTIAN¹, P. KALAISELVI¹, E. PARAMESWARI¹, R. SANGEETHA PIRIYA¹ AND S. ARULMANI²**¹Department of Environmental Sciences, DNRM, TNAU, Coimbatore, Tamil Nadu, India²Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu, India

In this incubation study, we monitored the concentration of three antibiotics: Oxytetracycline (Oa), Enrofloxacin (Ea), and Chlorotetracycline (Ca) at various concentrations levels (1, 2, 3, 4, and 5) in $\mu\text{g kg}^{-1}$. The concentration of Oxytetracycline gradually increased from $0.03 \mu\text{g kg}^{-1}$ to $0.11 \mu\text{g kg}^{-1}$ with a rise in concentration from 1 to $5 \mu\text{g kg}^{-1}$. Likewise, Enrofloxacin also exhibited an incremental increase in concentration, starting at $0.08 \mu\text{g kg}^{-1}$ and reaching $0.21 \mu\text{g kg}^{-1}$. Chlorotetracycline showed the highest initial concentration among the three antibiotics, measuring $0.12 \mu\text{g kg}^{-1}$ at $1 \mu\text{g kg}^{-1}$ and it continued to rise steadily, reaching $0.39 \mu\text{g kg}^{-1}$ at $5 \mu\text{g kg}^{-1}$. The maximum reached concentration of oxytetracycline is also found to be minimum at higher concentration. For Enrofloxacin ($0.21 \mu\text{g kg}^{-1}$) and chlorotetracycline ($0.39 \mu\text{g kg}^{-1}$), the concentration is little higher compared to oxytetracycline ($0.11 \mu\text{g kg}^{-1}$) even at higher concentration of $5 \mu\text{g kg}^{-1}$. The concentration of antibiotics is measured to evaluate their stability and antimicrobial activity. The study of antimicrobial activity of antibiotics is the first step to evaluate their potential. The minimum inhibitory concentration (MIC) of antibiotics is also an important measure of their effectiveness against bacteria. The MIC is the lowest concentration of an antibiotic that inhibits the growth of bacteria. The incubation period is an important factor in studying the effects of bacteriostatic antibiotics such as oxytetracycline. The study of the effects of antibiotics on microbial activities in soil also involves incubation of the soil samples for a certain period. The results of the study showed that the antibiotics have no inhibitory effects on soil microbial activity.

Key words: Antibiotics, Concentration, Incubation, Translocation**ANTIBIOTICS RESIDUE IN SOILS AND CROPS UNDER INTENSIVE ORGANIC FARMING SYSTEMS OF TAMIL NADU, INDIA****V. DAVAMANI^{1*}, S. PAUL SEBASTIAN¹, P. KALAISELVI¹, E. PARAMESWARI¹, M. PRIYADHARSHINI AND S. ARULMANI²**¹Department of Environmental Sciences, DNRM, TNAU, Coimbatore, Tamil Nadu, India²Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu, India

The study involved an evaluation of three different antibiotics - Oxytetracycline (OTC), Enrofloxacin (ENRO), and Chlorotetracycline (CTC) - from soil samples taken from three distinct fields: Sokkanur field (Field I), Nathegoundanpudur field (Field II) and Chinnathadagam field (Field III). All these three fields were grown crops more than 3 years under organically. The soil samples were collected at three stages of crop growth viz., vegetative, flowering and maturity. For organic grown rice crop sampling was taken in three distinct locations (Agarapatti field (Field I), Vayalogam field (Field II), Ayanpatti field (Field III)) of a Paddy field, during three different stages of growth (Tillering, Panicle initiation, Maturity) where the rice is grown organically and also located 100, 200 and 200 feet away from the organic crops grown field at Agarapatti, Vayalogam and Ayanpatti field, respectively. For instance, during the vegetative stage of tomato crop, the highest concentration of OTC was found in the Chinnathadagam field ($0.16 \mu\text{g g}^{-1}$), while ENRO concentration was highest in the Sokkanur field ($0.06 \mu\text{g g}^{-1}$) and CTC concentration was highest in the Nathegoundanpudur field ($0.23 \mu\text{g g}^{-1}$). During the panicle initiation stage of paddy crop, Agarapatti field had $0.05 \mu\text{g g}^{-1}$ OTC, $0.02 \mu\text{g g}^{-1}$ ENRO, and $0.15 \mu\text{g g}^{-1}$ CTC, whereas Vayalogam field and Ayanpatti field had no detectable levels of ENRO in the soil. In contrast, the highest concentration of CTC was found in Ayanpatti field with $0.15 \mu\text{g g}^{-1}$. The results showed varying concentrations of antibiotics in the soil samples, with OTC concentrations ranging from BDL to $0.18 \mu\text{g g}^{-1}$ and ENRO concentrations ranging from BDL to $0.12 \mu\text{g g}^{-1}$ in the tomato field samples. In the paddy field samples, OTC concentrations ranged from BDL to $0.12 \mu\text{g g}^{-1}$, ENRO concentrations ranged from BDL to $0.08 \mu\text{g g}^{-1}$ and CTC concentrations ranged from 0.10 to $0.12 \mu\text{g g}^{-1}$.

Key words: Antibiotics, Tomato, Paddy, Concentration**ASSESSMENT OF ORGANOCHLORINE RESIDUES IN MOTHER'S MILK: KALABURAGI, KARNATAKA, INDIA****V.PRASHANT^{1*}, K. VIJAYKUMAR²**^{1*}Assistant Professor, Department of PG Studies and Research in Zoology, Government Degree (Autonomous) College, Kalaburagi²Professor, Department of PG Studies and Research in Zoology, Gulbarga University, Kalaburagi-

The aim of the present study was to analyse the organic pollutant residues in mother's milk ($n = 14$) from Kalaburagi, Karnataka, India, which revealed p, p'-DDE and o, p'-DDE as the primary pollutants. **Objectives:** To examine the exposure level of organochlorine pollutants (OCPs) in mother's milk of the general population from Kalaburagi district. The purpose of this study was to investigate the effects of o, p'-DDE (1-chloro-2-[2,2-dichloro-1-(4-chlorophenyl) ethenyl] benzene) and p, p'-DDE (1-chloro-4-[2,2-dichloro-1-(4-chlorophenyl) ethenyl] benzene). **Results** - The increased levels of DDE in mother's milk were observed in rural areas with levels of 9 ng g^{-1} and the lowest was found in urban areas with 5 ng g^{-1} . **Conclusion:** In India, DDT is still used for various control programmes in health departments, which may be the credible reason for the organochlorine pollutants' presence in breast milk samples. The amount of organochlorine residues in a mother's milk was found to be higher in rural areas of Kalaburagi. The study shows the contamination in the mother's milk is below the permitted limit and harmless.

Keywords: Human breast milk; GCMS; DDE; Kalaburagi; organochlorine pollutants; mother's milk

ASSESSMENT OF HONEY CONSUMPTION PATTERNS AND ATTITUDES IN KALABURAGI, KARNATAKA, INDIA**V. PRASHANT¹, M. DINESH²****Department of PG Studies and Research in Zoology, Government Degree (Autonomous) College, Kalaburagi**

Honey is a natural sweetener that has been consumed for various purposes since ancient times. This study aims to investigate the consumer preferences and attitudes towards honey in Kalaburagi, Karnataka. A survey was conducted among a sample of 300 participants from various age groups and genders. The results showed that the majority of participants preferred natural honey over packed honey, and purity of honey was identified by both taste and color. Additionally, the study found that brand plays an important role in the perception of honey purity, and many consumers check the purity of honey before buying it. Moreover, honey was found to be used daily by a significant number of participants, with taste being an important factor in its usage. The study also found that consumers believe that the taste of honey depends on the type of honeybees and that honey should be preserved in a cool and dry place. Furthermore, a considerable number of participants preferred honey for its medicinal properties, and many were willing to use honey as a substitute for sugar. Overall, the study provides insights into the consumer preferences and attitudes towards honey in Kalaburagi, Karnataka, which can be useful for honey producers and marketers to develop effective marketing strategies.

Keywords: Honey; Consumer Preferences; Quality; Kalaburagi; Karnataka**MICRONUTRIENTS: A KEY ELEMENT IN CROP PRODUCTION****V. S GORE¹, S. G. MANE² AND A. J RATHOD¹**¹**Mahatma Phule Krishi Vidyapeeth, Rahuri (M. S)**²**Vasantrao NaikMarathwadaKrishi Vidyapeeth, Parbhani (M. S)**

Micronutrients are essentially as important as macronutrients to have better growth, yield and quality in plants. Their requirement by plants is in trace amounts. Boron, iron, copper, zinc, manganese, magnesium and molybdenum constitute main micronutrients required by different crops in variable quantities. The requirement of micronutrients is partly met from the soil or through chemical fertilizer or through other sources. Various physical and metabolic functions are governed by these mineral nutrients. Boron is particularly essential in pollen germination, copper plays major role in photosynthesis and increases sugar content in fruits, chlorophyll synthesis and phosphorus availability is enhanced by manganese, iron acts as an oxygen carrier and promotes chlorophyll formation, while, zinc aids plant growth hormones and enzyme system. Yield and quality of agricultural products increased with micronutrients application, therefore human and animal health is protected with feed of enrichment plant materials. Each essential element only when can perform its role in plant nutrition properly that other necessary elements are available in balanced ratios for plant. Therefore, in the plant manganese plays an important role on oxidation and reduction processes, as electron transport in photosynthesis. Manganese deficiency has very serious effects on non-structural carbohydrates, and roots carbohydrates especially. Crops quality and quantity decreased due to manganese deficiency, and this is due to low fertility of pollen and low in carbohydrates during grain filling. In the xylem routes zinc is transmitted to divalent form or with organic acids bond. In the phloem sap zinc makes up complex with organic acids with low molecular weight and increases its concentration. Zinc deficiency can be seen in eroded, calcareous and weathering acidic soils. Zinc deficiency is often accompanied with iron deficiency in calcareous soils. Iron in the soil is the fourth abundant element on earth, but its amount was low or not available for the plants and microorganisms needs, due to low solubility of minerals containing iron in many places the world, especially in arid region with alkaline soils.

Key words: Micronutrients**GLOBAL MILLETS (SHREE ANNA) – ANCIENT GRAINS FOR MODERN CHALLENGES****V. S. INGLE******Kalwan Education Society's, Arts, Commerce & Science College Kalwan (Manur), Dist. Nashik, Maharashtra**

Millet gained a great attention at the global level in 2023 which is celebrated as the International year of millets to create awareness to eventually promote consumption and production. Millets are highly varied group of small-seeded grasses widely grown around the world as cereal crops or grains for fodder and human food. Millets cannot only grow in poor climatic or soil conditions and provide nutritious grain as well as fodder, but these can also very well fit into multiple cropping systems under irrigation as well as dryland farming due to their short grazing season. It is important to increase the production of these crops. The increased production of Millets will help fight against hunger and mitigate climate change effects in the long run.

Key Words: Millets, Nutritious, Production, Climate change.

BIXA ORELLANA: A COMPREHENSIVE ANALYSIS OF APPLICATIONS AND CULTIVATION TECHNIQUES IN BIHAR**V. SHAJEEDA BANU*, A. K. PAL, RIMA KUMARI, PANKAJ KUMAR, A. K. SINGH AND D. R. SINGH****Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India**

The present study highlights the significance of natural colours over synthetic ones, with a particular focus on the *Bixa orellana* plant, commonly known as Annatto or Sindoor plant, renowned for yielding an orange to red dye from its seeds. This natural colourant has diverse applications in food, cosmetics, textiles and pharmaceuticals and has high impact in commercial terms, ranking second after saffron. Despite its prevalence in the Bihar region, comprehensive information on this plant remains scarce. Various propagation methods, including tissue culture, are currently being explored to optimize cultivation processes. The seeds of the Annatto plant are rich in apocarotenoid compound called bixin that has significant role across various industries. Moreover, this research highlights the potential utilizing of natural Sindoor derived from the Annatto plant as a safer alternative to synthetic Sindoor, which often has adverse side effects. This innovative approach not only promotes sustainable agricultural practices but also addresses health and environmental concerns associated with synthetic colors. By investigating the versatile applications and cultivation techniques of the Annatto plant, the present study contributes to the development of natural colourant research, offering promising opportunities in Bihar region and explores the importance of prioritizing natural alternatives for societal wellbeing.

Keywords: Annatto, *Bixa orellana*, Bihar, Natural colour, Propagation technique.**INVESTIGATIONS ON THE MULTISPECIES INSECT INTERACTIONS WITHIN SPIDER EGG SACS****V. SUSHAMA^{1,2*} AND K. RAJMOHANA^{1**}**¹**Zoological Survey of India, New Alipore, Kolkata, West Bengal, India**²**Department of Zoology, 35 Balligunge Circular Road, Kolkata, West Bengal**

Spiders (Arachnida: Araneae) rank among the most common and abundant predators of insects, exerting a profound impact on trophic interactions and ecosystem dynamics within terrestrial ecosystems. However, little is known about how their life stages are susceptible to trophic regulations, particularly by insect parasitoids. The larvae of parasitoids develop on or inside the bodies of their host organisms, while their adults usually remain free-living. The insect parasitoids of spider eggs develop as solitary endoparasitoid idiobionts within a single egg, while the egg sac parasitoids are gregarious and prey on multiple eggs inside the egg sac; some species even serve as secondary parasitoids. Despite spiders having developed various ecophysiological strategies to defend and safeguard their eggs, their broods are highly susceptible to attack by parasitoids. Sometimes, the individual spider egg sac itself supports a complex intrinsic food web. The present study, conducted at the Sundarban Biosphere Reserve in India, during 2021-24, aimed to investigate the multiple parasitoid/predatory taxa associated with spider egg sacs. Approximately 780 spider egg sacs were field-collected and reared in the laboratory. With the overall parasitoid/predator emergence accounting for more than 8%, their morphological studies segregated 20 morphospecies under nine genera and six families across three insect orders: Hymenoptera, Diptera, and Neuroptera. The study documented that parasitoid assemblages comprising multiple species were rather rare, and categorized as those with (i) only multiple endoparasitoid species, (ii) both endoparasitoids and egg sac predators, and (iii) both egg sac predators and secondary parasitoid species, also providing data on the biological traits as well as the nature of competition among the parasitoid species. The study enhances our understanding on the complex ecological interactions and their implications for the spider populations, as well as for the broader arthropod community in terrestrial ecosystems.

Keywords: parasitoid, spider, egg sacs**EVALUATION OF FUNCTIONAL VARIABILITY OF HILL LEMON FRUITS (*CITRUS PSEUDOLIMON* TANAKA) FROM DIFFERENT LOCATIONS OF HIMACHAL PRADESH****¹VAIBHAV TUNGAL, ¹ANSHU SHARMA****¹Department of Food Science and Technology****¹Dr. Yashwant Singh Parmar University of Horticulture & Forestry, Nauni, Solan (HP) India**

The present studies entitled "Evaluation of functional variability of Hill lemon fruits (*Citrus pseudolimon* Tanaka) from different locations of Himachal Pradesh" was conducted in 2023-24 at Dr. Y S Parmar University of Horticulture and Forestry, Solan, HP. The study aimed at evaluation of effect of different locations of Himachal Pradesh on physico-chemical and functional attributes of Hill lemon fruits. Hill lemon fruits were collected from two separate distant locations within each of the seven districts in Himachal Pradesh, namely Kangra, Una, Hamirpur, Bilaspur, Mandi, Solan and Sirmaur districts i.e., 14 locations. Further, a series physical and chemical analysis was done. Among all the physical parameters, fruit weight, fruit length, fruit diameter, volume, number of seeds, juice content and juice peel ratio were observed maximum in L₁₁ (Parwanoo). The same physical parameters were observed minimum in L₇ (Una city). Out of all the chemical parameters observed in segments of Hill lemon fruit, TSS, titratable acidity, ascorbic acid, total phenols, antioxidants and ash content were observed highest in L₁₁. Reducing sugars, sugar acid ratio, limonin, naringin, flavonoids and fibre content were observed highest in L₇ while same location showed least values for moisture, TSS, titratable acidity, ascorbic acid, total phenols and antioxidants. Minimum values were observed for limonin, naringin, flavonoids and ash content in L₁₂. Among all the chemical parameters of peel, moisture content, TSS, titratable acidity, total sugars, ascorbic acid, total phenols, antioxidants and ash content were observed highest in L₁₁. As observed in peel L₇ showed minimum moisture, TSS, total sugars, ascorbic acid, total phenols and antioxidants while the same location showed maximum value for limonin, naringin and fibre content. L₁₂ showed minimum values for reducing sugars, limonin, naringin, flavonoids and ash content.

Keywords: Hill lemon, *Galgal*, *Citrus pseudolimon*, physical parameters, chemical parameters

NAVIGATING THE ROLE OF LAW SCHOOLS' TO CLIMATE JUSTICE**¹PROF. VAIBHAV GOEL BHARTIYA, ²ANSHUL SAXENA****¹Prof and Dean, Faculty of Law Swami Vivekanand Subharti University****²Research Scholar (UGC SRF), Faculty of Law Swami Vivekanand Subharti University**

Sustainable development and sustainable environment were considered to go together. But since the inception of industrial revolution the rapid economic growth and development that has taken place can hardly be termed as sustainable. Even though the millennium development goals were adopted way back in the year 2000 but the concern and the contribution of the so called first world countries has been unsatisfactory at best and can be said first from the bottom. Perhaps this is the reason that the present SDGs have been framed differently with a direct involvement of the Higher Education Institution to ensure the maximum output with holistic development. As the global community grapples with the escalating challenges posed by climate change, the role of legal institutions becomes increasingly pivotal in shaping policies and promoting environmental justice. This abstract examines the responses of law schools worldwide to the urgent call for action on climate justice. The analysis encompasses diverse approaches, including curriculum development, research initiatives, and community engagement. Law schools are strategically positioning themselves as catalysts for change, integrating climate justice considerations into their academic offerings. This includes the incorporation of specialized courses addressing environmental law, climate policy, and sustainable development. Additionally, institutions are fostering interdisciplinary collaborations, allowing students to explore the intersectionality of climate justice with fields such as science, economics, and social justice. Research initiatives within law schools are expanding to address pressing climate-related legal challenges. Faculty and students are undertaking projects that scrutinize the legal frameworks governing environmental protection, while also exploring innovative legal solutions to mitigate the impacts of climate change. These efforts contribute valuable insights to the global discourse on climate justice, further reinforcing the role of legal education in shaping sustainable policies. Moreover, law schools are embracing a broader concept of experiential learning, engaging students in real-world cases and community-based projects. This not only equips future legal professionals with practical skills but also strengthens the ties between academia and local communities affected by climate issues. By participating in clinics, internships, and advocacy work, students gain a deeper understanding of the socio-legal dimensions of climate justice. However, challenges persist, including the need for increased collaboration between law schools, government agencies, and non-governmental organizations to foster a comprehensive approach to climate justice education. The abstract concludes by highlighting the imperative for law schools to continuously adapt their curricula, research agendas, and outreach efforts to address the evolving landscape of climate justice, ensuring that legal education remains at the forefront of global efforts to combat climate change.

Key Words: Sustainable Development Goals, HEI, Climate Justice, Environment, Human Rights,**AGROFORESTRY FOR SOIL HEALTH****VAISHALI SHARMA, C. L. THAKUR AND RUCHI THAKUR****Department of Silviculture & Agroforestry, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Solan, H.P.**

Agroforestry stands at the forefront of sustainable land management practices, offering a holistic approach to address soil health degradation while promoting agricultural productivity and environmental resilience. This abstract delves into the intricate nexus between agroforestry and soil health, exploring the multifaceted strategies and implications for sustainable agriculture. Agroforestry systems integrate trees with agricultural crops or livestock, leveraging diverse ecological interactions to enhance soil health. Through mechanisms such as nutrient cycling, erosion control, and biodiversity promotion, agroforestry fosters soil resilience and fertility. Trees play a pivotal role in stabilizing soil structure, mitigating erosion, and replenishing soil organic matter, thereby bolstering its capacity to support robust crop growth and sustainable agricultural production. Furthermore, the integration of agroforestry practices contributes to the mitigation of environmental stressors such as climate change and land degradation. By diversifying agricultural landscapes and enhancing ecosystem services, agroforestry systems mitigate soil erosion, conserve water resources, and sequester carbon, thereby contributing to climate change adaptation and mitigation efforts. the adoption of agroforestry for soil health enhancement carries significant implications for agricultural sustainability and rural development. Beyond soil health benefits, agroforestry offers opportunities for biodiversity conservation, income diversification, and community resilience, particularly in smallholder farming contexts. However, successful implementation requires supportive policies, technical assistance, and stakeholder engagement to overcome barriers and promote widespread adoption.

Keywords: Agroforestry, soil health, resilience, nutrient cycling, sustainability**ETHNOMEDICINAL SURVEY OF ANTIDIABETIC PLANTS FROM TRIBAL REGIONS OF NASHIK DISTRICT (M.S.) INDIA****VAISHNAVI B. MOTKARI¹, HEMANTKUMAR A. THAKUR²****Department of Botany, HPT Arts & RYK Science College, Nashik**

Diabetes mellitus is a metabolic disorder characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The prevalence of diabetes is escalating globally, making it necessary to explore for alternative remedies. Traditional medicinal plants have long been utilized in various cultures to manage diabetes. This research paper presents an ethnobotanical survey of antidiabetic plants conducted in tribal regions of Nashik District, Maharashtra, India. It includes 30 plant species from 21 families, used in folk medicines for diabetes management.

Keywords: Antidiabetic, Ethnomedicinal plants, tribal regions, Nashik.

EFFECTS OF COPPER NUTRITION ON PRODUCTION POTENTIAL AND NUTRIENTS UPTAKE BY WHEAT (*TRITICUM AESTIVUM* L.) CROP**VAISHALI SINGH¹, OMKAR SINGH², S. K. SHAHI³, CHANDRAKANT CHAUBEY⁴**¹Sardar Vallabhbhai Patel University of Agriculture and Technology is an agricultural university, Meerut, Uttar Pradesh, India³Udai Pratap Autonomous College, Varanasi, Uttar Pradesh, India

The field experiment was conducted on sandy loam soil on wheat as the test crop during the Rabi season (2019-2020) to investigate the effects of copper nutrition on production potential and nutrient uptake by wheat (*Triticum aestivum* L.). The experiment consisted of Control (T₁), 0.5 kg Cu ha⁻¹ + RDF (T₂), 1.0 kg Cu ha⁻¹ + RDF (T₃), 1.5 kg Cu ha⁻¹ + RDF (T₄), 2.0 kg Cu ha⁻¹ + RDF (T₅), and 2.5 kg Cu ha⁻¹ + RDF (T₆). The highest plant height (92.75 cm), number of tillers (441 tiller m⁻²), number of leaves (64.53 leaves plant⁻¹), number of grains (42.41 grains per ear head), spike length (18.23 cm), test weight (38.67 gm), grain yield (45.98 q ha⁻¹), straw yield (76.98 q ha⁻¹), biological yield (122.96 q ha⁻¹), and harvest index (37.39 %) of wheat were observed with the T₅ treatment, followed by T₅>T₆>T₄>T₃>T₂>T₁. Among the various treatments, the uptake of nutrients (NPK and Cu) by wheat was highest under the 2.5 kg Cu ha⁻¹ + RDF (T₅) treated plot and lowest under the control (T₁).

Key words: Wheat, Growth, Yield, Nutrient uptake**STUDIES ON SENSORY QUALITIES OF SHRIKHAND BLENDED WITH GUAVA (*PSIDIUM GUAJAVA* L.) PULP****VANDANA A. SHINDE¹, S. P. NAGE², S. V. LASHKARE³, N. SINGH⁴, R. H. TAYDE⁵**¹MSc Agriculture Dairy Science, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola, Maharashtra, India²Assistant Professor, Department of Animal Husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola, Maharashtra, India³PhD Scholar Dairy Science, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth Rahuri, Maharashtra, India⁴PhD Scholar – LPM, Department of Animal Husbandry and Dairying, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India⁵MSc Agriculture Animal Husbandry, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola, Maharashtra

Shrikhand is popular dessert and forms part of meal on festival occasion in some parts of India. This indigenous fermented milk product contain high percentage of casein and large amount of sugar therefore, it is heavy dish for digestion. Guava is the medicinal plant that could be incorporated in the shrikhand. Guava fruits are higher in vitamin-A, vitamin-C, good source of pectin and dietary fiber. The leaves of guava are rich in flavonoids, folic acid, dietary minerals, potassium, copper and manganese. Having a generally broad, low-calorie profile of essential nutrients. Guava fruit contains about four times higher amount of vitamin-C as an orange fruit. (Hassinmotto *et al.*, 2005). This investigation was carried out to evaluate the sensory qualities and work out the cost of shrikhand prepared by blending with different levels of guava pulp. The treatment details were T₁ control sample, T₂ (95 % shrikhand + 5 % guava pulp), T₃ (90 % shrikhand + 10 % guava pulp), T₄ (85 % shrikhand + 15 % guava pulp) and T₅ (80 % shrikhand + 20 % guava pulp). For overall acceptability scores obtained were 94.00, 86.60, 89.40, 94.80 and 84.20 for the treatment T₁, T₂, T₃, T₄ and T₅ respectively on the basis of 100-point score card. The treatment T₄ scored significantly highest scores for colour and appearance, body and texture, flavour and overall acceptability were found to be superior amongst all the treatments. The cost of shrikhand preparation by using different levels of guava pulp were 128.10, 125.24, 123.92, 122.59 and 121.49 (Rs/kg) for the treatment T₁, T₂, T₃, T₄ and T₅ respectively. The acceptable quality of shrikhand can be prepared by using 15 per cent guava pulp.

Keywords: Shrikhand, Guava pulp, Sensory qualities, Cost.**EFFECT OF VERMICOMPOST BASED ZINC APPLICATION ON GROWTH AND YIELD OF FODDER MAIZE (PRATAP MAKKA CHARI-6)****VANDANA PETWAL^{1*}, ANOOP BADONI², DEEPALI JOSHI¹ AND ADARSH DANGWAL²**¹Department of Agriculture, Himalayan Institute of Technology, Dehradun²PLANTICA- Indian Academy of Rural Development (IARD), Dehradun

India supports 17 per cent of global human and 11 per cent of the livestock population with only 2.3 per cent of the worlds land area. Maize means literally “that which sustains life,” provides nutrients for human beings and animals and serves as a basic raw material as an ingredient to more than 3000 industrial products A field experiment was conducted at Plantica, IARD, Dehradun to study the effect of vermicompost based zinc application on growth, and yield of fodder maize. The experiment was laid out in Randomized Block Design (RBD) with 3 replications. Total 17 treatments were done. The results show that exogenous application of vermicompost recorded maximum plant height and number of leaf per plant. All over the results shows most effective treatment for increasing quality characters and yield is vermicompost and zinc combination i.e., Vermicompost 30 T/ha + Zinc 30 kg/ha.

Key Words: Vermicompost, Growth, Yield, Maize, RBD

EFFECT OF CARBON NANODOTS DOPED NUTRIENTS ON SEED QUALITY PARAMETERS OF SUB-STANDARD CHILLI SEED**VANGALA NAVYA, SUJATHA P.****Department of Seed Science and Technology, Seed Research and Technology Centre, College of Agriculture, PJTSAU, Rajendranagar, Hyderabad, Telangana**

Nutrient deficiency is severing problem in chilli plants, while appropriate quantity of nutrients is necessary for better growth, flowering, and higher yield while it's deficiency drastically effects the production, seed quality and longevity. Hence, seed treatment with nutrients is vital to improve the quality of the seed. Therefore, a lab experiment was conducted in *Rabi*, 2022-23 at the Department of Seed Science and Technology, Seed Research and Technology Centre, College of Agriculture, PJTSAU, Rajendranagar, Hyderabad, Telangana. The experiment was laid out in Completely Randomized Design with seventeen treatments including control, each replicated four times on the basis of one year experimentation using carbon nanodots doped nutrients. The treatments consists of Zn – 0.50%, Zn – 1.00%, Zn – 1.50%, Fe – 0.25%, Fe – 0.50%, Cu – 0.25%, Cu – 0.50%, Mn – 0.25%, Mn – 0.50%, Ca – 0.25%, Ca – 0.50%, B – 0.25%, B – 0.50%, B – 1.050%, C Dot + polymer, Polymer, UTC. Both germination percentage and seedling vigour index II were reported higher with the application of Boron – 0.50% (78.25 and 1.62), Seedling abnormality was recorded higher in untreated control (11.50) and seed mortality was recorded higher in Ca – 0.50%.

Key words: Boron, calcium, chilli, Iron, manganese, Zinc.**MOLECULAR TARGETS IN TYPHOID FEVER PATHOGENESIS: IMPLICATIONS FOR THERAPEUTIC DEVELOPMENT**
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Typhoid fever, caused by *Salmonella enterica* serovar Typhi (*S. Typhi*), remains a global health concern, especially in regions with poor sanitation. Understanding the molecular targets of *S. Typhi* is critical for developing effective therapies. *S. Typhi* utilizes various virulence factors to establish infection and evade host defenses. The Vi capsular polysaccharide inhibits complement-mediated killing and phagocytosis, facilitating systemic infection. The type III secretion system (T3SS) injects effector proteins into host cells, manipulating signaling pathways and promoting bacterial dissemination. Lipopolysaccharide (LPS) modulates immune responses, while adhesins facilitate bacterial adherence and colonization. Toxins such as heat-labile enterotoxin (LT) and cytotoxic necrotizing factor 1 (CNF1) contribute to tissue damage and inflammation. Furthermore, through an in-depth analysis utilizing Genecards and DisGeNET databases, a total of 181 and 31 genes associated with Typhoid fever were identified, respectively. Among these gene sets, numerous genes were found to have directly contributed to the pathogenesis and clinical manifestations of the disease. To further explore their significance, the STRING database and Cytoscape tool were utilized. Through the CytoHubba plugin, 20 hub genes were identified from this gene pool. These hub genes, including TNF, IFNG, IL6, IL1B, CD4, IL10, TLR4, CD8A, TLR2, ALB, CXCL8, IL2, IL1A, INS, IL18, ITGAM, MYD88, STAT3, IL17A, and IL4, played pivotal roles within the molecular pathways associated with the pathogenesis of Typhoid fever. Their roles encompassed various aspects of immune response modulation, inflammation, and cellular signaling, highlighting their significance in the disease's pathophysiology. Understanding these targets informs the development of therapeutic interventions, including vaccines and antimicrobials. Targeting key virulence factors and pathways exploited by *S. Typhi* offers promise for novel treatments, addressing the global burden of Typhoid fever and antibiotic resistance.

Keywords: Hub Genes, Molecular targets, *Salmonella enterica* serovar Typhi, Therapeutic interventions, Typhoid fever**CHARACTERIZATION OF THE STANDARDISED ENERGY DENSE AND PROTEIN RICH MILLET BASED SUPPLEMENTARY FOOD PRODUCTS FOR MALNOURISHED CHILDREN****VANYA PAREEK, KOMAL CHAUHAN****Department of Food Science and Technology, National Institute of Food Technology Entrepreneurship and Management, Kundli, Sonapat, Haryana, India**

Supplementary food products are used to treat malnutrition in children below five years. Three millet based supplementary food products (biscuits, nutribar and paste) were standardised and formulated by using different proportions of the ingredients (cereals, millets, nuts, sugar, jaggery, oil/butter, vitamin and mineral premix, skim milk powder and water). The products were analysed physicochemically, organoleptically and microbiologically. The standardised products (biscuits, nutribar and paste) were analysed for protein (12.27, 14.12, 13.78) g/100g, energy (510.13, 510.09, 524.57) Kcal/100g, carbohydrate (45.19, 46.45, 40.20) g/100g, fat (31.34, 28.26, 32.19) g/100g, ash (2.27, 1.37, 1.33) g/100g and moisture (3.40, 4.64, 2.13) %, while the scores for organoleptic analysis (overall acceptability) on a nine point hedonic scale were 8.3, 8.1 and 7.5 for biscuits, nutribar and paste respectively. The products were also tested for aflatoxin µg/kg which was found to be not detectable, salmonella per 25g was found to be absent and enterobacteriaceae cfu/g which was found to be <10 for all the three standardised millet based supplementary food products. The feedback of the mother/care taker of the child was also recorded to assess the acceptability of the products and it was observed that all the three products were highly acceptable and therefore it can be used to improve the nutritional status of moderate acute malnourished children below five years.

Keywords: Bar; Biscuit; Paste; Supplementary food; Millets

FOLIAR MICRONUTRIENTS ENHANCE TOMATO GROWTH, YIELD, AND QUALITY IN POLYHOUSES**VARUN SHEKHAR¹, DR. VIJAY BAHADUR²**¹Ph.D. Research scholar, ²Associate Professor and Head Department of Horticulture (SHUATS)

Foliar application of micronutrients is gaining traction as a technique to improve tomato production under protected cultivation environments like polyhouses. This approach offers several advantages, including faster nutrient uptake and bypassing soil limitations that may hinder micronutrient availability. This study investigates the impact of foliar micronutrient application on tomato growth, yield, and quality within a polyhouse setting. The research explores the effects of specific micronutrients like boron, zinc, manganese, and copper, often applied as foliar sprays. These elements play crucial roles in various plant processes, influencing vegetative growth, fruit set, and overall yield. The study examines the impact of these micronutrients on key parameters such as plant height, number of branches, fruit size, and total yield. Additionally, potential improvements in fruit quality, including firmness, sugar content, and shelf life, are evaluated. The findings contribute to the understanding of how strategic micronutrient application can optimize tomato production in controlled environments. The results can inform best practices for sustainable and high-quality tomato cultivation within polyhouses, potentially benefiting farmers and consumers alike.

Keywords: Foliar application, micronutrients, polyhouse, growth, yield, quality.**ADVANCING SUSTAINABILITY THROUGH CIRCULAR ECONOMY IN WASTE PRODUCT ENERGY****VASUNDHARA****Environmental Science and Technology, SLSBT, CSJM University, Kanpur, U.P., India**

Waste products carry the potential for being a renewable energy resource. Value from the waste can be extracted by adopting the closed loop structure. Some of the benefits of waste to energy system include; reduced global warming due to greenhouse gas generation, reduction in pollution due to landfill formation, and resource recovery enhancement. This tackles the twin challenge of waste management and sustainable development. The current challenges associated with implementing such projects include limited present technological facilities and unexecuted regulatory frameworks. Perception by society in regards with any new change matters as it shapes the efficiency of law and policy implementation. Integrating circular economy model in waste management also promotes economic growth by creating job opportunities and technological advancement. Waste to energy systems provide dual benefits of waste reduction and energy generation. The circular economy model can be applied for any and all types of wastes and waste products as it follows the core principles of 5 R's, namely, Reduce, Reuse, Recycle, Recovery, Reclamation. Waste is no longer a problem but a resource with value and materials and energy are continuously recycled and reused. This idea also promotes growth of biofuels and green energy sector. Policy support and stakeholder collaboration play an important role in initiating and scaling up the waste to energy technology systems.

Keywords: Waste to Energy, Circular Economy, Sustainability, Resource Value, Public Perception.**EFFECT OF ROOT RHIZOSPHERE PROCESSES ON NUTRIENTS AVAILABILITY IN SOIL*****VATSAL S. RANPARIYA¹, HIMALAY R. PATEL¹, SARYU TRIVEDI¹, HARSH A. KAMANI¹ AND BANSI NIMAVAT²**¹Assistant Professor and ²Ph.D. Research Scholar, Department of Agriculture, Faculty of Science, Marwadi University, Rajkot, Gujarat, India

The rhizosphere, the narrow zone of soil surrounding plant roots, serves as a hotspot for microbial activity, nutrient cycling, and plant-microbe interactions, profoundly influencing soil health and fertility. This study aimed to elucidate the intricate mechanisms through which root rhizosphere processes modulate nutrient availability in soil. Root exudation, the release of organic compounds by plant roots, emerged as a pivotal factor shaping rhizosphere dynamics. These exudates serve as a food source for soil microorganisms, stimulating microbial growth and metabolic activity. As a result, microorganisms play a crucial role in nutrient mineralization, breaking down organic matter and converting it into plant-available forms. This symbiotic relationship between plants and microbes creates a feedback loop, enhancing nutrient uptake by plants and promoting their growth. Additionally, root-induced changes in soil pH were identified as another significant determinant of nutrient availability. Plant roots release ions that can alter the surrounding soil pH, affecting the solubility of essential nutrients like phosphorus, potassium, and micronutrients. A shift towards slightly acidic conditions can facilitate the release of bound nutrients, making them more accessible to plants. Conversely, alkaline conditions may reduce nutrient availability, highlighting the importance of pH regulation in nutrient management. Furthermore, the rhizosphere's unique chemical and biological properties foster a dynamic environment conducive to nutrient cycling. Enzymatic activities, facilitated by soil microorganisms, accelerate the decomposition of organic matter, releasing nutrients trapped in complex molecules. Root-microbe interactions also influence the nitrogen cycle, with nitrogen-fixing bacteria converting atmospheric nitrogen into plant-usable forms, enriching the soil with this vital nutrient. In conclusion, root rhizosphere processes exert a profound influence on nutrient dynamics in soil through a combination of root exudation, microbial activity, and pH modulation. Understanding these complex interactions is crucial for developing sustainable agricultural practices that optimize nutrient use efficiency, enhance soil fertility, and promote ecosystem resilience. This review underscores the significance of root-soil interactions in shaping the nutritional landscape of terrestrial ecosystems, emphasizing their role in maintaining soil health and productivity.

Key Words: Rhizosphere, root exudation, root-soil interactions, etc.

CLIMATE CHANGE AND SCIENTIFIC SOLUTIONS**VAREESH BAGHELA, PRAVEEN KUMAR, ASHOK KUMAR, SANDEEP****Department of Zoology, B.S.A. Degree College, Mathura, U.P, India**

The life on earth has been facing the challenges due to long term shift in temperature and weather patterns. Although natural factors play role in the climate change but human activities have been the main driver of climate change since the world has introduced to industrial revolution. Apart from rising temperature of the earth, Climate change has led to flooding, catastrophic storms, severe fires, melting of polar ice caps, rising of sea levels and many more destructive events on the earth. Climate change has adverse impacts not on the life above as well as below the earth surface. As the role of human in accelerating the climate change is undisputed, the same should take the responsibility and increase efforts in controlling the pace of climate change. Science can play a key role in combating against the climate change. Scientific advancements have helped to reduce emissions and curb the toxicity of various emissions. Various countries in the world are focussing on scientific solutions to encourage green technologies in order to reduce their levels of emissions.

Keywords: Climate change, scientific solutions, Green technologies**SYNERGISTIC ACTION OF *SPILANTHUS ACMELLA* WITH DELTAMETHRIN AGAINST ASIAN BLUE TICK, *RHIPICEPHALUS MICROPLUS*****VIJAY KISHORE¹, LALIT MOHAN², SUNITA BHASKAR, ASHOK KUMAR¹, RAKESH KAUSHIK¹, C.N. SRIVATAVA²**¹ICAR- Central Institute for Research on Goats, Makhdoom, Farah, Mathura (U.P.)²Dayalbagh Educational Institute (Deemed to be University), Agra (INDIA)

The ticks are the obligatory blood feeders and act as vector for several deadly tick-borne diseases, including bovine babesiosis, anaplasmosis, and theileriosis to the host. These diseases can cause fever, jaundice, organ damage, and even death in animals. *Rhipicephalus microplus*, commonly known as the **southern cattle tick, tropical cattle tick, and Asian blue tick**, is a parasitic arachnid that feasts on the blood of cattle and other bovids and causes havoc on livestock throughout tropical and subtropical regions, posing a significant threat to their health, productivity, and economic viability worldwide. Its relentless blood-feeding, parasitic lifecycle, and growing resistance to synthetic acaricides necessitate to control them through innovative measures. Exploring the potential of natural acaricides, like *Spilanthus acmella* extract, in combination with conventional pesticide, deltamethrin, could offer a more sustainable and effective approach with reduced consumption of both the ingredients with higher efficacy to manage this villainous little creature. The present study delves into the promising potential of a combined action of deltamethrin, a widely used synthetic acaricide, and *Spilanthus acmella* extract, a natural botanical acaricide with remarkable bioactivity. The joint action of deltamethrin and *Spilanthus acmella* revealed that the combination 1:8 was found to be the most effective among all the combinations tested and showed synergism against the target organism.

CONSERVATION AND CHARACTERIZATION OF WASTE FLOWER FOR DEVELOPMENT OF INCENSE STICKS**VEENA S JADHAV¹, ADHI SRILATHA² AND SHRUTI ANNIGERI³**¹Professor and PI, DST project, Department of Family Resource Management, College of Community Science, UAS, Dharwad²Ph.D Scholar, Department of Family Resource Management, College of Community Science, UAS, Dharwad³Project Associate, DST Project, Department of Family Resource Management, College of Community Science, UAS, Dharwad

The research study on “Conservation and Characterization of waste flower for development of Incense Sticks” was executed during the year of 2022-2023 in the department of Family Resource Management, CCSc, UAS, Dharwad, Karnataka, India. Every year, almost eight million tones of flower waste are discarded into Indian rivers and other water bodies, poisoning and smothering them while also inflicting environmental harm. It may leads to pollution in all forms viz., land, water, air. These flowers are widely applicable in the manufacturing of value-added products. Here, a meager attempt is made to lessen this waste and turn it into a valuable, aesthetically pleasing product as incense sticks. In Solar drying technique of 500.00 g of orange marigold, yellow marigold, chrysanthemum, rose and tuberose waste flowers each has generated 64.62±3.45, 68.54±3.21, 63.23±4.20, 61.26±1.66 and 60.5±4.27 g of powder respectively. Incense stick powders typically include wood powder, coal powder, adhesive substance and fragrance ingredients. In this study the coal powder is replaced by the flower powder. Various compositions were tried viz., Waste Flower Powder: Wood Powder: Jigat powder = 90:0:10, 80:10:10, 75:15:10, 70:20:10, 60:30:10. Among the 5 composition, 70:20:10 and 60:30:10 produced the appealing finish, uniform size, best burning time, quality and emits smoke in upright direction. From 100 grams of orange marigold waste flower powder, takes 20 min to generate 58 incense sticks, whereas 100 grams of yellow marigold takes 19 min to produce 57 incense sticks. 100 g of chrysanthemum, rose, and tuberose waste flower powder takes 17, 18 and 17 minutes to produce 74, 78, and 69 incense sticks respectively. Incense sticks made of rose waste flowers has shown more burning time (75 min). Air pollution will be minimized to an extent as charcoal powder was replaced by flower powder. The study has the potential to open up new business opportunities for the youths.

Key words: Waste flowers, Composition, Pollution, Value addition, Incense sticks, Burning

IMPACT OF CLIMATE CHANGE ON THE EMERGENCE OF DISEASES IN AQUACULTURE VENERABILITY DHAR^{1*} AND BANLAM J. MARBANIANG²

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One of the biggest environmental concerns to the aquaculture system is climate change, which is acknowledged as the major environmental issue of the twenty-first century. The appearance and spread of infectious animal diseases in a changing environment is one of the primary problems for the sustainable development of aquaculture. Increases in water temperature brought on by global warming are worrying for aquaculture and a primary source of stress in many disease outbreaks. A changing thermal regime will have an impact on diseases of cultured fish and shellfish, such as bacterial, viral, parasitic, and fungal infections, but the effects will be mostly unpredictable because of the uncertainty surrounding the temperature-induced variations in the immunological response of the cultured species. An increase in the surrounding temperature may affect disease transmission in the two directions. First, a direct improvement in the metabolism of the pathogen could result in more transmission phases, which would increase the disease's pathogenicity and speed its spread during a single outbreak. Second, a rise in temperature at either end of the disease's normal occurrence period may prolong the season during which the disease is transmitted, spreading the illness throughout the host population more widely. The disease would become more common as a result of either of these processes acting alone or in combination. Furthermore, a number of finfish and shellfish species are expected to experience an acceleration of the replication rate, pathogenicity, duration of the life cycle, and transfer of infections due to increased temperatures. The frequency and distribution of disease will alter as a result of rising water temperatures, favoring either the pathogen or the host. Furthermore, temperatures that are higher or lower than a fish's physiological optimum can alter its immune system and make it more vulnerable to illness. Elevated temperatures have the potential to prolong the season of transmission, resulting in an elevated overall infection prevalence and broader-based epidemics.

Keywords: Climate change, Global warming, Temperature, Aquaculture, Diseases, Pathogens,

EMERGING INNOVATIVE AVENUES OF AGROFORESTRY-BASED ENTREPRENEURSHIP DEVELOPMENT FOR SC COMMUNITIES OF UTTARA KANNADA DISTRICT OF KARNATAKA

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Skill based trainings for a small scale farmer focusing especially SC communities is essential for promoting sustainable agriculture, improving livelihood and fostering rural development. A present investigation was carried out to diversify the income sources of the poor marginal farmers of SC communities practicing agroforestry based entrepreneurship in Uttara Kannada district. The baseline survey was carried out to know the existing socio-economic status of the SC communities in four taluks of Uttara Kannada district namely Bhatkal, Sirsi, Mundgod and Haliyala. A total of 80 beneficiaries, 20 in each taluks were selected. Total 11 Entrepreneurship based training programmes were conducted to impart skills regarding nursery management, grafting, value addition of non-timber forest products, poultry raising and marketing value chain. Out of trained beneficiaries, 30 % of the beneficiaries initiated new Agroforestry based entrepreneurship for their livelihood enhancement whereas, 70 % of the beneficiaries have gained skills during the training programme and adopted their skills in their farming practices. Further, the selected beneficiaries were equipped with the skills and critical inputs viz., seeds and seedlings of Multi-purpose tree species, Poultry chicks, and nursery equipment's such as polycovers, secateurs, root trainers, grafting knife, budding knife, hoose pipe, rose head cane, shade nets and wheel barrow were distributed for setting up an individual or community entrepreneurship. Thus, Agroforestry entrepreneurship training empowers farmers to adopt sustainable, profitable and resilient farming practices, contributing to both economic, prosperity and long term sustainability.

Key words: Agroforestry, SC communities, Entrepreneurship, innovation and sustainability

FERTILITY RESTORATION STUDIES ON DIVERSE CYTOPLASMS OF PEARL MILLET [*Pennisetum glaucum* (L.) R. BR.]

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Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the most widely grown drought tolerant coarse grain cereal cultivated in semi-arid tropical environments of south Asia and sub-Saharan Africa. It is also consumed as feed and fodder for livestock. Though alternative sources of CMS are available and found to be highly stable, their utility is restricted due to non availability of suitable restorers. The present investigation carried out using three different cytoplasm (A₁, A₄ and A₅) as female parents. In the current study, out of twenty testers, 8 testers viz., ICMR 15455-2, ICMR 15455-3, ICMR 15024, ICMR 15037, ICMR 15038, ICMR 19631, ICMR 20405 and ICMR 20444 were considered as the strong restorers of the fertility on A₁ and 9 testers viz., BRBL 1136R, ICMR 15455-2, ICMR 15455-3, ICMR 15024, ICMR 15038, ICMR 15082, ICMR 19631, ICMR 16409 and ICMR 16410 on A₄ based male sterile lines. No testers showed strong fertility restoration on A₅ cytoplasm. Three testers ICMR 15024, ICMR 19631 and ICMR 15097 showed high restoration of fertility (>80%) on all three A₁, A₄ and A₅ based male sterile lines. Identification of restorers for diverse cytoplasmic male sterile sources opens up new avenues in pearl millet hybrid breeding. It brings out the possibility of developing successful hybrid combinations in diverse cytoplasmic background other than routinely used A₁ cytoplasm and to solve the risk of emergence of diseases.

Key words: Pennisetum, pearl millet, fertility restoration, restorer

TAXONOMICAL IDENTIFICATION OF MANGO (MANGIFERA INDICA L.) VARIETIES USING LEAF MORPHOLOGICAL CHARACTERISTICS**VIDYA ARORA¹, DS RAWAT¹, AK SINGH² AND P CHATURVEDI^{1*}**¹Department of Biological Sciences, College of Basic Sciences & Humanities, G.B. Pant University of Agriculture & Technology, Pantnagar-263145, Uttarakhand (India)²Department of Horticulture, College of Agriculture, G.B. Pant University of Agriculture & Technology, Pantnagar-263145 Uttarakhand (India)

Identification of varieties is important to select suitable cultivars for promoting cultivation in different areas. Identification conventionally depends upon the flowering and fruiting phases. For trees, these reproductive stages come late in the life cycle and hence identification is usually considered difficult during the vegetative phase of a plant. Leaves, however, can be used as an important identification feature during the young stage of a plant. Using leaf morphological characters, different varieties can be identified easily during vegetative stage only prior to attaining reproductive maturity. In the present study, several macro and micro morphological characteristics of leaves were used for identification of 25 cultivated varieties of mango growing in the Horticulture Research Centre, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. A total of fifteen leaf morphological characteristics were used for the identification of which three characters (type of leaf, phyllotaxy and vestiture) were uniform in all the varieties. Large variation was, however, observed in leaf length, width, petiole length, leaf apical process, base shape and posture. Comparatively, smaller variation was observed in leaf blade shape, apex shape, colour, margin, texture and venation. Based on the leaf characters, a taxonomic identification key has been proposed here that can be used for making the identification process faster, eventually reducing the time for improvement of a cultivar.

Keywords: Leaf, Identification, taxonomic keys, mango, venation, leaf posture**PRINCIPLE COMPONENT ANALYSIS AND COMBINING ABILITY STUDIES IN BITTER GOURD (*MOMORDICA CHARANTIA* L.)****VIDYA¹, VIJAYAKUMAR RATHOD², VILAS D. GASTI², DILEEPKUMAR A MASUTHI³ AND RENUKA B HIREKURUBAR⁴**¹Ph. D Scholar, Dept. of Vegetable Science, University of Horticultural Sciences, Bagalkot²Associate professor, Dept. of Vegetable Science, University of Horticultural Sciences, Bagalkot³Assistant professor, Dept. of Genetics and Plant Breeding, University of Horticultural Sciences, Bagalkot⁴Assistant professor, Dept. of Entomology, University of Horticultural Sciences, Bagalkot

Bitter gourd (*Momordica charantia* L.) which is popularly known as bitter cucumber, bitter melon or karela is one of the vegetables belonging to cucurbitaceae family. A potential source of iron and popular for its anti-diabetic property due to the presence of charantin. Despite the crop potential, economic and its medicinal use the present study was undertaken using nine lines (eight monoecious and one gynoeceous) and three testers to develop 27 F₁ hybrids in L × T (Line × Tester) pattern. Evaluation of hybrids along with their parents revealed that Jonpuri, Katahi Vaibhav and HUB-1 were found to be good general combiners for traits under study. The cross combinations HUB-1 × Co-1, HUB-1 × White Long and Katahi Vaibhav × White Long showed highest SCA effect which were supercilious for earliness, yield and quality parameters resulting as best hybrids. Based on its yield potential and favoured earliness characteristics, the gynoeceous HUB-1 × Co-1 hybrid was chosen as the best hybrid out of 27 cross combinations, with a yield of 18.38 t/ha. The hybrids Jonpuri × White Long and HUB-1 × Co-1 expressed superior quality parameters like beta-carotene, ascorbic acid and iron content. The gynoeceous based hybrid HUB-1 × Co-1 showed resistant reactions for virus and fruit fly infestation, which further can be used in resistant breeding programme. All the characters studied exhibited non-additive gene interaction. So, hybridization, recurrent selection and marker assisted selection can be used to improve these traits. Hence the best hybrids are recommended for commercial exploitation of heterosis.

GHANAJEEVAMRUTHA AS A SOURCE OF NUTRIENTS TO CHICKPEA**VIDYAVATHI G Y¹, G. S. YADAHALLI², H. B. BABALAD³ AND SARASWATHI POOJAR**¹Assistant Professor of Soil Science & Agricultural Chemistry, College of Agriculture Vijayapura, UAS Dharwad²Associate Professor of Agronomy, College of Agriculture Vijayapura, UAS Dharwad³Rtd Dean (Agri), College of Agriculture, Dharwad, UAS Dharwad⁴M.Sc graduate, College of Agriculture Vijayapura, UAS Dharwad

A field investigation was performed at instructional farm in medium deep black soils of College of Agriculture, Vijayapur during two consecutive *rabi* seasons of 2019-20 and 2020-21. The experiment was laid out under Randomized complete Block design (RCBD) with 13 treatments replicated thrice. Application of ghanajeevamrutha @ 100% of nutrient requirement + foliar spray of jeevamrutha @ 10% recorded maximum plant height, dry matter accumulation, pod numbers per plant, test weight, primary branches plant⁻¹, grain yield (1620 kg ha⁻¹), straw yield (1944 kg ha⁻¹) chickpea. At harvest, higher available N, P₂O, K₂O₅ and S, was observed in above said treatment as contrast to control. Further, highest B:C (Rs.1: 2.81) ratio was recorded with ghanajeevamrutha @ 75 % of nutrient requirement + foliar spray of jeevamrutha @ 10% as contrast to control. In the laboratory incubation studies conducted for 90 days. Application of ghanajeevamrutha at 2000 kg ha⁻¹ increased the organic carbon content from 24 hours to 90 DAI. Similarly, it also boosted the availability and release of N, P, K and DTPA extractable micro nutrients (Fe, Zn, Mn and Cu) from 15 to 75 DAI after which it declined slightly. Hence, the effect of ghanajeevamrutha seemed to be superior with positive influence on availability and release of most of the major and minor plant nutrients. Thus improved the soil fertility and productivity.

Key words: Ghanajeevamrutha, Jeevamrutha, Nutrient Release, Fertility

BORON NUTRITION TO SAFFLOWER (*CARTHAMUS TINCTORIUS* L.) IN A VERTISOL OF KARNATAKA**VIDYAVATHI G Y¹, G.S.YADAHALLI², PREMALATHA J R³, PUNEETHA B C⁴, SANGASHETTY G B⁵ AND S.B PATIL⁶****Vidyavathi G Y¹ Assistant Professor of Soil Science & Agricultural Chemistry, College of Agriculture, Vijayapura, UAS Dharwad**

The field investigation was conducted for two years at UAS, Dharwad in black soil to know the response of safflower (*Carthamus tinctorius* L.) to soil and foliar application of boron in a vertisol during *rabi* 2021 and 2022. The experiment was laid out under RCBD design with thirteen treatments replicated thrice. The treatments included were absolute control, RPP, three soil application (1, 1.5 and 2 kg ha⁻¹), two foliar rates (0.1 % and 0.2 %) of boron and their combination. The results revealed that RPP along with soil application of boron @ 2 kg ha⁻¹ + foliar spray of boron @ 0.2 % (T₁₃) recorded significantly higher plant height at flowering (89.45 cm), number of branches (33.88) and dry matter production at harvest (97.74 g/plant). The highest number of capitulum per plant (23.56), 100 seed weight (6.34), seed protein (13.51 %), oil content (31.15 %) and oil yield of 472.32 kg/ha were recorded in the treatment T₁₃ that received soil application of boron @ 2 kg ha⁻¹ + foliar spray of boron @ 0.2 per cent. As boron application increased yield parameter and quality parameter also increased. Soil and foliar spray of boron significantly influenced the seed and haulm yield of safflower. The highest seed and haulm yield per hectare was recorded in the treatment T₁₃ (1510 and 3341 kg ha⁻¹, respectively) that received soil application of boron @ 2 kg ha⁻¹ + foliar spray of boron @ 0.2 per cent which produced 37 % more yield compared to RPP. Among the various treatments, the treatment T₁₃ which received soil application of boron @ 2 kg ha⁻¹ + foliar spray of boron @ 0.2 per cent recorded higher gross returns and highest net return and benefit cost ratio was observed in treatment T₁₀ that received soil application of boron @ 1.5 kg ha⁻¹ + foliar spray of boron @ 0.1 per cent. Soil macro and micronutrient also were higher in the superior treatment after harvest of crop.

Key words: Boron, foliar spray, soil application, nutrients**A RAPID ASSESSMENT OF FLASH FLOOD IMPACT ON AQUATIC HABITAT AND FISHERY ECOSYSTEM SERVICES OF THE TRANSBOUNDARY RIVER TEESTA IN INDIA USING A GEOSPATIAL APPROACH****VIJAY KUMAR^{1, 2}, REJANI CHANDRAN^{2*}, GANESAN KANTHARAJAN², LALIT KUMAR TYAGI², AMIT SINGH BISTH², RAJEEV K. SINGH², UTTAM KUMAR SARKAR²**¹Faculty of Fisheries, Kerala University of Fisheries and Ocean Studies, Kochi, Kerala²ICAR-National Bureau of Fish Genetic Resources, Lucknow, Uttar Pradesh

Rivers are dynamic ecosystems with diverse habitats and offer crucial services to humankind. Anthropogenic and climatic factors, including flash floods, influence this critical ecosystem's structure and functions. Teesta is a snow-fed transboundary river that originates in the Indian Himalayas and flows to Bangladesh, where it joins the Brahmaputra. The purpose of this study is to evaluate the impact of the most recent flash flood on the physical habitat, channel morphometry, and ecosystem services of the Teesta River in India, employing a geospatial approach and field surveys. A physical habitat assessment before and after the flash flood revealed an overall decrease in habitat quality along the river, influenced by the influx of sediments, debris, and displacement of rocks. Riverbed mapping using Sentinel-2 satellite data demonstrated the expansion of the floodplain area and width in the studied sites for pre- and post-flash flood periods, with Tanak (138%; 0.077 to 0.184 km²) and Rangpo (150.1 to 490.28 m) experiencing the most significant increase. The spectral indices, viz., Normalised Difference Water Index and Normalised Difference Turbidity Index, indicated depth reduction in the deep pools and elevated turbidity levels after flash flood event. Such findings suggest impaired habitat conditions may influence fish species distribution and abundance. The questionnaire-based fishermen's perspective survey reveals the loss of numerous ecosystem services linked to livelihood and revenue generation. These findings shed light on and assess the impact of flash flood, which could prove effective for creating strategies and policies for mitigating and preventing negative consequences in the future.

