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1st International Conference
Book of Abstracts

Natural Resource Management and Environmental Sustainability for Future Generations



Organized by

Department of Botany, Zoology & Biotechnology

GOVERNMENT COLLEGE, HISAR

Affiliated to Guru Jambheshwar University
of Science & Technology, Hisar, Haryana

AFTEFS & VITAL BIOTECH EDUCATION GROUP, KOTA

on
20th April, 2024
at
Government College, Hisar

- **Dr. Deepmala**
- **Dr. Satish Kumar**
- **Dr. Jitendra Mehta**
- **Dr. Krishnendra Singh Nama**

VITAL BIOTECH PUBLICATION

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Natural Resource Management and Environmental Sustainability for Future Generations

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कुलपति

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VICE-CHANCELLOR



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MESSAGE

The most significant natural resources are land, water, soil and vegetation. These must be managed scientifically for their sustainable development and optimum utilization to the generations. The two main goals of natural resource management and conservation are preserving ecosystem services and the diversity of life on Earth. The multidisciplinary area of natural resource management incorporates the intricate relationships between soil, plants, animals, people and the environment. The uncontrolled and unscientific utilization has resulted in significant degradation of land and environment. One of the most important global challenges of present time is climate change, which will create a threat to the coming generations as it may increase in climate variability as well as catastrophic occurrences. Although its effects are seen throughout all industries and spheres of society, the agriculture industry is one of the most susceptible to the effects of climate change. In the context of a changing climate, sustainable agriculture requires the preservation and enhancement of land, water, biodiversity and climate resources. It is imperative that we implement thorough and efficient adaptation and mitigation strategies to increase our resilience to climate change. A study on the ways in which drivers of mitigation and loss of livelihood will be impacted by environmental changes in general and climate change in particular, and how these issues might be approached holistically, including through policy framing.

In light of this, the International Conference on "Natural Resource Management and Environmental Sustainability for Future Generations" organised by Government College, Hisar, in collaboration with AFTEFS & VITAL BIOTECH, Kota on April 20, 2024, is highly appropriate.

I extend my best wishes to the organizers as well as participants of this conference.

Prof. (Dr.) Narsi Ram Bishnoi

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MESSAGE

Technologies for conserving water and soil have been a vital factor in the growth of the country and an increase in agricultural productivity. Technologies for conserving soil and water resources are crucial in reducing the impact of climate change on agricultural output in the context of a changing climate. In the past, technologies were selected and implemented with the goal of lowering soil erosion, restoring degraded areas, improving soil moisture retention and eventually increasing output. It is imperative that natural resources be safeguarded, conserved, developed and used sustainably in order to reduce stress, increase livelihood security, maintain environmental stability and raise standard of living.

In the current context, where the Indian government is concerned with soil health, water management and increasing farmer income, an international conference on 'Natural Resource Management and Environmental Sustainability for Future Generations' is being organized on April 20, 2024 by Government College, Hisar, in collaboration with AFTEFS & VITAL BIOTECH, Kota. I think that our effort in 1st international conference on theme of resource conservation and management will undoubtedly result in a plan for sustainable agriculture through effective resource management. It will inculcate the innovative ideas of sustainability of healthy and pollution free environment for our offspring.

I send my best wishes to the organizing team and all the delegates.

Dr. Deepmala
Principal

OFFICE OF THE GOVT. COLLEGE HISAR



MESSAGE

India has rich treasure of natural resources like soil, water, flora and fauna which are essential to agricultural productivity as well as the sustainability of society and the environment. These resources are degrading in their quality due to pollution and unwanted anthropogenic activities. Fresh water is being polluted due to mixing of fertilizers and pesticides coming from agriculture fields. Furthermore, the disproportionate water supply for farming is being caused by climate change, which includes variations in the seasonal timing of rainfall and snow pack melt as well as frequent occurrences of droughts and floods. To ensure food security for the expanding population, agriculture production must be continuously improved. This calls for the sustainable management of natural resources through measures that support the preservation and restoration of water sources, optimize water use, encourage soil conservation and improved carbon stocks, treat waste water for reuse, and reduce as well as recycle the waste. Global warming should be checked for ecological sustainability of nature. There is intense need to conserve the plant biodiversity for food security and ecosystem equilibrium.