Keywords: Channel morphometry; Water turbidity; NDWI; deep pools; ecosystem services; Sentinel**LEVERAGING ARTIFICIAL INTELLIGENCE IN AGRIBUSINESS: ENHANCING FOOD SECURITY AND MARKET OPERATION EFFICIENCY****VIJAY KUMAR YADAV¹ AND JYOTI SINGH²**¹Department of Management, Delhi Technical Campus, GGSIP University, New Delhi²School of Agricultural Sciences, Shri Venkateshwara University, Gajraula (U.P.)

A significant amount of India's GDP flows from the agriculture industry (18%), which is a vital economic sector. The world's population is rapidly growing and is expected to reach around 9.7 billion by 2050. Hence, there is a more concern about how to meet the increasing demand for food while also ensuring food security and sustainability. In that regard, the implementation of artificial intelligence (AI) in the agri-food sector has the potential application to revolutionize the food industry and also increase sustainability in several ways. In order to improve productivity and streamline processes, this investigates the integration of artificial intelligence (AI) technology within agribusiness. AI offers a viable path to optimize inventory control, customer interaction, predictive analytics, and decision-making processes, among other aspects of shop administration. Agribusiness may enhance inventory forecasting, customize consumer experiences, and optimize pricing strategies by utilizing machine learning algorithms, data analytics, and natural language processing. Furthermore, chat bots and virtual assistants driven by AI provide real-time customer care, increasing client happiness and loyalty. This study may emphasize how recent developments in AI technology have transformed the agri-food sector by improving efficiency, reducing waste and enhancing food safety and quality. AI based technological solutions has enabled the farmers to produce more output with less input and even improved the quality of output and also ensuring faster go-to- market for the yielded crops.

Keywords: Artificial Intelligence, Agribusiness management, Food security, Socio-economic, sustainable agriculture

EXPLOITATION OF INSECT DIVERSITY BY INSECTIVOROUS BATS AROUND ARTIFICIAL LIGHT ILLUMINATION**VIJAY KUMAR AND VADAMALAI ELANGO VAN*****Department of Zoology, School of Life Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow, India**

Excessive artificial illumination poses an emerging threat to nocturnal fauna, particularly aerial ground-dwelling nocturnal insect species, which are significantly impacted. Light pollution can detrimentally affect nocturnal biodiversity, leading to ecological disruption and loss of flora and fauna. Urbanization exacerbates this issue, as the proliferation of streetlights within animal habitats disrupts ecological interactions among species and alters ecosystem dynamics. The emerging threat of artificial light at night causes the decline in insect populations from individual species to the community level. The current study was performed under street lights during night hours from January to March 2024 at Babasaheb Bhimrao Ambedkar University, Lucknow. The insect samples (fragmented insect parts damaged by bats) were collected from the foraging ground of insectivorous bats under street lights and identification was performed in the laboratory by identification key to check the insect diversity consumed by bats. The finding indicates that bats consumed several insect orders like Coleoptera, Diptera, Lepidoptera, Hymenoptera, Hemiptera, Orthoptera, and Odonata during the study the number of insect densities varies based on climatic parameters under light sources, such as temperature, humidity, and rainfall. Artificial light at night disrupts insect behavior, affecting foraging, mating, and migration patterns. This disturbance extends to nocturnal pollinators, impacting their ability to effectively pollinate flowering plants and threatening ecosystem stability. To mitigate these impacts, careful urban planning and strategies to reduce unnecessary nighttime light are crucial, particularly in sensitive ecosystems.

Keywords: Artificial Light Pollution, Bats, Conservation, Nocturnal pollinator Insect diversity,**INTEGRATED MANAGEMENT OF NUTRIENT, WEED, DISORDER, PEST- DISEASES & PLANT PROTECTION****VIKAS KUMAR ALORIA****Ph.D. Scholar, Dept. of Nematology, College of Agriculture Bhubaneswar, Odisha University of Agriculture & Technology**

Today's economic constraints place increasing demands on agricultural producers to find ways to optimize the efficiency of crop protection. IPM is a crop protection philosophy that efficiently integrates and applies short and long-term production strategies to maximize net profit while lowering the possibility of unfavorable impacts on the environment and human health. Integrated Nutrient Management (INM) is an approach that combines physical, biological, mineral and organic techniques to conserve water and soil fertility. INM takes a comprehensive approach to plant nutrient management. The underlying premise of integrated disease management is that all organism populations in each crop biosystem are in some state of equilibrium with their resources. The goal of integrated disease management is to minimize losses and maximize benefits by carefully choosing and implementing a variety of disease control techniques. Integrated weed management (IWM) ensures that weeds are exposed to a variety of control mechanisms and instruments, such as rotating the groups of herbicides that are available. IWM's main goals are to slow down or stop the emergence of weeds resistant to herbicides and to lessen the selection for resistance to any one type of control agent. Integrated pest, disease, nutrient and weed management use interdependent cultural, biological and chemical control techniques.

Keywords: Biological, Chemical, IDM, INM, IPM and IWM**A STUDY ON EFFECT OF SEED PRIMING ON CANE NODE FOR ENHANCING PRODUCTIVITY OF SUGARCANE (SACCHARUM SP. HYBRID)****VIKAS KUMAR****KVK, Baghpat, (SVP University of Agriculture & Technology, Meerut (U.P.), India**

Sugarcane (*Saccharum officinarum* L.) is a tropical giant perennial grass and one of the most important cash crop belonging to family gramineae. India contributes nearly 13.2% of the world and about 41% of Asian sugar production scenario. The productivity of sugarcane in India is low due to poor germination as well as so many biotic & abiotic factors like drought, flood, temperature variation, salinity & alkalinity etc. Seed priming has been used to shorten germination time, improve seed performance through synchronized accelerated germination, improved seedling establishment, stimulated vegetative growth and ultimately crop yield in many crops. Field experiments were carried out during spring season for two consecutive years (2020-21, 2021-22) at the experimental farm of krishi vigyan Kendra, Shamli (U.P.) India with an objective to assess the effect of seed priming techniques on cane code for enhancing germination. Experiment was laid out in a randomized block design with six treatments and three replications. The two years individual data recorded and pooled for outcome of the study. Different sugarcane varieties exerted significant difference on yield of sugarcane. Seed priming treatments had significant difference on germination yield of sugarcane. T₁ (priming with lime solution) treatment showed the maximum yield (845.73) which was statistically higher than of other priming treatments. The minimum yield (521.43) was found from T₀ (control) treatment.

FARMER PARTICIPATORY STUDY ON EFFECT OF DATE OF SOWING AND SPACE PLANTING ON YIELD OF SUGARCANE VARIETY CO. 0238**VIKAS KUMAR, DEV KUMAR & LAXMIKANT****Krishi Vigyan Kendra, Baghpat, S.V.P. University of Ag. &Tech., Meerut, U.P.**

Sugarcane is an important crop cultivated for sugar in different parts of India. Sugarcane area in U.P. is expected to be more or less same that of previous season i.e. at 23.10 lac ha. The present investigation was undertaken to study the effect of date of sowing and row spacing on growth and yield of sugarcane. The field experiment was conducted at Farmers fields and research farm of Krishi Vigyan Kendra, Shamli district, Uttar Pradesh during the winter (Pre-rabi) seasons of 2019-20 and 2020-21 on a sandy loam soil with sugarcane variety Co.0238. The experiment was laid out in split plot design keeping date of sowing treatments in main plots and row spacing in sub plots with three replications. The experiment comprised of three dates of sowing (18th Sep., 18th Oct., and 18th Nov) and three row spacing (90 cm, 120 cm and 150 cm) constituting 12 treatment combinations. The results revealed that Germination Percentage, tillers per plants, Number of millable canes, plant height, and yield influenced significantly due to different dates of sowing and row spacing. crop sown on 15th Sep. recorded highest cane yield and yield attributes followed by crop sown on 15th Oct. whereas lowest values were noted in the sowing of 15th November. The row spacing of 120 cm recorded significantly higher yield attributes and cane yield followed by row spacing of 150 cm. lowest cane yield was found under the influence of narrow row spacing (90 cm). The experimental results indicated that sowing of sugarcane for yield purpose during 15th Sep. to 15th Oct. coupled with the row spacing of 120cm may be advocated for better cane yield.

DIGITAL AGRICULTURAL MARKETING TOOLS IN INDIA***VIJAY KUMAR CHOUDHARY¹, PRIYANKA CHOUDHARY²****¹Ph.D. Scholar, Department of Genetics and Plant Breeding (GPB), Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, UP****²Ph.D. Scholar, Department of Soil Science, PGCA, Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar-848125**

Digital agricultural marketing in India is a growing trend that involves the use of digital tools and platforms to promote and sell agricultural products and services. It has gained significant importance in recent years, as more farmers and agribusinesses are realizing the potential of reaching a wider audience through digital channels. 1. E-commerce platforms: E-commerce platforms like Amazon, Flipkart, and Big Basket have expanded their operations to include agricultural products. Farmers and agribusinesses can register as sellers on these platforms to reach a larger customer base and sell their products directly to consumers. 2. Agri-tech startups: Several startups in India are focusing on digitizing the agricultural value chain and connecting farmers with markets. These platforms offer features such as online marketplaces, crop advisory services, farm management tools, and logistics support. 3. Social media marketing: Social media platforms like Facebook, Instagram, and Twitter are widely used for marketing agricultural products. Farmers and agribusinesses can create business profiles, showcase their products, share updates, and run paid advertising campaigns to target specific audiences. 4. Mobile apps: There are various mobile applications available in India that provide information on crop cultivation, weather updates, market prices, and pest management. These apps help farmers make informed decisions and connect with potential buyers. 5. Digital marketing agencies: Many agencies specialize in digital marketing for the agriculture sector. These agencies offer services such as website development, search engine optimization (SEO), pay-per-click (PPC) advertising, content marketing, and social media management. 6. Online farmer markets: Online farmer markets have gained popularity in recent years. These platforms connect farmers directly with consumers, enabling them to sell their produce without the involvement of intermediaries. 7. Online classifieds: Online classified platforms like OLX and Quikr have sections dedicated to agricultural products and services. Farmers can list their products and connect with prospective buyers. 8. Agricultural forums and communities: Online platforms like Krishak Bandhu, Farm Nest, and Agriculture Information Exchange provide a space for farmers to connect, share knowledge, and market their products. 9. Email marketing: Email marketing can be an effective tool for reaching out to potential customers. Farmers and agribusinesses can collect email addresses and send regular updates, offers, and information about their products. 10. Online advertising: Digital advertising platforms like Google Ads and Facebook Ads allow farmers and agribusinesses to run targeted advertising campaigns to reach potential Overall, agricultural digital marketing offers numerous opportunities for farmers and agricultural businesses to reach a wider audience, increase sales, and make data-driven decisions. While challenges exist, the benefits of digital marketing in agriculture are undeniable, and it is becoming an increasingly important aspect of modern agricultural practices.

Keywords- Digital tools, Market intelligence, Online market**ETHANO-MEDICINAL PLANTS UTILIZED BY TRIBAL COMMUNITIES IN BHORAMDEV SANCTUARY, KABIRDHAM DISTRICT, CHHATTISGARH: A SCIENTIFIC SURVEY****VIKAS*****Kalinga University Naya Raipur, Chhattisgarh , India**

Forest has been the source of invaluable medicinal plants. These medicinal plants have the potential to provide a green health alternative. Bhoramdev wild life sanctuary is located in the kabirdham district of Chhattisgarh. The forest of Kabirdham region has a rich diversity of medicinal plants. It is surrounded by forest and hills. The Tribes (like Gond, Baigaa, and Saura) of this region are dependent up to a large extent on wild resources for their food, Medicines and other daily needs. People living in remote areas have a vast treasure knowledge of medicinal plants. The present paper deals with the diversity of medicinal plants Bhoramdev sanctuary of kabirdham region. A total of 58 medicinal plant species belonging 36 families recorded from the forest of Bhoramdev sanctuary region. Out of these 29 were herbs, 06 were shrubs, 18 were tree and 05 were climber species. Fabaceae, Euphorbiaceae, Solanaceae and Asteraceae is the most dominant family during present investigation. All plants are enumerated with Botanical names followed by vernacular names, family, habit, plant part used and medicinal uses. Different part of these plants has been widely used to cure various ailments by local inhabitants in their daily life.

Keywords : Medicinal plants, Bhoramdev sanctuary, Tribes, Diversity

THE DIGITAL CARBON FOOTPRINT: THREAT TO AN ENVIRONMENTALLY SUSTAINABLE FUTURE**VIKAS SHARMA****School of Life and Basic Science, Jaipur National University, Jaipur, Rajasthan, India**

The world is undergoing digital transformation, which is accompanied by the hype of universal buzzwords such as Industrial Internet of Things (IIoT), smart manufacturing, smart banking, digital twins, and Industry 4.0, which is a phenomenon of our time, lauding the possibilities of a new technological revolution. With digitalization at its peak, every online action we take has an environmental impact. There is a growing concern about the world's ever-increasing carbon emission due to technological advancement. The vast majority of human actions have been proved harmful to the environment. This effect has been mostly tied to available carbon emissions. On the other hand, recent findings have raised awareness of digital carbon emissions. These harmful emissions represent the available CO₂ emissions rate resulting from generic digitization concepts. The advancement of technology has considerably contributed to CO₂ emissions. This study paper discusses the total effects of carbon emissions. It also shows the rates of carbon emissions caused by the tech industry worldwide. The article describes how digital services have boosted carbon emissions and the number of regions affected by the higher rates. The study focuses on the relationship between carbon emissions and digitization, remedies to the problem, and an overall analysis of the global digital carbon footprint.

KEYWORDS: Digitalization, Digital carbon footprint, CO₂ emission, Global warming, NARDL Approach, FD & CO₂ emission nexus, Sustainability.

APPLICATION OF DRONE TECHNOLOGY IN AGRICULTURE**VIKASH KUMAR MEENA^{1*}, RAJEEV BAIRATHI^{2*}, SONIYA RISHI^{*}*****Ph.D Research Scholar, Department of Extension Education, RCA (MPUAT) Udaipur******Professor, Department of Extension Education, RCA (MPUAT) Udaipur**

The population is increasing tremendously and with this increase the demand of food. The traditional methods which were used by the farmers were not sufficient enough to fulfil these requirements. Agriculture sector is the most promising sector, dealing with the lot of problems now a day's one of the main problems is labour unavailability for farming. Other problems or difficulties are extreme weather events, inadequate amount and inefficient application of fertilizer, infection, diseases, allergies and other health problems due to chemical application (fungicide, pesticide, insecticide etc.) or insect/ animal bite. The Use of advanced technologies such as drone in agriculture offer potential for facing several major or minor challenges. Thus, new automated methods (Drone technology) were introduced. These new methods satisfied the food requirements and also provided employment opportunities to billions of people. Drones technologies saves the excess use of water, pesticides, and herbicides, maintains the fertility of the soil, also helps in the efficient use of man power and elevate the productivity and improve the quality. The objective of this is to review the usage of Drones in agriculture applications. Based on the literature, we found that a lot of agriculture applications can be done by using Drone. In the methodology, we used a comprehensive review from other researches in this world. This paper summarizes the current state of drone technology for agricultural uses, including crop health monitoring and farm operations like weed management, Evapotranspiration estimation, spraying etc. The research article concludes by recommending that more farmers invest in drone technology to better their agricultural outputs.

Keywords: Drone, crop health monitoring, evapotranspiration, spraying

UNVEILING THE FUTURE OF DAIRY: ADVANCES IN SCIENCE AND TECHNOLOGY**VIKASH KUMAR^{1*}, M.P.S.YADAV²****¹Research Scholar, ²Professor****Department of Animal Husbandry and Dairying (Dairy Technology) Chandra Shekhar Azad University of Agriculture & Technology, Kanpur, U.P., India**

The dairy industry is undergoing a transformative shift driven by cutting-edge scientific and technological advancements. Innovative practices reshaping every aspect of dairy production, processing, and consumption are at the forefront of this evolution. Precision farming techniques, powered by data analytics and advanced sensors, are revolutionizing dairy farm management. Real-time monitoring of herd health, feed efficiency, and environmental conditions enables optimized decision-making, improving animal welfare, productivity, and resource utilization. Concurrently, exploring alternative protein sources, such as plant-based, microbial, and cultured options, diversifies the dairy product landscape. Leveraging biotechnology and fermentation processes, these novel alternatives cater to evolving consumer preferences, dietary restrictions, and sustainability concerns. Smart packaging solutions are also emerging as game-changers in the dairy sector. Intelligent labeling, embedded sensors, and active and intelligent packaging systems enhance product safety, extend shelf life, and provide transparent supply chain traceability, fostering consumer trust and reducing food waste. Moreover, the dairy industry embraces sustainable practices to minimize its environmental footprint. Innovative waste management strategies, renewable energy integration, and carbon capture technologies pave the way for a more eco-friendly and circular dairy ecosystem. At the convergence of these advancements lie immense opportunities for stakeholders across the dairy value chain. Collaborations between academia, industry, and regulatory bodies are vital in navigating the complexities of these transformative technologies, ensuring their responsible development, and ultimately shaping a more sustainable, diverse, and consumer-centric future for the dairy sector.

Keywords: Dairy Innovation, Precision Farming, Alternative Proteins, Smart Packaging, Sustainability.

EXPLORING GENETIC VARIABILITY AND MOLECULAR-CYTOGENETIC PROFILING OF RYE-WHEAT DERIVATIVES VIKRANT KHARE^{A*}, PUJA SRIVASTVA^B, ACHLA SHARMA^B, YOUSEF MOHSEN FELTAOUS^C AND NAVTEJ SINGH BAINS^B

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Interspecific plant hybridization is a pivotal evolutionary process shaping speciation dynamics. In the context of bread wheat cultivation in India, stripe rust stands out as the predominant factor contributing to yield reduction. With the objective of improving stripe rust resistance and floral traits, diverse back-crossed population was meticulously developed through triticale-wheat crosses. The BC₂F₇ generation of rye-wheat derivatives underwent a comprehensive analysis encompassing genetic variability, trait associations, multiple regressions, and principal component, with a focus on floral and yield attributes. The meticulously chosen stripe rust-resistant derivative lines underwent comprehensive evaluation, including an assessment of chromosomal abnormalities, fluorescence *in situ* hybridization, and rye genome-specific molecular markers analysis. The statistical analysis substantiates that the derived population exhibits significant variations for all the examined traits. Positive correlations were observed with anther size, pollen viability, tiller number, thousand kernel weight, and grain yield. Multiple regression analysis reveals that anther size, pollen viability, tiller number, and thousand kernel weights emerge as pivotal contributors influencing grain yield. Moreover, the three principal components exhibit more than one eigen-value, thereby signifying their capacity to encapsulate the maximum variability within the dataset. In addition, chromosomal abnormalities, encompassing univalent, multivalent, laggards, bridge chromosomes, and micronuclei, were observed within the PMCs of rye wheat derivative lines. Fluorescence *in situ* hybridization unequivocally demonstrated rye introgression by green signals. Furthermore, the affirmation of rye introgression was corroborated by rye genome-specific molecular markers. Hence, Comprehensive methods unveil promising traits in rye-wheat lines, advancing wheat breeding in India.

Keywords: rye wheat derivatives, genetic variability, molecular markers, mitotic abnormalities and FISH

MAMMEA SURIGA: AN IMPORTANT NTFP SPECIES IN WESTERN GHATS VILASKUMAR¹, S S INAMATI¹, HANUMANTHA M², AND JAGADISH M R¹

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India, which includes four of the world's biodiversity hotspots—the Western Ghats, Himalayas, Indo-Burma, and Sunda land is one of the mega diversity centers has an abundance of ecological diversity and a legacy of rare plants and animals. Its great degree of endemism and genetic diversity are well known. Unfortunately, a number of regions are facing severe threats to this biological resource, including habitat degradation, overexploitation and the invasion of exotic species and also rapidly running out. In an effort to meet the enormous demands of the forest-based sectors and promote afforestation, the current trend is to plant exotic trees anywhere possible, including in the heart of biodiversity hotspots like the Western Ghats. *Mammea suriga* Kosterm. is a well-known tree species endemic to the Western Ghats of India. It is an evergreen medicinal tree of the Calophyllaceae family, and it is valued as a non-timber forest product (NTFP) because to its considerable ecological and commercial worth. The significance of this species, emphasizing its involvement in the environment, economy, and cultural roles. The plant is prized for its fragrant blossoms, which support the livelihoods of nearby communities by being utilized in the creation of perfumes, essential oils, and traditional remedies. Bark phytochemical research reveals the presence of flavonoids, alkaloids, saponins and tannins, among other secondary metabolites, tannins and flavonoids are thought to be the most helpful ingredients when dying fabrics. Furthermore, *Mammea suriga* is essential to the biodiversity of the Western Ghats, supporting the stability of forest ecosystems and provide food and habitat to a variety of wildlife species. The population of the species must be maintained through sustainable harvesting methods and conservation initiatives, preventing ecological deterioration from the species' exploitation. It emphasizes the necessity for integrated management strategies that strike a balance between economic gains and environmental conservation in the Western Ghats.

Key words: Western Ghats, Biodiversity hotspots, Medicinal tree, Phytochemicals, Essential oils

FLORAL BIOLOGY OF GLADIOLUS GENOTYPES VINUTHA D. B.

Floriculture and Landscape Architecture, University of Horticultural Sciences, Bagalkot

The study was conducted at the experimental block of Department of Floriculture and Landscape Architecture, University of Horticultural Sciences, Bagalkot, India. The experiment was laid out in randomized complete block design with five genotypes namely Pusa Kiran, Pusa Shrijana, Pusa Sarang, Pusa Urmil and Arka Darshan. Observations were recorded for nine floral characters. Among the five genotypes, Pusa Kiran recorded the earliest days to bud initiation (66.91 days), days for first floret opening (74.80 days) and maximum days for first to last floret opening (11.50 days). Duration of flowering was long in the genotype Pusa Shrijana (20.75 days) and maximum number of spikes per plant (3.60) was recorded in the genotype Arka Darshan. The earliest anthesis (6:25 am), anther dehiscence (10:02 am), the longest stigma receptivity (29.823 hrs after anthesis) and maximum pollen viability (94.88 %) was recorded in the genotype Pusa Urmil.

**SCHLEICHERA OLEOSA: A POTENTIAL LAC HOST TREE SPECIES IN UTTARA KANNADA DISTRICT, KARNATAKA
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Schleichera oleosa, commonly known as Kusum, is a significant tree species found in the Uttara Kannada district of Karnataka, India. It is a large, deciduous tree belonging to the family Sapindaceae and is native to the Indian subcontinent and Southeast Asia, known for its ecological and economic importance; it has been identified as a potential lac host tree species in the region. Lac is a naturally occurring resin produced by lac insects, mainly *Kerria lacca* (now *Laccifera lacca*). Lac finds application in a range of industries, such as food, cosmetics, dye and medicines. Many rural populations in India depend on the traditional practice of lac cultivation on host trees for their livelihood. *Schleichera oleosa* is recognized for its suitability as a lac (Kusumi strain) host due to several factors, the bark and branches offer an ideal environment for lac insects to thrive. The tree's sap and nutrient composition support the growth and secretion of high-quality lac. This tree species is well-adapted to the climatic conditions of Uttara Kannada, which include a tropical monsoon climate with heavy rainfall. Its resilience to local pests and diseases further enhances its potential as a reliable host for lac product. Cultivation of lac on this tree can provide an additional income source for local farmers. The demand for natural lac is rising due to its eco-friendly properties, making it a valuable non-timber forest product. Utilizing *Schleichera oleosa* for lac production can promote sustainable agricultural practices. It encourages the conservation of tree cover and biodiversity, as farmers are motivated to protect and manage these trees effectively. Its successful integration into lac cultivation could enhance the livelihoods of local communities and contribute to sustainable forest management practices.

Key words: Deciduous tree, Lac host, *Laccifera lacca*, Uttara Kannada, NTFP.**IMPACT OF CLIMATE CHANGE ON COASTAL WETLANDS AND MANGROVE FORESTS****VILASKUMAR¹, MEGHARANI², HANUMANTHA M³, AND INAMATI S¹****1. Department of Silviculture and Agroforestry, College of Forestry, Sirsi, UAS, Dharwad, Karnataka.****2. Department of Agronomy University of Agricultural Sciences, Raichur, Karnataka****3. Department of Forest products and Utilization, College of Forestry, Sirsi, UAS, Dharwad, Karnataka**

Due to the effects of climate change, mangrove forests and coastal wetlands two essential ecosystems rich in biodiversity are confronting previously unheard-of difficulties. impacts of climate change on these essential ecosystems, emphasizing the consequences for the environment, society, and economy. Sea level rise brought on by climate change is a serious threat to mangrove forests and coastal wetlands. These ecosystems are under risk of flooding due to rising sea levels, which causes habitat loss and fragmentation. Furthermore, the resilience of these ecosystems is further jeopardized by the increased frequency and intensity of storms brought on by climate change, which worsen erosion and sedimentation. The delicate equilibrium of mangrove forests and coastal wetlands is also upset by the rise in global temperatures. Increased temperatures affect the patterns of precipitation, which modifies the hydrology and salinity of these ecosystems. These changes may have a negative impact on mangrove development and dispersal, impairing their capacity to offer vital ecological services including carbon sequestration and coastal protection. Variations in temperature and precipitation patterns have the potential to impact species distribution and abundance, which in turn can have an impact on the complex network of interactions between fauna and flora. Many species that depend on these environments for food, shelter, and breeding grounds are in danger of going extinct as a result of this disturbance. Millions of people rely on these ecosystems for their economic stability and nourishment, and their livelihoods are under danger as a result of climate change's degradation of coastal wetlands and mangrove forests. At the local, regional, and international levels, coordinated measures are needed to mitigate the effects of climate change on mangrove forests and coastal wetlands. Initiatives for conservation and restoration that seek to maintain and improve the resilience of these ecosystems are crucial.

Key words: Climate change, Mangrove forests, Wetlands, Sea level rise, Temperature**EFFECT OF NUTRIENT MIXTURES ON GROWTH AND PRODUCTIVITY OF CHICKPEA****VINITA¹*, GANAJAXI MATH², RAJKUMARA S³, VIJAYAKUMAR A G⁴, V B KULIGOD⁵****University of Agricultural Sciences, Dharwad – 580005, Karnataka, India**

The field experiment was conducted during rabi 2021-22 and 2022-23 at the University of Agricultural Sciences, Dharwad, Karnataka to study the effect of nutrient mixtures on growth and yield of chickpea under rainfed and irrigated conditions. The experiment was laid out in the split plot design with three replications and sixteen treatment combinations. The experiment consist of two irrigation levels (I) in main plots viz., I₁: Rainfed, I₂: Irrigation at pre flowering stage and eight nutrient mixtures spray (N) at flowering and pod development stage in sub plots viz., N₁: RDF + water spray, N₂: RDF+ Urea (2%), N₃: RDF+ KNO₃ (1%), N₄: RDF+ Chickpea magic (0.8%), N₅: RDF+ Dharwad chickpea nutrient mixture-1 (1%), N₆: RDF+ Dharwad chickpea nutrient mixture-2 (1%), N₇: RDF+ Dharwad nutrient mixture 3 (1%) and N₈: RDF+ Dharwad nutrient mixture 6 (1%). Results showed that, chickpea with scheduling of irrigation at pre flowering stage recorded significantly higher seed yield of 1932 kg ha⁻¹ along with higher number of branches plant⁻¹, leaf area index and dry matter production. Among the nutrient mixtures, spraying of Dharwad chickpea nutrient mixture-2 (1%) at flowering and pod development stage recorded significantly higher number of secondary and tertiary branches plant⁻¹ (20.85), leaf area index (1.21), total dry matter production (35.31 g plant⁻¹) and seed yield (1989 kg ha⁻¹). Interaction of Dharwad chickpea nutrient mixture-2 (1%) spray at flowering and pod development stage and irrigation at pre flowering stage recorded significantly higher growth parameters along with significantly higher seed yield (2069 kg ha⁻¹).

Keywords: Dharwad chickpea nutrient mixture-2, irrigation, seed yield,

CONTRIBUTION OF NTFP TO THE LIVELIHOOD OF RURAL DWELLERS**VILASKUMAR¹, HANUMANTHA M², MEGHARANI³, KARTHIK H N² AND INAMATI S S¹**¹Department of Silviculture and Agroforestry, College of Forestry, Sirsi, UAS, Dharwad, Karnataka²Department of Forest products and Utilization, College of Forestry, Sirsi, UAS, Dharwad, Karnataka³Department of Agronomy University of Agricultural Sciences, Raichur, Karnataka

NTFPs are biological products harvested from wild biodiversity in natural and anthropogenically modified environments by humans other than high-value timber. All products obtained from plants of forest origin and host plant species yielding products in association with insects and animals or their parts and items of mineral origin except timber may be defined as minor forest products (MFP) or non-wood forest products (NWFP) or NTFP. There are about 2.4 billion hectares of woody and non-woody forest products in the world, accounting for approximately 60 per cent of forest cover. NTFPs provide livelihoods for about two billion rural and urban poor people in the world. There is no question that they are among the most valuable plant resources for food security today and in the future. There is a wide range of products derived from plants, such as foods (nuts, fruits, mushrooms, gums, and syrups), food additives (spices, herbs, flavourings, and sweeteners), fibers (such as bamboo and rattan), barks (such as cork), fragrances, ornamental pods and seeds, resins, and oils. Various products that come from animals, such as bushmeat, skins, hides, and trophies, wild honey, beeswax, and edible insects. Globally, about one billion people depend on forests for their livelihoods and food and around 300 million of these people are heavily dependent on non-timber forest products. According to estimates, NTFPs provide a quarter of rural household income in developing nations. NTFPs are widely used in medicine and nutrition in tropical and low-income countries. NTFPs contribute significant financial benefits to livelihoods, especially for the poor who rely on the forest for their primary source of sustenance and who reside nearby.

Key words: NTFPs, Food security, Plant resources, Livelihood, Income.**HUMANS IMPACT ON FOREST RESOURCES AND CONSERVATION****VILASKUMAR¹, MEGHARANI², KARTHIK H. N.³, HANUMANTHA M³ AND INAMATI S. S.¹**¹Department of Silviculture and Agroforestry, College of Forestry, Sirsi, UAS, Dharwad, Karnataka²Department of Agronomy University of Agricultural Sciences, Raichur, Karnataka³Department of Forest products and Utilization, College of Forestry, Sirsi, UAS, Dharwad, Karnataka

Most tropical forests, even those in protected areas, are influenced by human activities, harvesting of forest resources to meet livelihood needs can impact on forest regeneration, structure and diversity, to better manage forests for multiple local, regional and global values we need to understand human impacts and their variation at local scales. Such understanding is pertinent for forests managed for biodiversity conservation, catchment values and tourism that are increasingly considered in terms of their carbon stocks and the various benefits that they can provide to local people. Different types and intensities of local resource extraction can lead to varying outcomes even within one forest. For example, forest grazing leads to different impacts than cutting timber or gathering other forest products and intensive extraction of certain highly valued species may have a greater impact on diversity than less intense forest uses. Environmental gradients like elevation, slope, substrate and moisture can confound results based on distance. For example, elevation is known to affect tree size and species diversity but human activities are also likely to be more intensive in lower elevation forest that is easier to access than on more remote, higher elevation sites. In densely populated landscapes remaining natural forests have generally been subjected to multiple human impacts. The resulting complexity and the challenge of defining simple cause and effect relationships may explain, yet the diversity in human activities and their impacts call for different interventions. For instance, different approaches may be required where people have long used forest as a source of medicinal products or foods, or as a location for cultural activities, than in areas where people claim forest-land for agriculture. Historical factors such as conflicts over boundaries may also influence attitudes and behaviours towards forest management.

Key words: Tropical forests, Human activities, Forest regeneration, Biodiversity conservation, Elevation.**ASSESSMENT OF GENETIC VARIABILITY FOR HEAT TOLERANCE IN BREAD WHEAT (*TRITICUM AESTIVUM* L.) USING MORPHO-PHYSIOLOGICAL TRAITS AND MOLECULAR MARKERS****VINOD KUMAR*, S. A. DESAI, BORANAYAKA M. B. SANTOSH PUJER, SHIVASHANKARGOUDA PATIL⁹, LALITA JAGGAL⁸, VEERESH B. A.⁹, MAHALAXMI K. PATIL⁹, ABHISHEK K. GOWDA⁹, CHETHANA C. K.⁷, AARATHI YADAWAD⁵, YASHAVANTHKUMAR K. J.³ SUMA S. BIRADAR, SANJAY KUMAR SINGH*****Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad, Karnataka, India**

A field experiment was carried out under timely sown (control) and late sown (heat stress) conditions during *rabi* 2017-18 to study the genetic variability, heritability and expected genetic advance for 23 traits in 10 bread wheat genotypes. The genotypes exhibited a wide range of variation for all the traits in both environmental conditions indicating the presence of enough genetic variability in the material under study. The genetic coefficient of variation and phenotypic coefficient of variation were high for grain yield per plot in both control as well as in heat stress conditions. Almost all the traits exhibited high heritability, however, very high values of heritability were observed for leaf waxiness (99%), days to 50 per cent flowering (96.30%) and days to maturity (95.10%) under heat stress conditions. The traits like grain yield, thousand-grain weight and kernel weight per spike showed high heritability (81.26%, 80.30% and 89.00%) and genetic coefficient of variation (30.66%, 10.10% and 24.32%) along with high genetic advance (56.94%, 18.65% and 47.42%). In molecular investigation, eight SSR markers were found to be associated with twelve different morpho-physiological traits. Traits selected based on various parameters could be considered for the development of high-yielding genotypes under heat stress conditions.

EFFECT OF CLIMATE CHANGE ON FOREST BIODIVERSITY AND MICRO-HABITATS**VILASKUMAR¹, KARTHIK H N,² MEGHARANI³, HANUMANTHA M², AND INAMATI S S¹**¹Department of Silviculture and Agroforestry, College of Forestry, Sirsi, UAS, Dharwad, Karnataka.²Department of Forest products and Utilization, College of Forestry, Sirsi, UAS, Dharwad, Karnataka³Department of Agronomy University of Agricultural Sciences, Raichur, Karnataka

Climate change is an undeniable reality that is dramatically shaping our world today. Its impacts are profound, from rising temperatures and melting ice caps to extreme weather. But its consequences are not limited to humans alone. It also has far-reaching effects on the world's biodiversity. This is often overlooked, yet it is interlinked. In just over 40 years, wildlife populations showed a dramatic decline of 69 per cent on average. The IPCC reports that around 20-30 per cent of species could die out if global mean temperatures go up by 1.5-2.5⁰ celsius. Yet the global average surface temperature has risen by roughly 1.0⁰ celsius. The timing of biological events is changing, the wildlife population is disappearing. But its impacts are not felt the same across the planet, as some regions and species are more at risk than others. Climate change is having a greater impact on the poles, tropical rainforests, and coastal areas than anywhere else in the world. This could have far-reaching consequences for the planet's health; and our future. Rising global temperatures, also known as 'global warming', is one of the most important aspects of climate change. It refers to the increasing greenhouse gases, like CO₂ and methane, in the atmosphere, which trap the sun's heat. This trapped heat is related directly or indirectly to widespread habitat loss on both land and in the sea. Micro habitats are a habitat which is of small or limited extent and which differs in character from some surrounding more extensive habitat. This will revolutionize our understanding of the dynamics, drivers and implications of forest microclimates on biodiversity and ecological functions, and the impacts of global changes. In order to support the sustainable use of forests and to secure their biodiversity and ecosystem services for future generations, microclimates cannot be ignored.

Key words: Climate change, Global warming, Micro habitat, Micro climate, Global temperature.**EFFECT OF CHANGING PRECIPITATION PATTERNS ON AGROFORESTRY PRACTICES****VILASKUMAR¹MEGHARANI², HANUMANTHA M³ AND INAMATI S S¹**¹Department of Silviculture and Agroforestry, College of Forestry, Sirsi, UAS, Dharwad, Karnataka²Department of Agronomy University of Agricultural Sciences, Raichur, Karnataka³Department of Forest products and Utilization, College of Forestry, Sirsi, UAS, Dharwad, Karnataka

Global warming as an outcome of climate change is being projected to influence modifications in acidification, humidity and precipitation patterns. In view of this, the overall effect on global life support systems resulting from climate change remains unclear. Extreme rainfalls leading to flooding occur in parts of world and other areas experience decrease in rainfall leading to drought conditions. Also, anticipated an increase in global mean temperatures between the range of 1.4 and 5.8 °C by the end of 20th century with a resultant sea level rise as glaciers are melting. Changes in rainfall patterns are among the long-term impacts of climate change that causes reduction in agriculture production as it reduces the food security. Agroforestry is a sustainable land management approach that integrates tree and crops on the same land, is increasingly recognized for its potential to mitigate the impacts of climate change. However changing precipitation patterns pose significant challenges to agroforestry practices worldwide. The effects of altering precipitation patterns on various aspects of agroforestry systems. It examines how changes in rainfall intensity, frequency, and distribution influence the growth, productivity, and resilience of trees and crop within agroforestry setups. The implications of changing precipitation patterns on soil moisture dynamics, nutrient cycling and water availability all of which are critical for the success of agroforestry systems. Adaptation strategies that agroforestry practitioners can employ to mitigate the adverse effects of changing precipitation patterns, including the drought resistant tree and crop species, implementing water management techniques, and adopting agroforestry practices that enhance water retention in soil. By understanding the impacts of changing precipitation patterns, agroforestry can continue to play a vital role in sustainable agriculture and climate change adaptation efforts.

Key words: Global warming, Climate change, Precipitation, Agroforestry, Food security.**UTILIZATION OF FOOD PROCESSING WASTES IN THE PRODUCTION OF HIGH VALUE ADDED PRODUCTS*****VIPUL CHAUDHARY, VIJAY KUMAR SINGH, RAM JEET SINGH, PAUL ARJUN SANJAY, SHIVAM, VIKAS KUMAR SINGH AND SHASHANK VERMA****Mahamaya College of Agricultural Engineering and Technology Ambedkar Nagar (Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, UP)**

Household and industrial activities like peeling, cutting and sorting of raw fruits and vegetables prior to processing, eating, cooking produce regularly enormous waste and are the cause for the environmental & health problem if it is not disposed of properly. The pomace, leftovers, peels, seeds cut-off of whole fruit are the wastes of Fruit and Vegetable. These wastes are rich sources of dietary fiber, polyphenols, antioxidants, essential fatty acids and carotenoids etc., which exhibits health-promoting effect like protection against cardiovascular diseases, cancer, and other degenerative diseases. Utilization of food processing wastes in the production of high value added products has increased the profitability of the food processing industry by reducing the cost of disposal of these wastes. This paper presents the utilization of wastes (by-products) from Fruits & vegetables in the Production of dried powder and products. These wastes can be used as supplementation in wheat based baked products such as bread, cakes, biscuits, muffins, noodles, pasta etc. Finding a viable strategy for the efficient utilization of fruit and vegetable waste to produce value-added goods that are more environmentally friendly, more affordable, and more sustainable is urgently needed.

Keywords: Fruit & Vegetables, Waste utilization, by-products and Industrial Waste

CHICKPEA NUTRIENT STATUS AS INFLUENCED BY NUTRIENT MIXTURESVINITA^{1*}, GANAJAXI MATH², RAJKUMARA S³, VIJAYAKUMAR A G⁴, V B KULIGOD⁵^{1*}Ph.D. Scholar, Department of Agronomy, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India²Professor, Department of Agronomy, Directorate of Research office, University of Agricultural Sciences, Dharwad, Karnataka³Professor, Department of Agronomy, University of Agricultural Sciences, Dharwad, Karnataka⁴Associate professor (GPB) and Seed Certification Officer (GPB), AICRP on Seed, UAS, Dharwad, Karnataka, India⁵Professor and Head, Department of Soil Science, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka,

The field experiment was conducted during *rabi* 2021-22 and 2022-23 at the University of Agricultural Sciences, Dharwad, Karnataka to study the effect of nutrient mixtures on nutrient content of chickpea. The experiment consisted of eight treatments with three replications. Eight nutrient mixtures spray (N) were taken and sprayed at flowering and pod development stage viz., N₁: RDF + water spray, N₂: RDF+ Urea (2%), N₃: RDF+ KNO₃ (1%), N₄: RDF+ Chickpea magic (0.8%), N₅: RDF+ Dharwad chickpea nutrient mixture-1 (1%), N₆: RDF+ Dharwad chickpea nutrient mixture-2 (1%), N₇: RDF+ Dharwad nutrient mixture 3 (1%) and N₈: RDF+ Dharwad nutrient mixture 6 (1%). Results showed that, among the nutrient mixtures, significantly higher nitrogen content (3.90%) was recorded in the treatment with urea (2%) spray, phosphorous and boron content (0.863% and 9.88 mg kg⁻¹) in the Dharwad chickpea nutrient mixture-2 (1%) spray and potassium content (1.394%) in KNO₃ (1%) spray at flowering and pod development stage compared to others. Whereas, zinc and iron content showed non significant difference among the treatments. However, Dharwad chickpea nutrient mixture-2 (1%) spray at flowering and pod development stage recorded significantly higher nitrogen (73.84 kg ha⁻¹), phosphorous (14.89 kg ha⁻¹), potassium (28.52 kg ha⁻¹), boron (19.09 g ha⁻¹), zinc (65.24 g ha⁻¹) and iron (101.8 g ha⁻¹) uptake compared to other nutrients spray.

Keywords: Dharwad chickpea nutrient mixture-2, Flowering and pod development stage, Nutrient content**MULTILAYER FARMING: A WAY TOWARDS LIVELIHOOD SECURITY OF SMALLHOLDERS IN TRIBAL AREA OF CHHATTISGARH**VINAMARTA JAIN¹ AND ABHAY BISEN²¹Professor (Agronomy), Pt. S.K.S College of Agriculture and Research Station, Rajnandgaon, IGKV, Chhattisgarh, India²Assistant Professor (Horticulture), Pt. S.K.S College of Agriculture and Research Station, Rajnandgaon, IGKV, Chhattisgarh, India

Multilayer farming is an innovative agricultural strategy that redefines traditional farming practices by harnessing vertical space to cultivate multiple layers of crops within a single agricultural system. This approach is designed to overcome challenges associated with land scarcity and inefficient land use. The concept involves arranging different crops in layers, utilizing the vertical dimension to its fullest extent. The layers can include ground-level crops, vines climbing on trellises, and even trees or shrubs, creating a multi-tiered ecosystem. This arrangement optimizes sunlight exposure, nutrient distribution, and water usage, resulting in enhanced productivity. One of the key advantages of multilayer farming is its potential to significantly increase overall yield per unit of land. By strategically combining plants that complement each other in terms of growth patterns, resource requirements, and ecological interactions, farmers can create a symbiotic environment that maximizes the use of available resources. Resource efficiency is a focal point in multilayer farming. The intercropping of different plant species helps in nutrient cycling, reducing the need for external inputs. Furthermore, the diverse plant composition can deter pests and diseases, reducing the reliance on chemical interventions. The vertical stacking of crops also allows for efficient water usage through integrated irrigation systems. Beyond its practical benefits, multilayer farming contributes to biodiversity preservation. The coexistence of various plant species fosters a more resilient and ecologically diverse agricultural landscape. This can have positive effects on soil health, pollination, and overall ecosystem stability. It is an integrated farming system based on gross use of water, fertilizers, and soil and getting maximum yield per unit. In this, the yield of 4-5 crops can be achieved in a year from the same field with the necessary fertilizers and irrigation for one crop. This is why multi-layered farming provides higher productivity per unit of land and higher economic returns at a lower cost. Multilayered farming is more popular among small, marginal, and progressive farmers who practice advanced farming, i.e., which are not dependent on farm laborers. It has been found very useful for fruit-vegetable horticulture crops. Rajnandgaon is one of the tribal districts of Chhattisgarh state and nearly 80 km away towards west from Raipur capital of the state. Five villages namely Kaudikasa, Bhagwantola, Muretitola, Arajkund and Netamtola were selected in the Farmer FIRST project. The selected area is dominated with tribal farmers. Total population of the cluster is 4821 in which ST and SC represents 71.8% in the cluster. There are 984 farm families are there in the five villages. Marginal and small farm families represent 72.4% in the total farm families of the cluster. In year 2022-23 under the horticulture based module of Farmer FIRST project, multilayer farming was adopted for growing bottle gourd, ridge gourd, bitter gourd, cow pea, turmeric and papaya crops in 14 farm families with 0.40 ha area was covered of five villages. In this intervention found that Bottle gourd + Papaya + Turmeric multilayer cropping system gave maximum net income and benefit-cost ratio(1:4) as compare to other sole cropping system.

AVIFAUNAL DIVERSITY AND THEIR DISTRIBUTIONAL PATTERN IN TWO DIFFERENT HABITATS IN HIMACHAL PRADESH, INDIA

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Avifaunal diversity in the natural habitats is a subject of significant ecological interest and conservation concern. Himachal Pradesh, situated in the Indian Himalayas, boasts diverse habitats, providing unique niches for avian species. Studying avifauna in distinct habitats elucidates their responses to environmental gradients, habitat preferences, and potential conservation implications. Our study investigated avifaunal diversity and distributional patterns in two contrasting habitats within Himachal Pradesh. A total of 73 species of birds belonging to 54 genera, 19 families and 9 orders were encountered during the survey. The number of bird's species in Chamba was higher than those in Kangra. The value of species diversity (Shannon-w diversity index $H' = 3.8$, Simpson diversity $D = 0.9665$, evenness $j' = 0.6346$) was also higher in Chamba than at Kangra ($H' = 3.529$, $D = 0.9477$, $j' = 0.5327$). According to IUCN Red list two endangered species (*Neophron percnopterus* and *Aquila nipalensis*), and two near-threatened species (*Gypaetus barbatus* and *Psittacula eupatria*) and one vulnerable species (*Catreus wallichii*) were recorded. Additionally, we identified habitat-specific variations in species richness, evenness, and composition, reflecting habitat specialization among avian taxa. Our findings underscore the importance of habitat heterogeneity in shaping avifaunal diversity and distributional patterns in Himachal Pradesh. The assessment of conservation status, particularly the identification of endangered and vulnerable species, underscores the importance of continued monitoring and conservation initiatives to protect these valuable components of the ecosystem. Furthermore, understanding the ecological requirements and habitat preferences of avian communities is essential for effective biodiversity conservation and ecosystem management in this ecologically sensitive region. Future research should focus on long-term monitoring to assess the resilience of avian populations to environmental changes and anthropogenic pressures, thereby ensuring the conservation of Himachal Pradesh's avifaunal diversity for generations to come.

Keywords: Avifaunal diversity, Diversity indices, Natural habitat, Conservation, Abundance

BIOCHEMICAL STUDY OF TRIDAX PROCUMBENS WEED ON VITAL ORGANS OF FEMALE SPRAGUE DAWLEY RATS

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Biochemistry and medicine are closely related. Health depends on the proper balance of biochemical reactions occurring in the body and diseases indicate abnormalities in biochemical reactions or processes. The perfect knowledge of biochemistry is most essential for the practice of medical and related health Sciences. India is endowed with a rich wealth of medicinal plants. Herbal drugs are emerging as a leading area for new drug discovery and development, and are being looked at seriously for health problem. Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. Medicinal plants and the active principles isolated from them are and will be of immense importance to humanity in their fight against diseases due to fewer side effects. However, the blind dependence on synthetics is over and people are returning to the naturals with hope of safety and security. The purpose of this study is to infer ethnobotanical value of weed i.e. *Tridax procumbens* on biochemical parameters in adult female albino rats of *Sprague dawley* strain. The experimental groups were received daily doses of ethanolic extract of plant at the concentration of 300mg/kg b.wt and 600mg/kg b.wt for the interval period of 7, 14 and 21 days. After the regimen period, the content of protein, glycogen, and cholesterol, activity of acid & alkaline phosphatase was estimated in liver, kidney, ovary and uterus of albino rats. And it was noted that there was significantly increased in content of protein and activity of acid & alkaline phosphatase ($p < 0.05$) as compared to control rats while content of cholesterol was decreased significantly. But there was no significant changes occurred in wet-weight and glycogen content of albino rats. The activity was uniform in all the organs. This may all due to presence of active phytochemical constituents of plant.

Key words: *Tridax procumbens*, protein, glycogen, cholesterol content, acid & alkaline phosphatase.

AN EMBEDDED SYSTEM FOR SEED BOOT CHOKE INDICATOR

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An embedded system for detecting seed flow in the delivery tube and choking of boot of a seed drill has been developed. This system comprised an indirect incidence thin small outline package (TSOP) based infrared (IR) sensor for sensing flow of seeds from seed metering mechanism, a direct incidence infrared sensor and an IR receiver for detecting choking of the boot of a seed drill with seeds and a microcontroller for receiving the input signals from the sensors. Based on these input signals and with the embedded proper code, the microcontroller provided output signals (both visual and audible). Sensing units of both the sensors were installed to a cone shaped pipe which was then attached to the lower end of the delivery tube of the seed drill. The display unit had one separate buzzers and two separate red and yellow light emitting diodes (LED) for audio and visual outputs, respectively. The developed system could produce both visual and audible signals to warn the operator for successful showing of Rice seeds both in the laboratory setup and also in a 9 row tractor drawn seed drill.

CHICKPEA NUTRIENT STATUS AS INFLUENCED BY NUTRIENT MIXTURES**VINITA^{1*}, GANAJAXI MATH², RAJKUMARA S³, VIJAYAKUMAR A G⁴, V B KULIGOD⁵**^{1*}Ph.D. Scholar, Department of Agronomy, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India²Professor, Department of Agronomy, Directorate of Research office, University of Agricultural Sciences, Dharwad, Karnataka,³Professor, Department of Agronomy, University of Agricultural Sciences, Dharwad, Karnataka⁴Associate professor (GPB) and Seed Certification Officer (GPB), AICRP on Seed, UAS, Dharwad, Karnataka, India⁵Professor and Head, Department of Soil Science, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka,

The field experiment was conducted during *rabi* 2021-22 and 2022-23 at the University of Agricultural Sciences, Dharwad, Karnataka to study the effect of nutrient mixtures on nutrient content of chickpea. The experiment consisted of eight treatments with three replications. Eight nutrient mixtures spray (N) were taken and sprayed at flowering and pod development stage viz., N₁: RDF + water spray, N₂: RDF+ Urea (2%), N₃: RDF+ KNO₃ (1%), N₄: RDF+ Chickpea magic (0.8%), N₅: RDF+ Dharwad chickpea nutrient mixture-1 (1%), N₆: RDF+ Dharwad chickpea nutrient mixture-2 (1%), N₇: RDF+ Dharwad nutrient mixture 3 (1%) and N₈: RDF+ Dharwad nutrient mixture 6 (1%). Results showed that, among the nutrient mixtures, significantly higher nitrogen content (3.90%) was recorded in the treatment with urea (2%) spray, phosphorous and boron content (0.863% and 9.88 mg kg⁻¹) in the Dharwad chickpea nutrient mixture-2 (1%) spray and potassium content (1.394%) in KNO₃ (1%) spray at flowering and pod development stage compared to others. Whereas, zinc and iron content showed non significant difference among the treatments. However, Dharwad chickpea nutrient mixture-2 (1%) spray at flowering and pod development stage recorded significantly higher nitrogen (73.84 kg ha⁻¹), phosphorous (14.89 kg ha⁻¹), potassium (28.52 kg ha⁻¹), boron (19.09 g ha⁻¹), zinc (65.24 g ha⁻¹) and iron (101.8 g ha⁻¹) uptake compared to other nutrients spray.

Keywords: Dharwad chickpea nutrient mixture-2, Flowering and pod development stage, Nutrient content**MANAGING BIOTIC AND ABIOTIC STRESS IN VEGETABLE CULTIVATION: A COMPREHENSIVE APPROACH****VINOD PRAJAPAT^{*} AND DR. S. K. BAIRWA^{**}**^{*}Ph.D. Scholar, Department of Horticulture, RARI (SKNAU), Durgapura, Jaipur (Rajasthan)^{**}Assistant Professor, Department of Horticulture, RARI (SKNAU), Durgapura, Jaipur (Rajasthan)

Vegetable cultivation is vital for global food security, yet it faces numerous challenges prominently biotic and abiotic stresses, which impede optimal growth and yield. Biotic stresses stemming from pests, diseases, weeds and abiotic stresses such as temperature, salinity and water scarcity have become increasingly escalated due to climate change and intensive agricultural practices. Biotic stress management involves integrated pest management (IPM) strategies, emphasizing biological, cultural, and chemical control methods. Biological control methods employ natural enemies, such as predators and parasitoids, to regulate pest populations. Cultural practices, including crop rotation, intercropping, sanitation, disrupt pest life cycles and enhance plant resistance. Furthermore, judicious use of pesticides with emphasis on eco-friendly and selective formulations, minimizes environmental impact while effectively controlling pests. Abiotic stress management focuses on enhancing plant tolerance and resilience to adverse environmental conditions. Genetic improvement through breeding programs facilitates the development of stress-tolerant vegetable varieties. Adoption of precision agriculture technologies such as drip irrigation and mulching, optimizes water use efficiency and minimizes moisture stress. Additionally, soil amendments and organic matter incorporation ameliorate soil structure and nutrient availability, mitigating nutrient deficiencies induced by abiotic stresses. Furthermore, innovative agronomic practices such as hydroponics and protected cultivation, offer controlled environments, shielding vegetables from extreme weather events and maintaining optimal growing conditions. Advances in biotechnology, including gene editing and RNA interference, hold promise for engineering stress-tolerant vegetable crops with improved productivity and resilience.

Keywords: Biotic, Abiotic, Stress and Productivity.**APPLICATION ARTIFICIAL INTELLIGENCE IN NEXT GENERATION SUSTAINABLE AGRICULTURE****ASWANI KUMAR AND CHANDAN KUMAR RAI****Assistant Professor, Department of Agricultural Extension, CSSS PG College (CCS University), Machhra, Meerut-250106, UP**

The integration of artificial intelligence (AI) in next-generation sustainable agriculture is revolutionizing the way food is produced, aiming to enhance efficiency, productivity, and environmental stewardship. AI technologies, including machine learning, computer vision, and robotics, are being harnessed to optimize various agricultural processes such as crop monitoring, pest control, irrigation management, and yield prediction. Precision agriculture, powered by AI, enables farmers to make data-driven decisions, reducing resource waste and minimizing environmental impact. Advanced AI algorithms analyse vast datasets from satellite imagery, soil sensors, and climate models to provide real-time insights and predictive analytics, ensuring optimal crop growth conditions and early disease detection. Additionally, AI-driven automation in farming equipment and machinery is significantly reducing labour demands and increasing operational efficiency. The application of AI in sustainable agriculture not only promises to meet the growing global food demand but also aims to conserve natural resources, enhance biodiversity, and reduce carbon footprints. As AI continues to evolve, its role in sustainable agriculture is expected to expand, fostering innovative practices that align with the principles of ecological balance and long-term sustainability. This paper explores the current advancements, challenges, and future prospects of AI in driving sustainable agricultural practices, highlighting its potential to transform the agricultural landscape in an era of climate change and resource scarcity.

Keywords: AI, Technology, Agriculture, and Sustainable Agriculture

EFFECT OF VALUE ADDITION OF GREEN TEA (*CAMELLIA SINENSIS*) INFUSIONS WITH HIBISCUS AND MARIGOLD EDIBLE FLOWERS ON BIOCHEMICAL COMPOSITION AND SENSORY PROFILEVINUTHA C^{1*}, PADMINI BASKEY¹, KIRAN B. O², NAGARATNA S OLEKAR¹, SOWMYASHREE G³ AND CHAITANYA R ITAGI⁴^{1*}Department of Biochemistry, University of Agricultural Sciences, Dharwad (Karnataka), India²Department of Plant Physiology, University of Agricultural Sciences, Dharwad- (Karnataka), India³Department of Biochemistry, Mount Carmel College, Autonomous University, Bangalore-, (Karnataka), India⁴Department of Food Science and Nutrition, University of Agricultural Sciences, Dharwad- (Karnataka), India

Green tea or *Camellia sinensis*, a universally relishing beverage prepared through the infusion process, wherein dried tea leaves steeped in hot water. Herbal infusions provide a means to extract health-promoting plant components to combat oxidative stress and to manage the impacts of metabolic disorders. The current study aims to compare the sensory attributes and phytochemical composition of conventional green tea and its Value-added floral tea with a combination of green tea (60%), hibiscus (20%) and marigold (20%) flowers in 3:1:1 ratio, following both hot and cold infusion methods. Processed green tea leaves were blended with finely ground, oven-dried floral petals and infused in distilled water. Control Green Tea (GT) and value-added floral Green Tea (FGT) were analyzed for sensory attributes and phytochemicals like reducing sugars, total protein, total phenols, tannins, flavonoids and caffeoylquinic acid. Value-added FGT in both hot and cold preparations exhibited superior sensory scores in appearance, color, aroma, taste, flavor, and overall acceptability compared to GT and also elevated reducing sugars (0.243 mg/g) and increased protein content (28.27 mg/g), in hot infusions accompanied by a decline in phytochemical compounds like total phenolics (from 251.67 mg GAE/g to 161.34 mg GAE/g), total tannins (from 33.05 mg TAE/g to 22.87 mg TAE/g), total flavonoids (from 1.44 mg QE/g to 0.75 mg QE/g) and total caffeoylquinic acid (from 1.907 mg CGAE/g to 1.08 mg CGAE/g) contents. Similar decrease in phytochemicals was noted in cold infused value-added FGT except for reducing sugar and protein content. The results indicated that edible floral green tea infusions added nutrients like sugars and proteins to the infused drink and marked for sensory acceptance. Thus, value addition of green tea with edible flowers might be the first choice of consumer preference and also a potential health beneficial beverage.

Keywords: Green tea, Value-addition, Hibiscus, Marigold, Phytochemicals, Sensory evaluation**VARIETAL SCREENING OF LOCAL BANANAS FOR PROCESSING AND VALUE ADDITION OF TRADITIONAL BANANA FIGS**VINUTHA U MUKTAMATH¹, HEMALATHA S², PUSHKALA M³ AND SHWETA BIRADAR⁴¹Assistant Professor & Scientist, ²Professor & Head, Dept. of Food Processing & Technology, ³Research Assistant, ⁴Assistant Professor, Dept. of HDFS University of Agricultural Sciences, Dharwad

Bananas (*Musa* spp.) is a major fruit crop in the tropics and subtropics rich in Vitamins, energy, cholesterol free, low in sodium and high in fibre. Value addition to Banana is gaining momentum because of abundant production and low keeping quality. In view of this, varietal screening of banana varieties for dried banana figs was studied to promote processing and promotion among farmers and farmer groups as an enterprise. The locally popular varieties in North Karnataka like G-9, Milltli, Bargi, Karibale were screened for their nutrition, drying kinetics and organoleptic evaluation and acceptance in the market employing an experimental study employing three different drying methods. The results revealed that there was threefold increase in protein and iron in dried banana figs, available carbohydrate by four times and calcium by two times when compared to raw banana among all the varieties. All four varieties namely Bargibale, Karibale, Yelakkibale, and Grand Naine were cut into 1cm thickness were examined in a forced convection dryer under control conditions and solar dryer with control as sun drying. Drying rate constant obtained using logarithmic mathematical modelling which varies between 0.01 - 0.04 for tray drying and between 0.005-0.006 for solar drying for all four varieties. Drying condition for artificial convective drying standardised at 70°C for 300-360 mins. Sensory evaluation conducted for banana figs obtained by sundrying, tray drying and solar drying depicted that the best quality banana figs are obtained by solar drying which retains the maximum natural colour, better texture and an adorable flavour when compared with tray dried fig and sun drying. Out of all four varieties of banana, Yelakki/Mitli variety banana is seen to yield the best quality of banana figs in all aspects such as nutritional, sensory and drying method. Karibale and Bargibale varieties can be considered for its vibrant rich reddish brown product whereas the Grand naine variety is not that appealing for consumers.

Key words: Banana, Dried banana figs, nutrition, solar drying, tray drying**EVALUATION OF YIELD PERFORMANCE OF FENUGREEK (*TRIGONELLA FOENUM-GRÆCUM* L.) THROUGH FRONT LINE DEMONSTRATION**

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Churu comes under Desert region of Rajasthan and agriculturally it is very important district. In Churu fenugreek cultivation is very common but its productivity is very low. To establish the production potential of crop Front Line Demonstrations is an appropriate tool. To increase the production and productivity of fenugreek in the district, Krishi Vigyan Kendra, GVM, Sardarshahar, Churu-1(Rajasthan) conducted 48 demonstrations on fenugreek during 2018-19 to 2021-22 in four adopted villages. The critical inputs were identified in existing production technology through farmers meeting and group discussions with the farmers. Average yield data of conducted FLDs revealed that, higher yield (1843 kg ha⁻¹) was obtained in demo plot over local check (1474 kg ha⁻¹) and additional yield in demo plot was obtained 369 kg. Percent increase over local check was found 25.03%. Averages of gross and net returns of demonstration were Rs. 73083 and Rs. 53619 higher than the farmers' practice respectively. Most important factor B:C ratio indicates that whether FLD technology is profitable, B:C ratio was found higher throughout the study and average was (2.85:1) in demonstration over local check (2.36). Result suggested economic viability and feasibility of the FLD technology for fenugreek cultivation.

Key words: Font Line Demonstration, Fenugreek, Yield, Gross return Net return

NUTRITIONAL AND HEALTH STATUS OF RURAL WOMEN IN DHARWAD TALUK OF KARNATAKA: AN INTERVENTION STUDYVINUTHA U. MUKTAMATH¹, SANNAPAPAMMA K. J², RAVI Y³, RAJESHWARI DESAI⁴, SUREKHA SANKANGOWDAR⁵, SUMANGALA BADAMI⁶ AND PRIYA HEGDE⁷¹Assistant Professor& Scientist, ²Professor& Head, ³Assistant Professor& Senior Scientist, Associate Professor& Senior Scientist⁵ and ^{6&7} Young Professional-I, All India Coordinated Research Project-WIA, University of Agricultural Sciences, Dharwad

Rural women play a dominant role in the country's economy and their nutritional status has direct bearing on the whole family. Hence the present study was conducted with the objective to study the role of intervention in promoting the nutritional and health status of women. The sample of the study was 500 rural women from Dharwad taluk in the age group of 16-80 years. The tools used were a self-structured questionnaire, SES scale by Agarwal 2005, 24 hr diet recall method to assess nutritional status along with BMI computation and Hb level. More than one third of the rural women were illiterates and involved in agriculture. Majority of them had health related problems and were in mild to moderate anemia category. Low SES, low nutritional knowledge, non working status, morbidity condition, middle age group, anemia status and poor protein diet were found to be the risk factors of poor nutritional status among rural women. Low SES was found to be 2.6 times riskier; anemia condition was 4.68 times risk when compared to normal Hemoglobin level. An intervention was carried out where women were divided into three groups like control (no intervention), Group 1, where the intervention included implementation of nutri-gardens, awareness camps, trainings, demonstration on nutrition education and the Group 2 were supplied supplementary nutritive dense promix rich in iron and calcium plus the intervention methods used for the second group. The intervention carried out for six months was found to significantly improve the nutritional and health status of rural women. After intervention majority of women in group 2 were found to have normal BMI (71.60%) and increased haemoglobin level. The dietary diversification was increased in their diet with improvement in their knowledge, attitude regarding the good nutritional practices when compared to control group. However, the intervention module implemented in Group 2 was more successful when compared to the group 2 module of education training alone.

Key words: Nutritional status, BMI, Anemia, Promix, Intervention**PREDICTION OF RUNOFF USING SCS-CN METHOD FOR MAHARUWA MICRO WATERSHED OF AMBEDKAR NAGAR DISTRICT (U.P.)**

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In this study surface runoff was estimated using the USDA Soil Conservation Service curve number (SCS-CN) method in Maharuwa micro-watershed. The total geographical area of the microwatershed is 1028.00 ha, located between 83° 54' 29" to 82° 54' 32" North latitude and 25° 64' 44" to 25° 55' 38" East longitude which is situated at Maharuwa village of Ambedkar Nagar District, Uttar Pradesh. A total of 11 year rainfall event were selected between the years 2010 and 2020 for the study. Antecedent moisture content (AMC) was calculated by taking preceding five days rainfall events which gave three conditions AMC I, AMC II and AMC III. Weighted Curve Number for the entire selected micro-watershed was calculated based on site information of the watershed by land use land cover classification using ArcGIS and found to be 82.905 for AMC II. The CN values corresponding to AMC I and AMC III were 68.011 and 91.907 respectively. The runoff for each storm events was estimated using Curve Number method and it is found that among the selected year events maximum rainfall occurred in year 2013 giving runoff value of 162.27 mm and minimum rainfall occurred in year 2015 with runoff value of 49.15 mm. Runoff volume of the Maharuwa micro-watershed for each year events were also calculated, and maximum runoff volume was 1668208.616 m³ found in year 2013 and minimum runoff volume was 505326.247 m³ in year 2015. By using previous year runoff values, prediction of runoff for next five year was also done. The prediction of runoff was done using Forecast tool available in Excel 2016 (FORECAST.ETS). It was found that the maximum runoff was expected in the year 2025 and minimum runoff was expected in year 2023. From the present study it was concluded that the SCS-CN method gives significant values of runoff, with the R² value of 0.8514. The predicted values from the study could be useful for design of soil and water conservation structures and also useful for preparation for the next Storm event.

Keyword: AMC, SCS-CN, ArcGIS.**BIO-EFFICACY OF DIFFERENT BIO PESTICIDES AGAINST *HYADAPHIS CORIANDARI* ON FENNEL**

MAYA CHOUDHARY

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Fennel (*Foeniculum vulgare* Mill.) is an important spices crop commonly known as 'Saunf' belongs to family Apiaceae. In India, it occupies an area of 80 thousand hectares with an annual production of 129 thousand metric tonnes and productivity of 1687 kg ha⁻¹. during 2020-21 (Anonymous, 2021a). The investigation on "Eco-Friendly Management of aphid, *Hyadaphis coriandari* (Das) on Fennel (*Foeniculum vulgare* Mill.)" was conducted at Instructional Farm an Eight bio pesticides were evaluated against aphid, *H. coriandari* on fennel revealed that two spray of *Verticillium lecani* (5gm/ltr.) was found most effective against aphid followed by *Beauveria bassiana* (5gm/ltr.) and Azadirachtin 3000 ppm (4ml/ltr.). The maximum grain yield 12.10 q ha⁻¹ was obtained in the treatment -1 of *Verticillium lecani* followed by *Beauveria bassiana* and Azadirachtin in which grain yield of 11.90 q ha⁻¹ and 11.25 q ha⁻¹ were recorded respectively. The highest net profit (Rs. 35220 ha⁻¹) and incremental benefit cost ratio (8.80) was obtained from *Verticillium lecani* followed by *Beauveria bassiana* in which net profit was (Rs. 32100 ha⁻¹) and incremental cost benefit ratio was (6.42).

UNDERSTANDING ENVIRONMENTAL DNA (EDNA) ANALYSIS AND ITS APPLICATIONS IN CONSERVATION AND MANAGEMENT OF AQUATIC ECOSYSTEMS**VIPUL SINGH BADGUZAR*, SAURAV KUMAR, ANJANA A, RAJESH KUMAR, AYUSHI BHARDWAJ****ICAR- Central Institute of Fisheries Education, Panch Marg, Off Yari Road, Mumbai**

In recent years, environmental DNA (eDNA) analysis has emerged as a powerful tool for studying and monitoring aquatic environments. eDNA refers to genetic material shed by organisms into the environment, which can be analyzed from water samples to detect and identify species, even those difficult to observe directly. This non-invasive approach has revolutionized biodiversity assessments, providing insights into the presence, distribution, and abundance of aquatic organisms. eDNA analysis has numerous applications in conservation and management. It aids in detecting rare and elusive species, guiding conservation efforts. By identifying endangered or threatened species, targeted measures can be designed to protect their habitats and promote recovery. eDNA also facilitates early detection of invasive species, offering a sensitive and cost-effective alternative to traditional monitoring methods. It allows for rapid response to invasive species introductions. By analyzing eDNA periodically, researchers can assess changes in species composition, community dynamics, and ecosystem health. This information is crucial for evaluating conservation success and adjusting management strategies. Despite its advantages, eDNA analysis faces challenges. Standardized protocols and quality control measures need to be established for consistency across studies. Understanding the impacts of environmental factors on eDNA persistence and transport is also essential. In conclusion, eDNA analysis has revolutionized aquatic conservation and management. Its non-invasive nature, species detection capabilities, and cost-effectiveness make it valuable for biodiversity assessments, invasive species monitoring, and evaluating conservation interventions. With ongoing advancements and a better understanding of its limitations, eDNA holds great promise in contributing to sustainable management and preservation of aquatic ecosystems.

Keywords- eDNA, non-invasive, conservation, monitoring**EFFECT OF BRASSINOLIDE AND BENZYL ADENINE ON NURSERY PERFORMANCE OF ACID LIME SEEDLINGS UNDER SHADE NET CONDITIONS (*CITRUS AURANTIIFOLIA* SWINGLE) CV. PDKV LIME****ASHA B BAHADURE*, P. K. NAGRE, M. S. JANBANDHU, D. H. PAITHANKAR, AND Y. V. INGLE**¹Ph.D Scholar, Dept. of Fruit Science, Dr. PDKV, Akola-444104 (Maharashtra) India²Professor and Associate Dean, College of Agril, Dr. PDKV, Akola 444104 (MH) India³Ph.D Scholar, Dept. of Fruit Science, Dr. PDKV, Akola-444104 (Maharashtra) India^{4 & 5}AICRP on Fruits, Dr. PDKV, Akola-444104 (Maharashtra) India

The present investigation entitled on “Effect of plant growth substances on germination of acid lime seedlings (*Citrus aurantifolia* swingle). cv. PDKV Lime was conducted at (AICRP) on Fruits, (Citrus) Dr. PDKV, Akola during 2020-21 and 2021-22. The experiment was laid out in a Randomized Block Design with three replications and fourteen treatments. Initially, seed were pre-soaked in the plant growth regulator solution and kept in muslin cloth impregnated with the same plant growth regulator solution for 12 hours in the plant growth regulator solution of respective treatments which was followed by foliar spraying of growth regulator solution viz., GA₃, Brassinolide, and 6- Benzyl Adenine comprising of different combinations and concentration at 90 and 120 days after sowing and compared with check (GA₃ 50 ppm + Urea 1%) and control (only water soaking). The results revealed that least number of days for first germination (5.67 days), 50 percent germination (13.00 days), and complete germination (17.50 days) were observed. However, maximum values for germination percentage i.e. (34.83 %, 74.33 % and 96.83 % at the 1st 2nd and 3rd weeks respectively), seed vigor index I (1450.28), seed vigor index II (36.52), Barlett's rate index (0.537), emergence rate index (104.19), pol yembryony percentage (65.50 %), number of seedlings per seed (2.49 /seed), root length (7.31 cm), and shoot length (7.69 cm) was recorded with treatment T₁₃ (GA₃ - 50 ppm + 6 BA -25 ppm + Brassinolide - 2 ppm). Similarly, growth parameters viz., Height of seedlings (94.81 cm), stem diameter(1.12 cm), number of branches (6.58), number of leaves (93.22), leaf area (56.27 cm²), chlorophyll content (67.06 mg/g), absolute growth rate (1.05 cm /day), fresh weight of seedlings (50.22 g), dry weight of seedlings (25.84 g), number of primary roots (23.68), number of secondary roots (34.00), fresh weight of roots (15.54 g), dry weight of roots (11.90 g), length of tap root (36.34 cm), root volume (37.74 ml), root density(0.32 g/ml), number of fibrous roots(133.04), root shootratio(0.48) and survival percentage (98.04 %) was found maximum with treatment T₁₃ (GA₃ - 50 ppm + 6 BA -25 ppm + Brassinolide - 2 ppm) in modified container raised nursery under shade net house the application of brassinolide and benzyl adenine enhanced the stress tolerance, growth, and overall vigor of acid lime seedlings, likely due to improved physiological and biochemical responses.

Keywords: Acid lime, Germination, Nursery seedlings, Stress hormone

ORGANIC AGRICULTURE: A GAMECHANGER FOR AGRICULTURE IN INDIA**DR. ALKA VERMA****Assistant Professor, Department of Horticulture, Faculty of Agriculture, Tanta University, Sri Ganganagar, (Raj.)**

Organic farming is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system. In 1980, USDA team defined the organic farming as a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible organic farming system rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm, organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pest. Organic farming is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system. In 1980, USDA team defined the organic farming as a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible organic farming system rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm, organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pest. Organic farming is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system. In 1980, USDA team defined the organic farming as a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible organic farming system rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm, organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests Organic agriculture is a production system that sustains the health of soils and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. It combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved. Organic farming does not advocate use of external inputs. It is certification systems that allowed the allowance for use of external organic, biological and mineral inputs as supplementary source to meet the gaps. Organic farming systems could be a viable method of reducing gas emissions in the agricultural sector. Also, organic farming is not only the model for sustainable agriculture and food security, but creative hybridizations of organic and conventional farming methods could assist to increase agricultural productivity globally. Organic farming is open for use of off-farm organic and biological inputs. It does not allow genetically modified seeds or products and open for micronutrient correction through use of minerals. In organic farming only on-farm inputs based on Desi Cow (Jeevamrit, Beejamrit, Ghanajeevamrit), biomass recycling through mulching and use of compost/ vermicompost and minerals are not allowed. Natural Farming is also a chemical-free alias traditional farming method. It is considered as agroecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity. Four Pillars of natural farming are Jivamrita & Ghanjivamrita, Bijamrita, Mulching and use of botanicals for plant protection. Organic and natural farming both are non-chemical systems of farming which based on diversity, on-farm biomass management and biological nutrient recycling.

Key Words: organic agriculture, farming systems, agricultural productivity, natural farming, ecosystem and greenhouse

EFFECT OF OPERATING PARAMETERS OF HYDRAULIC NOZZLE ON SPRAY DROPLET CHARACTERISTICS**ADITYA SIRMOUR¹, VIVEK KUMAR SINGHAL²****^{1,2}Assistant Professor, College of Agriculture and Research Station, Mahasamund, IGKV**

Chemical weed management in agriculture has gained popularity due to its simplicity, efficiency, and effectiveness in weed control. Herbicides are typically applied using low-pressure agricultural sprayers in crop fields. The nozzle plays a crucial role in achieving proper spray atomization. Selecting the right nozzle is critical to ensure the development of the desired spray pattern. Droplets smaller than 150 microns present a significant risk of drift. Choosing the correct nozzle not only helps achieve the desired spray pattern but also minimizes spray drift. Optimal spray uniformity is achieved with 50 to 100% overlapping of the nozzle spacing. Standard flat fan nozzles are recommended for broadcast application, while even flat fan nozzles are ideal for band application. In testing, N1-Hollow cone (HCN/PB), N2- Flat fan (XLCC/900), N3 - Flood type (XLP/WP40), N4- Flat fan (F 110/16/3) nozzles were tested on patternator and spraytec laser droplet analyzer at three different pressures (2, 3 and 4 kg/cm²) and three different heights (250, 350 and 450 mm). It was found that the flat fan type nozzles N2 and N4 were suitable for pre-emergence application of herbicide. They have produces medium to coarse droplets depending on the working pressure, type and height. But at treatment N2H3P2, it produces droplet size of 360.99 µm and uniformity coefficient as 6.9 which is less than N4 i.e. 7.1. A wide range of pressure and height settings would have created a distribution that would have been considered acceptable (i.e., CV < 10%) for the N2 nozzle at height H3 and pressure P2 with spray angle of 81.42° and swath width 60.57 cm. **Keywords-** Nozzle, droplet size, pressure, uniformity coefficient and spray height

EVALUATION OF DIFFERENT PRE- AND POST-EMERGENCE HERBICIDES AGAINST BROAD LEAF WEEDS IN WHEAT AMIT DHANKAR* AND AMARJEET

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The present investigation was studied at Regional Research Station, Bawal of CCS Haryana Agricultural University, Hisar during 2019-20 and 2020-21. The objectives of experiment was, to find out most effective and profitable herbicide treatments for control of broad leaf weeds in wheat crop. The experiment was conducted using WH 711 variety of wheat and was laid out in randomized block design with three replications. Ten different herbicidal treatments were applied in wheat crop and compared with weedy check and weed free treatment. The treatments were aclonifen 1000 g ha⁻¹ PRE (T₁), diflufenican 200 g ha⁻¹ PRE (T₂), aclonifen 1000 g ha⁻¹ + diflufenican 200 g ha⁻¹ PRE (T₃), pendimethalin 1500 g ha⁻¹ (T₄), aclonifen 1000 g ha⁻¹ + pendimethalin 1500 g ha⁻¹ PRE (T₅), diflufenican 200 g ha⁻¹ + pendimethalin 1500 g ha⁻¹ PRE (T₆), halauxifen + fluroxypyr (RM) 240 g ha⁻¹ PoE (T₇), metsulfuron + carfentrazone 25 g ha⁻¹ PoE (T₈), 2,4-D Na 500 g ha⁻¹ PoE (T₉), 2,4-D ethyl ester 450 g ha⁻¹ PoE (T₁₀), weed free (T₁₁) and weedy check (T₁₂). Among PRE herbicides, aclonifen 1000 g ha⁻¹ + diflufenican 200 g ha⁻¹ and aclonifen 1000 g ha⁻¹ + pendimethalin 1500 g ha⁻¹, while among PoE, halauxifen + fluroxypyr 240 g ha⁻¹ provided excellent control (>75% WCE) of broad leaf weeds at all stages of crop growth during both years of experiment. Comparatively poor control over different broad leaf weeds was reported from sole application of pendimethalin 1500 g ha⁻¹, 2,4-D Na 500 g ha⁻¹ and 2,4-D ethyl ester 450 g ha⁻¹ during both years. Both formulations of 2,4-D did not vary significantly from each other in controlling different broad leaf weeds in wheat. Lowest weed index was documented in T₃ while highest weed index was recorded from weedy check followed by pendimethalin. Highest growth parameters, yield attributes and grain yield of wheat crop were recorded from weed free treatment which was found statistically at par with T₃. Among different PoE herbicides, application of halauxifen + fluroxypyr provided more control of different broad leaf weeds as compared to other PoE herbicides resulting into higher crop yield during both years.

FUNGAL WARRIORS: THE VITAL ROLE OF ENTOMOPATHOGENIC FUNGI IN BIOCONTROL

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In the face of mounting concerns over chemical pesticide resistance and environmental impact, entomopathogenic fungi are emerging as powerful tools for sustainable insect pest management. This abstract explores the multifaceted role these fungi play in biocontrol. We discuss their diverse modes of action, including cuticle penetration, toxin production, and nutrient depletion, effectively crippling and killing insect hosts. The abstract highlights the safety of entomopathogenic fungi for non-target organisms, a significant advantage over traditional chemical pesticides. Furthermore, the potential for integrating these fungi with other control methods within an Integrated Pest Management (IPM) framework is addressed. Research into novel strains and formulations of entomopathogenic fungi is ongoing, with scientists seeking to enhance their efficacy and broaden their target range against a wider spectrum of insect pests. This abstract delves into the exciting possibilities of engineering these fungi for improved environmental persistence and virulence. Despite their promise, challenges remain in the mass production, formulation, and cost-effectiveness of entomopathogenic fungi for large-scale application. This abstract emphasizes the need for further research to address these hurdles and unlock the full potential of these natural biocontrol agents. By harnessing the power of entomopathogenic fungi, we can move towards a more sustainable and environmentally friendly approach to pest management.

Keywords: Entomopathogenic fungi, Biocontrol, Sustainable pest management, Insect pest management, *Beauveria bassiana*, Cuticle penetration, Nutrient depletion, Synergistic effects, Shelf life

HIGH YIELDING KABULI CHICKPEA GENOTYPE AKGK-1801 SUITABLE FOR MACHINE HARVESTABLE ARCHANA.W.THORAT¹, E.R.VAIDYA², J.N. PARMAR³ AND S.S. LANDE⁴

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There is an increased demand for Kabuli chickpeas worldwide, which has also resulted in increased Kabuli chickpea cultivation. Kabuli Chickpeas are known for superior quality and high nutritional value, which makes them delicious. Owing to the unique features, these are preferable food ingredient in India and abroad. Having richness of carbohydrate, Kabuli Chickpeas are best suitable for gluten free diets.

Now the trend is being changed, due to labour problem number of farmers are demanding the tall growing genotype suitable for mechanical harvesting. Now mechanical harvesting is being widely adopted in world wide. The current chickpea cultivars are not suited to mechanical harvesting because the plant height is not adequate and the branches are close to ground. Erect growth habit is essential for mechanical harvesting. Need to be developed high yielding and suitable for mechanical harvesting genotype through breeding programs. AKGK-1801 was identified high yielding and suitable for mechanical harvesting, with upright and erect growth habit (Average height of 58 cm) having fruiting zone starting at about 30 cm from the ground are considered suitable for mechanical harvesting derived through hybridization followed by pedigree selection method. Tested in Multilocation Varietal Trials in Vidarbha region of Maharashtra and State in Multilocation Varietal Trials in Maharashtra it was found to be superior over the existing checks by BDNG-798 (1363kg/ha) (42.03%), PKV-Kabuli-4 1404kg/ha (37.79%), PDKV -Kabuli-2 1485 kg/ha (30.37%), Kripa 1531kg/ha (26.45%) and Virat 1763 kg/ha (9.81%). In Multilocation Varietal Trial in Vidarbha region it was found to be superior by PKV-Kabuli-4 (25.31%) & PKV Kabuli - 2 (15.20%), over the existing checks. Therefore this genotype for commercial cultivation to the farmers of Maharashtra, due to its special character i.e. high yield potential with resistance to *Fusarium* wilt and pod borer. Tall semi-erect growth habit suitable for mechanical harvesting.

Key words: Kabuli Chickpea, Mechanical harvesting, high yielding, resistant to Wilt

INFLUENCE OF BAGGING ON FRUIT QUALITY IN MANGO**(MANGIFERA INDICA L.) CV. MALLIKA****BAHADURE ASHA B, WAGHMARE GIRIDHAR M AND JANBANDHU MOHIT S****¹Ph.D Scholar, Dept. of Horticulture Fruit Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maharashtra)-444104****Officer Incharge and Project Officer, Fruit Research Station, Himayat Bagh, Sambhajinagar (Maharashtra)-431003****³Ph.D Scholar, Dept. of Horticulture Fruit Science, Dr. PDKV, Akola (Maharashtra)-444104**

A field experiment was conducted to investigate the “Studies on the effect of impregnated bags on quality of mango (*Mangifera indica* L.) cv. Mallika taken up at the AICRP on irrigation water management, VNMKV Parbhani in the year 2018-19 from February to June which constituted seven treatments with tree replication viz., T₁-Methoxam treated bag, T₂-Decis treated bag, T₃-Potassium Metabisulphite treated bag, T₄-Methoxam + Decis treated, T₅-Potassium Metabisulphite + Decis treated bag, T₆-Untreated bag, and T₇- Control (No bagging) was undertaken in Randomized Block Design. Mango fruits were subjected to seven treatments at 30 days after the fruit set. Results showed that the quality parameters such as were affected significantly due to bagging. Decis-treated bags showed better performance length of fruit (12.69 cm), and diameter of fruit (7.86 cm) than the control. Maximum pulp weight (237.83), pulp-to-stone ratio (5.8:1), pulp percent (42.22%), and weight of fruit (367.39 g). Bagging of mango fruits before harvest controlled mechanical damage caused by various factors, and improved colour and physico-chemical properties of the fruits such as the maximum TSS (21.92 %), reducing sugar (7.14 %), non-reducing sugar (12.72%), total sugar (20.47%), β - Carotene (15395 μ g / 100g), and ascorbic acid (20.60 mg/100g) were, recorded significantly superior and the highest shelf-life (10.73 days) and minimum fruit drop was recorded at harvest (1.94%) was noticed in T₃. Thus, it was concluded that impregnated bags positively influenced the growth and development of mango fruit, making them an effective alternative for mitigating the adverse effects of recent climate changes on fruit.

Keywords: Mango, Mallika, Bagging, Fruit quality**APPLICATION OF IOT IN NEXT GENERATION SUSTAINABLE DAIRY FARMING****CHANDAN KUMAR RAI, AND ASWANI KUMAR****Assistant Professor, Department of Agricultural Extension, CSSS PG College (CCS University), Machhra, Meerut-250106, UP**

The application of the Internet of Things (IoT) in next-generation sustainable dairy farming represents a transformative approach to enhancing efficiency, productivity, and environmental sustainability. IoT technologies, encompassing interconnected sensors, devices, and data analytics platforms, enable real-time monitoring and management of dairy farming operations. These innovations facilitate precise tracking of animal health, behavior, and productivity through wearable sensors and automated monitoring systems, ensuring optimal care and early disease detection. IoT-driven solutions optimize feeding practices, improve milking processes, and enhance reproductive management by providing actionable insights derived from continuous data collection and analysis. Furthermore, IoT systems contribute to resource efficiency by optimizing water usage, managing waste, and reducing energy consumption, thereby minimizing the environmental footprint of dairy farms. The integration of IoT in dairy farming also supports traceability and transparency in the supply chain, enhancing food safety and quality assurance. As IoT technologies advance, their application in sustainable dairy farming is expected to expand, promoting practices that align with environmental stewardship and economic viability. This paper examines the current advancements, challenges, and future prospects of IoT in sustainable dairy farming, highlighting its potential to revolutionize the industry by fostering innovative practices that ensure the well-being of animals, conservation of resources, and long-term sustainability.

Keywords: IoT, Technology, Sustainable, and Dairy Farming**ARDU (AILANTHUS EXCELSA): A PLANT AVOIDING DROUGHT AND DEFENDING THE LIVELIHOODS OF PEOPLE LACKING ACCESS TO RESOURCES IN A DESERT ECOSYSTEM****JITENDRA SINGH RANAWAT¹ AND R.P.S. DESWAL²,****¹Research Scholar, Department of Forestry, College of Agriculture, Bawal, CCS Haryana Agricultural University Hisar, India****²Principle Scientist, Department of Forestry, Regional Research Station, Bawal, CCS HAU, Hisar, Haryana, India**

Ailanthus excelsa, a tree of heaven is also called "Tree of Paradise" in India and Sri Lanka. It is a fast growing deciduous tree species belongs to the class of Multi-Purpose Trees (MPTs) suitable for agroforestry systems in arid and semi-arid agro-ecosystems of India as well as word. Trees are placed adjacent to fields and riverbanks to prevent soil erosion and provide leaf fodder during the lean season. The bark of the tree has therapeutic properties for treating dysentery, bronchitis, and asthma. The leaves and bark are also used as postpartum tonics. *Ailanthus excelsa* is a significant economic resource, with cultivation encouraged in dry and semi-arid locations for soft wood and fodder. *Ailanthus* tree is produce approximate green fodder 7.47-7.64 t/ha and dry fodder 25.23 -24.64 q/ha used as fodder of cattles. 55-65t/ha match wood produced by 10-11 years old plant that fulfill wood demand of match box industry and demand of match box wood increased day by day. It is also absorbing suspended particulate matter (SPM) and supporting a range of animals in arid environments. Mahaneem is recognized for its broad adaptability, quick growth, and tolerance to biotic and abiotic challenges, making it beneficial for sustainable development and improving the livelihoods of resource-poor farmers in arid regions like Rajasthan, Haryana, Punjab and adjoining area of Desert in India.

Key words: *Ailanthus excelsa*, MPT, Fodder, SPM, Sustainable

STATUS OF ORGANIC AND NATURAL FARMING IN INDIA**KIRAN CHOUDHARY¹, HEMANT KUMAR LAMBA², KAVITA NITHARWAL³**¹MSc Student, Department of Agronomy, COA- Jodhpur, AU – Jodhpur (Raj.)³PhD Research scholar, Department of Ag. Economics COA, RVSKVV, Gwalior, (MP.)²Ph.D Research scholar, Department of Ag. Economics & management, RCA, MPUAT, Udaipur (RAJ.)

Organic farming is agriculture that makes healthy food, healthy soils, healthy plants and healthy environments a priority, along with crop productivity. Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, genetically modified organisms and livestock food additives. India introduced the organic farming policy in 2005. The 2.78 million ha was covered under organic farming in India is about two percent of the 140.1 million ha net sown area in the country. (Source: The Union Ministry of Agriculture and Farmer's welfare.) The concept of organic Agriculture was developed in the early 1900s by Sir Albert Howard, F. H. King, Rudolf Steiner and others who believed that the use of animal manures (often as compost), cover crops, crop rotation and biologically based insect and pest controls resulted in a better farming system. The term 'organic' was first coined by Lord Northbourne in 1940 in his book entitled 'Look to the Land'. Organic farming evolved on the basic theoretical expositions of Rodale in the United States Lady Balfour in England and Sir Albert Howard in India in the 1940s has progressed to cover about 23 million hectares of land all over the world. Sustainable and eco-friendly technology. It improves quality, shelf and nutritive value of them farm produce. It encourages sustainable livelihood of the producers as well as safeguards consumers health. It improves the physical, chemical and biological health of the soil. Promotes healthy use of the natural resources and minimizes all forms of the pollution. It enhances and sustains biological diversity within the system. National Program on Organic Production (NPOP) is being managed and operated by the APEDA under Ministry of Commerce and Industry, Government of India. National Program on Organic Production (NPOP) defines the regulatory mechanisms and is regulated under two different acts for export and domestic market. Rajasthan State Organic Certification Agency (RSOCA) is an integral part of Rajasthan State Seed & Organic Certification Agency (RSSOCA) working as an independent and separate cell. It functions under the State Government as per the National Programme for Organic Production (NPOP), India and National Organic Program (NOP-USDA). Small land holding and poor infrastructure facilities. Lack of technology knowledge and convert organic farm. Organic material such as animal dung and other crop waste used for fuel purpose. Organic material is bulky in nature very difficult store and high price. City garbage contain heavy metal, plastic bags, stones and needless. Bio control agent are available only few selected insect pests. Complicated organic certification process and high fees cost. Higher human population of India. GoI is promoting Natural Farming through a sub-scheme named BPKP since 2020-21. BPKP same as PKVY with focus on handholding & capacity building area covered - 4.09 lakh ha (980 clusters of 500 ha each. The scheme has a total outlay of Rs 4645.69 crore for the period of six years (2019-20 to 2024-25) and implemented on demand driven basis following Centrally Sponsored Scheme (CSS) guidelines. The scheme is compliant to PGS-India certification under PGS India program. Eight states Andhra Pradesh, Chhattisgarh, Kerala, Himachal Pradesh, Madhya Pradesh, Odisha, Tamil Nadu and Jharkhand have opted for the scheme.

ASSESSMENT OF INSECT-PEST DYNAMICS AND THEIR MANAGEMENT THROUGH AGROFORESTRY SYSTEMS OF SEMI-ARID TROPICS**KAILASH KUMAR, R. BAJPAI, VISHNU K SOLANKI, ALPANA KUMHARE*, AJAY KUMAR SHAH**

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Insect-pests are the most important group of organisms causing injury to plants in agroforestry systems. Therefore, the identification, period of infestation, nature of damage and management of insect-pest in agroforestry systems are crucial to sound and sustained production. The present study revealed total twelve insects of five orders under agrisilviculture and agrihorticulture system which are two insects of Coleoptera eg. Six-spotted zigzag ladybird (*Cheilomenes sexmaculata*), and *Illeis cincta* on *Dalbergia sissoo*, one insect of Hemiptera eg. Mustard aphid (*Lipaphis erysimi*), and one insect of Hymenoptera eg. Honey bee (*Apis indica*) on Mustard under agrisilviculture system. Four insect were observed of Heteroptera eg. Zelus bug (*Zelus luridus*) Leaf-footed bug /Squash Bugs (*Aschistocoris brevicornis*), Stink bug (*Erthesina fullo*), and Jewel Bug (*Chrysocoris purpureus*) on Guava, two insects of Lepidoptera eg. Common evening brown (*Melanitis leda*), Dark small-branded swift (*Pelopidas mathias*), one insect of Hemiptera eg. Mustard aphid (*Lipaphis erysimi*), and one insect of Hymenoptera eg. Honey bee (*Apis indica*) on Mustard under agrihorticulture system. The number of insects varied from block to block due to shade of tree component. The number of insects in open was less because of more sunlight as compare to the block of 75%, 50%, 25% and no pruned tree and the block of D₃, D₂, D₁ and no deheaded tree in agrisilviculture and agrihorticulture system respectively. Minimum mean population of insect-pest was found under 75% pruning intensity and 2.0 m deheading level under agrisilviculture and agrihorticulture system respectively and maximum mean population of insect-pest was found under no pruned tree in agrisilviculture system and no deheaded tree in agrihorticulture system.

Key words: Insect-pest, Agroforestry systems, Pruning intensity, Deheading level etc.

POTENTIAL EFFECT OF INTEGRATED NUTRIENT MANAGERMENTS ON SOIL MICROBIAL POPULATION IN RHIZOSPHERIC VERTISOLKALYANI MARAVI¹, SHEKHAR SINGH BAGHEL², KAMAL KISHOR PATEL³, *AJAY KUMAR SHAH⁴,^{1,3&5} Department of Soil science and Agricultural Chemistry CoA, JNKVV, Jabalpur²Krishi Vigyan Kendra, Seoni, JNKVV, Jabalpur, ^{4&6}Department of Forestry, CoA, JNKVV, Jabalpur

This study compares the potential of integrated nutrient managements on soil microbial activity using different composting methods. The research was carried out at Research Institute, Department of Soil Science, JNKVV, Jabalpur (M.P.). The study area has a flat topography and is well located. Research was conducted on chickpea JG-14). The study consisted of three primary treatments with fertilizer (NPK) and six treatments with vermicompost and biofertilizers which were multiplied by three in the plot design (SPD) and the treatment error was a value of $P > 0.05$ at analysis. The results showed that INM directly affects the *Rhizobium* spp Population in rhizospheric soil *NPK100+ VC+ Rhizobium +PSB+ KSB+ Trichoderma+ pseudomonas* exhibited significantly maximum response with 6.49 log cfu (5.89×10^6 cfu/g) which was 42% more over that of control (3.37 log cfu (1.68×10^4 cfu/g)). *Trichoderma* population was estimated in similar treatments exhibited highest response with 5.88 log cfu (7.59×10^5 cfu/g) which was 73% more over that of control. *Pseudomonas* spp presented highest response with 5.83 log cfu (6.81×10^4 cfu/g) under T₅ combination of NPK with enriched vermicompost as like as the dehydrogenase activity was monitored by T₅ with 8.53 $\mu\text{g TPF h}^{-1} \text{g}^{-1}$.

Keywords: *Rhizobium* sp, *Pseudomonas* sp., *Trichoderma*, Dehydrogenase activity and soil fertility**EFFECT OF INTEGRATED NUTRIENT MANAGEMENT (INM) ON GROWTH AND PHYSICAL QUALITY ATTRIBUTES OF SWEET ORANGE (CITRUS SINENSIS OSBECK) CV. MOSAMBI.**KOMAL YADAV^{1*}, SHASHI S. YADAV²

Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya Gwalior, M.P.

An effective strategy to overcome soil fertility limitations and enhance fruit quality and plant development is soil fertility management, which includes the careful application of mixes of organic, inorganic, and bio fertilizers. In order to explore the combined use of organic, inorganic, and bio- fertilizers on growth and quality parameters of sweet orange (*Citrus sinensis* o.), the current study was planned in 2019–2021 at the experimental area, Agrotechnology park of Krishi Vigyan Kendra, College of Agriculture, Gwalior. Thirteen treatments were applied to the soil in the field using a randomized block arrangement. The application of RDF (50%) + vermicompost (15 kg) + PSB (80 ml) + Azotobacter (80 ml) in treatment T9 significantly improved the growth attributes, such as plant height (9.47%), canopy volume (37.62%), plant spread in N-S directions (11.55%) and E-W directions (11.98%), and physical attributing characters, such as average fruit length (6.52 cm), average fruit breadth (6.04 cm), average fruit weight (200.355 g), minimum peel thickness (3.86 mm), minimum number of seeds per fruit (15.45), and juice content (50.32 %). Conversely, RDF (25%) + vermicompost (20 kg) was shown to be related with the lowest value of physical characteristics (T3). In summary, the findings demonstrated that the development and physical characteristics of sweet oranges were enhanced by the appropriate combination and application of organic, inorganic, and bio fertilizers.

Keywords: Sweet orange, Vermicompost, PSB, Azotobacter, Growth attributes Physical attributes.**NEW FRONTIERS IN MICROBES: SUSTAINABLE APPLICATIONS FOR HUMAN WELL-BEING**

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Microorganisms come in a variety of forms, sizes, and surface morphologies. Rather than surviving as individual planktonic cells, they frequently appear in nature to have developed intricate ecological interaction webs within the ecosystem. The valuable microorganisms are classified into several groups, such as archaea, bacteria, and fungi. They can be identified from a variety of habitats, including extreme conditions (acidic, alkaline, drought, pressure, salinity, and temperature), as well as those related to humans and plants (epiphytic, endophytic, and rhizospheric). Recent advances in science have shown that there are other types of bacteria in our environment that, when they interact, produce different products, embracing a wider range of useful and possibly profitable qualities than just simple antibiosis. Despite being essential to human wellbeing and ecosystems, their contributions are frequently overlooked or underappreciated. While the majority of research on the use of microorganisms in agriculture, industry, medicine, space missions, and many other fields is being conducted world-wide. Numerous bacteria have important functions in the fields of ecology, medicine, food production, biofuel or energy production, medication research, nitrogen and carbon fixation, biocontrol agents, bioremediation, organic matter decomposition, and soil formation, to name a few. Given that bacteria may maintain human welfare and guarantee the health of the Earth's environment. Therefore, in order to effectively address the issues of food security, healthcare, and environmental pollution, it is crucial to harness and exploit the biologically significant features of bacteria and their products. Methanogens are now considered a "boon rather than a bane" in the environment due to their employment in the production of renewable energy, the reduction of environmental pollution, and the synthesis of valuable compounds. The biggest threat to humanity in the short and long terms is the continuous release of hazardous waste and pollutants brought on by faulty industrialization and unrestrained urbanization. Hence Genetically modified organisms (GMOs) are beneficial to human welfare since they can be used to address pollution in extremely contaminated areas. Advances in gene technology have led to significant discoveries in the study of microbial communities and interconnected networks, beyond the capabilities of conventional models that rely solely on inferential descriptions.

RESPONSE OF WILD GRAPE GENOTYPES AGAINST SODIUM SALTS STRESS CONDITION**MEGHA PATIDAR*, PARSHANT BAKSHI AND KIRAN KOUR****Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu**

An investigation to the tolerance of fifteen wild grape genotypes of *Vitis* spp. against sodium salts by measuring leaf ions and biochemical changes due to salinity stress. Survey was done during the year 2021-2022 and 2022-2023 at areas of district Samba, Poonch, Udhampur, Doda and Kishtwar of Union territory of Jammu and Kashmir, to select promising accessions among the diverse wild grapes genotypes. After that six month old well established cuttings in pots were treated with different concentration of sodium salts (0, 50, 75 and 100 mM NaCl and 50, 75 and 100mM Na₂CO₃) started. Sodium and potassium concentrations were measured by using flame photometer. Chloride was estimated by titrated with silver nitrate. Proline was determined following Bates *et al.* (1973). Visual symptoms of leaves were scored for salt injury from one to five on the basis of necrosis of leaf. Sodium ion highly accumulated in the leaf lamina of the vines with significantly increasing with levels of NaCl and Na₂CO₃ respectively, but Cl ion significantly increase with NaCl but constant with the Na₂CO₃. Potassium content linearly decreased with the increased either salinity. Generally, Ca and N concentrations of leaf decreased by increasing salinity levels of the nutrient solution. Salt injury highly correlated with the Cl content. Proline accumulation significantly increase with salt levels and accumulation in tolerant genotypes was higher than in sensitive ones. Results concluded that SKJG-7 and SKJG-14 showed minimum salt injury and lower capacity to alleviate salt stress.

Key words: wild grapevines, sodium salts, leaf ions, salt injury, proline

NEXT-GENERATION BREEDING STRATEGIES FOR CLIMATE CHANGE AND SUSTAINABLE FUTURE**MUKESH KUMAR YADAV¹ AND MAHENDRA YADAV²**¹**Research Scholar, Department of Genetics and Plant Breeding, Rajasthan College of Agriculture, MPUAT, Udaipur- (Raj.)**²**Research Scholar, Department of Horticulture, Rajasthan Agriculture Research Institute, SKNAU, Jobner**

In the face of escalating climate change and its adverse effects on agriculture, the urgency to develop climate-resilient crops has never been more pressing. Next-generation breeding strategies offer promising avenues for the creation of crops that can thrive amidst shifting environmental conditions. Traditional breeding methods, while effective, often entail lengthy timelines and rely heavily on genetic variation within existing germplasm. Next-generation techniques leverage advancements in genomics, computational biology, and bioinformatics to expedite the breeding process and broaden the genetic diversity accessible for crop improvement. Genome-wide association studies (GWAS) and genomic selection enable the identification and utilization of favorable alleles linked to climate resilience traits, facilitating rapid trait introgression into elite cultivars. Moreover, emerging technologies such as CRISPR-Cas9 gene editing offer precise manipulation of target genes associated with climate adaptation, accelerating the development of genetically optimized crop varieties. Harnessing the power of high-throughput phenotyping platforms allows for the efficient phenotypic characterization of large plant populations under diverse environmental conditions, enabling breeders to select for desired traits more effectively. Furthermore, interdisciplinary collaborations between breeders, geneticists, agronomists, and computational scientists are fostering the integration of diverse datasets and methodologies, enhancing the predictive accuracy of breeding models and accelerating the delivery of climate-ready cultivars to farmers. In conclusion, next-generation breeding strategies represent a paradigm shift in crop improvement efforts, offering unprecedented opportunities to develop climate-resilient crops with enhanced productivity and sustainability. By harnessing the synergistic potential of cutting-edge technologies and interdisciplinary collaborations, these strategies hold the key to mitigating the impacts of climate change on global food security and ensuring a resilient agricultural future.

Keywords: Climate Change, Next-generation breeding, CRISPR-Cas9, Phenotyping, Bioinformatics.

PROTECTING THE BRINJAL HARVEST: A MULTIFACETED APPROACH THROUGH INTEGRATED PEST MANAGEMENT**NAVEEN KUMAR ¹, RAJENDRA SINGH², ANKIT RAI³, AKANKSHA⁴, KUSHAL CHATURVEDI⁵**¹**Assistant professor, Department of Entomology, National P.G. college Barhalganj Gorakhpur,**²**Professor, Department of Entomology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut,**³**M.Sc. Entomology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut,**^{4,5}**Research Scholar, Department of Entomology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut.**

The brinjal, or eggplant, is a vital vegetable crop susceptible to a variety of pests and diseases. This abstract explores the concept of Integrated Pest Management (IPM) as a sustainable and effective strategy for protecting brinjal crops. The abstract outlines the core principles of IPM, emphasizing preventive measures such as crop rotation, resistant varieties, and balanced fertilization to create a less hospitable environment for pests. It highlights the importance of monitoring pest populations and utilizing natural enemies like predatory insects and birds to suppress pest outbreaks. Furthermore, the abstract discusses the judicious use of biopesticides derived from natural sources like neem or entomopathogenic fungi as a targeted control method when pest populations exceed established thresholds. The importance of proper sanitation, including removal of crop residues and weeds, to disrupt pest life cycles is emphasized. By integrating these various techniques, IPM offers a holistic approach to brinjal pest management. This abstract concludes by underlining the benefits of IPM, including reduced reliance on chemical pesticides, improved fruit quality, and a more sustainable agricultural system.

Keywords: Brinjal, Eggplant, Integrated Pest Management (IPM), Crop Rotation, Resistant Varieties, Natural Enemies, Biopesticides, Neem, Entomopathogenic Fungi, Sustainable Agriculture

THE ROLE OF BEEKEEPING AGRO-INDUSTRIES IN BAGHPAT DISTRICT OF WESTERN UTTAR PRADESH**NITIN KUMAR NAG¹ AND OM PRAKASH MAURYA²**¹Research Scholar, Department of Agricultural Economics & Statistics, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)²Associate Professor & Incharge, Department of Agricultural Economics & Statistics, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)

The role of beekeeping Agro-industries in the economic and agricultural landscape of Baghpat district in western Uttar Pradesh. It explores how beekeeping contributes to rural livelihoods, agricultural productivity, and environmental sustainability. The research examines the practices of local beekeepers, the scale of honey production, and the integration of beekeeping with other agricultural activities. It also evaluates the market dynamics, including demand and supply chains, pricing strategies, and marketing channels. The study identifies key challenges faced by beekeepers, such as climate variability, pest management, and access to modern technologies. Recommendations are provided to enhance the efficiency and profitability of beekeeping agro-industries, emphasizing the need for improved training, financial support, and infrastructure development.

Keywords:- Beekeeping, Agro-industries, Rural livelihoods, Environmental sustainability, Honey production, Market dynamics, Pricing strategies, Climate variability, Pest management, Modern technologies, Infrastructure development.

ROLE OF INTEGRATED NUTRIENT MANAGEMENT (INM) IN SUSTAINABLE PRODUCTIVITY AND ENVIRONMENTAL CONSERVATION**OM PRAKASH MAURYA¹ AND NITIN KUMAR NAG²**¹Associate Professor & Incharge, Department of Agricultural Economics & Statistics, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)²Research Scholar, Department of Agricultural Economics & Statistics, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)

Integrated nutrient management (INM) represents a comprehensive approach to optimizing agricultural productivity while reducing environmental impacts. By harmonizing multiple practices including judicious use of chemical fertilizers, organic amendments, Precision Farming Technologies (PFT), and Conservation Agriculture Techniques (CAT), Integrated Nutrient Management (INM) aims to increase nutrient efficiency, soil fertility and to conserve and reduce environmental degradation. The importance of Integrated Nutrient Management (INM) is seen in achieving sustainable agricultural intensification, improving crop yields, reducing nutrient losses and emphasizing its role in protecting natural resources. Through the integration of diverse strategies tailored to local conditions and crop requirements, Integrated Nutrient Management (INM) provides a holistic framework to address the complex challenges facing modern agriculture, ultimately responding to a changing climate and global food security. Food security leads to, demands and contributes to environmental sustainability.

Keywords: Integrated Nutrient Management (INM), Technology, Optimizing Agricultural Productivity, Conservation Agriculture Techniques (CAT) and Precision Farming Technologies (PFT).

BIOCHEMICAL PROFILE OF SOME FRESHWATER FISHES FROM NAKANA LAKE, DHULE (MS) INDIA**PATIL MANISHA****Dept. of Zoology, TSS's Smt. Vimalbai Uttamrao Patil Arts & Late Dr. B. S. Desale Science College, Sakri Dist- Dhule (M. S.) Sakri**

The purpose of present investigation was to study biochemical analysis (glycogen, protein, lipid and moisture) appropriate amount of entire body wet weight tissue of 20 fish species which were recorded from Nakana lake, during the period Feb., 2016 to Jan., 2018. The extracted outcome was showed variation in different fish species with their biochemical composition. Glycogen content ranges in (06.55 ± 00.25) to (01.35 ± 00.30) , protein was found in between (22.85 ± 00.80) to (11.55 ± 01.70) , lipid ranges in (09.45 ± 01.20) to (01.25 ± 00.45) whereas the moisture ranges from (83.20 ± 01.30) to (45.10 ± 02.10) . In all twenty species of fishes had been recorded higher caloric value. Commercial as well as small indigenous fishes were shown an important source of macro nutrients. *Tenulosa ilisha*, *Mastacembelus armatus* and *Channa punctata* are more nutritious fishes as compare to other 17 species.

Keywords: Nakana lake, Commercial, *Tenulosa Ilisha*, Glycogen, Indigenous

YIELD AND ECONOMICS OF KHARIF ONION (*ALLIUM CEPA* L.) UNDER ON FARM TESTING IN BUNDELKHAND REGION OF UTTAR PRADESH**^APRASHANT KUMAR, ^BN K BAJPAL, ^ARAJEEV KR. SINGH AND ^AN K PANDEY**^aKrishi Vigyan Kendra, Hamirpur (U. P.)^bBanda University of Agriculture and Technology, Banda (U.P.)

The field experiment was conducted by Krishi Vigyan Kendra, Hamirpur Uttar Pradesh at farmer's field in the year 2022-23. The maximum number of plant/m² (68) was recorded in demonstrated technology followed by farmers practice (63) and the yield was recorded in T₂ variety Bhima Super (255q/ha) followed by T₁ N-53 (185 q/ha). The economics of the data showed that, on average, in demonstrations, gross returns were (459000/ha), net returns were (389600/ha), and benefit cost ratio was (5.6) as opposed to check (N-53), where gross returns were 333000/ha, net returns were 266800/ha and benefit cost ratio was (4.03). This observation showed that Bhima Super variety performed better over farmers practice (var. N-53).

ASSESSMENT OF RELATIONSHIP OF WEATHER CONDITIONS, TREE AGE AND MANAGEMENT PRACTICES ON INCIDENCE OF POWDERY MILDEW OF MANGO IN EASTERN DRY ZONE OF KARNATAKA**PREMALATHA B. R.¹, SHIVARAMU H. S.², RAJESHWARI, R.³, LINGARAJ HUGGI^{4*}, THIMMEGOWDA M. N.⁵, MANJUNATHA M. H.⁶**¹Assistant Professor, College of Horticulture, Bangalore, UHS, Bagalakot²Professor, Department of Agronomy, UAS, GKVK, Bangalore³Assistant Professor, College of Horticulture, Bangalore, UHS, Bagalakot⁴Research Associate, CoE-WM, UAS, GKVK, Bangalore⁵Professor and Head, AICRP on Agrometeorology, UAS, GKVK, Bangalore⁶Junior Agronomist, AICRP on Agrometeorology, UAS, GKVK, Bangalore

The influence of weather parameters, tree age and management practices on the development of powdery mildew on mango was studied during 2018-19 and 2019-20 in Eastern dry zone of Karnataka. Two fruit production cycles *i.e.*, from vegetative bud initiation to fruit maturity were studied in mango cultivar (Alphonso) belonging to two age groups (10 and 25 years old) with two management levels: M₁-Control and M₂-With plant protection chemicals (two sprays comprising of Hexaconazole 5% SC @ 1 ml/litre and Wettable Sulphur 80% WP @ 2 g/litre were given at the time of flower bud initiation and fruiting stage) located in the orchards of RHREC and DLAP, GKVK, Bengaluru respectively. The disease incidence and severity were recorded from panicle initiation to fruit setting stages of the tree at weekly intervals. Pooled analysis indicated that the disease severity was more in 25 years old trees (29.51 ± 12.92%) compared to 10 years old trees (22.77 ± 11.47%) due to dense canopy. The powdery mildew disease severity was significantly higher in 25 years old fungicide untreated trees (29.51 ± 12.92%) than treated trees (12.92 ± 8.53). While 10 years old trees, the powdery mildew disease severity was significantly higher in fungicide untreated (22.70 ± 11.47%) than fungicide treated (14.25 ± 7.58) trees. The severity of the disease coincided with the full bloom stage and gradually decreased with fruit setting, resulting in reduction of number of fruits in fungicide untreated trees compared to treated trees. The correlation studies showed that disease severity of powdery mildew was positively correlated with wind velocity (0.173) and sunshine hours (0.365) and highly significantly positively correlated with average RH (0.584**) and highly significant negative relationship was observed with maximum temperature (-0.591**), minimum temperature (-0.817**) and rainfall (-0.531**) and significantly negatively correlated with evaporation (-0.460*).

Keywords: powdery mildew, age, Alphonso, mango**CLIMATIC DRIVES ON PHENOLOGY, YIELD AND THERMAL RELATIONSHIPS IN MANGO (*MANGIFERA INDICA* L. CV. ALPHONSO) AS INFLUENCED BY TREE AGE IN EASTERN DRY ZONE OF KARNATAKA, INDIA****PREMALATHA B. R.¹, SHIVARAMU H. S.², LINGARAJ HUGGI^{3*}, THIMMEGOWDA M. N.⁴, MANJUNATHA M. H.⁵ AND PATIL, S. V.⁶**¹Assistant Professor, College of Horticulture, Bangalore, UHS, Bagalkot²Professor, Department of Agronomy, UAS, GKVK, Bangalore³Research Associate, CoE-WM, UAS, GKVK, Bangalore⁴Professor and Head, AICRP on Agrometeorology, UAS, GKVK, Bangalore⁵Junior Agronomist, AICRP on Agrometeorology, UAS, GKVK, Bangalore⁶Dean. College of Horticulture, Bidar, UHS, Bagalkot

A study was conducted for two years during 2018-19 and 2019-20 to examine the relationship between phenology, yield and thermal indices in mango (*Mangifera indica* L.) cultivar *Alphonso* belonging to two age groups (10 and 25 years old) located in the orchards of Regional Horticultural Research and Extension Centre and Dryland Agriculture Project, GKVK, Bengaluru. Pooled analysis indicated that 25 -year old mango trees took significantly more number of days for attainment of phenological stages 26.3, 11.8, 12.7, 15.2, 12.6, 13.5, 15.6 and 69.9 days for panicle initiation, flower initiation, 50 per cent flowering, full bloom, pea sized fruit, marble sized fruit, lemon sized fruit and for harvest maturity. While, Young aged trees of 10 years recorded significantly lower male flowers per tree (1776.01), higher hermaphrodite flowers (196.12), lower sex ratio (9.06) and higher fruit set percentage (4.64 %). And thus, significantly higher heat/thermal use efficiency (7.09 kg °days⁻¹), heliothermal use efficiency (0.86 kg °days hour⁻¹), photo thermal use efficiency (0.59 kg °days hour⁻¹), hydro-thermal use efficiency (0.14kg°days hr⁻¹) and radiation use efficiency (4.85 kg MJ⁻¹) was observed in younger trees as an attribute of better resource partitioning and source-sink relation in young trees. Furthermore, research examining the association between weather indices and fruit output revealed a substantial negative correlation for rainfall and a significant positive correlation for other indices, suggesting that trees respond differently to single and combined weather factors. The outcome of the study infers that canopy management practices like pruning, trimming and rejuvenation of older trees is essential for optimization of resource use and for obtaining good yields.

Keywords: Phenology, Energy use, Thermal relation, Tree age, Management.

THE ROLE OF MINIMUM SUPPORT PRICE (M.S.P.) IN INDIAN AGRICULTURAL FARMING**PUKHRAJ SINGH¹ AND NITIN KUMAR NAG²**¹Assistant Professor, Department of Agricultural Economics, J. V. College, Baraut (Baghpat)²Research Scholar, Department of Agricultural Economics & Statistics, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)

The Minimum Support Price (M.S.P.) system has been a fundamental component of India's agricultural policy frame work, Aimed at ensuring farmers receive remunerative prices for their produce and mitigating income volatility. Over the years, Minimum Support Price (M.S.P.) implementation has had a notable impact on Indian agricultural farming. It has provided a safety net for farmers, particularly those cultivating Minimum Support Price (M.S.P.) crops, by guaranteeing a minimum income level irrespective of market conditions. This has incentivized farmers to adopt improved agricultural practices, leading to enhanced productivity and production levels. However, challenges such as limited coverage, procurement inefficiencies, and market distortions persist, raising questions about the system's effectiveness in addressing the needs of all farmers. Nevertheless, Minimum Support Price (M.S.P.) continues to play a significant role in stabilizing agricultural incomes, supporting farmer welfare, and ensuring food security in India.