I feel proud to be part of the 1st International Conference on 'Natural Resource Management and Environmental Sustainability for Future Generations' organised at Government College, Hisar on April 20, 2024. I am grateful to AFTEFS & VITAL BIOTECH, Kota for their immense and continuous support in organization of the conference. I feel obliged with the motivation and support extended by worthy PrincipaL, Dr. Deepmala. I think that success of the event lies in hard work, planning and management of the teaching as well as non-teaching members of Government College, Hisar. I appreciate the active involvement of participants and have no doubt that the discussions and debates throughout the souvenir will result in insightful suggestions that could aid in creating plans for further study as well as a practical roadmap for the management and conservation of natural resources for future generations.

I hope that this International Conference is a huge success.

Dr. Satish Kumar

Convener

MESSAGE FROM CONFERENCE DIRECTOR & SOCIETY PRESIDENT



I'm happy to report that on April 20, 2024, at Government College Hisar, Haryana, a one-day International conference on "Natural Resource Management & Environmental Sustainability for Future Generations" was successfully organized by AFTEFS and Vital Biotech, Kota in partnership with Government College Hisar, Haryana. I thank the whole organizing team for successfully organizing this conference; their efforts are absolutely admirable. I have no doubt that the conference's discussions will open the door for the Ecological Research's further expansion and success.

My heartfelt appreciation goes out to the coordinators and all those involved in helping to make this conference a huge success. It is my hope that the information and insights that we will all acquire from the conference will enable us to make a more meaningful and effective contribution to the development of ecologically and socially responsible sustainable agriculture methods. I would want to take this opportunity to once again thank all of the stakeholders who attended the conference, and I am forward to see the proposals and results put into action.



Dr. Jitendra Mehta

PRESIDENT, AFTEFS

VITAL BIOTECH, KOTA, RAJASTHAN

MESSAGE FROM CONFERENCE CO-ORDINATOR



It is with great pleasure that I announce the successful organization of the first international conference on natural resource management and environmental sustainability for future generations, which was held in a hybrid format on April 20, 2024, at Government College Hisar, Haryana, thanks to the efforts of AFTEFS, Kota, and Vital Biotech. This conference, in my opinion, has been crucial in bringing together professionals, scholars, and policy makers from all over the world to share ideas, experiences, and advance the ecological sector. We have seen a number of cutting-edge strategies, new technology, and environmentally friendly practices that have the power to transform the environmental industry and improve both the environment and the economy.

The importance of cooperation amongst many stakeholders, including the government, academics, business community, and farmers, has also been emphasised by the conference. We have determined the main issues facing the green industry and potential remedies by means of fruitful dialogues. Let me conclude by congratulating the organising team on a job well done on the 1st International Conference. We anticipate seeing more cutting-edge concepts and methods in the field of ecology at this conference's upcoming edition. We appreciate your support and involvement, everyone.