Keywords: Minimum Support Price (M.S.P.), Agricultural Policy Framework, Income Volatility, Agricultural Incomes and Minimum Income Level

IMPROVEMENT OF SOCIOECONOMIC CONDITIONS OF SMALL AND MARGINAL FARMERS OF DHARWAD DISTRICT THROUGH INTEGRATED FARMING SYSTEMS**R.B. NEGALUR^{1*}, C. P. CHANDRASHEKARA², SAVITA B³, CHETAN⁴, V. V. ANGADI⁵ AND N. RAVISHANKAR⁶**¹Principal Scientist and Head, AICRP on IFS-OFR, ARS, Mundgod-University of Agricultural Sciences, Dharwad-²Professor of Agronomy, Institute of organic farming, MARS, University of Agricultural Sciences, Dharwad-³Sr. Scientist (Soil Science), AICRP on Dryland Agriculture, RARS, Vijayapura

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On farm research was planned aiming to explore the diversification of existing farming systems under small and marginal household conditions, in 0.79 hectares area an average of seven farm families having Crop + Dairy as the component modules and 0.66 hectares area an average of thirteen farm families comprising Crop + Dairy + Horticulture modules over five years. The experiment was carried out in Dharwad district (High productive) block, encompassing Kurubagatti, Lokur, Shibaragatti villages, and Hubballi (Low productive) block, including Karadikoppa and Kuradikeri villages. Twenty trials were conducted, involving three villages from the high productive block and two villages from the low productive block, with an average of four farmers per village. Moreover, leased land was utilized for this experiment. The gross returns (Rs.2,53,256 and 2,00,593, respectively), net returns (Rs.1,66,643 and 1,42,027, respectively), B:C ratio (3.26 and 3.68, respectively) employment generation (490 and 655Man days, respectively), overall assessment and key performance Indicators like equivalent yield, system productivity, system profitability, sustainable value index, GHG Emission and economic efficiency were better both crop + dairy and crop + dairy + horticulture modules of cropping systems compared to their bench mark survey at the end of five years. The key performance indicators suggest that both the farming system are productive, financially viable and provides livelihood opportunities.

Key words: Economics, Farming system modules, Integrated farming system, key performance indicators, On Farm Research (OFR) and ratio measures.

JOURNAL OF CRITICAL REVIEWS AGRICULTURAL MARKETING IN INDIA: A REVIEW ON CHALLENGES AND PROSPECTS**RAJ KUMARI SHARMA *¹, HEMANT KUMAR LAMBA², DR. HARI SINGH³**¹MSc Student, Department of Ag. Economics and management, RCA, MPUAT, Udaipur, Raj²PhD scholar Department of Ag. Economics & management, MPUAT Udaipur, RAJ³Associaite professor Department of Ag. Economics & Management, RCA, MPUAT, Udaipur, Raj

Agricultural marketing is considered to be one of the important dimensions of agricultural development in India. Over the years, there has been a substantial shift in the institutional innovations and reforms of the market to address imperfection in the market and maintain the collective strength of farmers. Though research, practitioner opinions, and policy initiatives have produced dualistic perspectives on both the benefits and drawbacks for farmer collectives and the agricultural market. The government of India made historic decisions to support resource-poor farmers through vertical integration, realize a better share in consumer price, and mitigate price risk in the market by passing laws enacting market reforms such as the Agricultural Produce and Marketing Committee Act (APMC), the Agricultural Produce Livestock Marketing Act (Promotion and Regulation), contract farming, and the Electronic National Agricultural Market (E-NAM). The paper which is primarily based on literature review, delves to review the situation of agricultural marketing in India with their challenges and prospects. It also identifies the literature gaps and suggests the important areas for further studies.

Keywords: Agricultural Marketing, Contract Farming, APMC, APLM, Farmer Producers Company, E-NAM

REVOLUTIONIZING SUSTAINABILITY: SYNTHETIC BIOLOGY'S ROLE IN ENVIRONMENTAL AND AGRICULTURAL INNOVATION**DR. RICHA MOR****Assistant Professor, Department of Biotechnology, NIILM University, Kaithal, Haryana (India)**

Synthetic biology, involves the designing and re-engineering of biological systems to transform waste into resources, mitigate climate change, and pave the way for a greener, more resilient future. As we stand at the dawn of this biotechnological revolution, exploring the role of synthetic biology becomes not just imperative, but a testament to our commitment to a thriving planet. Through real-world case studies, this paper examines the integration of synthetic biology innovations to promote a sustainable environmental and agriculture. In environmental conservation, engineered microorganisms such as *Ideonella sakaiensis* have demonstrated the capability to degrade plastic waste in marine environments, offering a solution to mitigate ocean pollution. Furthermore, advancements in carbon sequestration through engineered microalgae like *Chlamydomonas reinhardtii* have shown potential in reducing greenhouse gas emissions. In agriculture, synthetic biology presents opportunities to enhance crop productivity while minimizing environmental harm. One compelling example is the development of nitrogen-fixing crops. By engineering plants to host nitrogen-fixing bacteria like *Rhizobium*, *Azotobacter*, *Gluconacetobacter diazotrophicus* in their roots, scientists aim to reduce the need for synthetic fertilizers. This approach not only promotes soil health and biodiversity but also mitigates the carbon footprint associated with fertilizer production and application. Development of several drought-resistant crops, such as genetically modified maize shows significant yield improvements under water-limited conditions. Also, researchers are investigating the possibility of genetically modifying bacteriophages to target specific plant pathogens, such as *Pseudomonas syringae* or *Xanthomonas campestris*, which cause diseases like bacterial blight in crops. However, the use of synthetic biology raises ethical concerns, including potential impacts on ecosystems, biodiversity, and human health. Addressing these concerns requires robust ethical frameworks emphasizing transparency, public engagement, and precautionary measures and regulatory strategies to significantly advance environmental conservation and agricultural sustainability.

Keywords: Synthetic biology, Sustainable agriculture, environment conservation, ethical issue**DEVELOPMENT OF BIOPOLYMER PACKAGING INCORPORATING CARBON QUANTUM DOTS FOR ENHANCING THE SHELF LIFE OF TOMATO****RAMALAKSHMI, A^{A,B*}, BALAKRISHNAN, M^A, AJAHAR KHAN^B, ZOHREH RIAHI^B, JONG-WHAN RHIM^B, UMAMAHESHWARI T^{B&C}**^a**Department of Food Process Engineering, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu, India**^b**Department of Food and Nutrition, BioNanocomposite Research Center, Kyung Hee University, Seoul 02447, Republic of Korea**^c**Department of Soil Science and Agricultural Chemistry, ADAC & RI, Tamil Nadu Agricultural University, Trichy, Tamil Nadu**

Lignin is a naturally occurring, renewable, non-toxic polymer that is abundant in plant cell walls. Because of its complexity and quantity, it is a viable precursor for carbon quantum dots (CQDs). Lignin is derived to synthesise CQD allows for the development of intelligent packaging that monitors and indicates food freshness, spoilage, or contamination, thus ensuring consumer safety and confidence. This work makes a substantial contribution to the advancement of quick, efficient, and sustainable techniques for determining the freshness of food. This study will also open up opportunities to utilize the lignin rich residues with the effective and sustainable substitutes for traditional techniques, completely changing the food preservation sector. Carbon quantum dots from lignin was prepared at different temperatures with different concentrations. Further lignin-based CQD was characterized for their **fluorescence ability by UV-vis spectroscopy and fluorescence spectroscopy** and Antimicrobial and antioxidant activities. The results revealed that Carbon quantum dots derived from lignin showed high **fluorescence activity and good antimicrobial activity. Also recorded 100 per cent antioxidant activity when compared with control.** The synthesized carbon quantum dots were used for film fabrication. The chemical composition, structural morphology, and surface functional groups of the fabricated Ch/Gel, Ch/Gel-CD1%, Ch/Gel-CD2%, and Ch/Gel-CD3% films were characterized by FE-SEM, FTIR, XPS, TGA. Among them, film made from Ch/Gel-CD3% showed highest antimicrobial and antioxidant activities. At an excitation wavelength of 360 nm, film exhibited a strong fluorescent peak in the 300–650 nm range. TEM images were recorded to determine the size distribution of the synthesized CD and revealed that the GT-CD were spherical and monodisperse with a size distribution below 10 nm (Roy et al., 2021). Vegetables like tomato packaged with the CD-added functional film reduced bacterial growth and maintained color quality and can be used in active packaging applications to maintain food quality, ensure food safety, and extend the shelf life of packaged foods.

COMPARATIVE STUDY OF SELECTED CHEMICALS IN THE MANAGEMENT OF FRUIT ROT OF PUMPKIN**RAVINA AND SHASHI TIWARI****Ph.D. Research Scholar, Department of Plant Pathology, Swami Keshwanand Rajasthan Agricultural University, Beechwal, Bikaner, Rajasthan, India**

Pumpkin (*Cucurbita moschata* Duch) is a major global economic crop of the family Cucurbitaceae. Among fungal disease, fruit rot of pumpkin caused by *Colletotrichum gloeosporioides* is the most important disease of pumpkin. A trial was conducted to evaluate the comparative study of selected chemicals with neem oil on fruit rot (*Colletotrichum gloeosporioides*) of pumpkin during Kharif season 2022. The experiment was done using RBD (Randomized Block Design) with three replications with seven treatments viz., Captan + Neem oil, Carbendiazim + Neem oil, Fosetyl- Al + Neem oil, Tebuconazole + Neem oil, Hexaconazole + Neem oil, Neem oil and control. Among all the treatments used in experiment were found effective to varying extent. All the treatment statistically significant over control but Fosetyl-Al + Neem oil was most statistically significant.

Keywords: - *Colletotrichum gloeosporioides*, Fosetyl- Al, Fruit rot, Neem oil, Pumpkin.

EFFECT OF NUTRITION EDUCATION IN REDUCING RISKS AND INCIDENCES OF HEART FAILURE IN MAHENDRAGARH DISTRICT OF HARYANA, INDIA**RAVEENA AND URVASHI NANDAL****Department of Foods and Nutrition, I.C. College of Home Science****Chaudhary Charan Singh Haryana Agricultural University, Hisar (Haryana), India.**

This study was conducted on middle aged (minimum age 40 years) male and female population of Mahendragarh district, Haryana. All of the subjects n=160 had some type of cardiac health issue. The study population was equally divided into experimental and control group, n=80 in each category. Nutritional counseling was imparted at 0 day, 30th day and 60th day. There was observed a significant enhancement in the study subjects after the end of each counseling session. This study results support that informative nutritional counseling can be an effective tool in bringing health and heart related awareness among general population irrespective of their gender/age/class/educational status. And such tools can be an effective means to save millions of lives of people, eliminate burden on the health care system of the country, can make people actually wealthy (both financially – less expenditure on medical lab tests and surgical procedures carried out in case of heart blockage/attack; and physically- a healthy heart will lead to a healthy body). Overall, it can be said that it can add years of health and wellness in life of all (normally healthy, at risk, heart patients).

Keywords: Heart health, nutritional counseling, awareness, healthy lifestyle, knowledge gain.**Large CARDAMOM: AN OVERVIEW OF ITS PRODUCTION, PROCESSING AND ECONOMIC ASPECTS IN THE GREATER HIMALAYAN REGION****ROBIN SUBBA^{1*} RAKESH KUMAR RAIGAR¹, AND THAMERIDUS B. MARAK²**¹Department of Processing and Food Engineering, CAEPHT, CAU, Ranipool- 737135²Department of Agricultural Engineering, Assam University, Silchar-788011

The Greater Himalayan region is renowned for its unique spices, particularly black cardamom, which is produced in Nepal (53%), India (37%), and Bhutan (11%). The spice, known as the "Black Gold" of the Eastern Himalayas, gains value and aroma through a revolutionary curing process. Traditional post-harvest curing techniques, such as bhatti systems, have limitations due to exposure to smoke and temperature regulation. Innovative systems like ICAR's improved bhatti, gasifiers, mechanical trolley systems, portable curing chambers, and solar dryers have been developed. However, farmers have not widely adopted these systems due to high installation costs and concerns about flavour development. Black cardamom's antioxidant, immunomodulatory, and anticancer properties make it popular in traditional Chinese, Unani, and Ayurvedic medicine. Its therapeutic properties, which are associated with essential oils high in 1,8-cineole, have been the subject of several pharmacological investigations, underscoring its significance in medicine. Further research is needed to develop affordable curing technologies that not only yield high-quality products but also boost local farmers' income.

ASSESSMENT OF OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH) VAR. 'KASHI KRANTI' IN MUZAFFARPUR DISTRICT OF BIHAR**ROHIT MAURYA*, M.L. MEENA¹, SALONI KUMARI²*****Subject Matter Specialist, ¹Senior Scientist & Head, Krishi Vigyan Kendra Turki, Muzaffarpur, ²M.Sc. Scholer, EECM, DRPCAUPusa Samastipur, Bihar**

The major constraint for the low productivity of okra in the Muzaffarpur District of Bihar is the non-adoption of a recommended package of practices and an improved high-yielding variety. To replace this old technology, high-yielding okra var. 'Kashi Kranti' was conducted in the field of 20 farmers by Krishi Vigyan Kendra, Turki Muzaffarpur RPCAU Pusa, Samastipur during the pre-kharif seasons of 2019 and 2020. The demonstration used the recommended package of practices. An average yield of okra in ranged from 135.70 to 140.0 q/ha, whereas in local practices 80.80 and 85.88 q/ha during the year 2019 and 2020, respectively. A 67.94% (year 2019) and 63.46% (year 2020) increase in yield was recorded compared to local farmers. Similarly, the extension gap was also noticed at 54.90 and 55.00 q/ha during 2019 and 2020, respectively. **Keywords:** Okra, FLD, the extension gap, technology gap, technology index

Keywords: Okra, FLD, the extension gap, technology gap, technology index**EXPLORING ERGONOMIC HAZARDS: MUSCULOSKELETAL DISCOMFORTS OF HANDLOOM WEAVERS*****¹RUPANAGUDI UNESHA FAREQ, ²SEEMA KWATRA AND ³V.VIJAYA LAKSHMI*****¹Rupanagudi Unesha Fareq, PhD Scholar, Department of Resource Management and Consumer Sciences, College of Community Science, GB Pant University of Agriculture and Technology, Pantnagar, Uttarakhand****²Professor, Department of Resource Management and Consumer Sciences, College of Community Science, GB Pant University of Agriculture and Technology, Pantnagar, Uttarakhand.****³Professor, Department of Resource Management and Consumer Sciences, College of Community Science, Professor Jaya Shankar Telangana State Agricultural University, Hyderabad, Telangana.**

The handloom industry in India accounts for 15% of all textile manufacturing sector. The most prevalent occupational health issues among workers in any industry of both developed and developing nations are work-related musculoskeletal disorders (WMSDs). The prevention of WMSDs and the improvement of working conditions in any industry will have a significant impact on enhancing and maintaining people's quality of life and improving efficiency. The study aimed to evaluate the work-related Musculoskeletal discomfort hazards of handloom

weavers. An exploratory research design was adopted to collect the data for the study. The study was conducted in the state of Andhra Pradesh. A total sample of 120 handloom weavers working on the Pit loom were purposively selected for the study. NIOSH Work-related musculoskeletal discomfort hazard identification analysis was used to assess the WMSD hazards of weavers. The responses were collected in terms of never, sometimes and usually. The responses of weavers were kept under the category of “never” when they were not exposed to the condition. Similarly, when the weavers were exposed to the condition less than three times daily then they were fallen under the category of “sometimes”. When the weavers were exposed to the condition more than three times then it was categorized under “usually”. The results of the study revealed that all the weavers reported that usually performed tasks are externally paced by exerting force with their hands using hand tools. Cent per cent of the handloom weavers reported that they never work in standing posture continuously for a period of more than 30 minutes. Instead, the weaving task performed by weavers makes them sit for a period of more than 30 minutes without the opportunity to stand or move around freely. It was observed that none of the weavers (100%) work on kneeling position. The weavers reported that they usually have to perform activities with hands raised above shoulder height, perform activity usually bending or twisting the waist, Cent per cent of weavers reported that they usually are exposed to vibration. It was reported that sometimes weavers have to lift or lower or carry large objects that cannot be close to the body. The study concluded that most of the weavers performing activities using pit loom have a risk of WMSDs as they do not follow ergonomic principles and postures.

Keywords: Handloom, Pitloom, Weavers, WMSD and Ergonomics

FORMULATION AND EVALUATION OF POLY HERBAL ANTIBACTERIAL SOAP VIA UTILIZING A VARIETY OF HERBAL EXTRACTS IN PREVENTION AND REDUCTION OF ACNE IN HEALTHY ADULTS

SACHIN RAWAT

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Plants with healing properties have long been utilized as traditional remedies. Extracts derived from the leaves, stems, and roots of various medicinal plants have been traditionally used to naturally treat acne vulgaris. This current research on creating an herbal soap that includes *Ecilipta alba*, *Hemidesmus indicus*, *Swertia Chirayita*, *Euphorbia hirta*, *Coscinum Fenestratum*, *Symplocos racemosa*, *Acacia Nilotca*, *Rosmarium Officinalis*, *Tephrosia purpurea*, *Lavandula Latifolia*, were tested for antimicrobial activities against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, *Propionibacterium acnes*, *Streptococcus mutans* by disc diffusion and broth dilution methods followed with the Minimal inhibitory concentration to inhibit the growth of microorganisms. The findings revealed that these plants which were selected for the study may be a promising antioxidant source with antibacterial and free radical scavenging properties that will be helpful for the creation of polyherbal soap that treat acne. The purpose of this research is to create a poly herbal soap for acne reduction. Consequently, the study concludes that the developed poly herbal soap is suitable for both cleansing and beautifying purposes

IDENTIFICATION OF TURCICUM LEAF BLIGHT RESISTANT AND DROUGHT TOLERANT INBRED LINES IN MAIZE

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Maize is one of the important food crops in the world after rice and wheat. Although it is cultivated in various environments in tropical and temperate countries, maize is susceptible to several diseases, pests, and abiotic stresses, more specifically the moisture stress condition. Among the diseases, Turcicum leaf blight is one of the major diseases that can devastate the crop yields just like drought stress. Therefore, to develop the maize hybrids resistant to Turcicum leaf blight and tolerant to drought events, screening the available germplasm across locations, seasons and environments is the prerequisite to identify stable parental lines. To address this, we screened a set of 24 inbred lines for a period of four years from 2019 to 2023 under epiphytotic condition for identifying the inbred lines resistant to Turcicum leaf blight. Similarly, we screened a set 20 inbred lines under optimum irrigation and moisture stress condition at four locations. Based on the results, we identified two lines GI 707 and GI 751 as resistant genotypes for the Turcicum leaf blight, because these lines manifested consistent performance against the disease in all the four environments (years) which were on par with the resistant check CI-4. Similarly, we identified two lines GI 755 and GI 722 as drought tolerant genotypes as they performed exceptionally well in all the four locations with higher mean grain yield under severe moisture stress condition with minimum yield reduction compared to that of drought tolerant check CML 580. These lines could potentially serve as the donors for Turcicum leaf blight resistance and development of maize hybrids suitable for rain fed ecosystems.

Key words: Maize, Turcicum leaf blight, drought, moisture stress

PERCEPTION OF B.Sc. COMMUNITY SCIENCE DEGREE HOLDERS IN RELATION TO VOCATIONALIZATION OF B.Sc. DEGREE PROGRAM**SALONI KUMARI^{*}, PUNAM KUMARI¹, ROHIT MAURYA²*****M.Sc. Research Scholar, Extension Education & Communication Management, Community Science****¹Professor, Extension Education & Communication Management, Directorate of Extension Education****²Subject Matter Specialist (Horticulture), KVK, Turki Muzaffarpur, Dr. RPCAU, Pusa, Samastipur, Bihar,**

Community Science which was earlier known as Home Science. It also known as Family and Consumer Sciences in some regions, is an interdisciplinary academic discipline that encompasses various aspects of home management, family life, nutrition, child development, textile and clothing, and community living. It is a field of study that aims to improve the quality of life for individuals and families by integrating scientific principles with practical skills. However, over the years, the scope of Community Science has expanded significantly, and it now covers a wide range of topics relevant to both men and women, as well as families and communities. The present study entitled with the general objectives as "Perception of B.Sc. Community Science Degree Holders in Relation to Vocationalization of B.Sc. Degree Program" conducted in 15th Agricultural State or Central Universities of India with three objectives viz. 1) to assess the Knowledge of Students pertaining to content of B.Sc. Community Science; 2) to assess the perception of Students in respect of Vocationalization of B.Sc. degree Program; and 3) to study the relationship between perception of graduates of Community Science with their knowledge of content of B.Sc. Community Science. The M.Sc. Students of College of Community Science of 15 State Agricultural or Central Universities was purposively selected for the study. Vocationalization of B.Sc. Degree Program was independent variable and Perception of B.Sc. Community Science Degree Holders was dependent variable. In this study the Knowledge and perception scale was constructed and standardized to measure the Knowledge and Perception of B.Sc. Community Science Graduates. To obtain pertinent data, Online questionnaire methods were used. Appropriate statistical tools and measurements were used for analysis of data such as Frequency, Percentage, Mean and Correlation. The study revealed that the overall Knowledge of respondents, there are 14% respondents who scored below 174.55, they had a relatively low level of knowledge. The majority of the respondents, 74% of the sample ranging from 174.55 to 230.39 had medium level of knowledge whereas 12% within the range of 230.39 to 300 were demonstrate a higher level of knowledge. The Perception of students in respect of Vocationalization of Community Science education, only 21 % respondents were of the opinion that Community Science education provides Vocations to students for their further career with 16% disagreeing to the fact and 63% percent of the students had no opinion about it. The correlation coefficient between "Knowledge" and "Perception" is 0.572. This value indicates a positive correlation between the two variables, suggesting that as "Knowledge" increases, "Perception" also tends to increase.

Keywords: Home Science, Community Science, Perception, Vocationalization.**GREEN SYNTHESIS OF ZINC NANOPARTICLES USING SELECTED PLANT LEAF EXTRACT AND COMPARATIVE ANALYSIS OF THEIR ANTIMICROBIAL ACTIVITY****SAMIKSHA SINGH AND SWATI^{*}****School of Applied Science and Biotechnology, Shoolini University of Biotechnology & Management Sciences, Bajhol-Solan (HP)**

Green synthesis processes help in reducing the chances of environmental toxification thus, making the environment living worth. Biosynthesis approach has advantages over conventional methods involving chemical agents linked with environmental toxicity. The development of safe and eco-friendly methods for biogenetic processing is now of great interest, due to the simplicity of the processes and versatility. It has received increased attention due to growing need to develop environmentally benign technologies in material synthesis. In this study we use plant extract to synthesize nanoparticles. The nanoparticles were thoroughly characterized and demonstrated significant antimicrobial activity against fungus as well as bacteria (gram positive and gram negative). Further testing for Minimum Inhibitory Concentration (MIC) confirmed their potent antimicrobial properties. These findings suggest that zinc nanoparticles synthesized from plant leaf extract have promising potential as antimicrobial agents.

Key words: Green synthesis, antimicrobial activity, stabilizing agent.**AN ANALYSIS OF AGRIBUSINESS MANAGEMENT AND MARKETING: STRATEGIES FOR SUCCESS****SARIKA BISHNOI^{*}****Ph.D. Research Scholar, Institute of Agri Business Management, Swami Keshwanand Rajasthan Agricultural University, Beechwal, Bikaner, Rajasthan, India**

Agribusiness, as defined by the Food and Agriculture Organization of the United Nations (FAO), includes the supply of agricultural inputs, the production and transformation of agricultural products, and their distribution to final consumers, making it one of the main sources of employment and income worldwide. Given that agriculture is a business, it is imperative to understand who your market is, what they want, and how economic forces will affect your business. This abstract serves as a foundation for further exploration and discussion on strategies to enhance agribusiness management and marketing for a more prosperous and sustainable future. It provides a concise framework for outlining important success techniques. Key management strategies include grasping the full value chain, embracing innovation, and developing strategic alliances. Furthermore, long-term profitability depends on incorporating sustainable practices into management and marketing initiatives. Agribusinesses may overcome obstacles, seize opportunities, and support a more robust and successful agricultural sector by putting these methods into practice. It concludes that agribusiness helps to adjust these strategies into practice, agribusinesses may steer clear of uncertainty, spur innovation, and help ensure a more successful and sustainable future for the agriculture sector and provide boom in agriculture.

Key words: agriculture, business, marketing, management, value chain

NUTRITIONAL IMPORTANCE OF DRUMSTICK (*MORINGA OLEIFERA*)***SHIV BAHADUR****Department of Agronomy, C.S.S.S. P.G. College, Chaudhary Charan Singh University, Meerut, Uttar Pradesh (India)**

The “drumstick tree” or “miracle tree” (*Moringa oleifera*) is well known for its high nutritional value. It grows well in tropical and sub-tropical regions, even on poor soils and it is drought tolerant. It belongs to the family *moringaceae*. It is a small, fast-growing, multipurpose evergreen tree. Drumstick is also known as horseradish tree or drumstick tree (in English), Subhanjana (in Sanskrit), Haritashaaka (in Ayurveda), Saguna (in Hindi) and other local name is munga and sahjan etc. Every part viz. leaves, pod, seed and bark of the drumstick might contain essential properties for human health; hence, it may be one of the crucial nutritional herbs. For many years, the drumstick has been used as traditional medicine. According to the Ayurvedic system of medicine, drumsticks may have potential use and be helpful for various diseases due to their high nutritional value. Its leaves are extremely valuable source of nutrition for people of all ages. It has very high nutritional properties that would be useful as a food supplement. Besides its nutritional and medicinal applications, powder of leaves of has also been used to treat malnutrition in children, pregnant women, and nursing mothers. It's leaves has more iron than spinach, more calcium than milk, more potassium than banana, and more vitamin C than oranges and the protein quality rivals the egg and milk protein. For a long time, it has also been used as traditional medicine for treatment of many diseases. Pods of drumstick are also used for making sambar, mixed vegetable, dal and so many recipes in our country.

RICE PRODUCTION AND MARKETING STRATEGY OF CENTRAL ZONE IN UTTAR PRADESH**SHIV KUMAR¹ AND NITIN KUMAR NAG²**¹**Assistant Professor, Department of Agricultural Economics, J. V. College, Baraut (Baghpat)**²**Research Scholar, Department of Agricultural Economics & Statistics, R.S.M. (P.G.) College, Dhampur, Bijnor (U.P.)**

This study explores the rice production and marketing strategies in the Central Zone of Uttar Pradesh, a key agricultural region in India. It examines the agronomic practices, crop management techniques, and socio-economic factors influencing rice cultivation. The research highlights the role of irrigation facilities, use of high-yield variety seeds, and adoption of modern farming technologies in enhancing productivity. Additionally, it assesses the marketing channels, price mechanisms, and distribution networks that connect farmers with markets. The study also identifies challenges such as fluctuating market prices, inadequate infrastructure, and limited access to credit, offering strategic recommendations to improve the efficiency and profitability of the rice value chain in the region.

Keywords:- Rice production, Marketing strategy, Agronomic practices, High-yield variety seeds, Modern farming technologies, Price mechanisms, Distribution networks and Agricultural challenges,

OPTIMIZATION OF DIFFERENT PROCESSING VARIABLES TO DEVELOP A FRUIT BAR OF GUAVA (*PSIDIUM GUAJAVA* L.) AND SAPOTA (*ACHRAS ZAPOTA* L.)**SHIVANI PATEL¹, RAJNEE SHARMA¹ DEEPAK SINGH¹, REENA NAIR¹, RAJENDRA SINGH THAKUR², CHANDRA SHEKHAR PANDEY¹, T R SHARMA¹ ANKITA SHARMA¹**¹**Department of Horticulture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India**²**Department of Food Technology, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India**

A study was undertaken at the Post-Harvest Laboratory, Department of Horticulture, College of Agriculture, JNKVV Jabalpur (M.P.) in 2022. The objectives were to standardize the processing variables for the fruit bar, evaluate its physicochemical and organoleptic properties and assess its storage stability. The experiment utilized a Completely Randomized Design (CRD) with 15 treatment combinations involving different ratios of guava and sapota pulp (90:10, 80:20, 70:30, 60:40 and 50:50) and varying concentrations of potassium metabisulphite (KMS) (0.5%, 1.0% and 1.5%). Each combination was replicated three times. The fruit bars were stored at room temperature for 45 days and analyses were conducted at intervals of 0, 15, 30 and 45 days. Maximum TSS (76.73), ash content (1.71%) and moisture content (18.76%) were found in the 90% guava:10% sapota pulp + 0.5% KMS treatment. Highest acidity (1.38%), ascorbic acid content (193.81 mg/100g) and non-reducing sugar (64.68%) were reported with 90% guava:10% sapota pulp + 0.5% KMS and 1.0% KMS treatments. Highest total sugar (78.87%) and reducing sugar (15.48%) in the 50% guava:50% sapota pulp + 1.0% KMS treatment. The sensory evaluation, performed by a panel of judges using a 9-point hedonic scale, assessed color, appearance, taste, texture, flavor and overall acceptability. Statistical analyses were conducted at a 5% level of significance. The study observed a gradual decrease in acidity and ascorbic acid with an increase in total sugar and non-reducing sugar as the proportion of sapota pulp increased. The best organoleptic quality and storage stability were found in the 70% guava:30% sapota pulp + 1.0% KMS treatment, with no microbial growth detected over the 45-day storage period. In conclusion, the optimal treatment for preparing guava-sapota mixed fruit bars involved 90% guava:10% sapota pulp with 0.5% KMS, although the best sensory qualities were observed with 70% guava:30% sapota pulp and 1.0% KMS.

Keywords: fruit bar, guava, kms, organoleptic, processing, sapota, storage,

EFFECTS OF GRAPHENE ON ANTHRACENE-CONTAMINATED SOIL OF *TRIGONELLA FOENUM-GRÆCUM***SHRUTI SUMAN*, SONGITA SONOWAL, AND RAM PRASAD******Department of Botany, Mahatma Gandhi Central University, Motihari-845401, Bihar, India**

The long-term use of chemical fertilizers had numerous harmful effects on farmland and has significantly affect agriculture's sustainable development. Graphene, a unique and effective nanomaterial is used in plant-soil applications to improve plant nutrient uptake, reduce chemical fertilizer pollution by relieving inadequate soil nutrient conditions, and enhance soil absorption of nutrient components. We investigated the effects of graphene amendment on soil contaminant, *Trigonella foenum-graecum* growth, and soil physicochemical parameters. Graphene increased adsorption capacity to enhance the efficiency of environmental cleanup processes. In this study, we mainly focus on the phytoremediation of polycyclic aromatic hydrocarbon-contaminated soil (Anthracene) with the help of graphene. Graphene is applied as a soil conditioner to enhance the process of phytoremediation and seedling growth of fenugreek plants and their biomass, morphological and biochemical analysis

Keywords: Phytoremediation; graphene; anthracene; soil contaminant; nutrient uptake**ASSESSING KEY TRAITS INFLUENCING SEED YIELD IN LINSEED (*LINUM USITATISSIMUM* L.) THROUGH PATH COEFFICIENT ANALYSIS****UTTEJ KARLA^{1*}, HEMLATA SHARMA¹, PRADUMAN YADAV², AMIT DADEECH¹, RB DUBEY¹****¹Department of Genetics and Plant Breeding, Maharana Pratap University of Agriculture and Technology, Udaipur 313001, Rajasthan, India****²ICAR-Indian Institute of Oilseeds Research, Rajendranagar, Hyderabad, Telangana, India**

The current experiment was conducted to evaluate path coefficient analysis for yield and yield contributing traits in eighty-seven linseed genotypes. Augmented design was used to investigate the experiment during *rabi* 2022-23. Seeds per capsule, capsules per plant, branches per plant, thousand seed weight and capsule size exhibited positively significant association with single plant yield. Path coefficient analysis recorded that seeds per capsule, branches per plant, capsules per plant, harvest index and thousand seed weight had direct positive effects on single plant yield, implying these traits were major contributors to the seed yield and these traits can be further used in crop improvement programs to develop better yielding linseed varieties.

Key words: Linseed, Correlation, Path coefficient analysis**TRANSBOUNDARY AIR POLLUTANTS: A REVIEW STUDY WITH SPECIAL REFERENCE TO SOUTH EAST ASIA, DETERIORATING NATURAL EXISTENCE****VARUN TOMAR****Department of Zoology, M.M.H. College, Ghaziabad, CCSU, Meerut**

The paper examines the review study of the transboundary pollutants of **South-East Asia**. These pollutants explicitly originate in the specific region of the country but can cause the fatality to the environment of the another country. These pollutants could be the emissions from the transport and the subjects using energy of **sulphur dioxide (SO₂)**, **nitrogen oxide (NO)**, **persistant organic pollutants (POPs)**, **volatile organic compounds (VOCs)**, heavy metals as toxic materials, etc. This issue could be responsible for establishing severe threats to the environment and disorganizing the scale of equilibrium in biodiversity as well. They are creating a excessive peak of perturbation by forming acid rain mutilating ecosystems, exterminating flora, even impacting fauna by creating barriers to migrate. **Climate change** is also becoming the major factor caused by the increment of such precarious transboundary pollutants. The forest fire of the Indo-Bangladesh regions lead the way to long term **implications**. On the other side the enchanting of mineral dust between the region subscribes the accumulation of high particulate encumbering. **Long Range Transport (LRT)** of air pollution is foremost operation of pollution transport to the outlying sites. It is necessary to understand local as well as long range transport of pollution to study the wellsprings of air pollution and also the impacts of such founts. Presently, reviewers stated that, the effect of LRT on rain, climate and aerosols recapitulates the requirement of percentage of transported air pollutants from the other regions while concluding the **tasks** to improve upon quality of air.

Keywords – outh-East Asia, Pollutants, Long Range Transport, Climate change, toxic materials, long term implications, tasks, and air quality.**KINETICS AND ISOTHERM ANALYSIS OF GLYCINE AND SERINE ADSORPTION ONTO ACTIVATED RICE HUSK ASH AS A LOW-COST GREEN ADSORBENTS****VIRENDRA UPADHYAY,¹ SUDHIR KUMAR VERMA****Department of Chemistry, Dayalbagh Educational Institute, Agra-India**

Activated rice husk ash is emerging as a potential green adsorbent for removing various pollutants from wastewater. This study investigated biomass's efficacy as an adsorbent for removing amino acids, namely glycine, and serine. The absorbent was characterized by using various techniques, including XRD, TGA, FESEM, and EDS. The characterization results show that activated rice husk ash had a higher porosity and thermal stability. The higher porosity of activated rice husk ash could be attributed to its porous structure, which enhances its adsorption capacity. The TGA analysis showed that activated rice husk ash has a higher onset temperature of degradation.

Index Terms--, Activated Rice husk ash, Adsorption, Characterization, Amino acids

LEVERAGING ARTIFICIAL INTELLIGENCE IN AGRIBUSINESS: ENHANCING FOOD SECURITY AND MARKET OPERATION EFFICIENCY**VIJAY KUMAR YADAV¹ AND JYOTI SINGH²**¹Department of Management, Delhi Technical Campus, GGSIP University, New Delhi²School of Agricultural Sciences, Shri Venkateshwara University, Gajraula(U.P.)

A significant amount of India's GDP flows from the agriculture industry (18%), which is a vital economic sector. The world's population is rapidly growing and is expected to reach around 9.7 billion by 2050. Hence, there is a more concern about how to meet the increasing demand for food while also ensuring food security and sustainability. In that regard, the implementation of artificial intelligence (AI) in the agri-food sector has the potential application to revolutionize the food industry and also increase sustainability in several ways. In order to improve productivity and streamline processes, this investigates the integration of artificial intelligence (AI) technology within agribusiness. AI offers a viable path to optimize inventory control, customer interaction, predictive analytics, and decision-making processes, among other aspects of shop administration. Agribusiness may enhance inventory forecasting, customize consumer experiences, and optimize pricing strategies by utilizing machine learning algorithms, data analytics, and natural language processing. Furthermore, chat bots and virtual assistants driven by AI provide real-time customer care, increasing client happiness and loyalty. This study may emphasize how recent developments in AI technology have transformed the agri-food sector by improving efficiency, reducing waste and enhancing food safety and quality. AI based technological solutions has enabled the farmers to produce more output with less input and even improved the quality of output and also ensuring faster go-to- market for the yielded crops.

Keywords: Artificial Intelligence, Agribusiness management, Food security, Socio-economic, sustainable agriculture.

CONSEQUENCES OF CLIMATE CHANGE ON CARBON CONTENT IN SOIL**VIPIN KUMAR****Assistant Professor, Department of Agricultural Chemistry, CSSS (P.G.) College, Machhra, Meerut, U.P.**

Initial point of view were that enhanced level of atmospheric carbon dioxide would lead to increased plant productivity coupled with increased carbon sequestration by soil, meaning improved plant growth and soil-plant system may help to compensate increasing atmospheric carbon dioxide. This augmentation in plant growth is termed as carbon dioxide fertilization effect. Although, recent studies indicate carbon dioxide fertilization effect may not be as abundant as initially thought. Rise in ozone because of climate changes may offset carbon dioxide fertilization effect resulting to moderated plant growth under raised carbon dioxide. Also, adverse influence of increased temperature may lay off any carbon dioxide fertilization effect on plant growth that does come about. Nitrogen limits might also unfavorably distress plant growth and the modeling of carbon dynamics point out less carbon sequestration by soil that is affected by nitrogen compared with the expected due to given carbon dioxide fertilization. A long-term experiment in a grasslands ecosystem on high carbon dioxide directed that N and P became preventive aspects within two years, and also restrictive plant biomass react to high carbon dioxide. It is also concluded that the rise in plant productivity was due to soil moisture conditions as opposed to carbon dioxide fertilization effect. Study on decomposition of plant constituents under raised carbon dioxide in atmosphere also postulate that increased carbon dioxide are released during that decomposition. Some researchers also observed that soil organic carbon levels were deteriorating under increased atmospheric carbon dioxide because of enhanced microbial activity. Therefore, raised carbon dioxide levels might not essentially lead to increased soil carbon sequestration, but may instead result in more carbon turnover. Increased temperature is anticipated to have deleterious effect on carbon dissemination to the soil, leading to declines in soil organic carbon and building a positive-feedback in global carbon cycle (increase in temperature leads to increase in carbon dioxide release from soil to atmosphere, which bring about into more increase in temperature) as global temperature rises. Researchers also noticed that soil warming and drying led to about 32% fall in soil carbon over a time period of five year, a much more rapid decline in soil carbon compared with the reductions that have been noticed due to increased tillage in soils of a semi-arid steppe. Modeling study of carbon responses to climate change expected reduction in soil organic carbon from 2.0%–11.5% in North Central United States by 2100 as compared to 1990's status of carbon.

AN ASSESSMENT OF GROUNDWATER QUALITY INDEX IN KOHIMA AND DIMAPUR DISTRICTS, NAGALAND, INDIA**VISAKHONU KUOTSU^{1*}, PRAMOD CHANDRA DIHINGIA², KHAN CHAND³**¹Research Scholar, Department of Agricultural Engineering and Technology, School of Engineering and Technology, Nagaland University, Dimapur, Nagaland, India²Assistant Professor at the Department of Agricultural Engineering and Technology, School of Engineering and Technology, Nagaland University, Dimapur, Nagaland, India³Associate Professor at the Department of Agricultural Engineering, School of Agricultural Sciences, Nagaland University, Medziphema, Nagaland, India

Groundwater is a vital component of our life support system. Groundwater resources are used for industrial purposes and as a valuable means of informing policymakers and the affected user community about the water's quality. Consequently, it becomes an essential aspect in evaluating and administering groundwater. The present study determines the WQI (Water Quality Index) for the year 2020 in Kohima and Dimapur districts. The WQI was calculated by analyzing four parameters, pH, fluoride, electrical conductivity, and nitrate, to assess groundwater quality for drinking purposes in the area. The result reveals that the WQI values of each sample are within the permissible limits and are suitable for drinking purposes.

Keywords: Groundwater, WQI, pH, fluoride, electrical conductivity, nitrate

IMPACT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH, YIELD AND QUALITY ATTRIBUTES OF BRINJAL (*SOLANUM MELONGENA* L.) CV. PANT RITURAJ"**VIRENDRA KUMAR PATEL^{*1}, MUKESH KUMAR², RAJ PANDEY², AND CHANDRABHAN PATEL³**¹Department of Horticulture, S. D. J. P. G. College, Chandeshwar Azamgarh, Uttar Pradesh, India²Department of Horticulture, T.D.P.G. College, Jaunpur, Uttar Pradesh India³Department of Soil Science and Agricultural Chemistry, BAU, Sabour, Bihar, India

The present field experiment was carried out at Agricultural Farm Pilikothi, Jaunpur during *rabi* season of 2018-19. Jaunpur is a district that is situated in middle indo-gangetic plain in eastern Uttar Pradesh at latitude of 25° 44' 05" North and longitudes 82° 41' 07" East and an altitude of 82 meters above mean sea level. The topography of the experimental field was plain. This region lies under 8th Eastern plain zone of Agro Climatic Zone. The experiment was conducted in Randomized Block Design (RBD), with 11 treatments and each replicated thrice. The treatments were T0 (Control (RDF)), T1 (100% NPK (100:50:50)), T2 (75%NPK + 25%FYM + ZnSO₄ + Bo), T3 (75%NPK + 25%VC + ZnSO₄ + Bo), T4 (75%NPK + 25%NC + ZnSO₄ + Bo), T5 (50%NPK + 50%FYM + ZnSO₄ + Bo), T6 (50%NPK + 50%VC + ZnSO₄ + Bo), T7 (50%NPK + 50%NC + ZnSO₄ + Bo), T8 (25%NPK + 75%FYM + ZnSO₄ + Bo) and T9 (25%NPK + 75%VC + ZnSO₄ + Bo) T10 (25%NPK + 75%NC + ZnSO₄ + Bo). Plant height T1 (81.82cm), Number of leaves per plant (90.33) Total number of branches per plant (11.06) Length of leaves (87.55cm) Number of flower(20.66) and fruit (23.11) , Days to first flowering (51.96) and fruiting (64.03), Days to last flowering (110.21) and fruiting(120.19) , Fruit length (11.23cm), Fruit diameter (7.27cm), Fresh weight of fruit (116.85gm), Dry weight of fruit (60.56gm), Fruit yield per plant (2.37kg), Fruit yield per plot (37.71kg), Fruit yield per ha (439.14Q), Fruit Acidity (8.82 mg), Fruit TSS (5.59), Cost of cultivation per ha (Rs43000), Gross monetary return per ha (Rs 658710), Net monetary returns per ha (Rs 600256), B: C ratio (10.26/1).The observations were recorded on growth, yield and quality traits of Brinjal and subjected to statistical analysis. From the present investigation it is found that the treatment T1 growth and T9 yield, T6 Quality, Best performance,

Keyword: Brinjal, Integrated Nutrient Management, growth and yield, quality.**CONSTRAINTS IN ADOPTION OF POLYHOUSE CULTIVATION TECHNOLOGY IN SOUTHERN RAJASTHAN****VISHAL DADHEECH¹, S. S. SISODIA²**¹Research Scholar, ²Professor and Head Department of Extension Education, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan

In order to maintain self-sufficiency in food production, it is imperative to employ efficient technologies capable of enhancing the productivity and sustainability of our primary agricultural systems. Polyhouse technology is one such advanced technology that contributes to the stability of agricultural production. Nevertheless, farmers encounter various challenges when embracing polyhouse technologies. Hence, this current study was initiated with the aim of examining the constraints confronted by farmers when adopting polyhouse technology in the Southern Rajasthan. The study was conducted on 100 farmers of two districts, viz. Bhilwara and Chittorgarh to delineate the constraints in adoption of polyhouse. Data was gathered from individual respondents via personal interviews with the help of structured schedule. To enhance comprehension, all constraints were categorized into sixteen groups. Farmers have faced challenges related to environmental, technical, labour, economic and marketing aspects when attempting to maximize the profitability and sustainability of this technology. the study revealed that 77.00% of the respondents fell into the category of medium level of constraints and the major constraints in rapid adoption of polyhouse technology by both Bhilwara and Chittorgarh districts were high cost of skilled labour, high cost of pesticides, poor poly ethylene (covering material), Lack of availability of high yielding planting material, difficulty in identifying nematode infestation etc.

Keyword: Constraints, Adoption, Polyhouse, vegetable cultivation**CONSERVATION AGRICULTURE: A SUSTAINABLE SOLUTION FOR ADDRESSING GLOBAL CHALLENGES AND ENHANCING SOIL HEALTH****VISHAL KUMAR SINGH¹, SATENDRA KUMAR¹, NEHA KUMAWAT¹ AND SUNEEL KUMAR¹**¹Department of Soil Science, S.V.P. University of Agriculture & Technology, Meerut, UP

Food, water, energy, environment, and poverty are the major five problems humanity will face over the next 50 years. These are directly related to soil health. About 1.2 billion hectares of the world's land area suffer moderate to severe soil degradation. The use of heavy machinery in conventional tillage, decreased infiltration rates, hydraulic conductivity, air permeability, levels of organic matter, water storage, increased tillage erosion, and soil loss are the main long-term effects of conventional agriculture that lead to soil compaction, primarily subsurface compaction. Conservation Agriculture is a farming system that emphasizes plant species diversity, maintenance of a permanent soil cover, and minimal soil disturbance, or no tillage. It improves natural biological processes both above and below the ground, which boosts biodiversity and increases the efficiency of water and fertilizer utilization, leading to better and more consistent crop output. The physical properties of soil were enhanced by CA techniques, leading to improvements in bulk density, soil aggregation, water infiltration, and penetration resistance. Likewise, it has also been found that CA improved the chemical properties of the soil, such as the amount of macro- and micronutrients that were available. Under the CA system, the biochemical characteristics of the soil, such as microbial biomass carbon (MBC) and enzymatic activities like dehydrogenase were greatly enhanced. By adapting to and mitigating change and assisting in improved nutrient cycling, CA has positive effects on the economy of farmers, agronomically, the environment, and society.

Key words – Soil health, conventional agriculture, conservation agriculture, nutrient cycling

PLASTIC WASTE FOR ELECTRICITY POWER GENERATION**VISHAL SHARMA, TANISHKA BHATIA, PRIYA CHAUDHARY, VANSHIKA CHAUDHARY, INDU SHARMA****NIMS Institute of Allied Medical Science and Technology (NIAMST), NIMS Institute of Engineering and Technology (NIET), NIMS University, Rajasthan, Jaipur, Rajasthan, India**

Now a days, the putrescible waste is the substantial problem because any enzyme or microorganism have not quiescent to degrade it. Putrescible waste encompasses plastic, thermacol, DDT etc. It cannot be degraded because plastic are synthetic polymer made up of long chain of monomers which are known for their durability, versatility and light weight properties. They are the amorphous solid having irregular structure or semi-crystalline nature. Due to all these properties of plastic it is not competent to degrade readily. So we develop a method by which we can produce electricity directly from this putrescible waste. Generally, we work on the heat energy produced by the combustion of these putrescible waste which is used to run turbine and produce electricity by using high pressure of water vapours. The remaining gaseous by-product which are produced from the combustion of these putrescible waste, are hazardous for environment. These detrimental products are CO, SO₂, NO₂ etc. These harmful gases are treated by numerous methods like deep filtration, adsorption method, adequate ventilation, carbon monoxide detector, install a catalytic convertor etc. The foremost motive to minimize the production of colloidal particle which are very small particle having size between 10 nm and several micron and cause very threatening respiratory disease which are fatal for living organisms. The principal purpose is to manage putrescible waste in a way which is of environmental benefit and to reduce dependency of human on natural resources.

Keywords: Putrescible waste, Plastic waste, Energy, Electricity**INFLUENCE OF NPK ON YIELD AND ITS ATTRIBUTES OF CHILLI (*CAPSIDUM ANNUUM* L.)****VISHAL SINGH¹, ROHIT RAWAT², NIRAJ KUMAR PRAJAPATI¹ AND JASWANT PRAJAPATI³**¹Dept. of Horticulture, Babasaheb Bhimrao Ambedkar University, Lucknow, (U.P.)²Dept. of Vegetable Science, CSA University of Agriculture & Technology, Kanpur, (U.P.)³Dept. of Vegetable Science, Punjab Agriculture University, Ludhiana, Punjab

An experiment was conducted on the topic Influence of NPK on yield and its attributes of chilli (*Capsicum annum* L.) cv. Eagle during winter season 2021-22 at the Research Field of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The observations were recorded on the parameters i.e., Fruit length (cm), Average Fruit weight (g), No. of fruits per plant, Yield per plant (Kg), Yield per hectare (tons), Fruit diameter (mm). In order to achieve maximum production without lowering the quality of the chilli. Eight treatments i.e., T₀ (120:80:80), T₁ (140:70:80), T₂ (120:80:80), T₃ (140:90:80), T₄ (100:70:80), T₅ (110:80:80), T₆ (120:90:80) T₇ (130:60:80) of NPK were used in the experiment, which was set up in a Randomized Block Design and triple duplicated. Results demonstrates that the treatment (T₃) i.e., 140:90:80 NPK combination gives optimum results in terms of maximum number of fruits per plant (47.33), Fruit length (10.66 cm), Average Fruit weight (5.63 g), Yield per plant (0.64 Kg), Fruit girth (4 cm), Yield (23.95 t/ha). The level of NPK enhanced the yield, improve the input-use efficiency by the crop and can certainly lower down the expenditure on costly fertilizers to the farmers.

Keywords: NPK, factors, yield, morphological traits, fruit.**IMPACT OF CLIMATE CHANGE ON SOCIO-ECONOMICAL FACTORS OF FISHERIES SECTOR****VISHMAYA J, DEPARTMENT OF FISHERIES EXTENSION****Faculty of Fishery Sciences, West Bengal University of Animal & Fishery Sciences****Budherhat Road, Pancha Sayar, Kolkata, West Bengal**

Climate change poses a severe threat to aquatic life, including fish populations. Climate variability and change are predicted to impact on coastal and marine small-scale fisheries and dependent communities. Cyclones and associated floods may exert tremendous impacts on fishing assets, infrastructure and ultimately on the livelihoods of fishing communities. More frequent and intensified cyclones can further reduce fishing days in addition to it sea level rise and land erosion may make the current living areas of fishing communities unsuitable and may result in their displacement or may leave them in a more vulnerable situation. Research conducted in recent years has warned about the impending impacts, which are now becoming evident. The changing climate is disrupting fish habitats, environments, and food sources, leading to a decline in fish populations. This decline has far-reaching consequences, particularly for those dependent on the fishing industry. Without adaptation and mitigation measures, the livelihoods of fishermen and the economic viability of the industry are at risk. climate changing will mainly affect the economic sector. Addressing climate change is crucial to safeguarding the social and economic well-being of fishing communities. Therefore, urgent action is needed to mitigate the effects of climate change on the fisheries sector

Keywords: Socio-economic; Fisheries; Climate change; Adaptation;

STUDY OF APPLICATION OF AI IN FOOD PROCESSING INDUSTRY**VISHNU PRIYA*, VIPUL CHAUDHARY, V.K. SINGH, SHASHANK VERMA,****Mahamaya Collage of Agricultural Engineering and Technology Akbarpur, Ambedkar Nagar U. P., (A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya, U.P.)**

Artificial Intelligence (AI) is revolutionizing the food processing industry by introducing innovative solutions that enhance efficiency, quality, and safety. This paper explores the diverse applications of AI in food processing, including predictive analytics for supply chain optimization, machine learning algorithms for quality control, and robotics for automated production lines. AI-driven technologies such as computer vision for product inspection, natural language processing for consumer feedback analysis, and IOT integration for real-time monitoring are also discussed. Additionally, the role of AI in ensuring food safety through contamination detection and traceability is examined. The integration of AI enables real-time monitoring, reduces waste, and ensures compliance with regulatory standards, ultimately leading to improved operational performance and customer satisfaction. AI applications in food processing not only streamline operations but also contribute to sustainability by optimizing resource use and minimizing environmental impact. This review provides a comprehensive overview of current AI applications, highlighting their impact on various stages of food processing, from raw material procurement to packaging and distribution. Furthermore, it offers insights into future trends, potential developments, and the challenges associated with implementing AI in the industry, including data privacy concerns and the need for specialized workforce training. By examining these facets, the paper underscores the transformative potential of AI in driving innovation and efficiency in the food processing sector.

Keywords: Artificial Intelligence, AI applications in food processing, analytics for supply chain optimization, machine learning algorithms for quality control.

STUDIES ON AVIFAUNAL DIVERSITY AND HUMAN IMPACT ON SACRED GROVES OF RADHANAGARI WILDLIFE SANCTUARY, KOLHAPUR DISTRICT, MAHARASHTRA (INDIA)**VISHWAJEET LAGADE¹, SANTHOS MADHALE², ATUL KAMBLE³, PRAKASH PAWAR⁴, SANDIP GORSHETWAR⁵ AND SWAPNAJA LAGADE⁶**¹⁻⁵**Department of Zoology, Y. P. S. C., Solankur, Kolhapur, (Maharashtra), India**²**Department of Botany, Y. P. S. C., Solankur, Kolhapur, (Maharashtra), India**³⁻⁵**Department of Chemistry, Y. P. S. C., Solankur, Kolhapur, (Maharashtra), India**⁶**Department of Zoology, R. C. S. C, Kolhapur (Maharashtra), India**

Sacred groves are the pockets of forest that are collectively preserved due to cultural or religious convictions. This forest landscapes are dynamic, varied, and unspoiled environments that support endangered and endemic species. The present investigation was undertaken to explore the avian diversity, abundance and IUCN status and feeding guilds of four sacred groves such as Wakighol, Bhairawnath, Hasane and Bhairee of Radhanagari Wildlife Sanctuary, Kolhapur district Maharashtra from September 2022 to May, 2023. We also tried to estimate the driving factors which impacts on sacred groves and the avian diversity. A total 133 birds species were reported from the four sacred groves belonging to 18 orders and 46 families. Passeriformes is the single order of birds was reported highest count of bird species (73) compared to the other orders. Birds diversity was reported significant higher ($p < 0.05$) in Hasane followed by Wakighol, Bhairawnath and Bhairee sacred groves respectively. Finding of present study revealed that the sacred groves are natural landscapes for large number of resident bird species (115) and long distant migratory birds (21). In terms of IUCN status, five bird species were classified as Near Threatening and Vulnerable each while the remaining 126 species were as Least Concern. The Insectivorous birds were dominated (70) over Frugivorous (16) followed by Omnivorous, Granivorous, Carnivorous and Piscivorous respectively. According to the occurrence status, greatest count of birds (46) fell into the moderate category, which was followed by the abundant (39), lesser (27) and highly abundant (24) categories. The obtained data shows that sacred groves are extremely diverse environments for untamed avian species. However, now days the developmental activities, encroachment and human interference are increased significantly in relatively sacred groves. Consequently, these activities are responsible for deteriorating the ecological importance of fragile forest landscapes. In light of this research, we would like to propose that in order to protect the priceless and dynamic ecosystem, the illegal human activities should be prohibited and effective conservative strategies strictly executed.

Key words: Avifaunal diversity, IUCN status, Feeding guilds, Sacred groves, Human activities, Radhanagari Wildlife Sanctuary.

COMPARATIVE EFFICACY OF DIFFERENT RECOMMENDED INSECTICIDES AGAINST LEAF FOLDER OF PADDY.**VP WAGH¹, DR. VJ TAMBE², AA PAWAR.³****Department of Agricultural Entomology, College of Agriculture Nagpur**

The present investigation entitled "Comparative efficacy of different recommended insecticides against leaf folder of paddy" was conducted at the field of Anand Niketan College of Agriculture, Warora Dist. Chandrapur in Randomized Block Design with seven treatments and three replications. The insecticidal treatments viz., were, carbosulfan 25% EC, Acephate 75% SP, Cartap hydrochloride 50% SP, Fipronil 5% SC, Thiamethoxam 25% WG, Bifenthrin 10% EC, including control were used during kharif 2021. A total of three applications were applied at an interval of 15 days. The application of Bifenthrin 10 EC (1.36%) and was followed by Fipronil 5% SC (1.39%) proved effective in minimizing the Leaf folder, Acephate 75 SP (1.44%), Thiamethoxam 25% WG (1.5%), carbosulfan 25 EC (1.50%), Cartap hydrochloride 50 (1.55%) and control (1.61%) respectively

(Keywords: Paddy, insecticide, leaf folder)

STUDIES ON CHARACTER ASSOCIATION AND PATH ANALYSIS OF YIELD AND YIELD COMPONENTS IN BRINJAL (*SOLANUM MELONGENA* L.) GENOTYPES

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The investigation was conducted at Department of Horticulture, College of Agriculture, Vijayapur. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. Character association and path analysis in seventeen genotypes of brinjal were studied for 15 important characters. The correlation studies revealed that total yield per plant had significantly and positive association with plant height (0.504), plant spread (0.506), and number of primary branches (0.742), stem girth (0.746) at 90 days after transplanting, fruit length (0.313), fruit diameter (0.324) and fruit weight (0.825). While negatively and significantly associated with days to first flowering (-0.429), days to 50 % flowering (-0.362), days to first fruit maturity (-0.344), fruit length diameter ratio (-0.282) and number of fruits per cluster (-0.563) at both genotypic and phenotypic level. Narrow differences between the genotypic and phenotypic correlation coefficients were observed for various traits in the present findings. This indicates the lesser influence of the environment in the expression of these traits and presence of strong inherent association among the traits. Path analysis studies revealed that significant positive association at genotypic level among the traits viz., plant height (0.338), number of primary branches (0.680) at 90 days after transplanting, days to first flowering (0.706), days to first fruit maturity (0.562), fruit diameter (0.429), average fruit weight (1.22), number of fruits per cluster (0.198), number of fruits per plant (0.453) and phenol content in fruits (0.072) had exhibited true association with direct effect on yield per plant. The direct selection for these traits would be rewarding for improvement in the total yield per plant.

Keywords: Brinjal, Character association, Genotypes and Path analysis

ADDRESSING MICRONUTRIENT DEFICIENCIES IN INDIAN SOIL: CHALLENGES AND STRATEGIES

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Micronutrient deficiencies in Indian soil pose significant challenges to agricultural sustainability, food security, and human health. This paper provides a comprehensive assessment of micronutrient deficiencies, focusing on their causes, consequences, and mitigation strategies. In India, alkaline soils prevalent in regions like Punjab and Haryana are particularly susceptible to deficiencies of zinc and iron due to reduced solubility at higher pH levels. Intensive agricultural practices, including monoculture cropping and imbalanced fertilizer use, exacerbate deficiencies by disrupting soil nutrient cycles. Soil erosion, leaching, and climate change further compound the problem by accelerating nutrient loss and soil degradation. The consequences of micronutrient deficiencies extend beyond reduced crop yields to encompass poor crop quality and compromised human health. Hidden hunger and malnutrition are prevalent, particularly among vulnerable populations. Mitigation strategies include balanced fertilizer application, soil amendments, biofortification, precision agriculture, capacity building, and policy support. Case studies highlight regional variations in micronutrient deficiencies and underscore the importance of tailored interventions. Collaboration between stakeholders is crucial for driving innovation and scaling up interventions. Aligning policies with national nutrition goals and sustainable development objectives is essential for promoting holistic approaches. By adopting a comprehensive and integrated approach, India can build resilience to nutrient deficiencies, enhance agricultural productivity, and improve the well-being of its population.

IMPACT OF SOWING TIMING AND PLANT SPACING ON YIELD AND SEED QUALITY OF DHAINCHA (*SESBANIA ACULEATA*) IN THE POST-RAINY SEASON"

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A field experiment was conducted during the post-rainy seasons of 2021 and 2022 at IGKV, Raipur, Chhattisgarh. The objective was to evaluate the effect of sowing time and spacing on the yield and seed quality of dhaincha (*Sesbania aculeata*) in sandy clay loam soil. The experiment with four sowing dates (10th, 20th, 30th January and 9th February) as main plots and four spacing treatments (30 x 10 cm, 30 x 20 cm, 45 x 10 cm, and 45 x 20 cm) as subplots, replicated with three times. Results indicated that sowing on 20th January (D2) significantly enhanced yield-related traits, including the total number of pods per plant, number of seeds per pod, pod length, and test weight. This sowing date also achieved the highest seed yield, straw yield, quantity of graded seeds, undersized seeds, and germination percentage. Additionally, D2 resulted in the highest gross return, net return, and benefit-cost ratio. Regarding spacing, the 45 x 20 cm (S4) treatment yielded the highest number of pods per plant, number of seeds per pod, pod length, and test weight. However, the 30 x 20 cm (S2) spacing was superior for seed yield, straw yield, graded seeds, undersized seeds, and germination percentage, also providing the highest economic returns. The interaction effects revealed that the maximum number of pods per plant was achieved with sowing on 20th January (D2) combined with the 45 x 20 cm (S4) spacing. Although other yield attributes did not show significant interaction effects, the optimal combination for seed yield, straw yield, graded seeds, and germination percentage was 20th January (D2) with 30 x 20 cm (S2) spacing. These findings suggest that for optimal yield and seed quality in dhaincha, sowing on 20th January with a spacing of 30 x 20 cm is recommended.

COMPARATIVE EVALUATION OF TOXICITY OF TWO INSECT GROWTH REGULATORS NOVALURON AND CHLORFLUAZURON ON BIOMASS ACCUMULATION IN ANTIGSARTRA CATALAUNALIS DUPONCHEL. PUPAE AND ADULT

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The insect growth regulators are in vogue for many time because of their specific mode of action. Crop protection has become an indispensable component in the latest technology of crop production and much emphasis has been given to chemical insecticides for the control of noxious crop pests. This has posed a burning and alarming situation due to the indiscriminate use of chemicals on various agricultural commodities, resulting resistance in insects to insecticides and adverse effects on beneficial insects and human beings through food chain. The bio efficacy of insect growth regulators is generally manifested during ecdysis as it disturbs the process of chitin deposition, thus effecting growth and development of the insects. It also results in failure to feed, due to displacement of mandibles, maxillae and labrum and blockage of the gut. These insect growth regulators also produce delayed symptoms, in which the adults fail to escape from pupal skin and therefore cannot fly, feed and mate. These insecticides also induce the fertility and fecundity as observed by many entomologists. The study highlights the comparative effect of two insect growth regulators selected on biomass index of experimental insect.

Key words: Insect growth regulators, Novaluron, Chlorfluzuron, Antigsartra catalaunalis, Biomass

EFFECT OF ZINC APPLICATIONS ON ACUUMULATION OF ZINC CONCENTRATION IN ROOT, SHOOT, LEAF, HUSK RICE, BROWN RICE AND MILLING RICE IN KHARIF RICE (ORYZA SATIVA L.) GENOTYPES

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A field experiment was carried out at college farm, Navsari Agricultural University, Navsari, during *kharif* seasons of 2017 and 2018. The experiment was laid out in a randomized block design with factorial concept and replicated thrice. The experiment consisted of three varieties viz., IET-25450 (V₁), BPT-5204 (V₂) and IET-24766 (V₃), three soil base zinc application (S₁) control (00 kg ZnSO₄ ha⁻¹), (S₂) 10 kg ZnSO₄ ha⁻¹ at the time of transplanting and (S₃) 20 kg ZnSO₄ ha⁻¹ at the time of transplanting and two foliar Zn application (F₁) 0 % Zn EDTA and (F₂) 1 % Zn EDTA spray at tillering and grain filling stage. Among the varieties, IET-25450 gave significantly higher Zinc concentration in root, shoot, leaf, husk rice, brown rice and milling rice followed by BPT-5204 and IET-24766 and soil base zinc application of 20 kg ZnSO₄ ha⁻¹ at the time of transplanting as well as foliar zinc application of 1 % Zn EDTA spray at tillering and grain filling stage resulted in higher values in Zinc concentration in root, shoot, leaf, husk rice, brown rice and milling rice during in pooled analysis.

Keywords: Rice, Zn EDTA, varieties, transplanting and foliar

BEYOND BORDERS: HARNESSING DNA FINGERPRINTING FOR GLOBAL JUSTICE

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DNA fingerprinting assessment is a pivotal technique used across various fields to identify individuals and study genetic relationships. The objective of DNA fingerprinting is to analyze the unique genetic makeup of individuals, enabling accurate identification and differentiation. The hypothesis underlying DNA fingerprinting posits that each person possesses distinct DNA sequences or variations that can be utilized to establish individual identity. The methods involved in DNA fingerprinting encompass several key steps. Firstly, samples containing DNA, such as blood, saliva, or tissue, are collected. Subsequently, DNA is extracted from the samples and amplified using Polymerase Chain Reaction (PCR). The amplified DNA fragments are then separated based on size through gel electrophoresis, generating a DNA profile. Comparative analysis of these profiles allows for the identification of similarities and differences, facilitating the interpretation of genetic relatedness or identity among individuals. The results of DNA fingerprinting assessment yield unique genetic profiles for each individual, serving as a reliable tool for a multitude of applications. In forensic science, DNA fingerprinting aids in criminal investigations by matching suspects to crime scene evidence. It also plays a crucial role in establishing paternity or maternity in legal cases and familial relationships. Moreover, DNA fingerprinting is instrumental in genetic research, population studies, and medical diagnostics, contributing to advancements in various fields. Implementation of DNA fingerprinting techniques spans across diverse sectors, including forensic laboratories, paternity testing centres, research institutions, and medical facilities worldwide. Its widespread adoption underscores its significance in enhancing accuracy, efficiency, and reliability in identifying individuals and elucidating genetic relationships. Overall, DNA fingerprinting assessment stands as a cornerstone in modern genetics, revolutionizing various aspects of human identification, criminal justice, and scientific research.

Key words: DNA fingerprinting, Genetic makeup, PCR (Polymerase Chain Reaction), Gel electrophoresis, Forensic science, Genetic profiles.

COMPREHENSIVE BIOINFORMATIC ANALYSIS OF OXALATE METABOLISM GENES IN *COLOCASIA ESCULENTA* L. *VIVEKANANDA BEHERA¹, BIRUDUKOTA MONIKA¹, SUBIR DUTTA¹, AVIJIT KUNDU¹ AND RUPSANATAN MANDAL^{1,2}

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This study presents a detailed bioinformatic exploration of key genes involved in oxalate metabolism within *Colocasia esculenta* L.. Through data mining from the NCBI database, genes including Glycolate oxidase (GLO), Oxaloacetate acetyl hydrolase (OXAC), Oxalyl CoA synthetase (AAE3), Oxalate decarboxylase (OXDC), and Oxalate Oxidase (OXO) were identified. Protein sequences from Taro, Yam, and Arabidopsis were acquired, and domain identification was performed. A BLASTP query was conducted against *Colocasia esculenta* L. to explore evolutionary relationships. Subsequently, non-redundant protein sequences, genomic sequences, CDS, and promoter sequences were downloaded. Multiple sequence alignments and phylogenetic tree construction were carried out using ClustalW and Mega 5.0, respectively, to elucidate evolutionary divergence and relatedness among the studied genes. Conserved motif prediction was performed using the MEME suite, and subcellular localization was predicted via Wolf PSORT. Furthermore, cis-element analysis was conducted using the PlantCARE database to uncover potential regulatory elements in the promoter regions of these genes. Although the design of qPCR primers remains pending, the expression study in acid and non-acid genotypes, selected through morphological and biochemical screening, is planned for future investigation. Overall, this comprehensive bioinformatic analysis sheds light on the molecular evolution and regulatory mechanisms of oxalate metabolism genes in *Colocasia esculenta* L., providing valuable insights for further functional studies in this essential pathway.

EMPOWERING SUSTAINABLE GROWTH IN THE INDIAN AGRICULTURAL SECTOR BY AI

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The agricultural sector is deeply intertwined with the complex agro-food system and the expansive global market. It faces mounting pressures related to environmental sustainability, food safety, and the pursuit of high product quality. This convergence of forces presents significant challenges, requiring the sector to address escalating food demands, compete internationally, and achieve high agricultural yields with uncompromising quality standards. In recent years, the adoption of Artificial Intelligence (AI) technologies in Indian agriculture has shown remarkable potential for transforming traditional farming practices for advancing agricultural sustainability and productivity in India. AI-driven applications such as precision agriculture, crop and soil monitoring, predictive analytics, and smart irrigation systems have demonstrated their efficacy in optimizing resource management and increasing yields. Moreover, AI-powered solutions offer tailored insights and recommendations based on data analytics, weather forecasts, and crop modelling, enabling farmers to make informed decisions and mitigate risks effectively. The current state of AI adoption in Indian agriculture presents a dynamic landscape marked by both challenges and opportunities. Implementing AI technologies in this sector requires addressing several hurdles, such as limited access to technology in rural areas, affordability constraints for small-scale farmers, and the need for tailored solutions that account for diverse regional farming practices and crops. Additionally, integrating AI tools often necessitates overcoming infrastructural gaps related to connectivity and data access. To leverage these opportunities effectively, concerted efforts are needed to promote technology awareness, build robust infrastructure, and foster partnerships between stakeholders across the agricultural value chain. By navigating these challenges strategically, India can harness the transformative potential of AI to ensure sustainable growth and food security in its agriculture sector.

Keywords: Agriculture, Artificial Intelligence, Sustainable, Environment, India

GLASS TRANSITION PHENOMENA IN PC/PS BLEND NANOCOMPOSITES

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In the present study, we have investigated the features of the glass transition relaxation in PC/PS-ZnO blend nanocomposites using DSC (Differential Scanning Calorimeter) thermograms. ZnO nanoparticles have been synthesized by chemical route method and a series of nanocomposite samples of PC/PS (Polycarbonate/Polystyrene) (100/0, 75/25, 50/50, 25/75, 0/100 wt%/wt%) – ZnO (0, 1, 2 & 3 wt %) have been prepared by solution casting method. XRD and TEM have been used to confirm the size range of ZnO NPs and the average size has been found ~ 11 nm. DSC curves of these nanocomposites have been recorded at different heating rates (e.g. 5, 10, 15, 20°C/min). The purpose of this work is to provide an estimation of activation energy at glass transition by using Kissinger and Moynihan Models. Dependence of glass transition temperature on heating rate has also been studied by Lasocka empirical relation. Results indicate that both the glass transition and activation energy for the glass transition are influenced by composition of the blend nanocomposites. It has also been found that values of activation energies from Moynihan model are in good agreement with that of Kissinger model.

UNDERSTANDING FINE ROOT DYNAMICS IN AGROFORESTRY SYSTEMS**YALAL MALLESH^{1*}, SARANSH KUMAR GAUTAM¹, RAMAN CHOUDHARY¹, RAKESH PANDAY¹, RAM PRAKASH YADAV¹, PRABHAT TIWARI¹, ADARSH SEMWAL²****Department of Silviculture and Agroforestry¹, Department of Forest Biology and Tree Improvement²****Rani Lakshmi Bai Central Agricultural University, Jhansi, Uttar Pradesh, India**

Agroforestry systems have garnered increasing attention as a sustainable agricultural approach. Fine roots play a crucial role in nutrient and water acquisition, soil structure improvement, and carbon sequestration, yet their dynamics in agroforestry contexts remain understudied. Fine root distribution and turnover are influenced by various factors, including tree species selection, planting arrangement, soil characteristics, and management practices. Agroforestry systems typically exhibit greater fine root biomass and diversity compared to monoculture systems, attributed to the complementary resource capture strategies of trees and crops. However, the spatial and temporal dynamics of fine roots in these systems are complex and site-specific, highlighting the need for context-specific research. Fine roots in agroforestry systems contribute to soil organic matter accumulation and nutrient cycling, enhancing soil fertility and resilience to environmental stresses. Their proliferation promotes soil aggregation and pore formation, improving water infiltration and retention, thereby mitigating soil erosion and enhancing drought resilience. Furthermore, fine roots facilitate symbiotic associations with mycorrhizal fungi, enhancing nutrient uptake efficiency and promoting plant growth. Understanding the mechanisms underlying fine root interactions between trees and crops is crucial for optimizing resource use efficiency and minimizing competition. Innovative management strategies, such as selective root pruning or intercropping with shallow-rooted species, offer potential solutions to mitigate competition and maximize synergies between trees and crops. In conclusion, integrating knowledge of fine root ecology into agroforestry can enhance ecosystem services, improve agricultural productivity, and contribute to climate change mitigation and adaptation efforts.

Key words: Agroforestry, Fine root dynamics, Nutrient cycling, Drought resilience, Symbiotic associations.**REVIEW OF HEALTH STATUS OF WOMEN IN INDIA, WITH SPECIAL REFERENCE TO HEALTH POLICIES****PROF. YAMINI PANDEY****Department of Economics, Government Girls Degree College, Behat, Saharanpur, Uttar Pradesh, India**

Health is wealth, is true in everywhere. Development of any country depends upon natural resources as well as human resources. Women's health is a critical component of public health agendas worldwide. In India, despite significant advancements in healthcare, women continue to face various health challenges, rooted in socio-economic, cultural, and gender-based disparities. Socio-economic factors such as poverty, education, and employment significantly influence women's health in India. Cultural norms and practices deeply impact women's health in India. Gender-based discrimination, early marriage, and son preference contribute to adverse health outcomes, including maternal mortality, malnutrition, and limited reproductive rights. Structural factors, including inadequate healthcare infrastructure, insufficient healthcare workforce, and urban-rural disparities, pose significant challenges to women's health in India. India's healthcare infrastructure faces numerous challenges in addressing women's health needs effectively. While significant progress has been made in expanding healthcare facilities, especially through government initiatives such as the National Health Mission, disparities persist in healthcare access and quality. Limited availability of skilled healthcare professionals, particularly in rural areas, hampers women's access to essential health services. Maternal and child health programs, reproductive healthcare initiatives, nutrition supplementation schemes, and awareness campaigns on menstrual hygiene and family planning. Additionally, efforts to strengthen primary healthcare services and promote community-based interventions aim to address disparities in healthcare access. This paper is a modest effort to provide a comprehensive review of the health status of women in India, analyzing various factors influencing their health outcomes. This paper identifies key challenges and disparities faced by women in accessing healthcare services and highlights initiatives and interventions aimed at improving their health outcomes. The findings may be useful for the policy makers as well as researchers.

Key words: - Women's health, Health policies, Socio economic development, human resources**SURVEY AND CHARACTERIZATION OF ISOLATES OF THE GUMMY STEM BLIGHT PATHOGEN FROM DIFFERENT WATERMELON GROWING PARTS OF KARNATAKA****YAMUNA HANAMASAGAR¹, SANGEETHA, C. G.² AND RAJESHWARI, R.¹****¹Department of Plant Pathology, College of Horticulture, Bengaluru -560065, India****²Department of Plant Pathology, College of Horticulture, Kolar- 563103, India**

Roving survey was carried out to assess the per cent disease index of the disease in different areas of Karnataka which indicated the occurrence of the disease ranging from 51.2 to 29.6 per cent. The findings of the study clearly indicated that the occurrence of the disease in parts of Karnataka but with varied levels of incidence. The maximum mean per cent disease index of 51.2%, was noticed in Bengaluru Urban district and the lowest incidence was observed in the Mysuru district (29.6%) followed by Chikkaballapura district 31.0%. The differences in the incidence of disease in areas surveyed might be due to the variation in the source of inoculums, age of crop, type of variety, climatic conditions and area under the crop, even due to monocropping of susceptible varieties that aggravates the disease occurrence. The molecular characterization of thirteen isolates was carried out using ITS primers and RG primers after 35 cycles of polymerase chain reaction (PCR) amplification, all the isolates produced an approximately 500-550 bp fragment length to ITS primers and only twelve isolates of *Stagnosporopsis cucurbitacearum* amplified for RG-I primers and produced 735 bp fragment length and one isolate *Fusarium equiseti* which was not amplified for RG-I primers.

Key words: Gummy stem blight, Survey, Per cent disease index, Polymerase chain reaction

FISHERIES AND FOOD SECURITY: BRIDGING THE GAP THROUGH SUSTAINABLE PRACTICES**YASH KHALASI*, ASHUTOSH DANVE, ELINA JOSE VETOM, AKSHAYA SURESH****ICAR - Central Institute of Fisheries Education, Versova, Andheri West, Mumbai, Maharashtra**

Fisheries are vital for global food security, furnishing crucial animal protein and nutrients to millions worldwide. However, overfishing, habitat degradation, and climate change jeopardize fishery sustainability and, consequently, food security for vulnerable communities. This abstract delves into the nexus of fisheries management and food security, stressing the necessity of sustainable practices. Sustainable fisheries management is indispensable for ensuring fish stocks and marine ecosystems' long-term health while meeting rising population nutritional needs. Employing science-based approaches like catch limits, marine protected areas, and ecosystem-focused strategies can replenish depleted fish populations and preserve marine ecosystems. Additionally, promoting responsible fishing methods, reducing bycatch and discards, and combating illegal fishing are pivotal for sustainability. Strengthening coastal communities' resilience is equally crucial. Empowering small-scale fishers through resource access, technology, and market opportunities enhances local food systems and livelihoods. Diversifying income sources with alternative livelihoods such as aquaculture and sustainable tourism can reduce reliance on declining fish stocks. Collaborative efforts among governments, international organizations, civil society, and the private sector are imperative. By integrating social, economic, and environmental factors into policy-making, stakeholders can devise comprehensive solutions that foster sustainability, equity, and resilience in fisheries and food systems. Ultimately, bridging the fisheries-food security gap demands a multifaceted approach balancing conservation with communities' nutritional and socio-economic well-being.

Keyword: Fisheries; Food security; Sustainability; Overfishing; Small-scale fishers; Resilience**PHYTOCHEMICAL ANALYSIS AND BIOLOGICAL ACTIVITY OF *CURCUMA ANGUSTIFOLIA* ROXB. ESSENTIAL OIL AGAINST HUMAN PATHOGENIC BACTERIA****YENGKHOM ABINASH SINGH*, SAIKHOM HEROJIT SINGH****Department of Horticulture, Aromatic and Medicinal Plant, Mizoram University, Aizawl, Mizoram, India**

Curcuma angustifolia Roxb. commonly known as East Indian arrowroot, is an herbaceous, fast-growing perennial flowering plant. It has significant medicinal properties and is used in traditional medicines and as a functional food. The present study attempted to characterise the phytochemical constituents of the essential oils isolated from the rhizome of *Curcuma angustifolia* Roxb., as well as to assess their antioxidant and antibacterial activity. The phytochemicals investigation exhibited the class of compounds. The antioxidant property was evaluated using DPPH and FRPA. The DPPH radicals as well as the ferric ions was able to reduce in a concentration-dependent manner. Moreover, the antibacterial activities were evaluated against the five human pathogenic bacteria *Bacillus cereus* (MTCC-430), *Escherichia coli* (MTCC-723), *Salmonella typhimurium* (MTCC-3224), *Vibrio cholera* (MTCC-3906), *Staphylococcus aureus* (MTCC-6908) by estimating the zone of inhibition (DDA). The essential oil extracted from *Curcuma angustifolia* rhizome showed substantial antibacterial activities in all the tested bacterial strains but in varying degrees. Further, the GC-MS analysis revealed the presence of 43 compounds having major compounds named Epicurzerenone (37.3%), Camphor (14.2%), Coronarin E (5.6%), Germacrone (4%), 1,4-di-isopropyl naphthalene (3.6%), Borneol trifluoroacetate (3.9%) and N- hexadecanoic acid (2.8%). Thus, the present findings indicated that *Curcuma angustifolia* Roxb. is a very potent plant that may play a vital role in new drugs in the future.

Keywords: *Curcuma angustifolia* Roxb., antioxidant, antibacterial activity, phytochemical characterization.**INSIGHT STUDY OF PLANT GROWTH PROMOTING RHIZOBACTERIA ISOLATED FROM THE AROMATIC RICE FIELD****YENKOKPAM SUPRIYA¹, LIPI CHATTOPADHYAY², POLY SAHA³ AND JHUMA DATTA³**¹Department of Agricultural Biochemistry, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal²Department of Microbiology, West Bengal State University³College of Agriculture extended campus of Bidhan Chandra Krishi Viswavidyalaya-

India is fortunate with the nature gift of aromatic rice which has presence of excellent aroma, superior grain quality with premium price in both national and international markets. The aroma is mainly due to the recessive gene Betaine aldehyde dehydrogenase 2 (BADH2) mapped on chromosome 8 of the rice controls the level of 2 acetyl 1 pyrroline (2-AP) which is considered a major quality traits in aromatic rice. In this study, the rhizospheric zone from the aromatic rice field of College of Agriculture extended campus of Bidhan Chandra Krishi Viswavidyalaya, Purba Bardhaman, West Bengal was taken to study the role of PGPR like Siderophore production, Phosphorous solubilization, IAA production and HCN production which plays a vital role in soil fertility and promotion of plant growth and development. 28 rhizobacterial isolates was found in which 13 were gram positive, 9 were gram negative with 5 isolates as actinomycetes. Among which 12 isolates show positive result of Siderophore production, 7 isolates has phosphorous solubilization activity, 14 isolates has IAA activity and 6 isolates has HCN activity. From all the isolates it was found that KJ3B2 isolate showed both the direct and indirect role of PGPR and CK3A1, GB3B4 and GB3B1 isolates exhibited the characters of direct role of PGPR only. By, exploring the role of PGPR it can become an important strategy in sustainable agriculture decreasing the synthetic fertilizer and pesticide usage a environmentally sound way of increasing the crop yield.

Keywords- Aromatic rice, BADH2, 2 -AP, Siderophore, Phosphorous solubilization, IAA production, HCN.

DEVELOPMENT OF NEW MUTANTS USING GAMMA RADIATION IN GLADIOLUS CV. PRISCILLA**¹YOGRAJ KUSHWAHA*, ¹BHAGWAN DAS BHUI, ¹RANJAN SRIVASTAVA, ²N. K. SINGH, ¹SATISH CHAND****¹Department of Horticulture, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India****²Department of Genetics & Plant Breeding, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India**

This study presents the development of two new gladiolus mutants derived from the original cultivar Priscilla through mutation breeding using gamma radiation. The experiment was conducted at the Model Floriculture Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (Uttarakhand), using a randomized block design. Gladiolus grandiflorus var. Priscilla was chosen as the experimental material. Gladiolus corms of the Priscilla variety were exposed to controlled doses of gamma rays i.e. 4.0 kR (T₁) and 5.5 kR (T₂) and Control (non-radiated T₃) to induce random mutations in the genetic material. Following irradiation, the mutagenized populations were evaluated for novel phenotypic traits including flower color, size, shape, and overall plant vigor. Two distinct mutant lines showing desirable characteristics were selected and further propagated to establish stable new varieties. The newly developed gladiolus mutants exhibit unique ornamental features and represent successful outcomes of mutation breeding using gamma radiation. This abstract highlight the application of mutation breeding to expand the genetic diversity of gladiolus cultivars and introduce innovative mutants with enhanced ornamental qualities derived from the popular Priscilla cultivar.

Keywords: gamma radiation, mutation breeding, gladiolus, mutants, cultivar, Priscilla**STRATEGIES TO MANAGE MYMV DISEASE IN MUNGBEAN (VIGNA RADIATA)****YUDHISHTHIR BHANWARIYA*, RUPAL DHOT, RAMESH****Department of Genetics and Plant Breeding, Agriculture University, Jodhpur**

Mungbean (*Vigna radiata*) is a food legume crop which is widely grown in world and an efficient protein providing crop. Harmful biotic disease present which is a major problem to Mungbean (*Vigna radiata*) crop that is Mungbean Yellow Mosaic Virus (MYMV) which belongs to *Geminiviridae* family, begomovirus genus and group known as geminiviruses. MYMV contains bipartite circular single stranded DNA genome of two types DNA-A and DNA-B both possess ~2.7Kb size. MYMV is a consistent disease which if occur then it marks crop loss upto 85%, it is spreading to newer areas through transmitting vector name as whitefly (*Bemisia tabaci*) and it is also a seed borne disease also. Detection of viral disease is the first priority for management and ELISA test used for early detection of viral infected antibodies. Different practices are available by which management of MYMV can be done which include use of natural extract of plants like neem oil, use of insecticides to control vector insects, use of trap crops for control of whitefly, planting time period fluctuation to avoid attack, use of rouging practices, use of ABA hormone manipulation, use of breeding procedures (Hybridisation, mutational breeding, backcross breeding, etc) to create new resistant varieties, marker assisted selection (MAS), RNA silencing technique, alteration in non-coding RNAs (miRNA and lncRNA), RNA editing tools like Crisper Cas9, use of nanoparticles, seed treatment and crop rotation practice, genetic engineering and modern technique like Artificial intelligence.

Keywords: MYMV, whitefly, ELISA, RNA silencing, non-coding RNAs, MAS, Crisper cas 9.**MILLETS THE FUTURE FOOD****YUVRAJGOUR, TANISHQ BHABYA****Student of BSc. (Hon's) Agriculture, School of Agriculture Science, LNCT University Bhopal, (M.P.), India**

India's millets or millets, account for approximately 60% of the total farming area, contributing 44% of the country 's total food grain production. Millet farming is a brilliant concept that realizes biodiversity, ecological production systems, and food sovereignty for farming populations. Millets, such as sorghum, pearl millet, foxtail millet, little millet, kodo millet, proso millet and barnyard millet, produce an extraordinary food system that can secure livelihoods. They require very little water, requiring just 25% of the rainfall regime demanded by crops like sugarcane and banana. Millets are often grown on skeletal soils, reducing the burden of fertiliser subsidies borne by the government. They are also highly nutritious, three to five times more nutritionally superior to rice and wheat. **Nutritional Value:** Millets are significantly superior to rice and wheat in terms of mineral content, fibre, calcium, iron, and micronutrients like beta-carotene. Each millet has more fibre, calcium, iron, and beta-carotene than rice and wheat. This makes millet a potential malnutrition solution for malnutrition, which affects a large portion of the Indian population. Millet is a significant issue affecting the Indian population. **Futuristic Plan in Millets:** Introduce the new varieties of millets. Acknowledge the farmer about to production or cultivation of millets, for benefits and better production of it. Also, acknowledge the people to consume millets as cereals or millets-based products to fill his/ her daily nutritional and mineral values. Give ideas on whether the consumption of millet is more beneficial than rice or wheat. The primary issue with low millets productivity is the limited variety of millets give more funding to millets institutes by ICAR. Millets and value-added products; for the consumption of millets, the new generation are making new products from millet which is suitable for it, like sorghum puffs, bajra, biscuits, cookies, pearl millet pasta and etc. **Food Processing Industries:** Develop new industries and processing factories to export a wide variety of millet –based products, like it's makes millet flour, millet bakery, and canning factories of millet products and which also boosts the economy and generates employment and benefits for the farmer.

DISTRIBUTION, POPULATION DYNAMICS AND IMPORTANCE OF ARTOCARPUS HIRSUTUS IN KONKAN REGION**YUVRADNI S. PATIL, VINAYAK K. PATIL, MILIND D. PATIL, AJAY D. RANE, V. D. TRIPATHI****College of Forestry, Dr. Balasaheb Sawant Konakn Krishi Vidyapeeth Dapoli, Dist Ratnagiri, Maharashtra, India**

Artocarpus hirsutus is a species native to India and endemic to Western Ghats. This study focuses on the distribution, population dynamics and importance of the species in Konkan region of Maharashtra. Unlike in the southern part of its range, the species has a rare distribution and is not so well-known for its usage except excellent timber. This knowledge itself bears the most important threat for the existence of *A. hirsutus*. However, this pool of its genetic diversity is equally important for its survival and potential utilization. The methodology used for this project was snowballing surveys to locate individuals or populations of *A. hirsutus*, surveying potential areas of occurrence. Tree and habitat parameters were recorded for every individual and regeneration in the surrounding area was noted. Total 6 locations containing 32 individuals of *A. hirsutus* were identified. All locations were in the riparian habitat. Most of the individuals were found to be more than 50 years old. Due to unawareness at most locations, the fruits were also not used for consumption except for only one location. The timber was also observed to be used in earlier times for construction especially that of temples. However, this use seems to have fallen out of practice. These trees could be considered the last remaining representatives of this species in Konkan region. Greater awareness needs to be generated among the population to generate stewardship to protect these trees. Moreover, charismatic species like Hornbills and Giant squirrel rely on this species for food. Therefore, it is also necessary to include this species in propagation programs and forest restoration activities.

Key words: Western Ghats, Charismatic species, Timber, Rare tree species**DIVERSITY AND IMPORTANCE OF SOIL INHABITING NEMATODES IN ARID ECOSYSTEM****ZARRIN IMRAN* AND WASIM AHMAD****Nematode Biodiversity Research Lab, Aligarh Muslim University, Aligarh**

The most important factor that shapes the desert communities and functioning of arid ecosystem are the extreme abiotic conditions. Desert occupies about 33% of the total land area having high solar radiation, low soil moisture or dry soil with sparse vegetation. Despite their barren appearance the soil surfaces of these regions are covered by biological soil crusts. The biological soil crust present on and beneath the soil surface, it is a mixture of soil particles with soil surface community (Cyano bacteria, fungi, lichens, mosses, rotifers, arthropods larvae etc) in a cohesive manner which sustain the nematode communities. Nematode occupies the soil aggregate spaces and resides within the water films on the surfaces of soil particles. However, in the past eight decades plant parasitic nematodes were reported from Al-Kharj, Al-Qatif, Tabuk, Hail, Gassim, Hofuf, Najran, Riyadh and Jazan regions. During these studies taxonomic diversity of other soil-inhabiting nematode was overlooked, though these nematodes play crucial role in belowground bionetwork functioning, nutrient mineralization, as well as helps in assessing the level of disturbances in the ecosystem. In present study two known and four new species are described from Jazan Province, Saudi Arabia and highlight the importance of soil-inhabiting nematode in arid ecosystem.

Key words: arid ecosystem, diversity, nematodes, Saudi arabia**META-QTL ANALYSIS ENABLED IDENTIFICATION OF CANDIDATE GENES AND HAPLOTYPES FOR METAL STRESS TOLERANCE IN RICE (ORYZA SATIVA L.)****ZEBU QUAIYUM¹, BISHUN DEO PRASAD*, M. THUDI¹, YOGESH DASHRATH NAIK¹, SANGITA SAHNI², RUSHIKESH SANJAY MANE¹ & V. K. SHARMA¹**¹Department of Agricultural Biotechnology and Molecular Biology, CBS&H, RPCAU, Pusa, Samastipur, Bihar²Department of Plant Pathology, TCA, Dholi, RPCAU, Pusa, Samastipur-848125, Bihar

Rice (*Oryza sativa*) serves as a staple crop for approximately half of the world's population and is cultivated in various environmental conditions, some of which involve soil contaminated with heavy metals, which posing threat to human well-being. Recent investigations have revealed the detrimental effects of heavy metal contamination on rice yield and grain quality, highlighting the urgency for comprehensive interventions. Numerous quantitative trait locus (QTL) studies have been conducted to identify specific genomic regions associated with to heavy metal stress tolerance. In the quest to extract concise and precise QTLs from the extensive pool of previously reported QTLs, Meta-QTL analysis emerges as a robust genetic dissection approach for unravelling quantitative traits. In our study, we performed a comprehensive Meta-QTL (MQTL) analysis for heavy metal [Arsenic (As), Cadmium (Cd), Zinc (Zn), Iron (Fe), and Aluminium (Al)] stress tolerance traits. We developed a consensus integrated map and conducted Meta-QTL analysis using 107 QTLs from fourteen published research papers spanning from 2008 to 2021. The consensus integrated map covered >2000 cM with >1500 markers distributed across all twelve linkage groups. We identified a total of 17 stable MQTLs on ten linkage groups out of twelve (MQTL absent in LG11, LG12) across different genetic backgrounds. The average confidence interval of reported MQTLs underwent significant refinement compared to the initial QTLs, leading to the identification of both well-known functionally characterized genes and several potential novel candidate genes for the investigated traits. Our study enhances the understanding of the genetic mechanisms underlying heavy metal stress and provides valuable candidate genes and haplotypes that can be utilized in the development of heavy metal stress-tolerant rice varieties.

Keywords: Meta-QTLs, Heavy-metal, Consensus map, Markers, Candidate genes

STUDY ON FARMERS ATTITUDE, KNOWLEDGE AND PRACTICES RELATED TO ORGANIC FARMING IN RATNAGIRI DISTRICT

INGALE P. S., SHENDE S. S.*, KAUSADIKAR K. D.

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The study was conducted in Ratnagiri district of Konkan region. From Ratnagiri district Dapoli and Khedtahasil were selected purposively and Villages were selected with the help of list obtained from SDAO, Dapoli. According to list maximum numbers of organic farmers were located in Velavi and Dabhilvillages of Dapoli tahsil and Ayani and Vadi-malade villages in khed tahsil. In all there were 180 organic farmers in the selected villages. From each village 25 respondents were selected randomly for the study. An interview schedule was specially designed, in line with the objectives, to collect the needed information. The data were collected by personally interviewing 100 selected organic farmers. The analysis of data revealed that majority of the respondents were middle age group, secondary education, medium family size, medium category annual income, small land holdings and followed by marginal land holdings, medium livestock possession, medium social participation, medium level mass media exposure, medium level innovativeness. Majority respondents had adopted organic farming practice at medium level and also medium level of knowledge about organic farming. Majority (69.00) per cent respondents favorable attitude towards organic farming, followed by 18.00 per cent respondents had most favorable and 13.00 per cent respondents had unfavorable attitude towards organic farming. A critical analysis of association between personal variables and attitude of farmers towards organic farming, showed that the variables such as age, education, livestock possession, mass media, social participation, innovativeness, knowledge and organic farming practices followed by the respondents had significant association with their attitude towards organic farming. The other variables such as size of family, farm size, annual income and organic farming experience had no association with their attitude towards organic farming. Majority of the respondents pointed out need of training on different components and aspects of bio-fertilizer technology, composting / vermi-composting methods, its application methods and rate of application and grading / packaging and marketing of organic produce. Major constraint faced by respondents in cultivation of organic farming were lack of knowledge about organic plant protection management, high cost of organic manures and biofertilizers, lack of demand for organic produce in local market, lack of skill regarding preparation and usage of organic inputs.

Key words: Organic farming, Attitude, knowledge and practices related organic farming**HYDRO-GEOCHEMISTRY AND WATER QUALITY ASSESSMENT OF SURFACE AND GROUNDWATER IN VARANASI DISTRICT UTTAR PRADESH**

ABHISHEK KUMAR SHUKLA

Mahatma Gandhi Kashi Vidyapeeth, Varanasi (U.P.)

Water is one of the most indispensable resources and is the elixir of life. Modern civilization, industrialization, urbanization and increasing populations have led to rapid degradation of groundwater quality. It is estimated that approximately one-third of the world's population use groundwater for drinking. Those around Varanasi depend on ground and surface water resources. Heavy and constant groundwater use, without restriction, is lowering both the water table and water quality. Any type of contamination present in groundwater and surface water, will lead to several health related problems. Owing to this pressure on resources, the water quality around Varanasi, in the middle Ganga plain, was studied. A total of 800 numbers samples for each season were collected. These were for Physical, Chemical & Biological constituents for the pre monsoon & post monsoon season. Twelve water quality parameters (iron, nitrate, fluoride, chloride, pH, TDS, alkalinity, turbidity, sulfate, calcium, magnesium, and hardness) were investigated relating to 2023 -2024 for eight blocks of Varanasi district. Ground and surface water quality was calculated by using correlation, principle component analysis PCA, Piper, Gibbs, saturation index and water quality index (WQI). In general, good water quality was found in all but one block Kashi Vidyapeeth has poor water quality.

EFFECT OF INORGANIC FERTILIZER AND PLANT GROWTH REGULATORS ON GROWTH AND SEED YIELD OF RADISH (*RAPHANUS SATIVUS* L.)*ABHISHEK KUMAR¹, BHAVANA MISHRA¹ AND ANJALI JHA²¹PhD Research Scholar (Vegetable science), Department of Horticulture, College of Agriculture, JNKVV, Jabalpur, (M.P.)²PhD Research Scholar (Vegetable science) Department of Vegetable and Spice Crops, UBKV, Cooch Behar, W.B

Effect of different levels of inorganic fertilizer and plant growth regulator on quality seed yield of radish (*Raphanus sativus* L.)" was formulated and conducted during the rabi season of 2022- 2023 at vegetable seed production plot, Department of Horticulture (Vegetable & Floriculture), BAC, Sabour Bhagalpur. The experiment consists of four levels of fertilizers viz, (F0-control, F1-N40:P30:K40, F2-N60:P40:K50, & F3-N8P50:K50) as well as seven levels of PGRs viz, P0 (Control), P1 (GA3 @ 50ppm), P2 (GA3@100 ppm), P3 (GA3 @ 150 ppm), P4 (NAA @ 50 ppm), P5 (NAA @ 100 ppm) and P6 (NAA @ 150 ppm). The experiment was conducted in RBD (Factorial) and replicated thrice. The combined effect of inorganic fertilizers and (PGRs) significantly gave maximum diameter of pod (7.64 mm), length of pod (56.61mm), number of seeds/pod (6.18), 1000- seed weight (15.12g), seed yield (18.23q/ha), in treatment combination F2P3 (N60:P40:K50kg/ha×GA3@150ppm).

Key word: radish, seed PGRs, inorganic fertilizer

IMPACT OF FRONT LINE DEMONSTRATION ON YIELD AND ECONOMICS OF MUSHROOM**DR. ASHOK KUMAR¹, ER. MANOJ KUMAR ROY² AND DR. MAYA KUMARI³**¹ SMS (Extension Education), ²S.S. & Head, KVK, Gaya (Bihar) and ³SMS (Home Science), KVK, Sahebganj (Jharkhand)

Mushroom production is remunerative enterprise to enhance the socio-economic condition of the farmers. It is selected as ODOP for Gaya district. Many Farmers/Farm women & Rural Youths engaged in production of Oyster & other species of Mushroom having no or little demand in the market, hence, forced to sale at low rate. So, FLD was conducted by krishi Vigyan Kendra, Manpur, Gaya (during the year 2019-20 & 2020-21) in which Button mushroom kit was given among 134 beneficiaries under FLD. Before conducting FLD, the beneficiaries were made abreast with the latest recommended package of practices of mushroom production through group meeting and training under FLD and 100 of them were selected randomly. The data were collected through questionnaire developed related to mushroom production and analysis was done with suitable statistics like Percentage increase yield, Extension gap, Potential gap, Technology index and Respondent satisfaction index to know the impact of FLD. The result revealed that demonstrated technologies under FLD resulted in an increase in yield by 50.7 percent over Local Check. It was also observed that there was technology gap (TG), extension gap and technology index of 0.9kg/bag, 0.85 kg/bag and 32.0 percent respectively. The economic performance of Button mushroom under FLD showed an additional return of Rs. 139 /bag with additional cost of cultivation of Rs.23/bag with BC ratio of 3.72 for demonstration and 2.46 for Local Check. The respondent satisfaction index (RSI) revealed that majority of respondent farmers expressed high (59.00percent) level of satisfaction about Front Line Demonstration.

SOW THE SEEDS OF SUSTAINABILITY: EMBRACE TERRACE GARDENING FOR A GREENER FUTURE**AJAY SINGH, DEEPAK SINGH AND ABHISHEK KUMAR****Department of Horticulture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India**

Agriculture has long been the backbone of the Indian economy, providing employment and a source of subsistence. The global population is predicted to double over the next 30 years, resulting in a rise in the number of urban poor. Urbanization and population increase pose a major danger to sustainability. As urbanization accelerates and green places disappear, terrace gardens develop as a viable answer to environmental problems. A terrace garden is one that grows on the roof or terrace of a structure. The open areas of the terrace can be put to good use. Terrace gardening not only answers growing concerns about food sustainability, but also helps to mitigate climate change. Terrace gardens provide numerous advantages, including lowering urban air temperature and regulating the heat island effect, conserving water, attracting birds and insects, and reducing energy consumption. Terrace gardening provides ornamental benefits, fresh horticulture produce, temperature regulation, hydrological benefits, architectural additions, habitats or corridors for wildlife, and recreational opportunities. It also improves the renters' health. Terrace gardens are necessary for a number of reasons, including their contribution to building insulation and energy conservation. By transforming underutilized rooftop spaces into productive gardens, individuals and communities can actively participate in local food production, reducing reliance on resource-intensive, long-distance food supply chains. The terrace gardening sector has the potential to alleviate the scarcity of vegetables in populated countries such as India. Thus, terrace gardening can be a shortcut for urban greening any nature well in advance, while enhancing horticulture yield and mental health.

Keywords: Terrace, garden, urban, horticulture, rooftop**ROLE OF ENTOMOPATHOGENIC NEMATODES (EPNS) IN PEST CONTROL****AKANKSHA¹, RAJENDRA SINGH², ANKIT RAI³, KUSHAL CHATURVEDI⁴, DR. ADITYA PATEL⁵**^{1,4}Research Scholar, Department of Entomology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut,³M.Sc. Entomology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, ²Professor, Department of Entomology, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut,⁵Assistant professor, Narayan institute of Agricultural Sciences Gopal Narayan Singh University, Jamuhar, Sasaram, Bihar

Entomopathogenic nematodes (EPNs) are an integral component of biological pest control, offering a sustainable alternative to chemical pesticides. This abstract examines the role of nematodes, specifically *Steinernema* and *Heterorhabditis* species, in managing agricultural pests. EPNs exhibit a unique mode of action where they enter the host insect, release symbiotic bacteria that quickly kill the host, and then reproduce within the cadaver, ensuring long-term pest suppression. They are particularly effective against soil-dwelling pests such as root maggots, cutworms, and beetle grubs, but can also target foliar pests under optimal conditions. EPNs are environmentally friendly, posing no threat to humans, animals, or non-target organisms, and can be integrated with other pest management strategies. Their application methods include soil drenches, foliar sprays, and injections near root zones. Despite their advantages, the efficacy of EPNs can be influenced by environmental conditions like temperature, moisture, and UV exposure. Proper storage and handling are critical to maintaining their viability. Overall, nematodes offer a targeted, safe, and effective means of pest control, contributing significantly to integrated pest management (IPM) programs and promoting sustainable agricultural practices. Their role in pest management highlights the potential of biological control agents in reducing reliance on chemical pesticides and mitigating their associated risks.

Keywords: Entomopathogenic nematodes, cadaver, Insect pest management, non-target organisms and integrated pest management

EPIDEMIC DYNAMICS OF YELLOW MOSAIC DISEASE IN MUNGBEAN

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Aim: To study epidemiology of Yellow Mosaic Disease (YMD) in mungbean. **Methodology:** Epidemiological study was conducted at Main Agricultural Research Station Dharwad to understand weather-YMD correlations and variations across four sowing dates, with a special focus on highly susceptible DGGV-2. **Results:** Epidemiological investigations indicated positive significant correlation between high temperature and whitefly population dynamics, while rainfall and low temperatures exhibited a negative significant correlation. Early sowing practices correlated with reduced disease incidence (13.85 %) and enhanced seed yield (575 kg/ha). **Interpretations:** Understanding the complex interactions between environmental factors and disease dynamics plays crucial role in modelling YMD management strategies in mungbean cultivation and the efforts to overcome this challenge with various means may help to enhance mungbean productivity.

Key words: disease incidence, mungbean, YMD

CONSEQUENCES OF FLD-MUSTARD INTERVENTION OF RLBCAU ON FARMERS

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To identify the changes occur due to RLBCAU's FLD-Mustard intervention a comparative study had been carried out in 3 villages of Niwari district of M.P. To serve this purpose 60 beneficiaries and 30 non-beneficiary farmers were chosen to ascertain the changes occurs due to FLD-Mustard intervention. The findings point out that regarding knowledge of improved package of practices of mustard cultivation a small gain of 4.74 per cent was found in beneficiaries as compared to non-beneficiaries. Concerning the adoption of an improved package of practices of mustard cultivation, a small adoption change (3.31%) was observed between beneficiaries and non-beneficiaries. As far as the yield parameter is concerned, 1.77 q/ha yield difference was obtained between beneficiaries and non-beneficiaries. Similarly, changes occur in terms of income generated it was found that beneficiary farmers were able to earn 10,000 more rupees than non-beneficiary farmers.

Key Words: FLD-Mustard intervention, beneficiary farmers, non-beneficiary farmers, knowledge, adoption, yield and income

INVESTIGATION ON THE MORPHOLOGICAL VARIABILITY AND BLOOMING BEHAVIOUR OF GUAVA GENOTYPES

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A research was done to evaluate the blooming patterns of 33 different guava genotypes in the Jabalpur area of Madhya Pradesh. This research assessed several guava genotypes for their blooming characteristics over two consecutive years. The genotypes displayed significant variation in their morphological properties, including height, width, canopy structure, and several leaf attributes. The trees exhibited a range of heights, spanning from 2.99m to 6.46m. The circumference of the trunk varied from 27.21cm to 87.23cm. The width of the canopy in the east-west direction ranged from 4m to 8.34m, while in the north-south direction it varied from 3.68m to 8.41m. The observed variation in these characteristics provided valuable information that might influence the choice of parent plants for an advanced guava breeding programme. Genotype JG-309 consistently had the earliest blooming, while genotypes JG-311 and JG-330 showed late flowering. The time of full bloom exhibited variation across genotypes due to the combined effect of genetic variables and environmental circumstances. There was a notable variance in the number of floral buds (ranging from 11.66 to 16) and open flowers per branch (ranging from 11.33 to 13.16) across different genotypes, indicating differences in their reproductive ability. Comprehending these fluctuations is essential for efficient orchard administration, including pruning, fertilization, and insect control. Furthermore, there was significant variation in the length of the blooming period (ranging from 23 to 48 days) across different genotypes, which has important implications for determining the optimal time for harvest and ensuring the quality of the fruit. The genotypes were classified into categories based on their blooming length, namely as short, medium, or long. This classification emphasises the impact of both varietal traits and the local environment on the timing of flowering. The results of this study expand our comprehension of guava blooming patterns and provide valuable information for improving farming techniques to maximise production and fruit quality.

Keywords: guava genotypes, *Psidium guajava* L, Genotype JG-309, Jabalpur region

ETHNO-MEDICINAL PLANTS COMMONLY USED BY HUMAN BEINGS FOR MEDICINAL USE**DEVPAL SINGH AND SARIKA YADAV****Department of Botany, Agra College, Agra. (U.P)**

Traditional societies throughout India possess a wealth of ethnobotanical knowledge which they have accumulated during prolonged interaction with nature. Ethno-medicine is emerging as a new branch of study documenting the age old wisdom and the knowledge of the ethnic societies (tribals) about the utility of diverse plant species and their miraculous properties as medicines not yet known to the modern world. Ayurveda treatment is one of the oldest forms of remedies. Plants / herbs are the source of medicine since Vedic period. The ability of human beings to exploit natural resources to its advantages has been the main factor that made humans the most successful organisms in the planet. It is important to document and publicize the Ethno-medicinal plant knowledge among the young generation to raise awareness for traditional values & medicinal knowledge and to conserve the sustainable use of the plants. The use of medicinal plants for the treatment of various ailments is as old as the history of man. There is list of some plants along with their medicinal properties used by local people of Keetham, Agra and nearby rural area for their treatment. *Ageratum conyzoides* is useful in diarrhoea, skin diseases and leprosy sores; Seeds of *Allium cepa* are used for stimulate hair growth and juice with mustard oil is applied as a liniment over painful joints, inflammatory swellings and diseases; *Butea monosperma* Piles, skin diseases, parasitic infection, fibre and floss yielding plant; *Cassia occidentalis* are used for Cough, increases digestive power, clears throat obstruction and decoction of root bark in dysuria and inflammation. Seeds are used in skin diseases. *Withania somnifera* used for arthritis, tumors, tuberculosis, and liver disease ; *Adina cordifolia* used as antiseptic ; seeds of *Salvadora oleoides* used in rheumatic pain ; *Datura innoxia* leaves useful in bronchitis and asthma ; *Solanum nigrum* leaves used in rheumatic pain, berries in dropsy, heart disease, piles. *Marigold* is one of the most commonly grown flowering herbs used to cure bleeding piles, eye disorders and ulcers.

Keywords: Ethnomedicinal study, Keetham Jheel, medicinal plants, medicinal use.**WEED MANAGEMENT IN KHARIF RICE (ORYZA SATIVA L.) ESTABLISHED BY DIFFERENT METHODS****G. B. SHENDAGE, A. M. YADAV, S. H. LOHALE AND D. M. KALOKHE****Department of Agronomy, College of Agriculture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri**

The field experiment was conducted on plot No. 24 of 'B' block of Agronomy Department Farm, College of Agriculture, Dapoli. Dist. Ratnagiri during Kharif seasons 2016 and 2017 to study the "Weed management in Kharif rice (*Oryza sativa* L.) established by different methods". The field experiment was laid out in a strip plot design comprising of twenty-five treatment combinations replicated thrice. The horizontal strips comprised five rice establishment methods viz., Sowing of dry seeds by drum seeder at onset of monsoon (M_1), Sowing of sprouted seeds (*Rahu*) by drum seeder on puddled field (M_2), Broadcasting of sprouted seeds (*Rahu*) on puddled field (M_3), SRI (System of Rice Intensification) method (M_4) and Conventional transplanting (M_5). The vertical strips consisted five weed management practices viz., Need based two hand weeding at 20/30 and 40/60 DAS/DAT (W_1), Pre-emergence application of Oxadiargyl 80 WP @ 100 g ha⁻¹ + 1 hand weeding at 20/30 DAS/DAT (W_2), Pre-emergence application of Oxadiargyl 80 WP @ 100 g ha⁻¹ + 1 hand weeding at 40/60 DAS/DAT (W_3), Pre-emergence application of Oxadiargyl 80 WP @ 100 g ha⁻¹ + Post emergence application of Almix 20 WP @ 4 g ha⁻¹ (W_4) and Unweeded control (W_5). The results clearly showed that pre-emergence application of Oxadiargyl along with 1 hand weeding carried out at 20 DAS in rice established by sowing of sprouted seeds (*Rahu*) using drum seeder on puddled field was found to be most profitable compared to costly transplanting method of rice establishment and manual weeding requiring more man days as well as to overcome constraints of labour scarcity due to increased urbanization, industrialization and high wage rates.

Keywords: Rice, Oxadiargyl, Weeding, Rahu and Method**ANALYZING OCCURRENCES, FREQUENCY AND PATTERNS OF EXTREME FLOODS IN THE WAINGANGA RIVER BASIN****HARSHITA RANI AHIRWAR¹, M. K. NEMA^{*1}, A. K. NEMA¹**^{1,2}**Dept. of Farm Engineering, Institute of Agricultural Sciences, Banaras Hindu University Varanasi, U.P.**^{*1}**Water Resources Systems Division, National Institute of Hydrology, Jal Vigyan Bhavan, Roorkee, Haridwar, Uttarakhand**

Extreme flood occurrences linked to the monsoon season are common in India, threatening significant infrastructure damage and posing fatalities in the affected populations. Flood frequency analysis and assessment of its patterns are critical components of hydrologic planning, which is the precise estimation of floods, which forms the basis for flood management, community safety, minimizing infrastructure damage, irrigation support, and hydropower project facilitation techniques. In order to assist engineers in designing flood-resilient structures, this study offers a flood frequency analysis using the Gumbel method for calculating the likely magnitude of extreme floods (such as the flood that occurs once every 100 years) for various return periods in the Wainganga River basin at three gauging stations, i.e., Ashti, Ramakona, and Satrapur. The analysis highlights notable disparities in peak discharge values between these locations, attributable to their distinct geographical characteristics and contributing catchment areas. The findings show that at Ashti, the projected peak discharge exceeds the peak observed data for most return periods. The Satrapur site lacks extraordinary figures on one side for upstream gauging stations, whereas Ramakona displays predicted discharges surpassing only 75 and 100 years of the return period. This study offers insightful information that helps decision-makers in the area manage floodplains, build hydraulic infrastructure, and enforce land-use rules.

Keywords: Discharge, Flood Frequency Analysis, Flood, Gumbel method, Wainganga

QUANTIFICATION OF FARM RISK AND RISK MANAGEMENT IN JABALPUR DISTRICT OF INDIA***^AKULDEEP RAJPOOT, ^BABHISHEK SINGH, ^AJHADE SUNIL**^aResearch Scholar, Department of Farm Engineering, Banaras Hindu University, Varanasi^bAssociate Professor, Department of Farm Engineering, Banaras Hindu University, Varanasi

Agriculture risk is defined as the product of the degree of yield loss and the probability of its occurrence. These farm risks caused by climate, biological and many other factors are a serious threat to farmers as well as the stability of agriculture in various developing countries including India. To reduce this risk and stabilize farmers' income and production, a descriptive study of how farmers perceive and mitigate risks as well as is essential. A proper scoring of farmers' perceived risk and risk management methods, convert it as a quantitative variable which helpful in achieving this goal. In this study well-structured schedule had been prepared and a survey of 296 farmers was conducted in the Jabalpur district of India by using multistage simple random sampling to identify the major farm risk and the adopted risk mitigation strategy. For statistical analysis, Likert scale and risk matrix methods were used to find risk scores. The frequency or count and percentage adoption of each adopted risk mitigation strategy by farmers were calculated to find out the adoption score risk management category and graphically represented. Farmers had to deal with a variety of risks, in which high variability in agriculture production, frost, fog, insects, pests and disease affect crops and high prices of the input had the highest impact on farmers in the survey year. When considering occurrence frequency with impact perception high prices of the input, no proper payment of crop insurance and insect, pest, and disease effects on crop as well as effect of frost, fog and dew were the top four risks with 94.22%, 94.05%, 92.89% and 90.78% of maximum possible risk score. In the adoption of risk management increase input like fertilizer, government assistance to farmers and insurance were the top preventive, reactive risk management, and risk transfer strategies.

Keywords: Agricultural risk, farmers' risk perception, Sample Survey, Risk management adoption, risk matrix, Likert scale.

IN VITRO EVALUATION OF DIFFERENT BIO-CONTROL AGENTS (DUAL CULTURE) FOR INHIBITING THE GROWTH OF *FUSARIUM OXYSPORUM* F. SP. *CICERIS***MAMTA****Department of plant pathology, Rajasthan college of Agriculture, MPUAT, Udaipur, Rajasthan**

In vitro fungal and bacterial bio-agents were tested against *Fusarium oxysporum* Schlecht by using dual culture techniques, the results obtained. Revealed that, mycelial growth inhibition of the test pathogen ranged from 75.83 to 33.05 per cent. Among the four bio agent tested *T. viride* recorded the mean maximum inhibition 75.83 per cent followed by *T. harzianum* (50.83%). Minimum mycelial growth was recorded in *P. fluorescens* (33.05 %) and *B. subtilis* (41.66 %). *T. viride* was superior in all other treatments. Among all the bio agents tested fungal bio-agents were found to be effective than bacterial bio agents in inhibiting the mycelial growth of *F. oxysporum*. The use of bio control agents for the management of soil borne diseases involves the application of these agents to soil and planting material.

STUDIES ON SEASONAL INCIDENCE OF MAJOR INSECT PESTS OF SUMMER RICE AND THEIR MANAGEMENT THROUGH *CLEISTANTHUS COLLINUS* ROXB**MANISH GADEKAR^{1*}, R. K. PANSE², SUBHASHREE PATNAIK¹ AND SUBRATA GOSWAMI³**¹Ph.D. Research Scholar, Department of Entomology, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh²Assistant Professor, College of Agriculture, Balaghat, JNKVV, Jabalpur³Ph.D. Research Scholar, Department of Entomology and Agricultural Zoology, Banaras Hindu University, Varanasi

The experiment was conducted on summer rice crop at college of agriculture Balaghat, Madhya Pradesh. The present study undertaken with objectives to study the seasonal incidence of major insect pests of summer rice, bio-efficacy of *Cleistanthus collinus* extracts in different solvent against major insect pests of summer rice under field condition and make comparative studies on insect pests' management in summer rice with *C. collinus* and farmers practices. The result revealed that three major pests were recorded during crop growing period viz., stem borer, leaf folder and gandhi bug. Seasonal incidence of rice stem borer exposed that the percent DH was observed to be higher during 11th SMW at booting stage and percent WEH was higher in 16th SMW during dough stage. The incidence of rice leaf folder was found to be maximum in 12th SMW. However, sucking pest like gundhi bug reached its peak population during 15th SMW. The correlation studies revealed that percent dead hearts exhibited negative significant with morning RH. While, percent WEH a positive correlation with max. temperature. However, other parameters are exhibited non-significant correlation with rice stem borer damage. Leaf folder and gundhi bug showed the non-significant correlation with all-weather parameters. Out of seven botanical extract of *C. collinus* in different solvent including control are statistical analysis of all the observations (3, 7 and 14 DAS) of spray indicated that all the botanical treatment was found to be significantly effective to reduce damage and population of stem borer, rice leaf folder and gundhi bug. Methanol leaf extract was found the most effective against major insect pest of rice. Maximum reduction of damage and population of pests over control were recorded in methanol leaf extracts. Observed incidence of dead hearts and white ear head and population of gundhi bug in experimental plot which were significantly higher than the farmer fields, dead hearts and white ear head and gundhi bug at 5% level of significance. There was no significant difference between leaf damage cause by leaf folder in experimental plot and farmer's field.

Keywords: Rice, stem borer, leaf folder, gandhi bug, botanical, extracts and dead hearts.