Dr. Krishnendra Singh Nama

VICE PRESIDENT, AFTEFS

KOTA, RAJASTHAN

TABLE OF CONTENT

AFTEFS/GCH/2024/01	Advancements in Agricultural Practices and Crop Management: A Holistic Approach	Sanjay Lilhare, Vineet Kumar Dwivedi and Bhaskar Prasad Tripathi
AFTEFS/GCH/2024/02	Appraisalof Entrepreneurial Training Programme on Rural Youth Employment of Krishi Vigyan KendraYamunanagar of Haryana	Veer Sain and Gulab Singh
AFTEFS/GCH/2024/03	Habitat Restoration: Tool of Natural Resource Management	Krishnendra S. Nama and Kiran Choudhary
AFTEFS/GCH/2024/04	TRENDS, ATTRIBUTES AND THREATS TO SACRED GROVES OF THE INDIAN SUBCONTINENT	Priyal Vijayvargiya, Dr. Pratima Shrivastava
AFTEFS/GCH/2024/05	Assessment of soil health under black rice cultivation in an organic ecosystem of northeast India	Ashok S. Dambale, J. Goswami, K. K. Sharma, K. Kurmi, K. N. Das and R. Das
AFTEFS/GCH/2024/06	Honey Bee Diseases and Management: A Comprehensive Overview	Ravindra Kumar
AFTEFS/GCH/2024/07	Conservation of Biodiversity of Flora and Fauna	Mrs. Shakuntala
AFTEFS/GCH/2024/08	Green Economics: The Hidden Wealth of Medicinal and Aromatic Plants	Dr. Meera
AFTEFS/GCH/2024/09	Microbes: Guardians of Earth's Habitability and Human Health	Sushma
AFTEFS/GCH/2024/10	Assessment of bird damage to rainy season guava	Kiran Yodha, Dharambir Singh,

	(*Psidium guajava L.*) crop	Amit Kour, Renu Yadav, Rahul Kumar
AFTEFS/GCH/2024/11	Enhancing Sustainable Agriculture through Efficient Water Management Practices: A Critical Review	Preeti, Y. H., Dr. S. V. Suresha, Pradeep Kumar, T. L. and Gunashree, G. N.
AFTEFS/GCH/2024/12	Organic Farming: An Eco-friendly Agricultural Method for Environmental Sustainability	Malvika Kadian
AFTEFS/GCH/2024/13	Genetic characterization of virulence and extended spectrum β-lactamase producing genes of *Klebsiella pneumoniae* isolated from bovine milk	Bhavin Katira, Bhavesh Prajapati, Ratn Deep Singh, Sandip Patel, Kiran Solanki
AFTEFS/GCH/2024/14	Exploring the anti-diabetic and cardioprotective potential of *Hibiscus rosa-sinensis* fortified *Aegle marmelos* (L.) Correa extract as a nutraceutical	Dr. Sonal Prasad , Nitesh Pandey
AFTEFS/GCH/2024/15	Effect of foliar application of zinc sulphate and plant growth regulators on yield of guava (*Psidium guajava* L.) cv. Hisar Surkha	Akshay Mehta, Bijender Singh, Satpal Baloda, Alkesh Yadav and Aman Kumar
AFTEFS/GCH/2024/16	INTEGRATED FARMING: A SUSTAINABLE SOLUTION FOR ENVIRONMENT AND FARMERS	Dr Seema Gupta
AFTEFS/GCH/2024/17	Crop Residues: A Valuable Resource for Sustainable Development Across Industries	Sweety Monga
AFTEFS/GCH/2024/18	Harmonizing *in-situ*	Rajbir Singh

	microbial decomposition of rice residue for increasing wheat productivity and sustainability in Indo-Gangetic Plains of India	Khedwal, Jayesh Singh, Anu Kalia, KB Singh, Ram Avtar and Kiran Khedwal
AFTEFS/GCH/2024/19	Bioconversion of vegetable waste into vermiwash a potential biofertilizer	Renu Yadav, Rahul Kumar, Rajender Kumar Gupta and Kiran
AFTEFS/GCH/2024/20	Elucidating Interaction Between Non-Structural Protein (NS4) Of Bluetongue Virus and Glyceraldehyde-3-phosphate dehydrogenase (GAPDH)	Saima Mushtaq, Sonalika Mahajan, Gaurav K. Sharma, Ashwini Rameshrao Chaple
AFTEFS/GCH/2024/21	Conservation of Biodiversity of Flora and Fauna: Strategies and Challenges	Ghanwat Archana B.
AFTEFS/GCH/2024/22	Exploration of the Antimicrobial and Antioxidant Potential of Essential Oils	Bharat Shindhe, L.C. Chaudhary, Anju Kala, and Neeta Agarwal
AFTEFS/GCH/2024/23	IMPLEMENTATION OF NANOMATERIAL FOR SUSTAINABLE CROP MANAGEMENT IN GLOBAL CLIMATE CHANGE	Anjali Sangwan, Shikha Yashveer, Poonam Bansal and Sonali Sangwan
AFTEFS/GCH/2024/24	Studies on biochemical parameters of okra germplasm for resistance against jassids, *Amrasca biguttula biguttula* (Ishida)	Yogesh Kumar H D., Jayaraj Padhi, Ladu Kishore Rath, Gouri Shankar Sahu and Meenu Kumari
AFTEFS/GCH/2024/25	Causes, Effect and Solutions of Global Warming	Mrs. Sunena
AFTEFS/GCH/2024/26	CONSERVATION OF BIODIVERSITY OF FLORA AND FAUNA	Dr. Pooja Rani
AFTEFS/GCH/2024/27	INVESTIGATING CONSUMER	Sandhya Yadav ,