A REGENERATION STATUS OF SAL (*SHOREA ROBUSTA*) IN EXISTING PERMANENT SAMPLE PLOTS OF JHARKHAND.**PANKAJ KUMAR SINGH^{1*}, RUNA FARHA,^{2*} SMITHA PANKAJ³ & SIDDHARTHA TRIPATHI⁴**^{1* to 4}**Department of Forest, Environment and Climate Change, Ranchi, Jharkhand**^{1*2}**PhD Scholars –DSPMU, Ranchi, Jharkhand, India**

The objective of the present research is to know the regeneration status of *Shorea robusta* (Sal) in existing 12 permanent sample plots of Jharkhand whether its regeneration is going on from seed or whether it is coppice. These forests were categorized into three agro-climatic regions like- Central North-eastern Plateau, Western Plateau, and South-eastern Plateau. The regeneration status of the forest is enumerated by calculating the DBH ("whose DBH is more than 10 cm"), especially Sal (*Shorea robusta*) and associate's trees. *Shorea robusta* (Sal) has a good population of seedlings in natural forests of Jharkhand. But in present decades these do not mature in enough numbers to juveniles and young stages. Based on research work conducted in existing 12 permanent sample plots of Jharkhand, it has been found that regeneration of Sal from seeds is not happening. At present, out of total 7369 trees of 12 PSPs, only 4467 Sal trees are present. The percentage of Sal trees regenerated from seeds is only 13.92%, while the remaining 86.07% trees are regenerated from coppice. The results showed that the percentage of Sal trees regenerated from seed in Baresand sample plot was highest among 12 PSPs at 95.74%, whereas the lowest was found at 0% in Hadari, Kakokudar & Madgari PSPs. Thus, the study of regeneration of Sal tree has important implications for the conservation and management of natural forests in Jharkhand.

Key Words: *Shorea robusta* (Sal), regeneration, DBH, seeds & coppice, Permanent sample plots.**THE NUTRITIONAL AND MEDICINAL POTENTIAL OF POMEGRANATE (*PUNICA GRANATUM*)****PRASAD SONWALKAR¹, ASHOK YADAV², PRADYUMNA DESHMUKH³, GOPAL SHINDE⁴**¹**Department of Fruit Science, RLBCAU, Jhansi**²**ICAR-Central Agroforestry Research Institute, Jhansi**³**Department of Silviculture & Agroforestry, RLBCAU, Jhansi**⁴**Department of Agricultural Entomology, RLBCAU, Jhansi**

The pomegranate (*Punica granatum*) is a deciduous shrub or small tree that bears fruit. It has attracted much attention because of its rich nutrients and therapeutic qualities. its native areas ranging from Iran to northern India, this plant has been successfully grown in several parts of the world, especially in locations with Mediterranean conditions. The nutritional and therapeutic properties of pomegranate highlight its potential uses for improving health and treating diseases. The fruit has a high number of vitamins, minerals, and bioactive compounds, particularly polyphenols like ellagitannins and anthocyanins. These chemicals are found in large quantities in the fruit's peel, seeds, and juice. These chemicals possess strong antioxidant, anti-inflammatory, and antibacterial characteristics. The fruit is a highly nutritious food due to its rich content of dietary fiber, vitamin C, potassium, and iron. The antioxidant properties of pomegranate have shown its effectiveness in decreasing signs of oxidative stress and safeguarding against cellular harm. The main reason for this is the presence of punicalagins and other ellagitannins, which successfully remove harmful free radicals and regulate the activity of antioxidant enzymes. Anti-inflammatory properties of pomegranate have been shown in chronic inflammation, such as arthritis and inflammatory bowel disease, indicating its potential in the management of these disorders. Pomegranate a diet has shown favorable outcomes in cardiovascular health by boosting lipid profiles, decreasing blood pressure, and improving endothelial function. Regular use of pomegranate juice has been shown in clinical studies to lead to substantial reductions in LDL cholesterol levels and systolic blood pressure. These findings underscore the potential of pomegranate juice in reducing risk factors associated with cardiovascular disease. Which suggests that pomegranate might be used as a viable treatment for managing diabetes and obesity.

Keywords: pomegranate, *Punica granatum*, antioxidants, anti-inflammatory.**EFFECT OF ORGANIC AMENDMENTS ON SOIL CONCENTRATION AND ACCUMULATION OF METALS IN WHEAT*****SONAL SHARMA, D. P. SINGH****Department of Soil Science and Agricultural Chemistry, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan**

Cadmium (Cd) and Lead (Pb) accumulates in the vegetative tissues of wheat crops, posing a serious threat in the food chain. A pot experiment was conducted at glass house of Rajasthan College of Agriculture, MPUAT, Udaipur, to investigate the effects of organic amendments on the soil concentration and accumulation of metals in wheat. For the glass house study, plastic pots of 15 kg capacity were filled with 10 kg of polluted soil. Biochar (BC), Farm yard manure (FYM) and Poultry manure (PM) were added @ 0.5%, 1.5% and 2.5% (w/w) in soil as organic amendments. Each treatment was replicated thrice. The results showed that BC @ 2.5% significantly decreased the cadmium and lead concentration in soil and wheat plants over control. The Cd and Pb immobilization was increased by the application of BC while other treatments followed FYM> PM>control in wheat. This pot experiment suggested that the application of organic amendments consistently increased biomass of wheat and decreased the Cd and Pb concentration in tissues. The biochar remained more effective compared with FYM and PM in terms of low Cd and Pb accumulation in soil and wheat crop.

Keywords: Cadmium, Lead, Biochar, Poultry manure, Farm yard manure

NEEM BASED AGROFORESTRY: PRESENT STATUS AND FUTURE PROSPECTS**RAMAN CHOUDHARY^{1*}, MANMOHAN J. DOBRIYAL¹, RAM PRAKASH YADAV¹, PRABHAT TIWARI¹, SARANSH KUMAR GAUTAM¹****Department of Silviculture & Agroforestry, Rani Lakshmi Bai Central Agricultural University, Jhansi**

Neem-based agroforestry, integrating the cultivation of neem (*Azadirachta indica*) trees within agricultural landscapes, has garnered increasing attention for its multifaceted ecological and agricultural benefits. This systematic review synthesizes current research on neem-based agroforestry to assess its ecological and agricultural impacts. Ecologically, neem trees play a pivotal role in enhancing soil fertility, biodiversity conservation, and pest management. Their deep root systems contribute to soil structure improvement and nutrient cycling, while their allelopathic properties inhibit weed growth and suppress pests and pathogens, reducing reliance on synthetic inputs. Moreover, neem trees act as vital habitat and food sources for various beneficial insects and birds, fostering biodiversity within agroecosystems. Additionally, neem's medicinal properties offer potential applications in biopesticides and pharmaceuticals, enhancing the sustainability of agricultural practices and human health. On the agricultural front, neem-based agroforestry systems exhibit promising outcomes in enhancing crop productivity and resilience to environmental stresses. The shade provided by neem trees mitigates temperature extremes, reducing water stress and promoting favourable microclimatic conditions for crops. Furthermore, the nutrient-rich leaf litter and pruning's serve as valuable organic inputs, enriching soil fertility and improving crop yields. Overall, this systematic review underscores the ecological and agricultural advantages of neem-based agroforestry, emphasizing its potential to contribute to sustainable land management, biodiversity conservation, and food security. However, further research is needed to elucidate the long-term effects and optimize the integration of neem trees into diverse agroecological contexts.

Keywords: Agroforestry, Neem, Ecology and Sustainability.**DESIGN AND PREPARATION OF BIOMEDICAL CCAS WITH ENHANCED MECHANICAL PROPERTIES****RASHI BHARGAVA******Assistant Professor, Math department, Shri Guru Ram Rai University Dehradun, Uttarakhand, India**

This work explores the design and development of complex concentrated alloys (CCAs) that can be precipitation hardened. These CCAs are based on the Co-Cr-Ni and Co-Cr-Fe-Ni systems and are enhanced by the addition of Al, Ti, Ta, and Nb. The goal of the alloy design is to produce an L12-type intermetallic precipitate-complemented disordered solid solution matrix through meticulous thermodynamic calculations and phase equilibrium research. The study offers a thorough analysis of the kinetics of origin and development of these precipitates across time. To determine the correlation between the created alloys' mechanical properties and their microstructure, in-depth microstructural investigations are carried out. The outcomes show notable gains in mechanical performance, which can be ascribed to the customized microstructure attained by careful alloying and processing methods. The study also evaluates the effect of hydrogen content on the alloys, which is important when taking into account hydrogen embrittlement issues in many sophisticated applications. The results highlight these CCAs' potential for usage in cutting-edge biomedical applications, where resilience to hydrogen-induced damage and exceptional mechanical characteristics are critical. Through the integration of sophisticated alloy design principles and rigorous experimental validation, this work lays the groundwork for the creation of next-generation materials capable of withstanding the demanding conditions seen in biological settings. The novel approach to alloy design that makes use of both experimental and computational techniques opens the door to the development of CCAs with customized properties that meet certain application needs. This study contributes to our understanding of the mechanisms of precipitation in CCAs and creates new opportunities for their use in high-performance material-intensive sectors such as biomedical engineering. The deliberate inclusion of elements like Al, Ti, Ta, and Nb as well as the emphasis on hydrogen effects highlight how thorough this study is and how it may propel alloy development in the future.

Key words: Precipitation-hardenable, Complex Concentrated Alloys (CCAs), Microstructure-mechanical property relationships, Thermodynamic calculations, Biomedical applications etc.**TO STUDY INCIDENCE INSECT PESTS COMPLEX ON PEA (*PISUM SATIVUM* L.) CROP AND SCREENING OF PEA GENOTYPES AGAINST POD BORER, *HELICOVERPA ARMIGERA*****SUBHASHREE PATNAIK^{1*}, NANDA KHANDWE² AND MANISH GADEKAR¹****¹Ph.D. Research Scholar, Department of Entomology, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh****²Assistant Professor, College of Agriculture, Sehore, RVSKVV, Gwalior, Madhya Pradesh**

The experiment was conducted on pea crop in winter season for to study the seasonal incidence of major insect pests on pea and screening of selected genotypes against pod borer complex in the Malwa region of Madhya Pradesh. The result revealed that the incidence of insect pests was recorded from germination to till harvesting of the crop. The present study found that the borer complex, leaf miner, and aphid were prominent in pea crop. Larval counts of the borer complex, leaf miner and aphid were observed by the visual count, leaves of each plant, from upper middle and lower and on 5cm tender twig, respectively. The correlation study was performed by correlation of insect incidence with weather parameters. Screening study against the pod borer, *Helicoverpa armigera* was perform separately. For screening the resistant and susceptibility of pea genotypes were performing by observe average larval population of the pod borer on ten randomly selected plants, pod damage and overall yield were recorded. Results revealed that the FPD 21-148, -149, and -158 genotypes show the least susceptibility, while FPD 21-150, -151, -155, and -159 were moderately susceptible. On the other hand, FPD 21-152, -153, -154, -156, -157, -160, -161, -162, and -163 proved highly susceptible to the pod borer.

Keywords: field pea, insect pests, borer complex, leaf miner, aphid, weather parameters, correlation, Screening, Host plant resistance etc.

MARKET ASSESSMENT OF LENTIL IN MADHESH, LUMBINI, AND SUDURPASCHIM PROVINCES: ANALYZING DEMAND, AND TRADE DYNAMICS

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Lentil (*Lens culinaris* M.) is a vital legume for Nepal, cultivated on 202,416 ha, producing 246,092 MT and yielding 1.22 MT/ha (MoALD, 2022). Lentils account for 60.39% of total pulse area and 62.40% of total pulse production, primarily grown in Madhesh, Lumbini, and Sudurpaschim provinces. Rich in protein and micronutrients, lentils bolster immunity and metabolism. Nepal, a top global exporter, also imports substantial lentil quantities, emphasizing the need to boost domestic production to reduce imports. This study aims to understand the factors influencing lentil production, distribution, marketing, and consumption in Nepal to support the industry's growth and improve farmers' livelihoods. The study utilized a mixed-methods approach, collecting data through semi-structured questionnaires, household surveys, FGDs, and key informant interviews across Lumbini, Sudurpaschim, and Madhesh provinces. Market actors, consumers, and relevant government and non-government entities were surveyed. Data were analyzed using descriptive statistics and qualitative narrative analysis, presented through tables, graphs, and pie charts. Results indicate that grain sourcing involves a network of market actors with key hubs in Birgunj, Bhairahawa, Nepalgunj, and local areas within a 10-50 km radius. Consumer preferences reveal mixed perceptions of the competitiveness of Nepali lentils, with price comparisons showing minimal differences between local and imported varieties. A notable shift towards market purchasing over self-production was observed. Factors contributing to higher prices of Nepali lentils include losses during sourcing and processing, high production costs, and B2B trade margins. Enhancing export potential requires compliance with international quality standards, while addressing domestic preferences through improved packaging and market awareness.

Keywords: Consumer preferences, Export potential, Lentil production, Market dynamics

SPECTRAL CHARACTERIZATION OF HEALTHY AND MALFORMED PANICLES OF MANGO (*MANGIFERA INDICA* L.) CULTIVARS UNDER VARIABLE PHOTON FLUX DENSITY

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Malformation, a physiological disorder affecting mango growth and development is subjected to various environmental influences, contributing to diversity in susceptibility. The present investigation entitled "Spectral Characterization of Healthy and Malformed Panicles of Mango (*Mangifera indica* L.) Under Variable Photon Flux Density" was carried out at Fruit Research Station, Imaliya, in the Department of Horticulture (Fruit science), College of Agriculture, JNKVV, Jabalpur, (M.P.) during 2022-23. The research was laid out in Asymmetrical Factorial Randomized Block Design (FRBD). Four trees from each variety were selected randomly with healthy and malformed panicle in each direction and replicated thrice. Total 32 panicles from each variety i.e., 96 panicles were tagged and the observation for Growth, Morphological, Physiological characteristics and characterised their spectral signatures in over 25 Indices with respect to varietal and directional influence, were recorded and statistically analysed. The mango varietal response was observed that the percentage of malformed panicles was highest in the Dashehari variety (40.27%), while Amrapali exhibits a somewhat lower susceptibility with (27.98%) and Langra proves to be more tolerant (20.69%). The study also highlights the direction of incident PAR plays important role where panicles exposed to the North direction was associated with the highest percentage of malformed panicles (35.30%), while the south direction had the lowest percentage (24.09%). It reveals that the incidence of floral malformation was consistently highest on the north-facing sides of trees and lowest on the south-facing sides. The interaction studies of varieties and directions, it was observed that the percentage of malformed panicles was highest in the north direction of the Dashehari variety (42.75%), while the south direction of the Langra variety had the lowest percentage of malformation (14.55%). These results suggest that different varieties exhibit distinct responses to environmental factors, leading to altered physiological expressions in each direction. Among all the indices derived from hyperspectral reflectance such as SIPI, SPVI, NDVI, OSAVI, NPCI, VOG and VOG2 were very promising and can be significantly used to differentiate the malformed panicles from healthy ones. The spectral characterisation differentiated healthy and malformed panicles of mango using spectral reflectance data revealed the potential of hyperspectral remote sensing to discriminate them and useful in early crop management.

Keywords: NDVI, NPCI, VOG, Remote sensing, spectral, Flux

ENHANCING TRIBAL INCOME THROUGH KVK TRAINING AND LIVESTOCK INTRODUCTION: A ROADMAP FOR SUSTAINABLE DEVELOPMENT**VIJENDER KUMAR^{1*}, LATIKA SHARMA², SHOBHANA BISHNOI³, SANSKARAN SWAMI⁴ AND PRIYANKA YADAV¹**¹PhD Scholar, Department of Agricultural Economics and Management, Rajasthan College of Agriculture, MPUAT, Udaipur²Assoc. Professor, Department of Agricultural Economics and Management Rajasthan College of Agriculture, MPUAT, Udaipur³Ph.D. Scholar, Department of Agricultural Economics, College of agriculture, SKNAU, Jobner (Rajasthan), India⁴Ph.D. Scholar, Department of Agricultural Extension and Communication, College of Agriculture, SKRAU, Bikaner (Rajasthan),

The present study was undertaken on the beneficiary tribal farmer of the project entitled “Empowering Tribals Farmers through Capacity Building and Technology Demonstration”. A survey conducted on a total of 60 farmers who were benefitted from the technology demonstration and the Poultry birds of the Kadaknath breed, the Sirohi breed of goat and some quail birds were distributed among tribes. So a pilot study was made on the tribal farmers trained through KVK, Bargaon and KVK, Vallabhnagar for the economic upliftment and livelihood improvement of tribal people with the object of sustained economic development of the tribal area. The result indicated that tribal farmers were able to generate extra net income of ₹ 4884.00, ₹ 4988.00 and ₹ 4982.00 with goatary, poultry and quail farming respectively.

Keywords: Tribals, Capacity building, Kadaknath, Quail, Economic upliftment.

**CROP MODELLING FOR STRESS SITUATION, ASSESSING STRESS THROUGH REMOTE SENSING
SWATI SHUKLA****Ph.D. Research Scholar, Department of Fruit Science, College of Agriculture, IGKV, Raipur (C.G.)**

A model is a simplified representation of a system or a process. Modelling is based on the assumption that any given process can be expressed in a formal mathematical statement or set of statements. Simulation is the process of building models and analyzing the system. Crop model are simple representation of a crop. Crop models are tools of systems research which help in solving problems related to crop production. The main goal of a crop simulation model is to estimate crop production, resource use and environmental impact as a function of local weather and soil conditions and crop management. For using crop models, it requires certain input data which is used by the model to further generate the required output. Crop modelling requires data related to weather, crop, soil, management practices and insect- pests. In the sixties, the first attempt to model photosynthetic rates of crop canopies was made. There are different types of models that have been developed over the years, and they can be classified into various groups or types. A few of them are Empirical models, Mechanistic models, Stochastic models, Statistical models, Simulation models. In recent years, fruit quality has become an increasingly important aspect of fruit production. Thus, a new field of science has been emerging that is loosely termed functional-structural plant modelling. Remote sensing (RS) is an advanced tool that aids in gathering and updating information to develop scientific management plans in fruit crops. This involves sensing and recording reflected or emitted energy and processing, analyzing and applying that information. Remote sensing process mainly involves the use of visible to the microwave region. As the atmosphere appears to be transparent in the visible region most of the satellite remote sensing studies are designed in visible region. Sensor can detect the one object from the other by the means of the electromagnetic radiation absorbed. Remote sensing technology can also help in identification of water stress by change in leaf colour. Remotely Piloted Aircraft Systems (RPAS) also known as drones are gaining popularity in the monitoring of horticultural crops especially fruit crops. Remote sensing can provide valuable information combined with crop growth models for yield assessment. Information derived from remote sensing data may increase the accuracy of crop modelling.

Keywords: Crop, Modelling, Crop Simulation Model, Remote Sensing, Water Stress, RPAS.

DEVELOPMENT PARAMETERS YIELD AND AGRO METEOROLOGICAL INDICES OF WHEAT AS AFFECTED BY DIFFERENT DATES OF SOWING, COMPACTION LEVELS AND IRRIGATION SCHEDULES.**D. C. KALA^{1*} AND RAVINDRA TOMAR²**¹Subject Matter Specialist (Soil Science), KVK Gwaldam, Chamoli (G.B.P.U.A.&T., Pantnagar), Uttarakhand, India²Subject matter specialist (Agronomy), SVPUA&T, Meerut, Uttar Pradesh, India

Field experiments were conducted at N. E. Borloug Crop Research Center of the G. B. Pant University of Agriculture and Technology, Pantnagar during two *rabi* seasons of 2014-15 and 2015-16 in sandy loam soil with Wheat cv. UP-2565 under three compaction levels (C) viz. no compaction (C₁), two passes of 500 kg RCC (reinforced cement concrete) roller (C₂) and four passes of roller (C₃); three irrigation schedules (I) viz. irrigation at 30% depletion from available soil moisture (ASM)-I₁, irrigation at 40% depletion from ASM- I₂ and irrigation at 50% depletion from ASM-I₃ at three dates of sowing (D) viz. 5th November (D₁), 20th November (D₂) and 5th December (D₃) with three replications. Maximum days to seedling emergence was recorded with D₃ (8.11) and C₃ (7.69) during 2015-16 while maximum days to anthesis and physiological maturity was recorded with D₁ (91.49 and 135.39, respectively), C₃ (90.12 and 131.85) and I₁ (87.96 and 129.37, respectively) during 2014-15. Accumulated GDD at maturity (°C days) was recorded higher in D₁ (1500.31), C₃ (1514.83) and I₂ (1472.16) during 2014-15. Accumulated PTU at maturity (°C days-hour) was also recorded higher with D₁ (8942.46), C₂ (9009.28) and I₂ (8646.85) during 2014-15. Highest value of HUE was recorded with D₃ (3.63), C₂ (3.32) and I₂ (3.27) during 2015- 16. Grain yield (q ha⁻¹) was found higher during 2014-15 with D₃ (48.30), C₂ (47.07) and I₁ (45.88).

Keywords: Meteorological Indices, Wheat, Date of Sowing, Compaction, Irrigation schedules**EFFECT OF SOIL COMPACTION AND IRRIGATION SCHEDULES ON GROWTH AND DEVELOPMENT OF WHEAT WITH DIFFERENT DATES OF SOWING****D. C. KALA^{1*} AND RAVINDRA TOMAR²**¹Subject Matter Specialist (Soil Science), KVK Gwaldam, Chamoli (G.B.P.U.A.&T., Pantnagar), Uttarakhand, India²Subject matter specialist (Agronomy), SVPUA&T, Meerut, Uttar Pradesh, India

Wheat is an important crop for India and Uttarakhand which is sown during November-December and is harvested in April. Area, production, and productivity of wheat were 3.79 lakh- ha, 8.78 lakh metric tonnes, and 23.16 q ha⁻¹, respectively, in Uttarakhand (during 2015-16) which is even lower than the average productivity of wheat in India. Lower productivity of wheat in Indian and Uttarakhand context is due to temperature and soil moisture stress. Light texture soils (viz. sandy loam) having excessive permeability mainly because of their coarse texture, looseness and poor organic matter content, compaction has desirable effects on soil physical conditions. Moisture retention capacities of these soils are very low and more than one third of applied or rain water gets lost by deep percolation. In present investigation different irrigation schedules, compaction levels and sowing dates treatments were studied to find out their best suited levels and their interactions with the growth and development of wheat crop that majorly determines the yield of wheat crop. The field experiments were conducted in a sandy loam soil with wheat cv. UP-2565 under three compaction levels (C) viz. no compaction (C₁), 2 passes of 500 kg RCC roller (C₂) and 4 passes of roller (C₃) ; three irrigation schedules (I) viz. irrigation at 30 % depletion from available soil moisture (ASM)- I₁, irrigation at 40% depletion from ASM- I₂ and irrigation at 50 % depletion from ASM- I₃ at three dates of sowing (D) viz. 5 Nov. (D₁), 20 Nov (D₂) and 5 Dec (D₃) with three replications during two consecutive *rabi* seasons of 2014-15 and 2015-16. The maximum plant height (cm) was obtained at 100 DAS with D₁ (109.92 and 114.38 cm), C₂ (105.89 and 110.04 cm) and I₁ (104.55 and 108.58 cm during 2014-15 and 2015-16, respectively). The maximum LAI was observed at 80 DAS with D₁ (3.89 and 4.02), C₂ (3.57 and 3.59 during 2014-15 and 2015-16, respectively) and I₁ (3.46) was found to be higher over the LAI with other irrigation schedules during 2014-15 and 2015-16. The maximum root length density (cm cm⁻³ of soil) was observed at 0-15 cm soil depth under D₁ (1.27 and 1.13 cm cm⁻³ of soil) and C₂ (1.18 and 1.03 cm cm⁻³ of soil), respectively. RLD at 0-15 cm soil depth was higher with I₁ (1.16 and 1.0 cm cm⁻³ of soil during 2014-15 and 2015-16, respectively). Days to seedling emergence was highest with D₃ (7.92 and 8.11), C₃ (7.60 and 7.69, during 2014-15 and 2015-16, respectively) and I₂ (6.53) and I₁ (6.72) during 2014-15 and 2015-16, respectively. Days to anthesis were significantly more with D₁ (91.49 and 81.94), C₃ (90.12 and 76.16) and I₁ (87.96 and 79.17 during 2014-15 and 2015-16, respectively). Days taken to physiological maturity was highest in D₁ (135.39 and 125.45), C₃ (131.85 and 120.19) and I₁ (129.37 and 119.00 during 2014-15 and 2015-16, respectively).

Keywords: Wheat, Growth and Development, Date of Sowing, Compaction, Irrigation schedules**PREDICTING FORB SPECIES SURVIVAL UNDER CLIMATIC ABERRATIONS: USING LEAF- TRAITS VARIATIONS IN VARIED MICROCLIMATES AS A CASE .****POONAM MEHROTRA^{1*}**¹Dept of Botany, Bundelkhand University, Jhansi 284128, India, mpunu@yahoo.co.uk

The forest characterized by its highly diverse environment, leaf, a vascular asymmetric appendicle structure, highly sensitive organ that responds quickly to environmental conditions and affects the growth and development of other components of the plant and having an significant impacts on plant phenology. Leaf can shape and influence the natural composition of the environment and is considered as a gateway for the productivity of ecosystems. Light and atmospheric temperatures had an immense effect on leaf dynamics. However, no information is available regarding the adaptive significance of variations in leaf form and the functional integrations. Attempt was made to dissect the adaptational strategies of forbs in response to habitat characters and climatic variations within the annual cycle. Kumaun Himalaya, the area of the present study has unique characteristics and climatic features.

In the study, leaf traits, other functional traits, and their spatial variations are driven by both temperature and water availability. In the study, forb species changed their growth tactics to optimize the benefits of the warm, rainy monsoon season and were able to survive by utilizing even minimum light radiations and cold temperatures, or beneath the antagonistic microclimates while adhering to the limitations of given by competition, phylogenetic limitations with the adaptations of various leaf-traits. Leaf life span was influenced by the microclimate, resulting in variations in leaf longevity among individuals of the a species and leaf longevity were found to be associated with specific leaf mass loss and specific leaf mass (SLM) during senescence. These characteristics have a significant impact on plants, such as their growth and nutrient cycling. By considering leaf longevity, it becomes possible to make predictions about the performance of these forbs. Moreover, environmental factors were also found to be linked with other traits also such as leaf number, size, and shape. Notably, variations in leaf size were identified as a crucial trait consistent with several studies. Leaf size can be used to predict about an species' ability to survive in the face of climate change. This data can also offer valuable knowledge on whether a species is suitable for cultivation and restoration efforts in various environmental conditions, including climate, soil, and socio-cultural factors.

Keywords: Species, Leaf Traits

PERCEPTION OF B.Sc. COMMUNITY SCIENCE DEGREE HOLDERS IN RELATION TO VOCATIONALIZATION OF B.Sc. DEGREE PROGRAM**SALONI KUMARI¹, PUNAM KUMARI¹, ROHIT MAURYA²*****M.Sc. Research Scholar, Extension Education & Communication Management, Community Science****¹Professor, Extension Education & Communication Management, Directorate of Extension Education****²Subject Matter Specialist (Horticulture), KVK, Turki Muzaffarpur****Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar, 848125**

Community Science which was earlier known as Home Science. It also known as Family and Consumer Sciences in some regions, is an interdisciplinary academic discipline that encompasses various aspects of home management, family life, nutrition, child development, textile and clothing, and community living. It is a field of study that aims to improve the quality of life for individuals and families by integrating scientific principles with practical skills. However, over the years, the scope of Community Science has expanded significantly, and it now covers a wide range of topics relevant to both men and women, as well as families and communities. The present study entitled with the general objectives as "Perception of B.Sc. Community Science Degree Holders in Relation to Vocationalization of B.Sc. Degree Program" conducted in 15th Agricultural State or Central Universities of India with three objectives viz. 1) to assess the Knowledge of Students pertaining to content of B.Sc. Community Science; 2) to assess the perception of Students in respect of Vocationalization of B.Sc. degree Program; and 3) to study the relationship between perception of graduates of Community Science with their knowledge of content of B.Sc. Community Science. The M.Sc. Students of College of Community Science of 15 State Agricultural or Central Universities was purposively selected for the study. Vocationalization of B.Sc. Degree Program was independent variable and Perception of B.Sc. Community Science Degree Holders was dependent variable. In this study the Knowledge and perception scale was constructed and standardized to measure the Knowledge and Perception of B.Sc. Community Science Graduates. To obtain pertinent data, Online questionnaire methods were used. Appropriate statistical tools and measurements were used for analysis of data such as Frequency, Percentage, Mean and Correlation. The study revealed that the overall Knowledge of respondents, there are 14% respondents who scored below 174.55, they had a relatively low level of knowledge. The majority of the respondents, 74% of the sample ranging from 174.55 to 230.39 had medium level of knowledge whereas 12% within the range of 230.39 to 300 were demonstrate a higher level of knowledge. The Perception of students in respect of Vocationalization of Community Science education, only 21 % respondents were of the opinion that Community Science education provides Vocations to students for their further career with 16% disagreeing to the fact and 63% percent of the students had no opinion about it. The correlation coefficient between "Knowledge" and "Perception" is 0.572. This value indicates a positive correlation between the two variables, suggesting that as "Knowledge" increases, "Perception" also tends to increase.

Keywords: Home Science, Community Science, Perception, Vocationalization.**MECHANIZATION IN ONION HARVESTING: A REVIEW OF TRADITIONAL AND MODERN APPROACHES****¹B. M. KHANPARA*, ²T. D. MEHTA AND ³N. B. BHARAD****¹Ph.D Scholar, ²Associate Professor, ³M. Tech Student,****Department of Farm Machinery and Power Engineering, CAET, Junagadh Agricultural University, Junagadh, Gujarat, India 362001**

Onion harvesting stands as a critical aspect of Indian agricultural practices, presenting notable challenges due to its labour-intensive nature. The manual methods, involving bulb digging and leaf cutting, often leads to inefficiencies and financial burdens for farmers. Despite advancements in mechanization for crops like potatoes, onion harvesting remains largely manual in India. Efforts to automate onion harvesting using equipment designed for root crops have encountered hurdles due to the distinct biometric properties of onion bulbs, leading to low cleaning efficiency and high damage rates. Furthermore, existing harvesters focus solely on uprooting onion bulbs, requiring manual intervention for cutting matured leaves, thus consuming additional time and human resources. This paper critically evaluates manual and mechanized techniques, emphasizing the urgent need for improved mechanization in onion harvesting. It assesses performance metrics such as efficiency, cost-effectiveness and capacity, highlighting the limitations of current methods and identifying research gaps, particularly addressing the simultaneous requirements of digging and leaf cutting. Enhanced mechanization is essential to boost efficiency and reduce labour dependency in onion harvesting. The review outlines opportunities for innovation, emphasizing the necessity of advancing mechanization to benefit farmers and the agricultural sector in India. By addressing challenges and leveraging technological advancements, the paper advocates for a more sustainable and efficient approach to onion harvesting, contributing to the growth and development of agriculture in India.

Keywords: Manual harvesting, Mechanization, Onion Digger, Onion Detopper, Performance Metrics, sustainable Approach**DRONES: THE FUTURE OF PRECISION FARMING****¹B. M. KHANPARA*, ²PARMAR RAVINA AND ³N. B. BHARAD****¹Ph.D Scholar, ³M. Tech Student, Department of Farm Machinery and Power Engineering, CAET, JAU, Junagadh, Gujarat, India – 362001,****²Ph.D Scholar, Department of Processing and Food Engineering, CAET, AAU, Godhra, Gujarat, India – 389001**

In the realm of modern agriculture, the integration of drone technology has sparked a transformative shift, revolutionizing traditional farming practices. As the global population is projected to reach 9 billion by 2050, the demand for food production escalates, necessitating innovative

solutions to address the challenges faced by the agricultural sector. Drones, also known as Unmanned Aerial Vehicles (UAVs), equipped with advanced sensors, cameras and data analytics capabilities have become indispensable tools for precision agriculture. This paper explores the transformative impact of drones on agricultural efficiency, productivity and sustainability, also delves into various applications of drones in agriculture, including crop health assessment, mapping and soil analysis, precision crop spraying, plant establishment, livestock monitoring, weed management, evapotranspiration estimation, irrigation management, crop count and plant emergence analysis, geofencing and crop insurance. Through in-depth analysis of case studies, technological advancements and industry trends, the paper emphasizes the tangible benefits of drone integration in optimizing farming operations, reducing environmental impact and enhancing overall farm management. Despite the promising potential of drone technology, challenges such as privacy concerns, knowledge and skill requirement, legal frameworks and initial investment costs are addressed. An implementation plan for scaling drone technology adoption in agriculture is presented, emphasizing the importance of overcoming barriers to ensure a more resilient, sustainable and technologically advanced agricultural future. This paper aims to provide an extensive overview of the role and potential of drone technology in reshaping the future of agriculture, empowering farmers to optimize yields, conserve resources and embrace a more sustainable approach in the face of global challenges.

Key Words: Drone, Precision Agriculture, Sensors, Data Analysis, Crop Monitoring.

INFRARED, X-RAY DIFFRACTION, AND THERMOGRAVIMETRIC ANALYSIS OF COBALT AND PRASEODYMIUM SOAPS

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The physicochemical characteristics of cobalt and praseodymium caprylate soaps in solid-state were investigated using infrared, thermal analysis, and X-ray diffraction measurements. The results of the infrared analysis revealed that the fatty acids exist in a dimeric state through hydrogen bonding, and the soaps possess partial ionic character. The X-ray diffraction measurements were used to calculate the long spacings and the results confirm the double-layer structure of cobalt and praseodymium soaps. The thermal analysis showed that the decomposition reaction of the soaps was kinetically of zero order with an activation energy of 0.007 and 0.005 Kcal mol⁻¹ for cobalt and praseodymium caprylate, respectively.

ASSESSMENT OF OKRA (ABELMOSCHUS ESCULENTUS L. MOENCH) VAR. 'KASHI KRANTI' IN MUZAFFARPUR DISTRICT OF BIHAR

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***Subject Matter Specialist, ¹Senior Scientist & Head, Krishi Vigyan Kendra Turki, Muzaffarpur, ²M.Sc. Scholer, EECM, DRPCA Pusa Samastipur Bihar-848125**

The major constraint for the low productivity of okra in the Muzaffarpur District of Bihar is the non-adoption of a recommended package of practices and an improved high-yielding variety. To replace this old technology, high-yielding okra var. 'Kashi Kranti' was conducted in the field of 20 farmers by Krishi Vigyan Kendra, Turki Muzaffarpur RPCAU Pusa, Samastipur during the pre-kharif seasons of 2019 and 2020. The demonstration used the recommended package of practices. An average yield of okra in ranged from 135.70 to 140.0 q/ha, whereas in local practices 80.80 and 85.88 q/ha during the year 2019 and 2020, respectively. A 67.94% (year 2019) and 63.46% (year 2020) increase in yield was recorded compared to local farmers. Similarly, the extension gap was also noticed at 54.90 and 55.00 q/ha during 2019 and 2020, respectively. Keywords: Okra, FLD, the extension gap, technology gap, technology index

Keywords: Okra, FLD, the extension gap, technology gap, technology index

INDO- NEPAL CULTURAL RELATIONS

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India and Nepal share a deep and multifaceted cultural relationship that dates back centuries. This bond is rooted in historical, religious, linguistic, and social ties that transcend modern political boundaries. The cultural relations between these two countries have been a significant factor in maintaining cordial bilateral ties and fostering mutual respect and cooperation. Despite occasional challenges, the cultural bond remains robust and continues to play a crucial role in fostering goodwill and cooperation. The shared heritage and continuous cultural exchanges ensure that the relationship remains vibrant and mutually beneficial. In summary, India and Nepal enjoy a complex relationship marked by deep cultural connections, significant economic interdependence, and occasional political and border-related challenges. Both countries continue to work on strengthening their ties through diplomatic dialogue and cooperation on various fronts.

Keywords: Cultural bond, social ties, cooperation, political challenges.

SRI ANNA: THE FIRST AND FUTURE CROPS**DR. NISHA TIWARI****Assistant Professor, Department of Home Science****Sri Tikaram Kanya Mahavidyalaya, Aligarh**

Millets are nutrient-dense grains, rich in protein, dietary fibre, essential minerals (iron, calcium, magnesium) and vitamins (specially B-complex vitamins). Introducing millets into diet helps combat malnutrition and provides a balanced source of nutrition, contributing to better health outcomes. Millets can be ground into flour, which serves as a nutritious gluten-free alternative to wheat flour. It can be used to make bread, pancakes, baked goods, adding a nutty flavour and can be incorporated into ready-to-eat snacks and sweets. Fermenting millets can produce products like idlis or dosas. Compared to crops like rice or wheat, these crops are highly resilient to adverse environmental conditions such as drought, high temperatures, and low soil fertility. Millets have low fertilizer requirements and can grow in less fertile soils. Cultivating millets can contribute to improved soil health by reducing the need for chemical inputs, promoting sustainable agricultural practices. Policies and initiatives that promote research, development, and awareness about the benefits of millets, support small-scale farmers, and integrate millets into national food security programs can significantly foster more resilient agricultural systems worldwide.

Keywords: Nutrient-dense, gluten free, sustainability, food security.

ASSESSMENT OF PHYSICO- CHEMICAL QUALITIES AND NUTRITIONAL POTENTIALITY OF SWEET POTATO POWDER INCORPORATED COOKIES**SHAHFAHAD¹, RAMACHANDRA NAIK K², KASHUFTA MISREENA³ AND BHUVANESHWARI G³**¹Ph.D. Scholar, Department of Postharvest Management, College of Horticulture, UHS Bagalkot, Karnataka, India.²Professor and Dean Students Welfare Department of Postharvest Management, UHS, Bagalkot, Karnataka, India.³M.Sc (Biochemistry), Department of Biochemistry, Kuvempu university, shankarghatta, Shivamogga, Karnataka, India.⁴Professor and Head department of Postharvest Management, College of Horticulture Bagalkot, Karnataka, India.

Fresh sweet potato tubers have a limited shelf life of just a few days, making them semi-perishable. This necessitates the development of easy-to-use processing methods for the tubers. Converting these sweet potato tubers into flour allows them to be used in a variety of foods, including baked products. In this study the utilization of sweet potato powder was implemented to upgrade both the nutritional value and the physico-chemical quality. The cookies were made from composite flours by incorporating 5.0% to 22.5% of sweet potato powder and 5% defatted soybean flour with all-purpose flour. These cookies were evaluated for their physical attributes, chemical composition and sensory qualities. As the proportion of sweet potato powder in the blends increased, the diameter of the cookies decreased from 3.24 to 2.45 cm, thickness reduced from 1.06 to 0.86 cm, spread ratio declined from 3.06 to 2.85 and volume decreased from 8.75 to 4.06 cm³. Conversely, their weight increased from 14.83 to 15.08 gm and density increased from 1.69 to 3.93 g/cm³. with increase in the concentration of sweet potato powder the moisture, protein and crude fiber contents in the cookies also increased. The cookies supplemented with 12.5% SPP was found to be more acceptable.

Keywords: Sweet potato powder (SPP), cookies, nutritional potentiality, all-purpose flour.

DNA BARCODING OF ICHTHYOFAUNA OF WESTERN U.P.**NISHA RANA* AND AISHWARYA SHARMA****Research and development cell; Keral Verma Subharti College of Science****Swami Vivekanand Subharti University, Meerut, India 250005**

The present study reveals that the DNA barcoding of 72 species of fish from 9 orders and 17 families in Western U.P. region has been done till now. The data has been retrieved from the NCBI. DNA barcoding is a method for species identification based on DNA sequences. The use of DNA barcoding in fish identification, emphasizes the relevance of this technique in aquaculture and fisheries. The impact of conserved flanking regions, universality, and sequence variability in high-quality DNA barcodes have been demonstrated for PCR amplification and sequencing. The significance of DNA barcoding is facilitating taxonomic resolution, supporting biodiversity research, and advancing fish studies is emphasized. This highlights the importance of DNA barcoding as an effective method for accurately identifying fish and its various uses in aquaculture, fisheries, and aquatic ecosystem management.

Keywords- Fisheries, DNA barcoding, CO1 genes, Aquaculture.

SYNTHESIS AND CHARACTERIZATION OF NOVEL 1,3,4-THIAZOLE DERIVATIVES**SHAILENDRA KUMAR****Department of Chemistry****RBS COLLEGE, AGRA**

The titled molecule 2-Amino-N-(2-chloro-6-methylphenyl) thiazole-5-carboxamide (ANMC) is a core of anticancer drug Dasatinib (leukemia), its derivatives exhibited bioactivity against breast cancer, Experimentally, titled compound described by NMR (¹HNMR and ¹³CNMR), FTIR and UV visible spectroscopy and compared with the theoretical results with the good agreement. Hirshfeld surface analysis

well described the secondary internal and external interactions. Comparing UV-visible spectra obtained in various solvents with the calculated TD-DFT results revealed minimal solvent effects. Molecular electrostatic potential (MEP) map and Fukui function are employed which indicated reactive sites of the molecule. The bioactivity profile probability of ANMC is theoretically explored by calculation of electrophilicity index and drug-likeness. Molecular docking of the ANMC molecule performed with ten receptors to obtained the best ligand-protein interaction, minimum binding energy achieved -8.0 Kcal/mol. Biomolecular stability of ANMC was investigated by Molecular Dynamic Simulation (MDS). Free energies also analysed and showed great interactions between ligand and protein.

IMPACT OF PASSIVE SMOKING ON PUBLIC HEALTH: A COMPREHENSIVE REVIEW

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Passive smoking, also known as second-hand smoke exposure, persists as a significant universal concern for human health. This study aims to comprehensively elucidate the detrimental impacts of passive smoking on public health and society. Various alterations occur due to this form of smoking, resulting in adverse health effects such as respiratory diseases, cardiovascular problems, and numerous other health issues. Certain populations, including pregnant women, children, and individuals already experiencing health problems, are particularly susceptible to the harmful effects of second-hand smoke. Overall, passive smoking exposure intersects with increased healthcare costs, decreased productivity, and environmental degradation. Urgent efforts are required to attenuate passive smoking, including the implementation of smoke-free policies, awareness campaigns, and smoking cessation programs. Concerted efforts from policymakers, healthcare professionals, and the public are necessary to create smoke-free environments and promote healthy lifestyles. This review underscores the critical need for immediate action to address the challenges posed by passive smoking and safeguard public health.

Keywords: Public Health, Second-hand Smoke, Health Strategies

AGRICULTURAL FRUIT HARVESTING ROBOT: AN OVERVIEW OF DIGITAL AGRICULTURE

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The integration of robotics into agriculture has ushered in a transformative era, offering innovative solutions to longstanding challenges such as labor shortages, rising production costs, and the need for increased efficiency. Among these advancements, agricultural fruit harvesting robots have emerged as a pivotal development, poised to revolutionize traditional farming practices. This paper presents a comprehensive overview of autonomous fruit harvesting robots, impact on agricultural practices. The Agricultural Fruit Harvesting Robot (AFHR) represents a significant milestone in modern agriculture, equipped with state-of-the-art sensors, actuators, and machine learning algorithms. Its capabilities encompass the identification of ripe fruits, delicate manipulation, and efficient harvesting from trees. The AFHR's design prioritizes versatility, enabling adaptation to various fruit types, shapes, sizes, and orchard configurations, ensuring broad applicability across diverse agricultural landscapes. Key technological features, including computer vision and machine learning algorithms, empower the AFHR to discern fruit maturity levels, optimizing harvesting timing to maximize yield and minimize waste. Autonomous navigation systems facilitate efficient traversal of orchards while avoiding obstacles, reducing labor requirements and minimizing plant damage. The integration of soft grippers on robotic arms ensures gentle fruit handling, mitigating bruising and damage during harvesting. Autonomous fruit harvesting robots offer a promising solution to address labor shortages, enhance efficiency, and improve the sustainability of fruit production systems. Continued advancements in technology are anticipated to further refine the capabilities and foster widespread adoption of these robots in agricultural practices. The AFHR stands at the forefront of agricultural innovation, poised to redefine the future of fruit harvesting, fostering increased efficiency, sustainability, and profitability in the agricultural sector.

Key words: Robotics, computer vision, sensors, algorithms, robotic arms.

EVALUATION OF RONFEN 1858 SC (PYRIPROXYFEN 8% + DINOTEFURAN 5% + DIAFENTHIURON 18% SC) AGAINST SUCKING PESTS COMPLEX OF BRINJAL

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Brinjal sucking pest complex causes significant economic harm to brinjal (*Solanum melongena* L.) production. The present study was carried out at Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka to evaluate the efficacy of RONFEN 1858 SC (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) against sucking pests complex of Brinjal during 2021 & 2022. The application of RONFEN 1858 SC and other treatments was made on initiation of sucking pest incidence on the crop. The observations for sucking insect pest populations viz., leafhoppers, whitefly, thrips and aphids were made one day before spray and

at 1, 3, 7, 10 and 14 days after each spray on randomly selected three leaves of ten plants per replication and expressed as population per plant. The results revealed that, the population of leafhopper, whitefly, thrips and aphids before spray was ranging from 7.15 to 7.65, 10.13 to 10.98, 5.12 to 6.01 and 27.56 to 29.13 per plant, respectively. The result revealed that, application of RONFEN 1858 SC @ 600 ml/ha is found to be effective in controlling the sucking pest complex in brinjal by recording lower number of leafhopper (0.95/plant), whitefly (1.56/plant), thrips (0.45/plant) and aphids (2.94/plant) after second spray. The per cent reduction in population over untreated control showed that RONFEN 1858 SC @ 600 ml/ha was recorded 100 percent control and thus able to effectively control the sucking pest complex in Brinjal. The same treatment has recorded higher fruit yield of 28.50 t/ha & 27.39 t/ha during 2021 & 2022, respectively.

Keywords: RONFEN 1858 SC, Sucking pest complex, Management, Brinjal.

SCOPE OF COMMERCIAL FLORICULTURE IN NCR AND WESTERN UP: PRESENT SCENARIO

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*Commercial floriculture plays a pivotal role in the agricultural landscape of the National Capital Region (NCR) and Western Uttar delves into the current scenario and potential of commercial floriculture in this region. The NCR, with its proximity to major urban centers like Delhi, Noida and Gurgaon, presents a lucrative market for floriculture products. The demand for high-quality flowers, both for domestic consumption and exports, has been steadily rising, driven by factors such as increasing disposable income, changing consumer preferences, and a growing interest in floriculture-related events and celebrations. Western UP, known for its fertile soil and favorable climatic conditions, offers excellent opportunities for commercial floriculture. The region's agricultural expertise, coupled with modern farming practices and technological advancements, has contributed to the successful cultivation of a wide range of flowers including roses, marigolds, carnations, and gerberas. The present scenario reflects a dynamic industry with significant growth potential. However, challenges such as fluctuating market prices, seasonal variations, pest and disease management, and access to finance and technology remain areas of concern. Addressing these challenges through strategic interventions including research and development, skill enhancement, market linkages, and policy support will be crucial in harnessing the full potential of commercial floriculture in NCR and Western UP. In conclusion, the scope of commercial floriculture in NCR and Western UP is promising, offering opportunities for economic growth, employment generation, and agricultural diversification. Strategic initiatives and collaborative efforts involving farmers, researchers, government agencies, and industry stakeholders will be instrumental in realizing this potential and ensuring sustainable growth in the sector.

GREEN NANOPARTICLES FOR SUSTAINABLE DEVELOPMENT

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The term Nanotechnology defines the process of designing, synthesis and application of materials of size in the range of nanoscale. Any particle having size 1 nm to 100 nm is considered to be a nano-particle and the materials or chemicals in this range are commonly referred to as nanomaterials. The key pathways for synthesizing nanoparticles are physical and chemical, usually expensive and possibly hazardous to the environment. In the recent past, the evaluation of green chemistry or biological techniques for synthesizing metal nanoparticles from plant extracts has drawn the attention of many researchers. The literature on the green production of nanoparticles using various metals (like gold, silver, zinc, titanium etc) and plant extracts is discussed in this seminar. The generalized mechanism of nanoparticle synthesis involves reduction, stabilization, nucleation, aggregation and capping, followed by characterization. During biosynthesis, major difficulties often faced in maintaining the structure, size and yield of particles can be solved by monitoring the development parameters such as temperature, pH and reaction period. To establish a widely accepted approach, researchers must first explore the actual process underlying the plant assisted synthesis of a metal nanoparticle and its action on others. The green synthesis of NPs is gaining attention owing to its facilitation of the development of alternative, sustainable, safer, less toxic and environment-friendly approaches. Thus, green nanotechnology using plant extract opens up new possibilities for the synthesis of novel nanoparticles with the desirable characteristics required for developing biosensors, biomedicine, cosmetics and nano-biotechnology, agriculture, electrochemical, catalytic, antibacterial, electronics, sensing and other applications.

Keywords: Applications, biosynthesis, environment, nanoparticles.

HEAVY METALS (As, Cd, Cr, Cu, Pb, Mn, Hg, Ni, Zn) POLLUTION OF RIVER GANGA

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River Ganga is considered sacred by people of India for providing life sustenance to environment and ecology. Anthropogenic activities have generated important transformations in aquatic environments during the last few decades. Advancement of human civilization has put serious questions to the safe use of river water for drinking and other purposes. River water pollution due to heavy metals is one of the major concerns in most of the metropolitan cities of developing countries. These toxic heavy metals entering the environment may lead to bioaccumulation and biomagnifications. These heavy metals are not readily degradable in nature and accumulate in the animal as well as human bodies to a very high toxic amount leading to undesirable effects beyond a certain limit. Heavy metals in the riverine environment

represent an abiding threat to human health. Exposure to heavy metals has been linked to developmental retardation, kidney damage, various cancers, and even death in instances of very high exposure. The following review article presents the findings of the work carried out by the various researchers in the past on the heavy metal pollution of river Ganga.

CURRENT STATUS OF CLIMATE RESILIENT PEST MANAGEMENT SYSTEM IN INDIA

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Impact of climate change on agriculture will be one of the major deciding factors influencing the future food security of the mankind. Food production in India is sensitive to climate changes such as variability in monsoon rainfall and temperature changes within a season. The crop losses due to insect pests are likely to increase as a result of change in crop diversity and climate change. The importance of climate and weather events to the distribution of insects and their population dynamics has long been recognized. Several minor insect pests are likely to become more devastating with global warming and climate change. Overwintering of insect pests will increase as a result of climate change producing larger spring population as a base for a build-up in numbers in the following seasons. The climate change has also diverse effects on natural enemies of insect pests. The abundance of natural enemies can be altered in response to changes in insect pest population size induced by temperature and elevated carbon dioxide concentration effects on plants. Therefore, detailed study of the climate change scenario on the basis of long-term historic weather data, its impact on yield and formulation of coping strategy are of paramount importance to reduce the risk of crop failure. Considerable knowledge is available on the effects of weather and climatic events on insect pests growth and development over the world. But concerned to the impact of climate change on insect pests and their management studies are under lag phase. The adaptation, mitigation and natural resource management are basic components of remedial measures taken to combat the adverse impact of climate change. The natural resource management is a holistic approach to minimize the adverse impact of climate change by application of sustainable approach in insect pest management. To combat the adverse impact of climate change on insect pests, its urgent need to adopt climate resilient strategies and initiatives for insect pest management in India. This paper attempt to analyse the review of reported studies on the current status of climate resilient pest management system in India.

Key words: Current status, Climate resilient, Pest management, Insect pests, India.

MORPHOLOGICAL CHARACTERIZATION OF MYSTUS FROM MIDDLE GANGETIC REGION

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Mystus is a genus of fish in the family Bagridae native to Asia. It is of small to medium sized fish which is an edible riverine catfish. Molecular characterization is the method to characterize the collected sample with the help of DNA isolated from the sample by using different DNA extraction techniques. Morphological characterization is again the method to characterize the collected sample morphologically (external features). Traditionally, Mystus species are identified using morphological traits, but significant ambiguity exists due to morphological similarity Mystus and overlapping meristic counts. Thus, method of proper identification is important for morphologically similar species for aquaculture practices and conservation of the species. The present study was conducted on To identification and characterisation of wild fish species of Mystus genus from middle Gangetic Region, Bijnor, Uttar Pradesh. A total of 50 samples were collected and morphometrically studied and found same. Mystus singhala was most abundant species. During the study few cryptic samples were are found. For more accurate identification at molecular level, the DNA isolation will be done for future Confirmation.

Keywords- Mystus, Genus, Morphological traits, Morphological Characterization.

ASSESSING THE EFFECTIVENESS OF COMMERCIALLY AVAILABLE BOTANICALS AGAINST *Fusarium verticillioides* CAUSING POKKAH BOENG DISEASE IN MAIZE

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Aim: To study the efficacy of botanicals against *Fusarium verticillioides* under *in-vitro*.

Methodology: The Pokkah boeng diseased maize samples were collected and isolated the pathogen to obtain pure culture. Morphological and molecular diagnosis were carried out to confirm the pathogen causing Pokkah boeng disease. Further, the efficacy of commercial botanicals was tested to identify the effective botanical for the management of disease.

Results: From the investigation it was observed that, as the concentration of botanicals increased, there was a corresponding decrease in the mycelial growth of *Fusarium verticillioides*, indicating a direct relationship between concentration and per cent inhibition. Elixir (Turmeric

extract 25%+Neem extract 50%) and crop verdict (Cinnamomum zylanicum oil 10%+herbal extract 23%) were found effective in suppressing the fungal growth. Followed by Kaneem

Interpretation; Recent advances in *Fusarium* spp. control have been achieved through the application of botanical products and antagonistic microorganisms. Crude aqueous extracts of various plants have exhibited some levels of antifungal activity as they contain active (polyphenols) compounds that are antifungal, antibacterial, biodegradable and are selective in their toxicity. However, frequent and indiscriminate use of chemicals leads to ill effects on environment causing soil and water pollution and development of new strain with more virulence. Hence, botanicals and bioagents have been advocated as one of promising alternative strategy to overcome these problems.

Keywords: Maize, *Fusarium verticillioides*, botanicals and Pokkah boeng.

RESPONSE OF INTEGRATED NUTRIENT MANAGEMENT ON QUALITY PARAMETERS OF BROCCOLI (*Brassica oleracea* L. VAR. *ITALICA*) CV. PUSA KTS-1

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The present investigation was carried out to study the response of integrated nutrient management on quality parameters of broccoli (*Brassica oleracea* L. var. *italica*) CV. Pusa KTS-1. The field experiment was conducted at Horticultural Research Farm, Department of Horticulture, Ch. Charan Singh University Campus, Meerut (U.P) India, during the years 2019-20 and 2020-21. The experiment was laid out in Randomized Block Design. The treatments involved in the study were twelve in numbers i.e. T₁ (Control), T₂ (RDF 150:100:100 N.P.K), T₃ (Azospirillum @ 5 kg), T₄ (VC @ 10 t/ha), T₅ (80% NPK + Azospirillum @ 1 kg), T₆ (60% NPK + 2t/ha VC + Azospirillum @ 1 kg), T₇ (60% NPK + Azospirillum @ 2 kg), T₈ (60% NPK + 4 t/ha VC), T₉ (40% NPK + Azospirillum @ 3 kg), T₁₀ (30% NPK + 7t/ha VC), T₁₁ (20% NPK + Azospirillum @ 4 kg), T₁₂ (20% NPK + 8t/ha VC). The investigation indicated that a judicious combination of organic manures, inorganic fertilizers and biofertilizer i.e. 60% NPK + 2t/ha VC + Azospirillum @ 1 kg gave the maximum vitamin A (2452.07 IU) and protein content (3.53 %). Maximum vitamin C (98.28 mg/100g) was recorded under soil application of 60 % NPK + 4 t/ha Vermicompost which was found statistically at par with the treatments 60% NPK + Azospirillum @ 2 kg and 60% NPK + 2t/ha VC + Azospirillum @ 1 kg. However, the minimum vitamin A content (2369.24 IU), vitamin C value (51.79 mg/100g) and protein content (2.58 %) was observed under control treatment during two consecutive years of experimentation.

TIME SERIES ANALYSIS FOR MUSTARD PRODUCTION, PRODUCTIVITY, AND AREA FORECASTING IN MADHYA PRADESH

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This study is done with objective of forecasting of area, production and productivity of mustard using time series analysis in M.P. Secondary data are area, production and productivity has collected from official web sites of Directorate of Economics and Statistics of Madhya Pradesh. To achieve this objective, data from 1976 to 2021 are analysed. This study uses time series analysis model ARIMA to forecast mustard area, production, and productivity. The statistical software R and SPSS, were employed for analysis purpose. To validate the fitted models and testing the accuracy of the fitted models different indices like R-squared, RMSE, MAPE, MAE and were used. The results showed that the ARIMA (0,1,0), (0,1,1), (0,1,1) and models are suitable for forecasting mustard area, production, and productivity in M.P. We found that models are well fitted with MAPE value for area(12.851), production(23.510) and productivity(13.110). Thus the study concluded that the, over the time data of area, production and productivity of mustard over all it is found best ARIMA model for Madhya Pradesh.

Keywords:- Forecasting production, productivity and mustard

FORECASTING OF AREA, PRODUCTION AND PRODUCTIVITY OF MUSTARD USING TIME SERIES ANALYSIS IN INDIA

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Department of Mathematics and Statistics, JNKVV, Jabalpur, M.P-482004

This study is done with objective of forecasting of area, production and productivity of mustard using time series analysis in India. Secondary data are area, production and productivity has collected from official web sites of Directorate of Economics and Statistics of India. For achieving objective, data from 1976 to 2021 are analysed. This study uses time series analysis model ARIMA to forecast mustard area, production and productivity. The statistical software R and SPSS, were employed for analysis purpose. To validate the fitted models and testing the accuracy of the fitted models different indices like R-squared, RMSE, MAPE, MAE and were used. The results showed that the ARIMA (0,1,0), (0,1,0), (0,1,1) and models are suitable for forecasting mustard area, production and productivity in India. We found that models are well fitted with MAPE value for area(8.788), production(15.335) and productivity(7.790). Thus the study concluded that the, over the time data of area, production and productivity of mustard over all it is found best ARIMA model for India.

Keywords:- Forecasting production, productivity and mustard.

FACTOR ANALYSIS ON FARMER PERCEPTION REGARDING SOIL HEALTH CARD IN SURGUJA DISTRICT OF CHHATTISGARH

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Factor analysis is a useful tool for reducing large numbers of related variables in questionnaires, allowing for more manageable data for analysis. This study aimed to analyze a questionnaire's factor analysis to identify key variables determining perceptual satisfaction. The researchers used the determinant score, Kaiser-Meyer-Olkin, and Bartlett's test of sphericity to examine the likelihood of using factor analysis for the given data set. Factorability is assessed using Determinant score, Kaiser's Criterion and Scree test, and Varimax orthogonal factor rotation method. Internal consistency is confirmed through Cronbach's alpha and composite reliability. The key variables were identified using principal component analysis and the varimax orthogonal factor rotation approach. The study involved 150 farmers aged 28 to 61 years, with a total sample size of 150. The results showed that perception index, education, farming experience, annual income, extension contact, social interaction, innovativeness, exposure to media, and attitude towards science were the most significant factors affecting perceptual satisfaction. However, further research is needed to make firmer decisions on perception satisfaction factors to support farmers in a country. The convergent validity is established when average variance extracted is greater than or equal to 0.003. The results have revealed that the factor analysis not only allows detecting irrelevant items but will also allow extracting the valuable factors from the data set of a questionnaire survey.

Keywords: Factor analysis, Kaiser-Meyer-Olkin, Bartlett's test of Sphericity, determinant score, Kaiser's criterion, Scree test, Varimax

DEVELOPMENT OF MANAGEMENT MODULES IN TOMATO UNDER PROTECTED CULTIVATION

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Three different pest management modules were evaluated against insect pests on tomato under protected cultivation. The module-II (Adaptable module) bearing treatments neem cake, chlorantraniliprole 8.8 SC + thiamethoxam 17.5 SC @ 1.0 ml/l, azadirachtin 1000 ppm @ 2.0 ml/l, indoxacarb 14.5 SC + acetamiprid 7.7 SC @ 1.0 ml/l, pyriproxyfen 5 EC + fenpropathrin 15 EC @ 1.5 ml/l and spinosad 45 SC @ 0.25 ml/l + buprofezin 25 SC @ 1.0 ml/l was found superior in reducing tomato pinworm and silverleaf whitefly in tomato under protected cultivation which was followed by module-I (Biointensive module) and module-III (Recommended package of practice). An effective, economically feasible and eco-friendly pest management module was developed to manage the most notorious pests (tomato pinworm and silverleaf whitefly) of tomato under protected cultivation.

Keyword: Module ,Protected cultivation , pinworm, silver leaf whitefly

VARIATION FOR GROWTH, LEAF OIL YIELD AND LEAF QUANTITATIVE TRAITS AMONG HALF-SIB PROGENIES OF CINNAMOMUM ZEYLANICUM BLUME.,

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A progeny trial was conducted at the Bakkal Botanical Garden near Sirsi to evaluate the growth, leaf oil yield and leaf quantitative characteristics of two-year-old progenies of *Cinnamomum zeylanicum*. The germplasm site included 15 half-sib families with 3 replications originating from Uttar Kannada, Haveri and Shivamogga districts. The evaluation of progenies for growth, leaf oil yield and leaf quantitative traits took place 28 months after planting and the leaf oil extraction was performed in May 2022. The G11 family displayed the highest mean plant height (213.33 cm), while the K16 family had the highest girth at the collar region (51.46 mm). The G11 family had the highest number of leaves and number branches per plant 677.66, 50.33 respectively. The Clevenger glass apparatus was utilized for the extraction of leaf oil. The leaf oil content (v/w dry weight basis) ranged from 1.30 per cent to 2.20 per cent. The highest leaf oil content was recorded in the J6 family (2.20 %). The eugenol content varied from 55.78 per cent to 89.43 per cent. The S5 family exhibited the highest eugenol content (89.43 %). However, the J2 family had the highest number of inflorescences per plant (16.66) and the highest number of immature fruits per plant (6). While considering growth, leaf yield and leaf oil traits the best families are G4, G11, K16, J2 and J6 these families can be further used for tree improvement and breeding programme.

Keywords: Progeny, Cinnamon, Germplasm, Eugenol.

EVALUATION OF FIELD SURVIVAL OF INTER-SPECIFIC GRAFTS IN GARCINIA SPECIES**PREETI R. NAIK¹, RAMESH S RATHOD², SYED ALI³ AND VENKATESH L²**¹Range Forest Officer, Gerusoppa Range, Honnavar forest Division, Karnataka Forest Department,²Assistant Professor of Forestry, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, University of Agricultural Sciences, Dharwad- 580 005 Karnataka, India.³Ph.D. Scholar, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Karnataka, India.

Garcinia, also known as Malabar tamarind holds significant economic importance due to its rich content of Hydroxycitric acid (HCA) which is used in diverse pharmaceutical formulations. In the present study, five species of *Garcinia* were subjected to inter-specific grafting in order to assess their survivability during the early stages of growth in the field. Among the tested graft combinations, T₁ (*G. indica* rootstock and *G. gummi-gutta* scion), T₃ (*G. gummi-gutta* rootstock and *G. indica* scion), T₆ (*G. xanthochymus* rootstock and *G. indica* scion), and T₇ (*G. xanthochymus* rootstock and *G. morella* scion) exhibited the highest survivability rates, each recording 100 %. Conversely, the lowest survival rates were observed in T₄ (*G. gummi-gutta* rootstock and *G. mangostana* scion) at 11 % and T₂ (*G. indica* rootstock and *G. gummi-gutta* scion) at 22 %. None of the grafts survived in T₈ (*G. xanthochymus* rootstock and *G. mangostana* scion), T₉ (*G. mangostana* rootstock and *G. indica* scion), T₁₀ (*G. mangostana* rootstock and *G. morella* scion), T₁₁ (*G. mangostana* rootstock and *G. gummi-gutta* scion), and T₁₂ (*G. mangostana* rootstock and *G. xanthochymus* scion). The *Garcinia mangostana* species exhibited poor compatibility with most other species of *Garcinia*, as evidenced by the lack of survival in several graft combinations. Additionally, graft compatibility barriers were observed between T₁ and its reciprocal combination, T₃. However, this research pinpointed a simple and effective approach for grafting different species of *Garcinia* together, offering important guidance on which graft combinations might be successful for future exploration and sustainable utilization.

Keywords: Inter-specific grafting, survivability, compatibility and sustainable utilization**ASSESSMENT OF SURVIVAL AND GROWTH PERFORMANCE OF TREE SPECIES IN EARLY AGE URBAN PLANTATION OF KUMTA TOWN IN UTTARA KANNADA DISTRICT OF KARNATAKA****RAMESH RATHOD¹, SYED ALI², MURUGESH HATTI³ AND VENKATESH L¹**¹Assistant Professor, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, University of Agricultural Sciences, Dharwad- 580 005 Karnataka, India.²Ph.D. Scholar, Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Karnataka, India.³B.Sc. Hons. (Forestry), College of Forestry, Sirsi, University of Agricultural Sciences, Dharwad- 580 005 Karnataka, India.

Urban forests are vital for creating sustainable, resilient cities that enhance environmental health, human well-being, and the overall quality of urban life. They play a critical role in managing urban ecosystems by improving air quality, stabilizing soil, and fostering sustainability. However, urban forestry faces numerous challenges such as tree maintenance, survival, establishment, soil compaction, public support, inventory of planting sites, and high costs. To address these challenges, a study was conducted to assess the survival and growth performance of tree species in a one-year-old urban plantation in Kumta town, Uttara Kannada district, Karnataka. The results revealed varying survival rates among the planted species, ranging from 36.58% to 100%. Similarly, height growth increment rates varied from 4.5 % to 13.12 %, while girth increment rates ranged from 25.19 % to 42.08 %. Species such as *Swietenia macrophylla*, *Parkia speciosa*, and *Tamarindus indica* demonstrated 100% survival rates, with *Swietenia macrophylla* exhibiting the highest growth increment rates in both height and girth, followed by *Parkia speciosa*. Therefore, *Swietenia macrophylla* appears to be highly suitable for the region. However, species like *Tamarindus indica* and *Vateria indica* are not recommended for this region due to their slow growth rates. This study underscores the importance of selecting appropriate tree species for urban plantations to ensure their survival and growth in urban environments for building greener and sustainable cities.

Keywords: Urban Forest, survivability, growth performance and sustainable cities**EFFECT OF DIFFERENT LEVEL OF SALINE WATER IRRIGATION ON GROWTH OF LILUM SPECIES****RAVEENA¹, ARVIND MALIK² AND DIVYA²**¹Department of Horticulture, Maharana Pratap Horticulture University, Karnal-132001²Department of Horticulture, CCS Haryana Agricultural University, Hisar-125004

The experiment on “Effect of different level of saline water irrigation on growth of lilum species” was conducted in 2021-22 and 2022-23 at the Agritourism Centre CCS HAU, Hisar. In the present study, three species of lilium viz. Asiatic lily, oriental lily and LA hybrid were used with two varieties of each species and four different level of salinity (canal water, 3 dS/m, 4 dS/m and 6 dS/m). The experiment comprised of twenty four treatments, each having three replications and was planted in earthen pots under greenhouse in complete randomized design. The study revealed that among different treatments, maximum weight of bulb per plant, diameter of bulb (cm) was found in canal water followed by 3EC saline water irrigation whereas, minimum was observed in 6EC saline water irrigation. Among different species, maximum weight of bulb per plant, diameter of bulb (cm) was recorded in Oriental lily var. Siberia whereas maximum number of bulblets per plant LA hybrid var. Albuifelara and minimum was found in Asiatic lily var. Colaris.

Keyword: Salinity, polyhouse, bulb, species, weight

PRODUCTION AND PROCESSING OF BAEI IN MADHYA PRADESH**RAHUL DONGRE¹ AND BHARTI CHOUDHARY²**²Scientist, Department of Forestry, CoA, JNKVV, Jabalpur (M.P.)¹Ph.D. Research Scholar, Department of Horticulture, CoA, JNKVV, Jabalpur (M.P.)

Bael (*Aegle marmelos* L.). production in Madhya Pradesh has a promising future due to the favorable climatic conditions and availability of suitable land for cultivation. Bael is a tropical fruit tree that thrives in hot and humid weather and grows well in well-drained, loamy soils. Madhya Pradesh has a tropical climate, with a monsoon season from June to September and an average temperature range of 25-30°C. With the increasing demand for healthy and organic foods, the demand for bael fruits and products made from them, such as juice, jam, and pulp, is also expected to increase. Bael is known for its various health benefits, including its ability to improve digestion, boost immunity, and treat various ailments. To promote the production and processing of bael in Madhya Pradesh, the state government can provide financial incentives and subsidies to farmers and entrepreneurs engaged in Bael farming and processing. They can also provide technical assistance and training programs to help farmers improve their production practices and increase their yield.

To convince farmers to produce Bael fruit, All India coordinated research project of arid zone fruits works to promote farmers for cultivation of Bael. In this project evaluation verifies for this region and developed improved agronomical practices to educate them about the benefits of cultivating bael and how it can be profitable for them. Madhya Pradesh State Agro Industries Development Corporation Limited (M.P. Agro) has also launched a scheme for the promotion of bael processing and value addition. Overall, the government of Madhya Pradesh is taking various measures to promote the cultivation and processing of Bael fruit, which has immense economic and nutritional potential.

Key words: Bael, Madhya Pradesh, Processing**PERFORMANCE OF DIRECT SEEDED RICE (*Oryza sativa*) And Weeds Under Different Weed Control Practices****RUCHI RAJPOOT¹, G. RUPA², CHINMAYA SAHOO³, M. L. KEWAT⁴, ANAMIKA PANDEY^{2*}, LALIT KUMAR MAINWAY⁵ AND MEKA SHIVARAM REDDY^{3*}**¹Ph. D Research Scholar, Department of Agronomy, Rani Lakshmi Bai Central Agricultural University - Jhansi, Uttar Pradesh-284003²Ph. D Research Scholar, Department of Agronomy, College of Agriculture, JNKVV, Jabalpur, M.P-482004³Ph. D Research Scholar, Department of Agronomy, Dr. Rajendra Prasad Central Agricultural University, Pusa – 848125⁴Professor, Rani Durgavati Vishwavidyalaya, Jabalpur, M.P-482001⁵Ph. D Research Scholar, Department of Agronomy, Indian Agricultural Research Institute Pusa New Delhi-110012

A field experiment was conducted at the College of Agriculture, JNKVV, Jabalpur during Kharif 2022, to assess the efficacy of various weed control practices on direct-seeded rice (*Oryza sativa*) and weed populations. The study encompassed seven distinct treatments, with a focus on weed density and dry weight reduction for both monocot and dicot weed species. The most effective treatments in mitigating weed density and dry weight involved the pre-sowing application of glyphosate, supplemented by a single hand weeding event at 30 days after sowing (DAS). Additional treatments that demonstrated noteworthy weed control included hand weeding twice at 30 and 45 DAS, post-emergence application of bispyribac-sodium coupled with a single hand weeding event, post-emergence application of bispyribac-sodium alone, and pre-sowing glyphosate application in conjunction with a solitary hand weeding event at 30 DAS. These treatments yielded grain outputs of 3475, 3154, 2655, 2330, 2110, and 1870 kg/ha, respectively, in stark contrast to the meagre 1508 kg/ha grain yield in the weedy check plot. Regarding plant development and productivity, the treatment involving the pre-sowing application of glyphosate alongside one-hand weeding at 30 DAS displayed the most favourable outcomes. This treatment yielded the maximum plant height at 30 DAS (29.75 cm), at the time of harvest (72.00 cm), and the highest number of effective tillers, registering 825.00/m². Subsequently, the treatment involving hand weeding twice at 30 and 45 DAS also exhibited notable plant growth and tiller development characteristics.

Keywords: DSR, Glyphosate, Bispyribac-sodium, Weed density, Weed Dry weight**COMPARATIVE ANALYSIS OF THE TRENDS IN RIVER WATER QUALITY PARAMETERS: A CASE STUDY OF THE YAMUNA RIVER****SHARAD KUMAR SINGH CHAUHAN AND RAJEEV KUMAR SHARMA****Dept. of Chemistry, D.S College, Aligarh**

This research paper explores the recent trends in critical water quality parameters of the Yamuna River Which indicate significant deviations in its different segments. The Delhi segment is the most polluted as the river gets severely affected by the impediments of industrialization, urbanization and agricultural advances. In view of the social, economic, religious and cultural significance of the Yamuna River And progressive degradation of its water quality, numerous conservation campaigns and the major cleaning up projects like the Yamuna Action Plan (YAP) I, II and III were undertaken for its restoration and conservation. Comparative analysis of the trends in river water quality parameters of the Yamuna River illustrate that despite all the efforts the water quality in terms of DO and BOD is not fit for designated best uses in the Delhi and eutrophicated segments. The results necessitate innovative perspectives in the development of an updated comprehensive conservation strategy for the Yamuna River. The paper concludes with multidimensional recommendations for the improvement of water quality of the Yamuna River.

APPLICATION OF WATER QUALITY INDEX AND MULTIVARIATE STATISTICAL TECHNIQUES FOR ASSESSMENT OF WATER QUALITY AROUND YAMUNA RIVER IN AGRA REGION, UTTAR PRADESH, INDIA

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In this research, Water Quality Index and Multivariate Statistics Techniques was carried out on fourteen water quality parameters collected quarterly (four times/year) from nine water sources in Agra, Uttar Pradesh, India for one year (May 2019- April 2020). The Water Quality Parameters (WQP) included are the concentration of hydrogen ion (pH), Electrical conductivity, Turbidity, Total dissolved solids (TDS), Total Hardness, Total Alkalinity, Calcium, Sulphate, Chloride, Magnesium, Iron, COD, DO, and BOD. The Water sample collected shows that the mean values of physicochemical parameters are in the range of WHO and BIS except for Hardness in summer (1,680 mg/L); monsoon (832.22 mg/L); winter (1,876.66 mg/L); spring (1,535.55 mg/L), TDS in summer (1,000.33 mg/L); monsoon (683.44 mg/L); winter (1,087.66 mg/L); spring (776.66 mg/L) and sulphate (927.22 mg/L); monsoon (446.77 mg/L); winter (925.77 mg/L); spring (944.88 mg/L) which indicate the bad quality of water. The WQI values were calculated for three locations at different weather conditions. WQI values in summer, winter and spring are 630.90, 279.61, 279.91 shows that river water is not suitable for drinking purpose whereas the WQI value in monsoon is 75.89 shows that water is fit for drinking purposes due to the dilution of river water. A moderate positive correlation was observed for turbidity with total hardness, iron, total alkalinity, and sulphate. Negative Correlation was observed with pH. Moderate Correlation was seen with TDS-EC (0.608), TDS-Alkalinity (0.7794), EC-Ca (0.723) and strong was observed for BOD-DO (0.941) and Ca-Mg (0.999). Principal Component Analysis revealed that five factors were significant (eigen value . 0.5) with total variance of 39.43%–85.19% respectively. The ICP-MS study of water sample from point source indicate the presence of Ni²⁺, Cr⁶⁺, Co²⁺, Mn²⁺, Cu²⁺, Zn²⁺ ions at higher concentrations.

QUALITY ASSESSMENT OF GROUND WATER AT ALIGARH DISTRICT, INDIA

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A water quality analysis was carried out in Aligarh City for the evaluation of the current status of physicochemical contaminants and their sources in groundwater. Groundwater samples were obtained from 15 different sampling stations in Aligarh City . The results were compared with standards prescribed by CPCB and BIS. Different parameters were analyzed that are ph, alkalinity, total hardness, turbidity and chloride. The sampling sites showed that the physico chemical parameters were within the water quality standards and the quality of water was found to be fit for drinking purposes.

PHYTOTOXICITY EVALUATION OF RONFEN 1858 SC IN BRINJAL

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Phytotoxicity describes any adverse effects on plant growth, physiology, or metabolism caused by a chemical substance, such as high levels application of pesticides, herbicides, heavy metals, or nanoparticles. General phytotoxic effects include altered plant metabolism, growth inhibition, or plant death. Changes to plant metabolism and growth are the result of disrupted physiological functioning, including inhibition of photosynthesis, water and nutrient uptake, cell division, or seed germination. In this regard, the field experiment was carried out at Department of Horticulture, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka to evaluate the phytotoxicity of RONFEN 1858 SC (Pyriproxyfen 8% + Dinotefuran 5% + Diafenthiuron 18% SC) in Brinjal crop during the year 2021 & 2022. The RONFEN 1858 SC was sprayed at two different dosages viz., 600 ml/ha and 1200 ml/ha along with untreated water spray in order to study the phytotoxicity on the crop. For phytotoxicity evaluation of treatments, the symptoms observed were leaf injury on tips/surface, wilting, vein clearing, yellowing, stunting, necrosis, epinasty and hyponasty at 1, 3, 7, 10 and 14 days after each application of treatments. To record the observations 0-10 rating scale was used. The results revealed that, even after foliar sprayings of RONFEN 1858 SC at double the recommended dose (600 ml/ha), no phytotoxic effects were observed on brinjal leaves, shoots, flowers, or fruits. The population of prevailing natural enemies in brinjal crop ecosystem namely, spiders and coccinellids were uniform in various experimental plots before application of treatments. There was not much variation in the populations of these natural enemies after application of treatments and the difference was not significant at each observation time. Hence, it may be stated that the application of RONFEN 1858 SC at different dosages did not show adverse impact on natural enemies.

Key words: RONFEN 1858 SC, Phytotoxicity, Brinjal

CHILLI ANTHRACNOSE: SURVEY FOR THE INCIDENCE AND CHARACTERIZATION OF *Colletotrichum* spp. ISOLATES IN TELANGANA STATE

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Chilli (*Capsicum annuum* L.) is most widely cultivated as fruit vegetable throughout the world. The crop is susceptible to many foliar and soil borne fungal diseases of which fruit rot/ anthracnose caused by the *Colletotrichum capsici* is significant. Typical anthracnose symptoms on chilli fruit include sunken necrotic tissues with concentric rings of acervuli. Since, the pathogen express the latent infection, in India the crop yield losses ranged from 10-80% with losses of up to 80-89% in Telangana. A roving survey was conducted during the month of December, 2023 in major chilli growing areas of erstwhile Khammam (Konijerala, Wyramandals) and Warangal (Nallabellimandal) districts of Telangana and the disease incidence was assessed in different popular cultivars such as swarnamukhi, tejitha, keerthiteja, armour and tomato. The study revealed variations in per cent disease incidence of anthracnose among the cultivars swarnamukhi, tejitha (32-35%), keerthiteja, armour (23-26%) and tomato (75-80%) and different chilli growing areas i.e Khammam and Warangal districts. Highest disease incidence was recorded in Pandillapallivillage, Konijerala mandal of Khammam district with a range of 25-27% followed by Nagarajpalle village, Nallabelli mandal of Warangal district with 15-18% disease incidence. The collected infected seed samples were subjected to different standard seed health tests for detection of pathogen, wherein, standard blotter method was found effective in showing maximum per cent recovery of *Colletotrichum* spp. isolates. A total of five isolates were isolated from the cultivars and were further studied for morphological and cultural characterization which has showed variability in their colony colour ranging from yellowish to brown, light pinkish to brown, dark grey colour with cottony texture and the shape of the conidia was half-moon shape to ovoid where few isolates have exhibited pseudo septa and pinkish to black acervuli with setae.

EXPLORING ASHWAGANDHA (*WITHANIA SOMNIFERA*) AS A POTENTIAL HERBAL MEMORY ENHANCER

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Introduction: Age-related cognitive decline and memory impairment are major health concerns, affecting millions worldwide. This decline can significantly impact daily life, independence, and overall well-being. Conventional medications used for cognitive enhancement often come with a risk of adverse effects. As a result, the search for safe and effective alternatives is ongoing. **Ashwagandha: A Promising Candidate:** Ashwagandha, also known as *Withania somnifera*, is a revered medicinal herb with a long history of use in Ayurvedic medicine. It is considered an adaptogen, a natural substance believed to help the body adapt to stress and improve overall well-being. Recent research suggests Ashwagandha may also possess memory-enhancing properties. **Potential Mechanisms of Action:** Several mechanisms may underlie Ashwagandha's potential benefits for memory. These include: **Antioxidant activity:** Ashwagandha contains powerful antioxidants that may protect brain cells from oxidative stress, a major contributor to cognitive decline. **Neuroprotective effects:** Studies suggest Ashwagandha may protect neurons from damage and promote neurogenesis, the growth of new brain cells. **Enhanced cholinergic function:** The cholinergic system plays a vital role in memory. Ashwagandha may increase acetylcholine levels in the brain, potentially improving memory function. **Reduced inflammation:** Chronic inflammation is linked to cognitive decline. Ashwagandha's anti-inflammatory properties may contribute to its memory-enhancing effects. **Challenges and Future Directions:** Despite encouraging findings, further research is needed to fully understand the efficacy and optimal dosage of Ashwagandha for memory enhancement. Additionally, the quality and standardization of Ashwagandha products can vary significantly, highlighting the need for stricter regulations. **Conclusion:** Ashwagandha presents a promising avenue for natural memory enhancement. Its potential mechanisms of action and early positive findings from clinical trials warrant further investigation. With more rigorous research, Ashwagandha could become a valuable tool in the fight against cognitive decline and memory impairment, offering a safe and effective alternative to conventional medications.

Keywords: Herbal drug, memory enhancer, Ashwagandha, *Withania somnifera*, cognitive decline, neuroprotection, neurogenesis, oxidative stress, neurotransmitters.

ASSESSING THE IMPACT OF NATIONAL EDUCATION POLICY ON AGRICULTURAL EDUCATION: A COMPARATIVE STUDY

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Education policies play a pivotal role in shaping a nation's future by establishing the framework for developing human capital, fostering innovation and driving economic growth. Agricultural education has a direct link to a country's food security, agricultural productivity and

rural development. Agricultural education encompasses a wide range of subjects. It is crucial not only for training the next generation of farmers and agricultural scientists but also for promoting sustainable practices, innovation in food production and rural community development. National education policies define the structure and content for educational institutions. In the context of agricultural education, these policies can influence curriculum design, teacher training and development, funding and resources, access and inclusion etc. This research paper explores the impact of national education policy on agricultural education by conducting a comparative study across different educational institutions. The primary objective is to understand how changes in education policy affect the structure, content and effectiveness of agricultural education programs. The study examines educational frameworks, curriculum development, funding allocations and teacher training initiatives within the context of agricultural education. The research methodology involves a mixed-methods approach, combining quantitative analysis of educational outcomes with qualitative insights from stakeholders in the education and agricultural sectors. Data is sourced from government reports, educational institutions and interviews with educators, policymakers and students. The findings indicate that national education policies have a significant influence on the quality and relevance of agricultural education. Based on the results, the paper provides recommendations for policymakers to design education policies that foster a strong connection between academic learning and real-world agricultural applications. Overall, this study contributes to the ongoing discourse on the role of education in fostering sustainable agricultural practices and offers insights into policy mechanisms that can support the development of a robust agricultural education system.

Keywords: Agricultural Education, National education policy, Policy impact assessment, Policy implementation, Educational outcomes and quality.

SOCIOECONOMIC DISTRIBUTION AND ITS IMPACT ON QUALITY OF LIFE: A BASELINE ANALYSIS IN HEMODIALYSIS PATIENTS

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Background: End-stage renal disease (ESRD) patients on maintenance hemodialysis experience a significant decline in quality of life. This study aimed to investigate the association between socioeconomic status (SES) and quality of life in this population.

Methods: A total of 100 ESRD patients undergoing hemodialysis were recruited from the nephrology department of Maharani Laxmi Bai Medical College, Jhansi, India. The study adhered to the International Conference on Harmonization-Good Clinical Practice (ICH GCP) guidelines and received ethical approval (NO-838 / SURGERY/15) from the institute's Human Ethics Committee. Patients' SES was categorized using the Kuppuswamy's scale.

Results: The distribution of SES between the control and experimental groups was similar (p -value > 0.05). The largest proportion of patients belonged to the lower middle class (45.83% and 34.69% in control and experimental groups, respectively), followed by the lower class (27.08% and 32.65%). Upper-middle and upper classes comprised a smaller percentage (4.17% and 6.12%, and 10.42% and 10.20%, respectively).

Discussion: Our findings suggest that SES distribution is comparable in both groups. This baseline data ensures a balanced comparison of quality of life between different socioeconomic strata within the study population. Considering previous research (Alqahtani et al., 2019) reporting an expected poor quality of life rate of 50% among hemodialysis patients, further analysis will examine the influence of SES on this outcome variable.

Keywords: End-stage renal disease, Hemodialysis, Socioeconomic status, Quality of life

UNVEILING THE FUTURE OF DAIRY: ADVANCES IN SCIENCE AND TECHNOLOGY

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The dairy industry is undergoing a transformative shift driven by cutting-edge scientific and technological advancements. Innovative practices reshaping every aspect of dairy production, processing, and consumption are at the forefront of this evolution. Precision farming techniques, powered by data analytics and advanced sensors, are revolutionizing dairy farm management. Real-time monitoring of herd health, feed efficiency, and environmental conditions enables optimized decision-making, improving animal welfare, productivity, and resource utilization. Concurrently, exploring alternative protein sources, such as plant-based, microbial, and cultured options, diversifies the dairy product landscape. Leveraging biotechnology and fermentation processes, these novel alternatives cater to evolving consumer preferences, dietary restrictions, and sustainability concerns. Smart packaging solutions are also emerging as game-changers in the dairy sector. Intelligent labeling, embedded sensors, and active and intelligent packaging systems enhance product safety, extend shelf life, and provide transparent supply chain traceability, fostering consumer trust and reducing food waste. Moreover, the dairy industry embraces sustainable practices to minimize its environmental footprint. Innovative waste management strategies, renewable energy integration, and carbon capture technologies pave the way for a more eco-friendly and circular dairy ecosystem. At the convergence of these advancements lie immense opportunities for stakeholders across the dairy value chain. Collaborations between academia, industry, and regulatory bodies

are vital in navigating the complexities of these transformative technologies, ensuring their responsible development, and ultimately shaping a more sustainable, diverse, and consumer-centric future for the dairy sector.

Keywords: Dairy Innovation, Precision Farming, Alternative Proteins, Smart Packaging, Sustainability.

MONITORING THE ANTIMICROBIAL ACTIVITY OF FRUITS *Capsicum annum* AGAINST THE PATHOGENIC STRAINS JAGRITI SHARMA AND ADITI YADAV

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Capsicum, also known as red pepper or chilli is an herb. Its fruit is commonly used for skin diseases, arthritis pain and other conditions. The *Capsicum* fruit contains a chemical called Capsaicin. Red pepper belongs to the Solanaceae family also known for its lipid lowering, antihypertensive, anti-diabetic and anti – obesity effects. Recently, there is a rising demand for herbal drugs which has less adverse effects and have shown more beneficial effects in comparison to synthetic options. This study was conducted to determine the antibacterial activities of fruit extracts of *C. annum*. Fresh fruits weighing 200g were washed in tap water to remove the dust from it. Then the fruits were wiped with a clean cloth to remove the moisture from them. The fruits were oven dried for 15min at 60°C, stored at room temperature, and ground to a fine powder. The fine powder was stored in a clean container and was subjected to chemical and microbiological studies. Thus by the above process 25 g of powder was obtained. Using a Soxhlet extractor, 3 types of extracts were formed using different solvents i.e., Ethanol Solvent (78°C), Aqueous Solvent (100°C), Methanol Solvent (64°C) respectively. The extracts were filtered while still hot using Whatman filter paper dark red solid residue was produced. The antagonistic activity was evaluated against 4 pathogens *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Enterococcus pneumoniae*, and *Candida albicans* by disc diffusion method. The medicinal properties of *C. annum* used to formulate the drugs for several diseases caused by antibiotic resistant pathogenic microorganisms.

Keywords: Antagonistic activity, *Capsicum annum*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Enterococcus pneumoniae*, and *Candida albicans*

A CARBON ENRICHED COMPLEX FERTILIZER AND METHODS OF PRODUCTION THEREOF

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Huge quantity of Silica sand required in complex fertilizer production but faces environmental challenges from unsustainable mining. Alternatives like rice husk ash (RHA) are gaining attention due to their nutrient-rich composition and sustainable sourcing from rice husk combustion residues. DAP and NPK fertilizers, essential for enhancing soil fertility and crop yields in India, rely on silica sand as a filler during production. However, silica sand contributes no nutrients to soil and poses environmental risks such as erosion, biodiversity loss, and groundwater impacts. Rice husk ash is considered as a waste from rice husk based power generation plants, contains significant plant nutrients and micronutrients. Its use as a filler in fertilizers not only reduces environmental burdens associated with disposal but also enhances nutrient content in the complex fertilizers. The production process involves synthesizing DAP from ammonia and phosphoric acid, incorporating fillers like silica sand or RHA, potash, and recycled materials, which are granulated to specific market requirements. RHA's nutrient profile offers an advantage over silica sand, potentially improving soil health and crop productivity while addressing sustainability concerns in fertilizer manufacturing. This research underscores RHA's potential as a sustainable substitute for silica sand, promoting efficient nutrient utilization and environmental stewardship in fertilizer production.

Keywords: Rice husk ash, Rice husk ash based fertilizer, Sustainability, Complex Fertilizer, Silica sand

EXPLORING THE EFFICACY OF VARIOUS PLANT LEAF POWDERS AS STORED WHEAT PROTECTANTS AGAINST INFESTATION OF *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae)

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The insecticidal effectiveness of twelve frequently utilized plant leaf powders against *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae) in wheat storage. The experiment was done in P.G. Laboratory of Entomology Department (Assam Agricultural University, Jorhat-13) during the period from 2017-2020. Leaves were collected from twelve plants viz. *Aegle marmelos*, *Annona reticulata*, *Artemisia nilagirica*, *Azadirachta indica*, *Catharanthus roseus*, *Clausena heptaphylla*, *Datura stramonium*, *Eucalyptus tereticornis*, *Heteropanax fragrans*, *Lawsonia inermis*, *Matteuccia struthiopteris*, and *Vitex negundo* which were used traditionally by farmers of Assam as grain protectant against stored rice. Collected leaves were meticulously rinsed with tap water to eliminate any dirt or debris from the natural environment. The powder was used to make 0.25, 0.50, 0.75, 1.00, 1.25, 1.75, and 2.50 gm / 25 g seeds from each plant leaf. The powder was thoroughly

mixed with seeds and became 1, 2, 3, 4, 5, 7 and 10 per cent (wt/wt) concentration on weight basis. In each replication, 20 adults were released and the mortality was counted after 24, 48 and 72 hr. Results of LD₅₀ (wt/wt g) and relative toxicity experiment after 24, 48 and 72 hr exposure period during 2018, the lowest LD₅₀ was observed in *A. indica* leaf powder recorded as 1.94, 1.84, and 1.70 per cent, respectively, followed by *D. stramonium* with 3.05, 2.36, and 1.97 per cent. Conversely, *M. struthiopteris* exhibited the highest LD₅₀ 30.66, 15.22, and 4.27, respectively. During the year, 2019, similar trend was observed. The LD₅₀ (wt/wt g) value was lowest in *A. indica* leaf powder (2.21, 1.89, and 1.73) followed by, *D. stramonium* showed values of 2.86, 1.83, and 1.68. After 24, 48, and 72 hours of exposure, *M. struthiopteris* showed the highest LD₅₀ values, 16.62, 12.37, and 3.09 percent, respectively. The mean repellency rate after 72 hr of treatment maximum was found in case of *A. indica* (78.19%) followed by *E. tereticornis* (74.62%), *A. nilagirica* (71.84%), *D. stramonium* (71.35%), *C. heptaphylla* (70.36%), *C. roseus* (64.61%), *A. reticulata* (61.21%) class IV (Mc Donald et al., 1970) *A. marmelos* (47.40%) and *V. negundo* (44.44%) class III, *M. struthiopteris* registered minimum mean repellency rate with (39.99%) class II.

While in 2019 the mean repellency after 72hr the highest repellency was observed in case of *A. indica* (77.03%) class V followed by *E. tereticornis* (74.07%), *D. stramonium* (70.36%), *C. heptaphylla* (57.77%), *A. nilagirica* (67.38%) (class IV), *A. marmelos* (56.29%), *A. reticulata* (56.29%), *C. roseus* (57.77%), *L. inermis* (52.59%) and *H. fragrans* (48.14%), (class III) while *V. negundo* (39.33%) and *M. struthiopteris* (37.03%), showed lowest repellency rate (class II). *A. indica* dry leaf powder had given maximum (26.25%) mortality against *S. oryzae* in 2018 experiment followed by *D. stramonium* (22.50%) which was significantly deferent from *E. tereticornis* (21.25%) and *A. nilagirica* (20.00%) at 1 day after treatment and found 100% at 45 days after treatment. During 2019, *A. indica* was showed highest (32.50%) mortality, followed by *D. stramonium* and *E. tereticornis* with (30.00 and 27.31%) mortality. While *A. nilagirica* provided lowest (26.25%) mortality and statistically similar with others at 1 day after treatment and found 100% at 45 days after treatment. *A. indica* had the least amount of grain loss (5.76 and 8.64%) and *D. stramonium* (12.05 and 15.19%) which were spastically similar and significantly different from *E. tereticornis* (20.12 and 18.34%) and *A. nilagirica* (21.91 and 18.34%) in both the year.

Keywords: *Sitophilus oryzae*, Botanicals, LD₅₀, Repellency, Mortality rates, Grain weight loss.

Transforming Horticulture: Innovations in Technology and Sustainability

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Horticulture is undergoing a profound transformation through the integration of innovative technologies and sustainable practices to meet the demands of a growing global population and address environmental challenges. Key advancements in this field include precision agriculture, biotechnology, smart farming, vertical farming, and hydroponics. **Precision Agriculture:** This approach uses data analytics, GPS technology, and remote sensing to optimize resource use and improve crop management. Data on soil health, weather patterns, and crop conditions are collected and analyzed to make informed decisions, reducing waste and increasing efficiency. **Biotechnology:** Significant advancements in biotechnology, such as genetic modification and tissue culture, are enhancing plant breeding, disease resistance, and yield potential. Genetically modified crops are designed to withstand pests and environmental stresses, while tissue culture allows for the mass production of disease-free, uniform plantlets. **Smart Farming:** Incorporating IoT devices, automation, and AI, smart farming is revolutionizing greenhouse management, irrigation, and pest control. Sensors monitor soil moisture and nutrient levels in real-time, automated systems manage planting and harvesting, and AI-driven algorithms provide actionable insights for crop management. **Vertical Farming and Hydroponics:** These methods address urban agriculture and resource conservation challenges. Vertical farming grows crops in stacked layers to maximize space, while hydroponics uses nutrient-rich water solutions instead of soil, significantly reducing water usage and allowing precise nutrient control. **Sustainable Practices:** Sustainability is central to modern horticulture, with practices like organic farming and integrated pest management (IPM) promoting environmental health. Organic farming avoids synthetic chemicals, and IPM combines various methods to manage pests in an eco-friendly way. These advancements offer numerous benefits, including increased productivity, improved crop quality, and environmental conservation. However, challenges such as high initial costs, the need for technical expertise, and ensuring technology access for all farmers must be addressed. By adopting these advanced technologies and sustainable practices, the horticultural industry can achieve higher productivity and sustainability.

Keywords- Precision Agriculture, Biotechnology, Smart Farming, Vertical Farming, Hydroponics

CORRELATION ANALYSIS SINGLE CROSS MAIZE (*Zea mays* L.) HYBRIDS

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correlation coefficients analysis were estimated in a set of 53 genotype of Maize (*Zea mays* L.) grown in an complete randomized block design with three replication during *kharif* 2023-24. Correlation studies revealed that grain yield per plant exhibited highly significant and positive correlation with Ear girth and Grain rows per ear while it exhibited highly significant and negative correlation with Days to 50 per cent tasseling, Days to 50 per cent silking and Days to 75 per cent brown husk. Its association with 100- seed weight and Ear length were positive and non-significant.

WEED DYNAMICS, PRODUCTIVITY AND PROFITABILITY OF MAIZE (*Zea mays* L.) AS INFLUENCED BY COMBINED AND SEQUENTIAL APPLICATION OF TANK MIX HERBICIDES

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In India, maize covers large area in *kharif* season where heavy rainfall and higher relative humidity favour weed infestation and compete with the crop. Although manual weeding renders better control of weeds but it is costly, labor-intensive and not feasible under untimely rainfall therefore, chemical control of weeds prefers to save labor and time. The experiment was conducted during 2021-22 at G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand to evaluate the impact of sequential and tank mix application of pre- and post-emergence herbicide on weed dynamics and maize productivity. The study was comprised of nine treatments viz. Weedy; Weed free, Pre-emergence (PE) application of Atrazine -1 kg a.i./ha *fb* hand weeding; PE application of Atrazine - 0.75 kg a.i./ha *fb* Post Emergence (Post E) application of Topramezone - 25.2 g a.i./ha; PE application of Atrazine - 0.75 kg a.i./ha *fb* Post E application of Tembotrione - 120 g a.i./ha; PE application of Atrazine - 1.0 kg a.i./ha *fb* Post E application of Topramezone - 25.2 g a.i./ha; PE application of Atrazine - 1.0 kg a.i./ha *fb* Post E application of Tembotrione - 120 g a.i./ha; Early Post E application of Topramezone - 25.2 g a.i./ha + Atrazine - 0.75 kg a.i./ha and Early Post E application of Tembotrione - 120 g a.i./ha + Atrazine - 0.75 kg a.i./ha. *Eleusine indica*, *Echinochloa colona*, *Digitaria sanguinalis* and *Eragrostis japonica* were dominant among grassy weeds whereas, broad leaf weeds included *Cucumis melo*, *Phyllanthus niruri*, *Cleome viscosa* and *Commelina benghalensis*. *Cyperus rotundus* was dominant among sedges. Topramezone - 25.2 g a.i./ha + Atrazine - 0.75 kg a.i./ha early post emergence resulted significantly lower total weed density and was similar to other herbicidal treatments. The highest grain yield (7.2 t/ha) was recorded in a weed-free crop that was similar to all herbicide-treated crops and significantly higher than the weedy crop. Pre-emergence application of atrazine -1 kg a.i./ha *fb* HW resulted in the highest net return (₹ 90,527/ha) followed by treatment atrazine - 1.0 kg a.i./ha PE *fb* post-emergence tembotrione - 120 g a.i./ha which was similar to all treatments except for the weedy treatment. Tank mix application of atrazine - 0.75 kg a.i./ha with tembotrione 120 g a.i./ha or topramezone 25.2 g a.i./ha at 15 DAS can be suggested owing to higher grain yield and profits for farmers while lowering the dose and expenses involved in manual weeding and spraying atrazine separately.

WATERMELON: A NUTRITIONAL AND MEDICINAL BENEFITS

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Watermelon (*Citrullus lanatus*) botanically considered as the fruit is belonging to the family Cucurbitaceae (Edwards et al., 2003). The common name of watermelon is Tarbooz (Hindi and Urdu), Tarbuj (Manipuri), Kaduvrindavana (Marathi), Eriputcha (Telugu), Kallangadiballi (Kannada), Tormuj (Bengali), Indrak (Gujarati). Watermelon is originated from Kalahari Desert of Africa but nowadays cultivated abundantly in tropical regions of the world. It is a large, sprawling annual plant with coarse, hairy pinnately-lobed leaves and yellow flowers. It is grown for its edible fruit, which is a special kind of berry botanically called a pepo. Watermelon contains phytochemicals such as lycopene, vitamin C, β -carotene, and Total polyphenolic content that possess anti-inflammatory, anticancer, and antioxidant properties. Dietary intake of these products with antioxidants properties is important in maintaining human health and well-being. These reduces incidence of chronic diseases such as hypertension, diabetes, cancer, and some coronary heart diseases, through inhibiting formation of free radicals and reactive oxygen species. Heart health: Watermelon contains high levels of lycopene that is very effective in protect cells from damage and lower the risk of heart disease. Watermelon extracts help to reduce hypertension and lower blood pressure in obese adults. Skin and hair benefits: Vitamin A helps keep skin and hair moisturized and it also encourages healthy growth of new collagen and elastin cells. Cancer prevention: Like other fruits and vegetables, watermelons may be helpful in reducing the risk of cancer through their antioxidant properties.

Keywords; anti-cancer, anti-diabetic, functional food, lycopene, obesity, polyphenols

EFFECT OF NANO FERTILIZERS AND BIO FERTILIZER ON GROWTH, YIELD AND QUALITY OF BER (*Ziziphus mauritiana* Lam.)

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A field experiment entitled “Effect of Nano fertilizers and consortium of bio fertilizer on Growth, Yield and Quality of Ber (*Ziziphus mauritiana* Lam.)” was carried out at experimental research farm of Agriculture Research Station, Mandor, Jodhpur (Rajasthan), from October 2021 to February 2022. The experiment comprises, three levels of nano- fertilizers, control, nano nitrogen @ 2 ml/ litter water and nano nitrogen @ 2 ml/ litter water + nano phosphorus @ 2ml/ litter water and two levels of bio-fertilizers, control and consortium of bio-fertilizers, treatments were allocated in factorial randomized block design with three replications. The present experiment concluded that treatment consortium of bio-fertilizers and nano nitrogen @ 2 ml/ litter water + nano phosphorus @ 2ml/ litter water) was found best over all other treatments with respect to maximum increase in plant height, number of primary branches, number of secondary branches, chlorophyll content in leaves, fruit volume, specific gravity, fruit length, fruit diameter, pulp thickness, pulp weight, pulp: stone ratio, fruit setting, yield/ tree, ascorbic acid, total soluble solids, total sugar, reducing sugar, non-reducing sugar, average fruit weight and fruit pH.

However, stone weight and fruit drop was recorded minimum. Number of microorganisms in rhizosphere was increased significantly with the treatment (100% RDF), consortium of bio-fertilizers.

Keywords- Ber, Bio fertilizers, Chlorophyll, pH and Nano fertilizers

ESTIMATION OF EMISSIONS FROM CROP RESIDUE BURNING IN JAGTIAL DISTRICT, TELANGANA USING FREELY AVAILABLE REMOTE SENSING DATA

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This study aims to estimate the emissions from crop residue burning (CRB) in the Jagtial district of Telangana using freely available remote sensing data from Landsat 8. The methodology involves the integration of Landsat 8 data to identify and quantify the spatial distribution of crop residue burning events. The Google Earth Engine platform was utilized for data processing and analysis. The analysis was conducted for the post-harvest season in 2023. Emissions of greenhouse gases (GHGs) and particulate matter (PM) were calculated following the Intergovernmental Panel on Climate Change (IPCC) guidelines. Results indicated significant emissions of CO₂, CO, CH₄, NO_x, and PM from CRB activities. Spatial analysis revealed hotspots of burning activity, providing insights for local policymakers to target interventions aimed at reducing CRB and its environmental impacts. The study demonstrates the utility of freely available satellite data for environmental monitoring and highlights the importance of remote sensing in supporting sustainable agricultural practices.

Keywords: Crop residue burning, remote sensing, Google Earth Engine, greenhouse gases, particulate matter, environmental monitoring.

INFLUENCE OF DIFFERENT SHADES OF INORGANIC MULCH AND ORGANIC MULCH ON GROWTH ATTRIBUTES IN BROCCOLI (*Brassica oleracea* L. var. *italica*)

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The present investigation entitled “Influence of different shades of inorganic mulch and organic mulch on growth attributing traits of broccoli (*Brassica oleracea* L. var. *italica*)” was conducted at the Department of Horticulture, College of Agriculture, VNMKV, Parbhani (M.S.) during Rabi 2021-2022. The experimental design adopted was randomized block design with three replications comprising eight treatments viz., T1 (silver polythene mulch), T2 (black polythene mulch), T3 (white polythene mulch), T4 (blue polythene mulch), T5 (red polythene mulch), T6 (orange polythene mulch), T7 (dry leaves) and T8 (control). The results showed that the growth characters viz., plant height, number of leaves, length of leaf, width of leaf, leaf area, stem girth, minimum days to 1st head initiation, minimum days to 50 percent head initiation, minimum days to harvesting, weight of head and diameter of head of broccoli were recorded highest with the application of T2 (black polythene mulch) and was significantly superior to other treatments.

Keywords: Broccoli, colored mulching, inorganic mulch, organic mulch and growth

OFF-SEASON CULTIVATION OF TUBEROSE (*Polianthes tuberosa* L.)

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Tuberose (*Polianthes tuberosa* L.), renowned for its fragrant blooms and ornamental value, is traditionally cultivated during specific seasons to maximize yield and flower quality. However, the increasing demand for tuberose flowers throughout the year has driven research into off-season cultivation techniques. This study explores the feasibility and methodologies for off-season cultivation of tuberose, focusing on controlled environmental conditions, growth regulators, and optimized cultural practices. The effects of temperature, light, and humidity on tuberose growth and flowering; assessing the use of growth regulators such as gibberellic acid (GA₃) and paclobutrazol; and developing a cost-effective and sustainable off-season cultivation protocol. Experimental trials were conducted in greenhouse conditions, comparing traditional in-season cultivation with various off-season strategies. The off-season cultivation is viable with significant modifications to standard practices. Controlled environment agriculture (CEA) with regulated temperature and photoperiod extended the flowering period, while growth regulators effectively manipulated flowering time and enhanced bloom quality. Specific combinations of temperature (20-25°C), light intensity (1500-2000 lux), and relative humidity (60-70%) were found optimal for off-season growth. Economic analysis revealed that although initial setup costs for controlled environments are high, the year-round production of high-quality tuberose flowers can lead to increased profitability and market competitiveness. Furthermore, sustainable practices such as the use of organic fertilizers and integrated pest management (IPM) contributed to reduced environmental impact. In conclusion, off-season cultivation of tuberose presents a promising opportunity for growers to meet market demands and enhance profitability.

Keywords- Agricultural Sector, New Technology, Planning, Remote sensing & Artificial intelligence.

SPATIAL VARIABILITY MAPPING OF SOIL PROPERTIES IN THE UPPER BANAS RIVER BASIN USING GEOGRAPHIC INFORMATION SYSTEMS (GIS) TECHNIQUES

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A survey was conducted during the pre-monsoon season of the year 2021 in the Upper Banas River Basin to map the spatial variability of soil properties using Geographic Information Systems (GIS) techniques. The study area covered various tehsils in the Rajasthan state, India. Soil samples were collected and analyzed for pH, electrical conductivity (EC), soil organic carbon (SOC), calcium carbonate (CaCO₃), available nitrogen (N), phosphorus (P), potassium (K), and sulfur (S) content. The results indicated that the soil in the area was neutral to slightly alkaline in reaction, with low salinity levels. The majority of soils had sufficient organic carbon, medium to high calcium carbonate content, and medium levels of available nitrogen and phosphorus. Available potassium was generally at a medium level, while available sulfur was low in most areas. The generated soil fertility maps can be valuable tools for optimizing nutrient management and promoting sustainable farming practices in the region. These findings provide essential insights for precision agriculture, allowing farmers to tailor their nutrient application strategies based on specific soil conditions. By leveraging GIS technology and the comprehensive soil fertility maps, stakeholders can make informed decisions to enhance crop productivity while minimizing environmental impacts.

Keywords: Soil properties, Geographic Information Systems (GIS), Upper Banas River Basin, pre-monsoon season, nutrient management.

NAVIGATING CHALLENGES AND SEIZING OPPORTUNITIES IN ORGANIC VEGETABLE FARMING

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Organic farming has surged in popularity recently, gaining widespread acceptance among both producers and consumers. This shift is largely driven by growing concerns over health issues linked to the excessive use of agricultural chemicals. These chemicals often leave residues in food that surpass maximum permitted levels, particularly concerning for vegetables due to their short time from harvest to consumption. Despite the allure of organic farming for its nutritional benefits, disease prevention and preservation of soil health and biodiversity, questions persist about its sustainability without synthetic fertilizers and pesticides. Balancing these concerns against the imperative of feeding a growing global population, it's crucial to assess the current landscape, challenges, certification processes, and future prospects of organic vegetable cultivation. Organic farming offers a pathway to produce high-quality food while safeguarding soil, plant, human, and environmental health. The organic agriculture system is particularly adept at fostering resilient food systems amidst uncertainties by promoting farm diversification and enhancing soil fertility through organic residues. Certified organic vegetables not only provide farmers with lucrative income opportunities.

Key words: Organic farming, Vegetables, nutritional etc.

EFFECT OF DIFFERENT GROWING MEDIA ON SEED GERMINATION, SEEDLING GROWTH AND ESTABLISHMENT OF PAPAYA (*Carica papaya* L.) cv. RED LADY

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The study was carried out to study Effect of Different Growing Media on Seed Germination, Seedling Growth and Establishment of Papaya (*Carica papaya* L.) cv. Red Lady during 2023-24. They were utilized for research in order to facilitate seed germination and seedling growth on various media. The current study used a randomized block design with three replications for each of the nine treatment combinations. The characteristics of seed germination and the growth parameters of seedlings were noted. The findings demonstrated that utilizing a medium mixture consisting of soil, vermicompost, and cocopeat (1:2:1) improved seed germination (91.93%) and reduced days of germination (14.73). The highest net profit ratio (Rs. 323227.5 per 1000 seedlings) and B:c ratio (3.47) of seedlings were observed in the maximum seedling height (13.20 cm), number of leaves (13.40), chlorophyll content (67.85), shoot length (9.62 cm), grith of seedling (5.74 mm), Seedling Vigor index (1213.75), fresh weight of seedling (18.98 g), leaf area (46.05 cm²), and seedling survival percentage (83.27%).

Keywords: Germination; seedlin growth; red lady; papaya.

AEROPONICS: FOOD FROM AIR

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Soil-less cultures like hydroponics and aeroponics may be the alternative systems to traditional soil based cultivation and they will scale up the technology of indoor farming. Aeroponics is the process of growing plants, while they are suspended in air, by misting their root system with an atomized nutrient solution. It is designed to optimize plant root access to oxygen and nutrients while minimizing water usage. The basic principle of aeroponic growing is to allow plants to grow under pest and disease free conditions where the aeroponic environment mimics environmental conditions in nature. Aeroponic systems are favored over other methods of water culture like hydroponics and nutrient film technology because the increased aeration delivers more oxygen to plant roots stimulating growth and preventing pathogen formation. Aeroponic growing is considered to be eco-friendly. The main ecological advantage of aeroponics is the conservation of water and nutrients. The system requires only minimum land and labour for proper functioning. The major components of an aeroponic system are air, light, nutrient solution, nutrient reservoir, supporting frames, root chambers and atomizer. Aeroponics is used for the production of various horticultural crops like vegetables, fruits, flowers, spices and medicinal plants. It has got other applications like vertical farming, arbuscular mycorrhizal fungi production, space station agriculture, etc. Another major application is as a research tool. Thus, aeroponics is an improved artificial life support for commercially viable plants. It supports environmental control and rapid unrestricted growth compared to other improved techniques that have been used for decades by traditional agriculturalists. Aeroponic production of crops in controlled environments provides opportunities for improving quality, purity, consistency, bioactivity and biomass production on a commercial scale.

Keywords: Soil-less culture, hydroponic, aeroponics, atomizer, vertical farming.

GENETIC VARIABILITY, HERITABILITY AND GENETIC ADVANCES IN GARDEN PEA

(*Pisum sativum* L.) GENOTYPES

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Among leguminous vegetable Garden peas are considered as one of the important in India which has wide variability in different parameters with varied yields. The research was carried out at AICRP (Vegetable crops) research block, Kumbapur farm, Dharwad during 2020-21. The experimental material comprised of 38 genotypes which was laid out in Randomized complete block design (RCBD) with 3 replications. The observations were recorded on various growth, yield and quality parameters. A higher magnitude of PCV was observed than a corresponding GCV for all the characters, indicates that the genetic variation was not limited to genotypic effect alone but also affected by environmental factors. High GCV and PCV (> 20 %) values were observed for number of branches per plant, number of leaves, days to first flowering, days to 50 per cent flowering, days to first pod picking and pod yield per plant (35.53 % PCV and 34.83 % GCV) which indicates the existence of broad genetic base. High heritability and GAM were detected for plant height, number of branches per plant, number of leaves, days to first flowering, average weight of green pod, shelling percentage, protein content in seeds, pod yield per plant (96.11 % h^2 and 70.35 % GAM), pod yield per plot and pod yield per hectare. High heritability estimates coupled with a high GAM and high GCV and PCV values were observed for the traits such as number of branches per plant, pod yield per plant. This suggests that genotypic and phenotypic improvement for these traits would be possible by selection that shows additive gene action.

Keyword: Garden pea, Legumineceae (Fabaceae), Coefficient of variation, Heritability (h^2), Genetic advance over per cent mean (GAM)

INTRINSIC RESISTANCE MECHANISM OF DIAMONDBACK MOTH AGAINST BT-BASED COMMERCIAL INSECTICIDES

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Diamondback moth (*Plutella xylostella* L.), belonging to Plutellidae family is the most destructive lepidopteran insect pest of cole crops (Cabbage) throughout the world. The absence of effective natural enemies and insecticide resistance are believed to be the major causes of *P. xylostella* outbreaks in most of the parts all over the globe. *P. xylostella* is not native to the United States and is believed to have originated in either the Mediterranean region or southern Africa. The assessment of its origin being in southern Africa is based on the diversity of parasitoids attacking *P. xylostella* as well as the large number of indigenous *Brassica* species present in that area. Patterns of general insecticide usage vary widely over time and space, but have been greatly influenced by the development of insecticide resistance and new insecticides becoming available. Given this heavy reliance on synthetic chemicals, *P. xylostella* has developed resistance to almost every class of insecticide. It was one of the first agricultural pests in the world to develop resistance to DDT, and later to the microbial insecticide *Bacillus thuringiensis*. Resistance to the older organophosphates and organo-chlorine insecticides was addressed by the widespread adoption of pyrethroids in the early 1980s, but by the mid-1980s, widespread control failures of these insecticides were reported. This pattern of introduction and failure of insecticides continues today because of the widespread lack of adoption of any insect resistance management (IRM) strategy by farmers. Research focused on the molecular genetics and genomics of *P. xylostella* has dramatically increased in recent years, providing tremendous amounts of information on the specific mechanisms controlling *P. xylostella* physiology and its interactions with plants. This new information has the potential to revolutionize the way we approach management of this pest. There is now a large and rapidly accumulating body of knowledge on *P. xylostella* physiology and pesticide resistance, including chemosensory proteins, proteinase

activities in the midgut, pheromones and their receptors, sodium channel genes, cytochrome P450 genes, and and bacterial symbionts. This high level of selection pressure and the high fecundity of DBM are key factors which have contributed to this species developing resistance to a wide range of insecticides in the field, including novel insecticides such as spinosad and indoxacarb as well as some strains of the bacterial insecticide, *Bacillus thuringiensis*. The rapid evolution of resistance to insecticides makes DBM particularly challenging to control in a sustainable fashion. This problem is especially acute for poorer farmers in Asia and Africa, who lack access to up-to-date knowledge and the newest insecticides and so tend to rely heavily on and overuse older, more toxic, broad-spectrum insecticides. Researchers are nowadays trying to improve BT strains to check DBM infestation in Brassica field either by introducing useful molecular variations into them or upgrading the commercial BT-formulations with some advanced combinations like nano-emulsions.

Key Words: Diamond Back Moth (DBM), Bt, Cabbage, DDT and insect resistance management (IRM).

EFFECT OF INTEGRATED NITROGEN MANAGEMENT PRACTICES ON GROWTH AND YIELD OF CHICKPEA VARIETIES

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Chickpea (*Cicer arietinum* L.) is an important crop for vegetarian people as primary source of protein, it is third most important pulse crop grown in the world after dry beans and peas. Pulses are the cheapest and rich source of protein which can be considered as lifeline for vast vegetarian population of India. Apart from being the good source of protein, it also contains substantial quantity of minerals, vitamins, crude fiber etc. Mixed diet of cereals and pulses, which constitute staple diet of majority of Indian population, is of the superior biological value than either taken separately. In India, pulses are the second major source of dietary protein (27%) after cereals (55%). However, the share of animal protein is as low as 18%. In addition to meeting the protein needs of the human population, pulses are also essential for the health of soil. The experiment was carried out at Research Farm, RCA, Udaipur (Rajasthan) to effect of integrated nitrogen management practices on productivity of chickpea (*Cicer arietinum* L.) varieties. The experiment consisted four chickpea varieties in main plot and four of integrated nitrogen management practices (organic (100%), integrated (50% organic + 50% inorganic), integrated (75% organic + 25% inorganic), inorganic (100% RDF)) in sub plot laid out in split plot design within three replication. The result revealed that chickpea variety GNG 1581 showed higher plant height, dry matter accumulation and seed yield (1836 kg ha⁻¹) which was statistically at par with GNG 2144. Among integrated nitrogen management practices, significantly higher plant height, dry matter accumulation and seed yield (1775 kg ha⁻¹) were recorded by the application of integrated (50% organic + 50% inorganic) which was statistically at par with inorganic (100% RDF).