	PERCEPTIONS OF ENVIRONMENT-FRIENDLY PACKAGING IN KUMARGANJ, AYODHYA	Dr. Poonam Singh
AFTEFS/GCH/2024/28	Role of Politics in Biodiversity Conservation	Dr. Geeta Devi
AFTEFS/GCH/2024/29	Dried Ornamentals: A new aesthetic approach	Nikita Maurya, Saniya Syed
AFTEFS/GCH/2024/30	Effect of different nitrogen levels on seed production of potato *cv.* Kufri Khyati	Monika Yadav, Sangam Badeshra
AFTEFS/GCH/2024/31	Environment Sustainability through Plastic Waste Management	Sandeep Kumar, Naresh Kumar
AFTEFS/GCH/2024/32	Exploring the Nutritional and Functional Potential: Sea Buckthorn-Based Ingredients for Innovation in the Food Industry	Sangamesh, Dev Raj, Manjula K
AFTEFS/GCH/2024/33	Food, Agriculture and the Environment: Can we feed everyone and preserve the planet at the same time	Ajay
AFTEFS/GCH/2024/34	Effect of salt stress on medicinal plants	SURAJ KALA
AFTEFS/GCH/2024/35	Enhanced Detection of Tomato Leaf Diseases Using Customized CNN Models: Performance and Evaluation	Amulya Gulati, Amit Prakash Singh and Anuradha Chug
AFTEFS/GCH/2024/36	Methane dynamics in upland forest ecosystems	[1]Susmita Shil, Asha K Raj, K. Srinivasan
AFTEFS/GCH/2024/37	Assessing Water Use Efficiency and Productivity in Drip Irrigated Horticultural Crops	Baljeet Singh, Ram Naresh and Narender Kumar
AFTEFS/GCH/2024/38	Identification and characterization of	Rahul Kumar

	Pathogenic bacteria from *Heteropneustes fossilis*	
AFTEFS/GCH/2024/39	Management of water and soil resources	Dr. Chanchal Sharma
AFTEFS/GCH/2024/40	MANAGEMENT OF WATER RESOURCES IN INDIA	Dr. Pinki Rani
AFTEFS/GCH/2024/41	Applications of nanotechnology in horticulture: A new, environmentally beneficial strategy	Gurpreet Singh, Dr. Krishan Kumar Singh, Lovejeet Singh and Manjot Kaur
AFTEFS/GCH/2024/42	Standardization of growing media and container type for improving seed germination and seedling growth in papaya (*Carica papaya* L.) cv. Red Lady	POOJA PANT
AFTEFS/GCH/2024/43	Postharvest Management and Value Addition in Strawberry	Sangamesh, Dev Raj, Manjula K
AFTEFS/GCH/2024/44	The Influence of Municipal Solid Waste on Soil Physicochemical Characteristics	Sarita, Renu Sharma
AFTEFS/GCH/2024/45	Soil salinity Tolerance in Vegetable Crops	Ravi Gautam
AFTEFS/GCH/2024/46	STUDY ON EVALUATION OF SPIDER LILY GENOTYPES FOR PRODUCTIVITY AND QUALITY TRAITS	Akshatha V., Nagajyothi G N., Balaji S. Kulkarni., Pavan Kumar P
AFTEFS/GCH/2024/47	Potential of Nano – Technology in Sustainable Agriculture	Suhani
AFTEFS/GCH/2024/48	Sustaining Nature with Commerce: How Businesses Can Help Protect the Environment	Pushpa Rani
AFTEFS/GCH/2024/49	Jojoba towards Natural Resource Management	Sunil Kumar
AFTEFS/GCH/2024/50	A palynological assessment of natural honeys of *Apis dorsata* F. bees from Nalgonda district	Dr. Chaya Pallati