Keywords: Integrated nitrogen management practices, plant height, yield.

EVALUATION OF CHILLI (*CAPSIUM ANNUUM* L.) HYBRIDS FOR GROWTH, YIELD AND QUALITY ATTRIBUTES

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The field experiment was conducted during *rabi* season 2022-23 at Central Horticultural Experiment Station (CHES-IIHR), Aiginia, Bhubaneswar, Odisha (India) to identify potential hybrids for different quantitative and qualitative traits among fourteen hybrids of chilli (*Capsicum annum* L.) using randomized block design with two replications. The chilli hybrid cultivars were collected from Indian Institute of Horticulture Science, Bangalore fourteen cultivars viz. Arka Tejasvi, Arka Yashasvi, Arka Saanvi, Arka Tanvi, Arka Gagan, Arka Dhriti, Arka Nihira, Arka Harita, H-1, H-2, H-3, H-4, H-5, H-6. All the hybrids showed significant difference for all the traits. H-4 produced the highest fruit yield per plot (34.57kg) and fruit yield per plant (898.00 g). Highest number of primary branches (7.30) was recorded in the hybrid Arka Gagan. Maximum plant height (84.83 cm) was noted in the hybrid Arka Nihira. H-4 recorded maximum green fruit weight (7.7g). Maximum number of fruits per plant (193.39) was recorded in the hybrid Arka Gagan. The hybrid H-4 was the earliest in respect of initial (33.50 days) as well as 50% flowering (46.00 days), ascorbic acid content was maximum in hybrid Arka Nihira (138.45 mg/100gm) and total soluble solid (TSS) was maximum in H-3 (5.05). Disease reaction studies revealed that most of the cultivar showed high degree of tolerance against leaf curl virus. The hybrids H-4, H-5, Arka Nihira and Arka Dhriti showed low incidence of insect pest and diseases.

Keywords: Growth, yield, quantitative, qualitative, hybrid cultivar and chilli.

STUDY OF HETEROSIS AND COMBINING ABILITY IN PEARL MILLET [*Pennisetum glaucum* (L.) R. Br.]

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Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is an important coarse grain cereal of dry land agriculture and mostly grown for grain and fodder purpose in the arid and subtropical regions of the world. It is annual, cross-pollinated crop with high photosynthetic efficiency and protogynous flowering pattern. Three testers (Male sterile lines) and eleven lines (Restorer lines) was crossed in line × tester design to estimates the heterosis and combining ability studies in pearl millet [*Pennisetum glaucum* (L.) R. Br.] and developed experimental material during *summer*, 2022. Afterwards, the parents along with thirty three hybrids and standard checks (MPMH-17, MPMH-21 and HHB 67) were evaluated during *kharif*, 2022. The crossing and evaluation work was carried out at Research farm of AICRP on Pearl Millet, Mandor

(Jodhpur) Rajasthan. On the basis of *per se* performance, hybrids ICMA 04999 × MIR 915, ICMA 94555 × MIR 1252, ICMA 04999 × MIR 710, ICMA 04999 × MIR 525-2 and ICMA 96333 × MIR 710 were found to be promising for grain yield per plant. Hybrids ICMA 04999 × MIR 915, ICMA 94555 × MIR 1252, ICMA 04999 × MIR 710, ICMA 04999 × MIR 525-2 and ICMA 96333 × MIR 710 were reported good for grain yield per plant and other yield attributing traits and showed high *per se* performance and standard heterosis. Whereas, preponderance of additive gene action was found for inheritance of plant height and nodes per plant. Three hybrids viz., ICMA 04999 × MIR 915, ICMA 94555 × MIR 1106 and ICMA 96333 × MIR 612 showed maximum *sca* effect for grain yield per plant and other yield attributing traits.

Keywords: Heterosis, Fodder yield, grain yield, Line x Tester, Pearl millet.

ARTIFICIAL INTELLIGENCE, MACHINE AND DEEP LEARNING, CLOUD, IOT TOOLS IN NEXT GENERATION SUSTAINABLE AGRICULTURE

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Agriculture has been a significant source of food for humans. In which, sustainable agriculture is a type of agriculture that focuses on producing long-term crops and livestock while having minimal effects on the environment. This type of agriculture tries to find a good balance between the need for food production and the preservation of the ecological system within the environment. For great global production appropriate agricultural techniques have been developed for a variety of crop types. A key component of the fourth industrial revolution is agriculture sustainability, which aims to address the challenges posed by climate change and the world's growing population. Adoption of innovative technology can be seen as a proactive strategy that can boost agricultural productivity and mitigate the global food shortages. Farmers have recently have a great interest in sustainable agriculture approaches. This is because of a number of variables in which the broad availability of low-powered wireless sensors based on the Internet of Things (IoT), machine learning, big data analytics, cloud computing, drone tech. that can be used to remotely monitor and report on crop, weather and field conditions. This makes it possible to manage resources more effectively reducing the amount of water needed for irrigation, the need for harmful pesticides and minimize the crop diseases and pest infestation. Crop breeding can be made easier by machines and deep learning. Farmers can also use autonomous farming equipment and improve their forecasting skills by utilizing past data and current conditions. This is made possible by the recent advancements in artificial intelligence. The application of these smart technologies is increasingly receiving more attention.

STUDY OF PROXIMATE AND BIOCHEMICAL ANALYSIS OF WATER CHESTNUT (*Trapa natans* var. *bispinosa* Roxb) KERNEL WITH RESPONSE TO VARIOUS ORGANIC AND INORGANIC SOURCES

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The water chestnut plays a significant role in wetland zones in India, however artificial fertilizers that are harmful to human health are employed to keep up with the fast-growing production rate. The present investigation aimed to know the impact of various organic and inorganic fertilizers on the proximate value and biochemical parameters of water chestnuts. The water chestnut was treated with half of the RDF through (Urea + DAP) (T₁), one-fourth of the RDF through Urea + DAP (T₂), and Nano-Urea @ 4.0%. T₅ Jivamrut (10%) 100% RDF. The treatment T₄ i.e., Nano-Urea (4%) significantly enhanced the value of most of the parameters. The highest N (2.68%), C (53.66%), H (8.49%), C/H ratio (6.31), protein (16.75%), S (0.29%) were most significant in T₅ (@ Jivamrut 10%) and amylose (16.24%) observed in T₁. For biochemical studies under different nutritional regimes where T₃ (¼ RDF–Urea + DAP) had the greatest moisture (19.13%) content, T₅ (@ Jivamrut 10%) had the highest TSS (3.800 brix), and T₄ (Nano-Urea @ 4.0%) had the highest acidity (0.13%).

Keywords: Minerals, Proximate analysis, Biochemical analysis, Protein, Carbohydrate.

ARTIFICIAL INTELLIGENCE UTILIZATION IN FRUIT PRODUCTION

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An additional 2 billion people will be added to the world's population by 2050, according to UN FAO figures, meaning only 4% of the land will be available for crop cultivation. Due to the increased need for food, this situation puts significant strain on agricultural production. The food production obtained from these traditional methods of cultivation which have been followed by farmers right now were not sufficient or may fail to feed this growing global population. Adaptation of new and latest technological solutions for the improvement of farming might be the only possible way to meet out the food requirement in future. While artificial intelligence (AI) proved to support all sectors of agriculture to boost the productivity and also helps to control uninvented natural condition. AI-supported solutions enable farmers to increase yield while decreasing input costs and improving product quality. AI technology helps to achieve competitive advantage in market. In recent years AI powered systems aids the farmers in all process of fruit production such as in irrigation scheduling through smart irrigation systems, detection and diagnosis of pest and diseases, weed management, precise predictions, etc. Current review discussed the insights in artificial intelligence and its various applications in fruit production.

Keywords: AI application, Artificial intelligence, Crop protection, Fruit harvest, Fruit yield prediction.

SOLID STATE FERMENTATION AN ECONOMIC APPROACH TO LIPASE PRODUCTION IN TRAY-BIOREACTOR BY *TRICHODERMA HARZIANUM*

*S SHUBHA, **C MRUDHULA AND ***G P SANTOSH

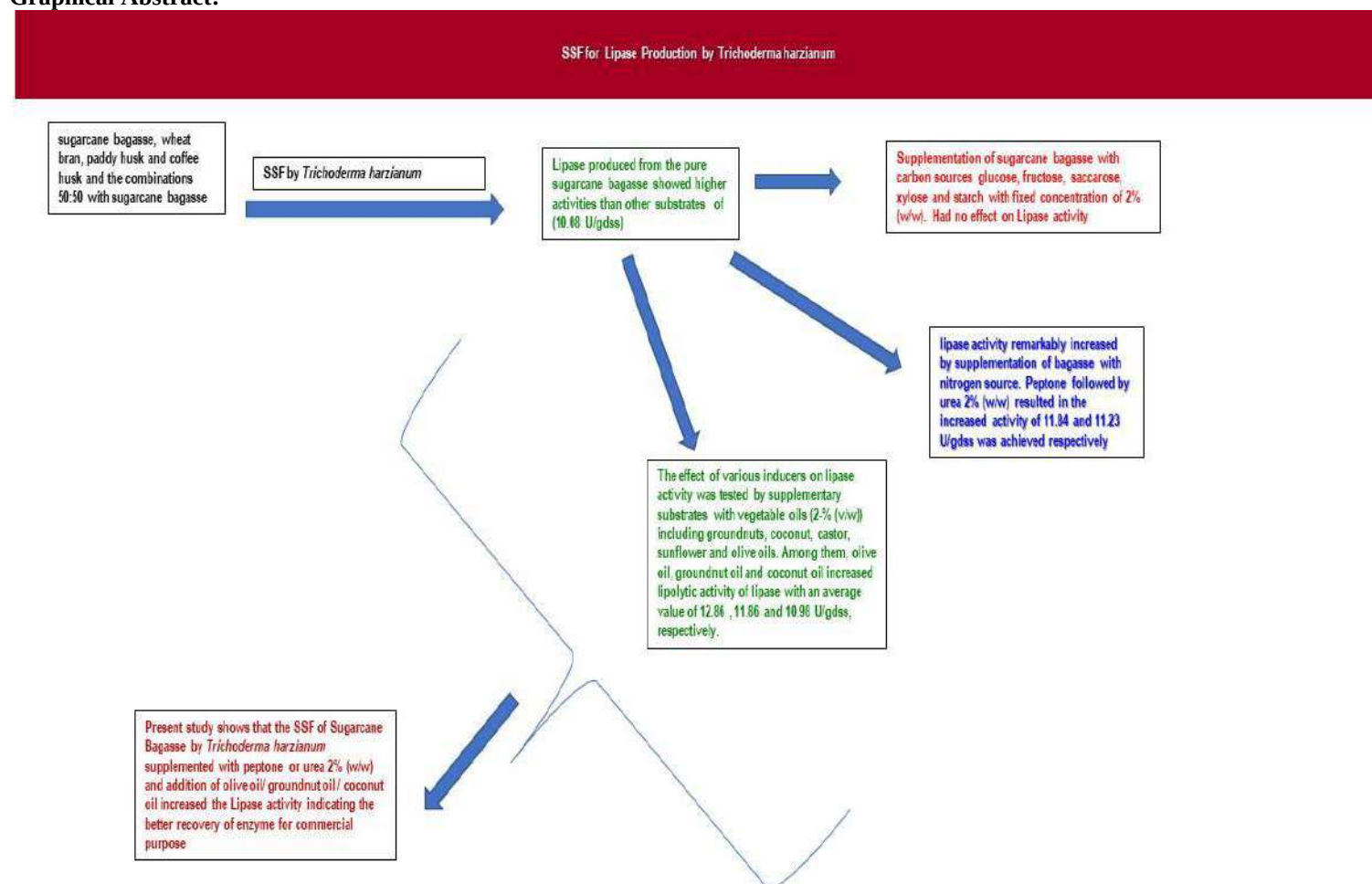
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The experiment was conducted at AICRP on EAAI (Bioconversion Technology) MARS Dharwad, University of Agricultural Sciences Dharwad. An attempt was made to produce Lipase in tray bioreactor using fungus strain *Trichoderma harzianum*. Agricultural residues which were locally available viz., sugarcane bagasse, wheat bran, paddy husk and coffee husk and combinations with Sugarcane bagasse was done. Lipase produced from the pure sugarcane bagasse showed higher activity of 10.08 U/g dss than wheat bran, paddy husk and coffee husk, sugarcane bagasse+ wheat bran, sugarcane bagasse+paddy husk and sugarcane bagasse+coffee husk. Furthermore, the influence of carbon and nitrogen supplements were investigated. Addition of carbon sources was found to be ineffective, while lipase activity remarkably increased by supplementation of bagasse with adequate amount of nitrogen source. Among the nitrogen supplements, peptone followed by urea performed better as suitable nitrogen source with increased lipolytic activity of 11.84 and 11.23 U/g dss were achieved respectively. In addition, locally available vegetable oils were used as inducers of Lipase activity viz., groundnut, coconut, castor, sunflower and olive oils. The results indicate that olive oil, groundnut oil and coconut oil increased lipolytic activity of lipase with an average value of 12.86, 11.86 and 10.98 U/g dss, respectively.

Graphical Abstract:



Keywords: Lipase; Enzyme activities; Solid state fermentation; *Trichoderma harzianum*; Tray bioreactor ; Sugarcane Bagasse; vegetable oils

IMPACT OF PLANT NUTRIENTS AND ORGANIC SUBSTANCES ON GROWTH, YIELD AND QUALITY ATTRIBUTES OF MALUS PUMILA UNDER SEMI-ARID REGIONS**MOHAN LAL JAT¹, GAJENDER SINGH RANA², JITENDRA SINGH SHIVRAN³ AND RAKESH KUMAR JAT⁴**^{1&2}Department of Horticulture, CCS Haryana Agricultural University, Hisar, 125004, Haryana, India³Department of Horticulture, G. B. P. U. A & T, Pantnagar, 263145, Uttarakhand, India⁴College of Agriculture, Navgaon, SKNAU, Jobner, 303329, Rajasthan, India

A field experiment was conducted at Horticulture Farm of CCS Haryana Agricultural University, Hisar during two succeeding years, 2020–21 and 2021–22, to study the influence of different plant nutrients and organic substances on growth, flowering, quality and yield attributes of the Anna apple cultivar. The experiment consisted of nineteen treatments in a RBD system. The plant growth parameters [leaf area (33.64 cm²) and trunk girth (13.16 cm)] when applied 2.0% Urea (N) + 15% Cow urine-T₁₂. Whereas, number of flower bud (232.83/m₂) and flowering duration (39.00 days) were found better with T₆. Similarly, [fruit volume (158.95 cm³), number of fruit (63.33/ tree) and fruit drop (70.54 %)] and [TSS: acid ratio (22.60), reducing sugars (7.17 %), non-reducing sugars (2.83 %), total protein (0.97 g 100g⁻¹), starch index (3.59)] were superior with the application of treatment T₆. Higher content of boron (80.09 ppm) was estimated in treatment T₆, zinc (24.69 ppm) in T₉, iron (134.67 ppm) in T₁ and manganese (59.94 ppm) in T₁₂ during the experimentation. Therefore, it was concluded that treatment T₁₂ was most effective for enhancing plant growth while treatment T₆ found superior for flowering, high yield and quality of apple cv. Anna fruit under semi-arid conditions.

Keywords: Anna Apple; Semi-arid region; Cow urine; Humic acid; Yield; Quality; Micronutrients.**RESPONSE OF SOYBEAN TO BIO-NPK AND ZN WITH FERTILIZERS IN VERTISOLS OF MADHYA PRADESH****ABHISHEK SHARMA^{1*}, M.D. VYAS², S.B. AGRAWAL³, B.K. SHARMA⁴ AND SHANI GULAIYA⁵**¹R.A.K. College of Agriculture, Sehore, (M.P.) India.²Principal Scientist, R.A.K. College of Agriculture, Sehore, (M.P.) India.³Associate professor, JNKVV, Jabalpur, (M.P.) India.⁴Assistant professor, R.A.K. College of Agriculture, Sehore, (M.P.) India.⁵Assistant professor, Galgotia University, Noida (U.P.) India.

Soybeans are a large oil seed crop and legume that may be produced in a variety of soils and climates. A crucial micronutrient needed by humans, animals, and plants is zinc. As there is a greater concern to sustain the deteriorating soil health due to indiscriminate use of chemical fertilizers and hence exerting the lack of beneficial microbes in the soil. Therefore, lack of essential nutrients in the soil is a global concern for the yield of food crops. The present investigation was carried out during kharif 2021 on Research farm of R.A.K. College of Agriculture, Sehore (M.P.) to evaluate the Response of Soybean to Bio-NPK and Zn with Fertilizer. The studies have been found beneficial to fetch the more production of the crop. The experiment was laid out in Randomized Block Design with seven treatments in combinations in three replications consisting of treatments T1: Control; T2: 100% Recommended dose of fertilizers (RDF); T3: 75% RDF; T4: 75% RDF + Bio-Zn; T5: 75% RDF + Bio-NPK; T6: 75% RDF + Bio-Zn + Bio-NPK; T7: 75% RDF + Rhizobium japonicum. Revealed that yield was increased with the inoculation of microbial cultures as compared to uninoculated control and highest seed and straw yield was found in treatment T2 (100% RDF) 1008 kg ha⁻¹ and 869 kg ha⁻¹. Highest net monetary return was recorded under T2 (20996 ₹ ha⁻¹) i.e. 100% RDF followed by treatment T6 (19349 ₹ ha⁻¹) i.e. 75% RDF+ Bio-Zn + Bio-NPK and T5 (19096) i.e. 75% RDF+ Bio-NPK as compare to control. So, the study revealed that the 75% RDF + Bio-Zn + Bio-NPK found more effective as it gave equivalent yield to 100% RDF

Keywords:** Bio-Zn, Bio-NPK, Fertilizers, Black Soil, Soybean.**ULTRA VIOLET (UV) RADIATION LEVELS WERE ALARMINGLY HIGH IN CHITTORGARH DISTRICT AND ITS ADVERSE EFFECTS ON HUMAN HEALTH*MOHAMMED YASEEN*, HIMANI JAIN AND MOHAMMED TAHIR⁴**¹Dept. of Biology, Shekhawati Science Academy, Vidya Vihar, Chittorgarh (Rajasthan)-312001²Geetanjali Medical college and Hospital, Udaipur 313001(Raj.), India

The study was conducted between April 2022 to June, 2023. Sampling was done every week. It is first of its kind to be conducted in Chittorgarh. The survey was conducted with the help of three different digital instruments, between 8 am to 6 pm. Care is taken that the reading is taken by keeping the UV sensor and light sensor towards the sun. The results of the survey were alarming as it shows extremely high levels of intensity of UV radiations which is very harmful for human beings and other creatures as well. Highest UV index 12 was found in the 4 tehsils (Chittorgarh, Kapasan, Nimbahera, Rashmi). The maximum UV index in remaining tehsils was 11. As per the data collected, UV radiation levels were in the high risk range in the months (March, April, May, July, August, September, December 2022, January, February, March, April, May, June 2023). Ultra violet (UV) radiation levels were alarmingly high in the summer, monsoon and even winter months, an analysis of the recordings in the district from April 2022 till June of this year. Ozone is vital for survival of living beings. It acts as protective shield for all the living beings as it absorbs almost all the ultraviolet rays coming from sun. It thus protect earth's surface from becoming too hot. Due to uncontrolled human activities this ozone layer is depleting thereby making humans exposed to harmful effects of UV radiations. UV radiations directly hitting human beings are a major cause of many diseases. The most powerful impact is been observed on skin, the largest organ of the body because skin is directly exposed to UV radiations whenever we go out in sun. It's not the usual burning effect due to higher temperatures instead it is the effect of ultraviolet radiations penetrating human body and

leading to many diseases. UV radiations may lead from mere a skin burn, heat stress, heat stiffness, heat exhaustion, skin pigmentation, itching, to serious diseases like melanoma, Squamous cell carcinoma, Basal cell carcinoma and premature ageing. These harmful effects on skin are more in fair skinned persons as compared to dark skinned. Recently UV radiations have been implicated as 2nd hit in the causation of an autoimmune disease called Systemic lupus erymatosus. It also leads to cataract, pterygium, photokeratitis, blindness in persons exposed to increasing day time activities. UV radiations are responsible for mutations in DNA which may lead to many cancers, acquired and inherited diseases. It is also so a major cause of emphysema, bronchitis, asthma.

Key word: Ultra violet (UV) radiation, district, UV index, ozone, autoimmune disease, Systemic lupus erymatosus.

EFFECTS OF SOIL POLLUTANTS ON THE LEAVES OF PIGEON PEA (*CAJANUS CAJAN*), CULTIVATED IN PROXIMITY OF SUGAR INDUSTRY LAKSAR, HARIDWAR.

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Effects of soil pollutants on the leaves of pigeon pea (*Cajanus cajan*), a significant pulse crop of the Fabaceae family, cultivated near a sugar industry. Industrial activities, particularly from sugar production, often release various pollutants, including heavy metals and chemical residues, into the surrounding environment, leading to soil contamination. This research aims to assess the extent of soil pollution and its direct impact on the physiological and morphological characteristics of pigeon pea leaves. Samples were collected from different proximities to the sugar industry, and the soil was analyzed for contaminants such as lead, cadmium, and other potential pollutants. Concurrently, pigeon pea plants growing in these soils were studied for changes in leaf structure, chlorophyll content, and overall plant health. Preliminary results indicate a correlation between high levels of soil pollutants and adverse effects on leaf morphology, including chlorosis, reduced leaf size, and compromised photosynthetic efficiency. The findings underscore the critical need for monitoring industrial pollution and implementing remediation strategies to safeguard agricultural crops and ensure food security. This study highlights the importance of environmental management practices in industrial zones to mitigate the detrimental effects of soil pollutants on vital crops like pigeon pea.

Keywords: Soil pollutants, Pigeon pea, Industrial pollution, Heavy metals, plant health.

IMPACT OF PESTICIDES ON SOIL AND PLANT HEALTH: ENVIRONMENTAL RISK

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The use of pesticides in modern agriculture has significantly contributed to increased crop yields and enhanced food production. However, this widespread application of pesticides has raised concerns about their potential detrimental effects on soil and plant health. Pesticides, while effective in controlling pests and diseases, can have unintended consequences on soil quality. The accumulation of certain pesticides in the soil may lead to soil degradation, affecting its physical, chemical, and biological properties. Alterations in soil structure, nutrient content, and microbial diversity can have dropping effects on plant health and overall ecosystem stability. Moreover, pesticides can directly influence plant physiology and growth. Pesticide residues in plant tissues may compromise the nutritional quality of crops, posing potential risks to human health through the food chain. To mitigate the negative consequences, integrated pest management (IPM) strategies, alternative pest control methods, and the development of environmentally friendly pesticides are being explored. This review provides an overview of the current state of knowledge regarding the impact of pesticides on soil and plant ecosystems and also highlights the need for continued research to better understand the complex interactions between pesticides, soil, and plants.

Keywords: IPM, Pesticide residue, plant health, soil degradation.

EFFECT OF FOLIAR SPRAY OF CONVENTIONAL AND NANO-FERTILIZERS ON LEAF AND FRUIT NUTRIENT STATUS OF GUAVA CV. HISAR SAFEDA

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The experiment was conducted to examine the effect of foliar spray of conventional and nano-fertilizers on leaf and nutrient status of guava cv. Hisar Safeda at CCS Haryana Agricultural University, Hisar during the year 2022-2024. The study comprised seventeen different foliar concentration of conventional and nano fertilizers viz. T1 = Control, T2 = 1% Urea, T3 = 2% Urea, T4 = 0.25% Nano-Urea, T5 = 0.50% Nano-Urea, T6 = 0.75% Nano-Urea, T7 = 1% Urea + 0.25% Nano-Urea, T8 = 1% Urea + 0.50% Nano-Urea, T9 = 1% Urea + 0.75% Nano-Urea, T10 = 0.25% Zinc Sulphate, T11 = 0.50% Zinc Sulphate, T12 = 0.025% formulated Nano-Zn, T13 = 0.050% formulated Nano-Zn, T14 = 0.075% formulated Nano-Zn, T15 = 0.25% Zinc Sulphate + 0.025% formulated Nano-Zn, T16 = 0.25% Zinc Sulphate + 0.050% formulated Nano-Zn, T17 = 0.25% Zinc Sulphate + 0.075% formulated Nano-Zn. The experiment was conducted using a randomized block design with three replications in winter season. The findings revealed that nitrogen content in leaf and fruit was found to be highest in T3 treatment followed by T9 and T11 treatments whereas, Zinc content in leaf and fruit was found to be highest in T11 treatment followed by T17, T3 and T9 treatments.

Keywords – Foliar Spray, Hisar Safeda, Nano-fertilizer, Nano-urea, Nano-zinc.

DEVELOPMENT AND EVALUATION OF FUNCTIONAL AND NUTRITIONAL PROPERTIES OF COMPOSITE FLOURS**RATNESH KUMAR*, SAMSER¹, SURESH CHANDRA¹, NEELASH CHAUHAN¹, B.R. SINGH¹ AND VAISHALI²****Faculty of Agriculture, Mangalayatan University, Jabalpur (MP), India****¹Department of Agricultural Engineering, SVPUAT, Meerut (UP), India****²Department of Agricultural Biotechnology, SVPUAT, Meerut (UP), India**

The functional properties like water absorption capacity, swelling capacity, oil absorption capacity, emulsion activity, emulsion stability, foam capacity, foam stability, and bulk density were evaluated. The moisture content of composite flours ranged from 3.93 to 8.60% among all the flours. The highest moisture content was observed in T₆ composite flour (8.60%) while the lowest was in T₁ wheat flour or control (3.93%). The composite flour was prepared in different compositions and ratios. The WAC of the flour varied from 113 to 127.40% among all the types of composite flours. The highest water absorption capacity was observed in T₆ composite flour (127.40%) while the lowest was in T₁ wheat flour or control (113%). The swelling capacity of composite flour decreased with decreasing. The swelling capacity of the composite flours is also affected by the moisture of the flour and the ratio of individual flours, texture, and particle size of the flour.

Keywords: Water absorption capacity, Swelling capacity, Oil absorption capacity, Emulsion activity, Moisture content, pH, Protein and Crude fiber.

GC-MS PROFILING OF METABOLITES OF ENDOPHYTIC FUNGI CURVULARIA PSEUDOROBUSTA FROM DISTIMAKE DISSECTUS.**KALPASHREE M. M.¹ AND DR. KRISHNA K.²****Research Scholar¹ and Professor²****P.G. Department of Botany, Yuvaraja's College (Autonomous), Mysuru**

In recent days endophytic fungi are recognized as an excellent source of widely occurring natural producers of natural products, mostly secondary metabolites. The use of these fungi may benefit to current demand for novel biomolecules in medical, agriculture and pharmaceutical industries. This research emphasizes on the numerous fungal endophytes that have been isolated from *Distimake dissectus* which has known to be a rich herbal source. The isolates were identified based on the morphological identification and molecular characterisation. *Curvularia pseudorobusta* was found to be the most predominant. The selected fungal isolate *Curvularia pseudorobusta* was screened for the production of secondary metabolites, followed by extraction using ethyl acetate. Ethyl acetate fraction of culture filtrate was subjected to GC-MS analysis, resulted in the identification of several compounds and some are known to have medicinal properties, such as anti-fungal and anti-bacterial effects. This analysis revealed the presence of various metabolites/bio-compounds viz., 3-Octen-2-one, 1-Undecene 9-methyl, 1-Dodecanol, Oxalic acid, allyl hexadecyl ester, 2-Undecanol, Formic acid, oct-2-yl ester etc. These findings suggest the potential bio active compounds could be used in the development of antimicrobial agents that can be used in pharmaceuticals and agrochemicals. Fungal based products offer a unique opportunity to discover novel therapeutic agents to combat various infectious agents and agricultural pathogens. This study is an important step to investigate the biodiversity of fungal endophyte and to explore novel bioactive compounds from natural resource.

Keywords: *Distimake dissectus*, *Curvularia pseudorobusta*., Endophytic fungi, Bioactive compounds, Gas Chromatography - Mass Spectrometry (GC-MS Profiling).

RECOMBINANT DNA TECHNOLOGY AND ITS APPLICATION IN FISHERIES SCIENCE**SWATI SHARMA* AND NISHA RANA****Swami Vivekanand Subharti University, Meerut U.P., India, 250005**

Recombinant DNA technology has revolutionized fisheries science, offering a range of applications from genetic modification of fish to the development of vaccines. This chapter provides an in-depth exploration of recombinant DNA technology tools, techniques, and their applications in fisheries science. It discusses the isolation of genes, insertion into vectors, transformation into host organisms, and the expression of introduced genes. Additionally, gene transfer techniques such as microinjection, electroporation, and retroviral integration are examined, highlighting their roles in facilitating genetic modification in fish. The chapter also explores the applications of gene transfer in fisheries science, including the development of genetically modified fish with enhanced traits and the production of vaccines to combat diseases. Finally, it discusses future perspectives in the field, emphasizing the potential for further advancements in marine fish development, reproductive cycle alteration, environmental adaptability, taste and nutritional enhancement, and regulation of sexual maturation.

Keywords: Recombinant DNA technology, gene transfer, genetic modification, vaccines, gene isolation, microinjection, electroporation, retroviral integration, genetically modified fish.

GC-MS PROFILING OF METABOLITES FROM *Cladosporium chalastosporoides* ISOLATED FROM *Euphorbia laciniata* KAVYA B C¹ AND DR. KRISHNA K².

¹Research Scholar and ²Professor.

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Fungal metabolites are valuable sources of bioactive compounds with diverse applications in pharmacology, agriculture, and ecology. For this purpose, endophytic fungi were isolated and identified from different parts of *Euphorbia laciniata* plant. *Cladosporium chalastosporoides* was found to be the most abundant. Hence, this endophyte was taken for further analysis. Metabolites were extracted using standard techniques and subjected to GC-MS analysis for compound identification. This process revealed a diverse array of metabolites produced by *Cladosporium chalastosporoides*. Notable compounds included 1-Docosene, 3-Eicosene, Pentacos- 1-ene, 1-Nonadecene, 3-Tetradecene etc some of which are known for their antimicrobial or antifungal properties. The identification of bioactive compounds by GC-MS (Gas Chromatography-Mass Spectrometry) is based on the molecular weights, peak areas, mass fragmentations and retention times. Most of these compounds have therapeutic properties and are used in the pharmaceutical field. The identification and characterization of metabolites from *Cladosporium chalastosporoides* isolated from *Euphorbia laciniata* highlight the potential biotechnological and pharmaceutical applications of these compounds.

Keywords: *Euphorbia laciniata*, *Cladosporium chalastosporoides*, Endophytic fungi, Bioactive compounds, Gas Chromatography - Mass Spectrometry (GC-MS Profiling).

PRECISION AGRICULTURE LEVERAGES VARIABLE RATE TECHNOLOGY AND VARIABLE RATE APPLICATION TO OPTIMIZE WEED CONTROL

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Variable-rate application (VRA) adjusts seed, fertilizer, and pesticide inputs in real time based on field variability using sensors, electronic controllers, and mechanical systems, with methods including sensor-based and map-based approaches, each offering distinct advantages and challenges. Sprayer controllers from agricultural equipment vendors now enable variable pesticide rates according to pre-planned maps, minimizing application inconsistencies. This overview examines various sprayer systems, their pros and cons, and their integration with task computers that manage these maps. Although VRT (Variable Rate Technologies) are widely available, their implementation demands careful planning and investment, with site-specific decisions influencing economic outcomes. VRA and VRT can improve both production and environmental efficiency, despite the initial technology costs and the need for specialized knowledge. As precision agriculture advances, these costs are likely to decrease, making VRA and VRT more accessible and environmentally beneficial by reducing herbicide use and chemical runoff, thus supporting healthier soil and water quality.

Keywords: Precision agriculture, Variable rate application, Variable rate technologies, sprayer controllers, weed control.

GCMS ANALYSIS AND MOLECULAR DOCKING OF ANTIBACTERIAL COMPOUND OF ENDOPHYTE *COLLETOTRICHUM GLEOSPORIOIDES* FROM *ARGYREIA CUNEATA* USING GC-MS

KALPASHREE M M¹ AND DR. KRISHNA K²

Research Scholar¹ and Professor. P.G. Department of Botany² Yuvaraja's College (Autonomous), Mysuru

Endophytes are organisms that inhabit living plant tissues internally without causing harm to their host. Over the past two decades, there has been a growing recognition of endophytes, particularly due to their potential roles in biocontrol, stress mitigation, and promoting plant growth.

The current research investigates various fungal endophytes isolated from *Argyreia cuneata*, highlighting their significant importance. A total of 25 fungal endophytes were identified, with *Colletotrichum gloeosporioides* being the most prevalent and exhibiting notable antibacterial activity. The identification of the fungal samples was carried out through morphological characterization and molecular identification.

The selected fungal isolate was then evaluated for its secondary metabolite production, followed by extraction using ethyl acetate. GC-MS analysis of the bioactive compounds from *C. gloeosporioides* revealed significant antifungal and antibacterial effects, with 2-Hexenal being the most predominant metabolite. Molecular docking studies of 2-Hexenal with various proteins from both gram-positive and gram-negative bacteria, including 4MKS, 1RX7, 5OE3, and 1NPC, indicated strong binding energies, suggesting its potential for significant bioactivity.

Keywords: *Argyreia cuneata*, *Colletotrichum gloeosporioides*, Endophytes, Molecular docking, Bioactive compounds, Gas Chromatography - Mass Spectrometry (GC-MS).

MANAGEMENT OF FUSARIUM WILT OF SAFFLOWER BY IN VITRO AND IN VIVO EVALUTION OF FUNGICIDES AND BIOCONTROL AGENTSASHWINI*¹, PRABHAVATHI N. RAO², NAGABHUSHANA NAYIDU³ SHALINI N. HUILGOL, K⁴, S. I. HARLAPUR⁵ SANGSHETTY BALKUNDE⁶¹Department of Plant Pathology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India²Scientist (Plant Pathology), AICRP on Safflower, Agricultural Research Station, Annigeri, Dharwad³Associate Professor, Department of Plant Pathology, AICRP on Soybean, Main Agricultural Research Station, Dharwad 580005, Karnataka, India⁴Assistant Professor, Department of Genetics and Plant Breeding, AICRP on Safflower, Agricultural Research Station, Annigeri, Dharwad⁵Professor and Head, Department of Plant Pathology, University of Agricultural Sciences, Dharwad 580005, Karnataka, India⁶Scientist (Agronomy), AICRP on Safflower, Agricultural Research Station, Annigeri, Dharwad**Aim:** To study the action of bio control agents and fungicides against safflower wilt disease under labrotory and field conditions.**Methodology:** Effective study was made using the fungicides, Captan, Carbendazim, Tebuconazole, Carboxin 37.5 % + thiram 37.5 %, Carbendazim 25 % + mancozeb 50 %, Thiophanate methyl 45%+pyraclostrobin 5 % FS and Penflufen 13.28% w/w + trifloxystrobin 13.28 % w/w FS and biocontrol agents, *Trichoderma harzianum* *Pseudomonas fluorescens*, *Bacillus subtilis* and *Neofusicoccum parvum* in a Complete Randomized Design and Randomized Complete Block Design under laboratory and field conditions respectively. Recorded the percent seedling emergence, Percent Disease Incidence at 30, 60, and 90 days after sowing, seed yield, BC ratio and made the economic analysis. **Results:** The pooled data revealed that among the fungicides evaluated under in vitro conditions, the combi-product Carboxin 37.5 % + thiram 37.5 % and Carbendazim 25 % + mancozeb 50 % inhibited the mycelial growth completely at all the tested concentrations followed by Tebuconazole 2 DS (93.57 %). Among the antagonists, highest inhibition of radial growth was found in case of *Trichoderma harzianum* (76.60 %). Under field conditions, the combi-product Carboxin 37.5 % + thiram 37.5 % treated plots has recorded the least mean per cent disease incidence, the highest per cent seedling emergence (95.71%), seed yield (12.8 q/ha) and the highest B: C ratio of 1.81. Among the biocontrol agents, the least per cent disease incidence was recorded in case of *Trichoderma harzianum* treated plots.**Interpretation:** Seed treatment with Carboxin 37.5 % + thiram 37.5 % WP at 3 g/ kg of seeds and *Trichoderma harzianum* at 10 g/ kg of seeds + soil application of *T. harzianum* enriched with FYM (1 kg *T. harzianum*+ 20 kg neem powder + 100 kg FYM per acre) applied to seed furrows at the time of sowing in an integrated approach will be an effective method controlling Fusarium wilt disease of safflower.**Keywords:** Biocontrol agents, Fungicides, Fusarium, In vitro, Safflower, Wilt.**SPECTRUM OF GENETIC VARIATION FOR YIELD AND YIELD RELATED TRAITS IN MUTANT POPULATIONS OF BREAD WHEAT (*Triticum aestivum* L) FOR DROUGHT STRESS.**ANISA M NIMBAL¹, V RUDRA NAIK², SUMA S. BIRADAR,³ SHRINIVAS A DESAI⁴ P V PATIL⁵ AND T SUDHA⁶¹Associate Professor (GPB), All India Co-ordinated Research Project on Sesame and Niger, UAS, Dharwad-580 005, Karnataka, India²Professor and Deputy Director of Research, Directorate of Research, (retd.), UAS, Dharwad 580 005, Karnataka, India³Senior Scientist (Plant Breeding), All India Co-ordinated Research Project on Wheat, UAS, Dharwad-580 005, Karnataka, India⁴Professor (GPB), Agriculture College, UAS, Dharwad, Karnataka, India⁵Professor (Plant Pathology and Dean (CS), UAS, Dharwad, Karnataka, India⁶Professor (Agronomy), Agriculture College, UAS, Dharwad, Karnataka, India**Aim:** Induced mutagenesis by chemical or physical mutagens is the most common and rapid approach for creation of novel variation genetic variation in crop improvement programs. An investigation was carried out to study the extent of genetic variability released through recombination, induced mutation and combination of recombination and induced mutation for yield and yield related traits under well watered and water stress conditions in bread wheat. **Methodology:** The study was carried out at Agricultural Research Station, Bailhongal, UAS, Dharwad during *rabi*-2018-19 in augmented randomized design under well watered and water stress condition. Segregating (F₂) and mutant populations (F₂M₂ and M₂) of two bread wheat crosses and their parents were evaluated for nine yield and its attributing traits were recorded and genetic variability parameters were estimated using standard methodology. **Results & Interpretation:** The study revealed that the irradiated populations (F₂M₂) of the crosses GW 322 x UASBW 11949 and NI 5439 x UASBW 11949 revealed wide range of variation and positive shift in mean values for important traits viz., grain yield per plant, number of tillers per plant and 1000 grain weight both under well watered (WW) and water stress (WS) conditions. High percent estimate of both PCV and GCV coupled with high heritability for number of tillers per plant, 1000 grain weight and grain yield per plant was observed in F₂M₂ and M₂ population treated with 150 Gy and 200 Gy. Gamma rays irradiated F₂M₂ populations recorded higher number of potential segregants compared to control F₂ and F₂M₂ (EMS) and M₂ populations suggesting that provision of greater scope for irradiation in heterozygous condition to generate potential segregants than EMS. Hence, these F₂M₂ populations could be expected as a source population for isolation of high yielding genotypes under rainfed/water stress condition.**Keywords:** Bread wheat, induced mutation, variability, drought stress, segregants

GC-MS PROFILING OF METABOLITES OF ENDOPHYTIC FUNGI ALTERNARIA SPP. ISOLATED FROM MICROSTACHYS CHAMAELEA**KAVYA B C¹ AND DR. KRISHNA K.²****Research Scholar¹ and Professor²****P.G. Department of Botany, Yuvaraja's College (Autonomous), Mysuru**

Endophytic fungi from medicinal plants were proven to provide novel resources for bioactive compounds. Endophytes are the potential sources for new remedies since they are the reservoirs of novel bioactive secondary metabolites, such as alkaloids, phenolic acids, quinones, steroids, saponins, tannins, and terpenoids serve as a potential candidate for antimicrobial, anti-insect, anti-cancer and many more properties. In the present study, endophytic fungal extracts isolated from *Microstachys chamaelea* which used as a traditional medicine for several diseases. The isolates were identified based on the morphological identification and molecular characterisation. *Alternaria* spp. was found to be the most predominant. The selected fungal isolate *Alternaria* spp. was screened for the production of secondary metabolites, followed by extraction using ethyl acetate. Ethyl acetate fraction of culture filtrate was subjected to GC-MS analysis, resulted in the identification of several compounds and some are having anti microbial effects. This analysis revealed the presence of various active bio-compounds viz., Phthalic acid, cyclobutyl tridecyl ester, cyclobutyl isobutyl ester, 4-bromophenyl octyl ester, 4-cyanophenyl nonyl ester, Phthalic acid 6-ethyl-3-octyl butyl ester, Phthalic acid cyclobutyl tetradecyl ester, Phthalic acid nitrophenyl octyl ester, Phthalic acid cyclobutyl heptyl ester etc., Phthalic acid was the major bioactive component of *Alternaria* spp. These findings suggest the potential bio active compounds could be used in the development of antimicrobial agents that can be used in harmaceuticals and agrochemicals. Plant endophytes metabolites are being extensively explored for new chemical entities for therapeutic purposes, endophytic microbes also constitute an important source for drug discovery.

Keywords: Endophytic fungi, *Alternaria* spp. *Microstachys chamaelea*, , Bioactive compounds, Phthalic acid, Gas Chromatography - Mass Spectrometry (GC-MS Profiling).

RESOURCE STRUCTURE OF MENTHA CULTIVATORS IN SAMBHAL DISTRICT OF UTTAR PRADESH**DR. DEEPAK SINGH CHHONKER* & DR. R.K. KULSHRESHTHA*******Assistant Professor and **Assistant Professor*****Department of Agronomy and **Department of Agril. Economics, RBS, College, Bichpuri, Agra**

Mentha oil used for flavoring mouth freshener, toothpastes, pan-masala, perfumery compounds oral preparations confectionery and cigarette the oil has a bitter cooling taste harsh odour and is the principal source of menthol. Present study is conducted during the year 2021-22. The study was primarily based on primary data, the size of holding varied from farm to farm. Hence, a purposive non-random sampling was adopted for the present study. Total numbers of sample farms 48 from different categories were selected purposively from Baniyakhera Block of Sambhal District of Uttar Pradesh. This study is conducted for study of the Resource Structure of *Mentha* Cultivators in different farm size groups in study area.

Keywords : *Mentha*, Cultivation, Resource, Structure

ACOUSTIC AND THERMODYNAMIC PROPERTIES OF BENZALDEHYDE AND CCL₄ AT 308K**REETU GUPTA****Department of Chemistry, Ganj Dundwara P. G. College, Ganj Dundwara, Kasganj**

In this work density, viscosity and ultrasound velocity of Benzaldehyde in CCl₄ have been measured at 308K. From these values various thermoacoustic parameters such as excess molar volume, excess inter-molecular free length, excess isentropic compressibility are calculated. The reason for deviation in these excess parameters is explained based on the molecular interaction present in these liquids.

Key words: Ultrasonic interferometer, Ostwald viscometer, Pycnometer, Benzaldehyde, Carbon tetrachloride.

VISCOMETRIC AND THERMODYNAMIC STUDIES OF ION-ION AND ION-SOLVENT INTERACTIONS IN ELECTROLYTES AND AQUEOUS SUCROSE MEDIA AT (293.15,303.15 and 313.5k.)**DR. VIJAY LAXMI****Department of Chemistry****Shaheed Bhagat Singh P.G. College Bithoor Kanpur**

The Viscosities(η),Densities(ρ) and apparent molar volumes (V_ϕ) of solution of electrolytes (KCl, NH₄Cl, KNO₃, NaNO₃, NH₄NO₃, BaCl₂, and Ba(NO₃)₂ in purely aqueous and aqueous sucrose solution have been measured at 293.15,303.15 and 313.15K. Activation thermodynamics quantities ($\Delta\mu_1$ 0#, $\Delta\mu_2$ 0#, ΔS_2 0# ΔH_2 0#) of viscous flow have been obtained. The result were Interaction in the light of ion-ion and ion-solvent interaction. It has been found that all the electrolytes behave as structure makers in purely aqueous and aqueous sucrose solutions.

Keywords: Density, Viscosity, electrolyte, aqueous sucrose

COST-EFFECTIVENESS ANALYSIS OF A SYSTEM OF DISTINGUISHABLE SUBSYSTEMS WITH REPAIR PREFERENCE AND WEATHER CONDITIONS**LALIT KUMAR¹, D. PAWAR^{1*} AND KAILASH KUMAR²**¹Department of Statistics, Amity Institute of Applied Sciences, Amity University, Noida – 201313, INDIA²Department of Statistics, Lady Shri Ram College for Women, University of Delhi, New Delhi – 110024, INDIA

In this paper, reliability model of a system consisting of two non-identical subsystems is developed and analyzed for its cost-effectiveness. Initially, the first subsystem (A) is operative and non-identical subsystem (B) is in cold standby mode. Subsystem-A has three modes – operation, repair and activation whereas subsystem-B has four modes – operation, inspection, minor repair and major repair. All-time availability of single technician is considered to perform all repair and activation activities. At the failure of subsystem-A, technician initiates its repair immediately while for subsystem-B inspection is carried out to identify the requirement of minor/major repair. To study the impact of weather conditions on repair and activation activities two weather conditions are taken – normal and abnormal. Only subsystem-A requires activation after repair and no repair/activation activity is carried out in abnormal weather. Change of weather conditions does not impact inspection and repair activities of subsystem-B. Failure and repair rates of both the subsystems are exponentially distributed whereas general distribution is taken as rate at which subsystem-A operates. Various reliability components like mean time to system failure (MTSF), steady-state availability, busy period of the server, profit of the system model are evaluated using semi-Markov process. Arbitrary values are taken to represent the outputs of the system model graphically.

Keywords: Reliability, Inspection, Activation, Semi-Markov, Weather, Minor Repair, Major Repair.**PREDICTING FORB SPECIES SURVIVAL UNDER CLIMATIC ABERRATIONS: USING LEAF- TRAITS VARIATIONS IN VARIED MICROCLIMATES AS A CASE.****POONAM MEHROTRA****Dept of Botany, Bundelkhand University, Jhansi 284128, India**

The forest characterized by its highly diverse environment, leaf, a vascular asymmetric appendicle structure, highly sensitive organ that responds quickly to environmental conditions and affects the growth and development of other components of the plant and having a significant impact on plant phenology. Leaf can shape and influence the natural composition of the environment and is considered as a gateway for the productivity of ecosystems. Light and atmospheric temperatures had an immense effect on leaf dynamics. However, no information is available regarding the adaptive significance of variations in leaf form and the functional integrations. Attempt was made to dissect the adaptational strategies of forbs in response to habitat characters and climatic variations within the annual cycle. Kumaun Himalaya, the area of the present study has unique characteristics and climatic features. In the study, leaf traits, other functional traits, and their spatial variations are driven by both temperature and water availability. In the study, forb species changed their growth tactics to optimize the benefits of the warm, rainy monsoon season and were able to survive by utilizing even minimum light radiations and cold temperatures, or beneath the antagonistic microclimates while adhering to the limitations of given by competition, phylogenetic limitations with the adaptations of various leaf-traits. Leaf life span was influenced by the microclimate, resulting in variations in leaf longevity among individuals of the species and leaf longevity were found to be associated with specific leaf mass loss and specific leaf mass (SLM) during senescence. These characteristics have a significant impact on plants, such as their growth and nutrient cycling. By considering leaf longevity, it becomes possible to make predictions about the performance of these forbs. Moreover, environmental factors were also found to be linked with other traits also such as leaf number, size, and shape. Notably, variations in leaf size were identified as a crucial trait consistent with several studies. Leaf size can be used to predict about a species' ability to survive in the face of climate change. This data can also offer valuable knowledge on whether a species is suitable for cultivation and restoration efforts in various environmental conditions, including climate, soil, and socio-cultural factors.

COST-EFFECTIVENESS ANALYSIS OF A SYSTEM OF DISTINGUISHABLE SUBSYSTEMS WITH REPAIR PREFERENCE AND WEATHER CONDITIONS

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Keywords: Reliability, Inspection, Activation, Semi-Markov, Weather, Minor Repair, Major Repair.

PREDICTING FORB SPECIES SURVIVAL UNDER CLIMATIC ABERRATIONS: USING LEAF- TRAITS VARIATIONS IN VARIED MICROCLIMATES AS A CASE.

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The forest characterized by its highly diverse environment, leaf, a vascular asymmetric appendicle structure, highly sensitive organ that responds quickly to environmental conditions and affects the growth and development of other components of the plant and having a significant impact on plant phenology. Leaf can shape and influence the natural composition of the environment and is considered as a gateway for the productivity of ecosystems. Light and atmospheric temperatures had an immense effect on leaf dynamics. However, no information is available regarding the adaptive significance of variations in leaf form and the functional integrations. Attempt was made to dissect the adaptational strategies of forbs in response to habitat characters and climatic variations within the annual cycle. Kumaun Himalaya, the area of the present study has unique characteristics and climatic features. In the study, leaf traits, other functional traits, and their spatial variations are driven by both temperature and water availability. In the study, forb species changed their growth tactics to optimize the benefits of the warm, rainy monsoon season and were able to survive by utilizing even minimum light radiations and cold temperatures, or beneath the antagonistic microclimates while adhering to the limitations of given by competition, phylogenetic limitations with the adaptations of various leaf-traits. Leaf life span was influenced by the microclimate, resulting in variations in leaf longevity among individuals of the species and leaf longevity were found to be associated with specific leaf mass loss and specific leaf mass (SLM) during senescence. These characteristics have a significant impact on plants, such as their growth and nutrient cycling. By considering leaf longevity, it becomes possible to make predictions about the performance of these forbs. Moreover, environmental factors were also found to be linked with other traits also such as leaf number, size, and shape. Notably, variations in leaf size were identified as a crucial trait consistent with several studies. Leaf size can be used to predict about a species' ability to survive in the face of climate change. This data can also offer valuable knowledge on whether a species is suitable for cultivation and restoration efforts in various environmental conditions, including climate, soil, and socio-cultural factors.

HUMAN HEALTH RISK ASSESSMENT OF MULTICLASS POLLUTANTS IN AQUATIC FAUNA FROM RAMSAR SITE ON THE SOUTHWEST COAST OF INDIA

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The multiresidue method developed and validated in GC-MS/MS for the trace level analysis of multiclass microcontaminants was utilized to analyze the aquatic samples collected from the Vembanad estuary, Ramsar site on the southwest coast of India. The level of pollutants detected in the matrices was further evaluated for human health risk assessment via intake of these contaminated species. Among the samples, 90.75% tested positive for 41 contaminants. The most frequently detected contaminants were Metalaxyl, and 2-Phenylphenol, followed by OCPs and PAHs. Approximately 21 OCPs were identified in 33.30% of the fish and crab samples, with concentrations ranging from 5.02 to 339.51 ng/g. In the case of clam samples, 89 different analytes were detected in approximately 89.64% of the clam samples. Biphenyl was the most frequently detected contaminant in the raw clam matrix (86.45%), followed by fluorene and phenanthrene. The analysis of THQ for POPs revealed the following trends: OCP > Pesticides > PAH and its value across all categories of people ranged from

10^{-1} to 10^{-5} for exposure to the average concentration of contaminants. Furthermore, the Hazard Index (HI) value considering the contaminants' mixture effect was less than 1. Therefore, the non-carcinogenic risk assessment associated with consuming samples indicates a low to moderate risk of exposure. This study revealed the presence of potential contaminants in the estuarine biota of an important RAMSAR site is a cause for concern and requires urgent scientific attention to protect the aquatic environment. Given the substantial presence of EDCs, we advocate for additional in-depth analyses to understand potential long-term effects and address associated health issues.

NUTRIENT BUDGET LITTER DECOMPOSITION OF MULTIPURPOSE TREES IN FOREST ECOSYSTEM

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Litter fall is a major pathway linking the plant components to the soil in an ecosystem through organic matter decomposition cycle. It acts as input-output system and as temporary sink for nutrients. Because of this important role in nutrient fluxes, factors influencing litter formation and decomposition have important implication for long term productivity of ecosystem. Environmental factors, floristic composition, stand age, tree management and stocking levels cause variation in quality and quantity of litter. They in turn alter decay and nutrient turn over rates. Thus, the return of plant nutrients to the soil and subsequent recycling via plant uptake can be manipulated by choice of species. Multipurpose trees with varying litter quality differ widely in their nutrient uptake, storage and recycling patterns. It is, therefore, essential to have a clear understanding of the tree species impacts on various aspects of soil organic matter dynamics and nutrient cycling including the effects of litter or green manure addition on soil nutrient dynamics.

Keywords: Litter fall, ecosystem, nutrient cycle, organic matter, decomposition, multipurpose trees, soil.

CONSERVATION AGRICULTURE: AN APPROACH FOR SUSTAINABLE AGRICULTURE

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Conservation agriculture (CA) is now considered as a new way ahead for the conservation of resources and also improves the productivity for accomplish the goals of sustainable agriculture. In latest past, progressive and considerable efforts are made to expand, filter and spread conservation-based agricultural technologies across the world. Remarkable efforts on surface management with crop residues and zero-till practices for crop production were reviewed. Conservation Agriculture (CA) comprising the minimum mechanical soil disturbance, covering the soil with cover crops or plant biomass and diversifying crop rotations or associations which is feasible and considered as a more sustainable cultivation system than that currently done. Many challenges are faced by the world and one of it is to fulfill the demand of growing population on the scenario of climate change with reduction in external inputs. The surface of the soil is kept covered by residues of crop, biomass or cover crops to provide the physical protection to the soil from the soil degradation agents and most importantly provide nourishment for the life of the soil. In the paper discussion has been done about the rising concerns of conventional agriculture systems with regard to its adoption, positives and negatives of conservation agriculture in promoting conservation agriculture.

Keywords: Cover crops, zero-till, crop rotations, soiled gradation

INNOVATIONS IN GRAZING MANAGEMENT FOR RESILIENT SMALL RUMINANT FARMING

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Creative grazing management techniques are crucial for developing robust small ruminant farming systems, particularly when addressing climate variability, land degradation, and resource constraints. Sheep and goats, being flexible foragers, thrive in various and frequently challenging environments; however, their productivity and well-being are heavily linked to the quality and viability of grazing systems. Conventional continuous grazing methods frequently result in overgrazing, soil degradation, and decreased pasture efficiency. Conversely, creative methods like rotational grazing, adaptive multi-paddock systems, silvopasture, and forage diversification provide sustainable solutions to enhance land utilization and animal performance. Technological innovations like GPS tracking, remote sensing, and pasture monitoring systems are changing the way farmers oversee grazing by facilitating immediate decision-making and accurate forage distribution. Furthermore, incorporating regenerative agriculture principles, like fostering biodiversity, improving soil health, and capturing carbon, aids in achieving sustainable ecological harmony. Innovations led by farmers and participatory research are also fostering tailored solutions that correspond with local expertise and socio-economic circumstances. In general, advancements in grazing management enhance both the productivity and well-being of small ruminants while also bolstering the resilience of agricultural systems against environmental and economic disruptions. These approaches are essential for attaining sustainable livestock farming and aiding the lives of rural populations.

Keywords: Grazing innovations, small ruminants, resilient farming, sustainable livestock, rotational grazing, adaptive management, pasture systems.

INTEGRATED SILVICULTURE AND AGROFORESTRY APPROACHES FOR SUSTAINABLE FOREST REGENERATION, SOIL HEALTH, AND LANDSCAPE PRODUCTIVITY UNDER AGRISILVICULTURE SYSTEMS***Sanjay Singh Jatav, R. Bajpai and S.B. Agrawal****Ph.D. Research Scholar, Head of Department of Forestry and Associated Professor**

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Agrisilviculture, as an integrated land-use system, combines the ecological and productivity benefits of silviculture and agroforestry to address sustainable resource management and rural livelihood enhancement. Silvicultural practices, including species selection, site-specific spacing, thinning, pruning, and stand regeneration, play a crucial role in maintaining forest structure, enhancing timber quality, and promoting natural regeneration. When implemented within Agrisilvicultural systems, these practices interact synergistically with agricultural crops and soil management techniques, resulting in improved soil physical and chemical properties, enhanced nutrient cycling, increased organic matter content, and higher microbial activity. Additionally, tree–crop interactions modulate microclimatic conditions, reduce erosion, increase carbon sequestration, and optimize land productivity. This integrated approach not only strengthens ecosystem resilience but also promotes multifunctional landscape productivity, ensuring the simultaneous delivery of ecological services, economic returns, and climate adaptation benefits. The study emphasizes the potential of agrisilviculture-based silviculture–agroforestry integration as a scientifically robust pathway for sustainable land-use management and long-term landscape sustainability.

Conclusion: Integration of silvicultural practices within agrisilvicultural agroforestry systems significantly enhances forest regeneration, soil quality, and overall landscape productivity. The synergy between tree management and crop–soil interactions improve nutrient cycling, soil organic matter, microclimatic regulation, and ecosystem resilience. Such systems not only provide sustainable timber and agricultural outputs but also support carbon sequestration and climate adaptation. Therefore, agrisilviculture-based integrated silviculture–agroforestry represents a scientifically validated, multifunctional land-use strategy for achieving ecological, economic, and social sustainability.

Keywords: Agrisilviculture, Silviculture, Agroforestry, Forest Regeneration, Soil Health, Nutrient Cycling, Ecosystem Resilience, Landscape Productivity, Carbon Sequestration, Sustainable Land Management