	of Telangana state S.India	
AFTEFS/GCH/2024/51	Millets Crops are Environmentally Sustainable: A Geographical Analysis	AJAY KUMAR Dr KARAM SINGH
AFTEFS/GCH/2024/52	Knowledge of the farm women about KVK activities	Nisha, Seema Rani
AFTEFS/GCH/2024/53	Role of Political System and Constitution in Conservation of Natural Resources	Dr. Rajeev Verma, Assistant Professor
AFTEFS/GCH/2024/54	Aquaculture and its management in present context	SONAL YADAV
AFTEFS/GCH/2024/55	Catalytic Reduction of Organic Pollutant p-nitrophenol using Phytofabricated Silver Nanoparticles (AgNPs)	Dr. Monika Moond
AFTEFS/GCH/2024/56	WATER QUALITY AND ALGAL DIVERSITY IN RELATION TO INDICATION OF POLLUTION STATUS IN KOT DAM, SHAKAMBHARI CONSERVATION RESERVE, RAJASTHAN (INDIA)	Ankit Kumar Jangid and Pratima Shrivastava
AFTEFS/GCH/2024/57	Analysis of Growth and Yield Optimization of *Clarias magur* (Hamilton, 1822) Integrated with *Lactuca sativa* in an Aquaponics system	Avik Bhanja, Basudev Mandal
AFTEFS/GCH/2024/58	Effect of nutrients and biofertilizers on growth and yield of guava (*Psidium guajava* L.) cv. Hisar Safeda	Aneja Nair M and Arvind Malik
AFTEFS/GCH/2024/59	PORTRAYAL OF MOTHER NATURE IN INDIAN WRITING IN ENGLISH	Dr. Priyanka Singla
AFTEFS/GCH/2024/60	A Review on Chia seeds (Salvia hispanica): health promoting properties and therapeutic applications	Dr. Mamta Rani

AFTEFS/GCH/2024/61	INTEGRATED FARMING SYSTEM: A HOLISTIC APPROACH	Karir S. R., Sachin Choudhary, Lokesh Kumar, Ravina and Pandey N.
AFTEFS/GCH/2024/62	Agronomic practices to improve forage sorghum yield	Kanika, Suresh Kumar, Nitish, Manjeet Kaur and Deepanshu
AFTEFS/GCH/2024/63	Optimization of Agro-Waste Treatments for Reduction of Heavy Metal from the Effluent Using a PBD-RSM Approach	Jayesh R Ruparelia, Hiren K Patel
AFTEFS/GCH/2024/64	Efficacy of essential oils against bacterial isolates from *Litopenaeus vannamei* (Boone)	Vaibhav Tripathi, Ravikant
AFTEFS/GCH/2024/65	Role of Political System and Constitution in Conservation of Natural Resources	Dr. Rajeev Verma
AFTEFS/GCH/2024/66	Status of Plant Biodiversity in India: Challenges and Conservation Efforts	Dr. Hemant Sharma
AFTEFS/GCH/2024/67	Effect of indigenous herbs on growth parameters of common carp (*Cyprinus carpio* L.) challenged with *Aeromonas hydrophila* infection	Shivam Pandey
AFTEFS/GCH/2024/68	Aeroponics – New Era of Farming	Chandan Kumar and Anoop Badoni
AFTEFS/GCH/2024/69	Comparative performance of phosphate solubilizers with varying phosphorus levels in wheat under mollisols of Uttarakhand	Sk Asraful Ali, Anjali Kumari, V.C. Dhyani
AFTEFS/GCH/2024/70	Medicinal and aromatic plants and their utilization	Ankur Kumar, Nitin Kumar, Chirag, and Mukul
AFTEFS/GCH/2024/71	Natural Farming: An Approach towards Sustainability	Anoop Badoni, Chandan Kumar and Vandana Petwal

AFTEFS/GCH/2024/72	Prawn Farming for Food Security in India	Vijayanti Jakhar
AFTEFS/GCH/2024/73	Effect of nutrients and biofertilizers on growth and yield of guava (*Psidium guajava* L.) cv. Hisar Safeda	Aneja Nair M and Arvind Malik
AFTEFS/GCH/2024/74	Effect of zinc oxide nanoparticle on growth of maize crop under salinity stress	Rahul and Vinita Hooda
AFTEFS/GCH/2024/75	Exploring the Potential and Utilization of Medicinal and Aromatic Plants (MAPs) in India: A Multifaceted Approach to Health, Economy, and Sustainability	Asha
AFTEFS/GCH/2024/76	Ground water management strategy of Kaithal District of Haryana region in India	Dr. Pinki Rani, Amit saini
AFTEFS/GCH/2024/77	COMPUTATIONAL AND PHYLOGENETIC ANALYSIS OF *WITHANIA SOMNIFERA* PROTEINS	Juhi Rani, Poonam Bansal, Annu kalyan and Sonali Sangwan
AFTEFS/GCH/2024/78	KOMBUCHA FERMENTATION BY SCOBY	ANSHUL
AFTEFS/GCH/2024/79	*Heena (Lawsonia inermis)* and *Babool (Acacia nilotica)* bark: Utilizing there potential for antimicrobial activity	Neeta, Nisha Arya, Arpita Grover and Namrata Kushwah
AFTEFS/GCH/2024/80	Microgreens for Enhancing Nutritional Security	Manjeet Kaur, Kanika, Nitish and Deepanshu
AFTEFS/GCH/2024/81	Unveiling the Potential of Artificial Intelligence in Natural Resource Management: Applications and Challenges	Mukesh Rani

AFTEFS/GCH/2024/82	Applications of nanotechnology in horticulture: A new, environmentally beneficial strategy	Gurpreet Singh and Dr. Krishan Kumar Singh
AFTEFS/GCH/2024/83	Microbes and their sustainable use for human welfare	Nitin Kumar, Ankur Kumar, Kamaluddin, Chirag, and Mukul
AFTEFS/GCH/2024/84	Understanding the phytotoxic effects of gliotoxin on *Sesamum indicum*	Premalatha, K., V. Ramamoorthy, S. Samundeeshwari, R. Jayalakshmi, R. Oviya
AFTEFS/GCH/2024/85	Evapotranspiration, Its Different Method for Calculation and Importance in Agriculture	RAHUL PUNIA, ANURAG, PARDEEP KUMAR
AFTEFS/GCH/2024/86	Role of Hindi literature in nature conservation	Bimla Devi
AFTEFS/GCH/2024/87	DOMESTICATING NATIVE WILD FRUITS FOR DIVERSIFICATION IN MAHARASHTRA'S MELGHAT REGION	Rutuja N. Deshmukh and Dr. Surendra R. Patil
AFTEFS/GCH/2024/88	Unveiling the Impact of Microbes in Human Welfare and Environment Protection	Savita Nagoria
AFTEFS/GCH/2024/89	Accessing light and moisture reduction under casuarina (*Casuarina junghuhniana*) based agroforestry system and its impact on performance of wheat crop	Shivam, Sandeep Arya
AFTEFS/GCH/2024/90	INTEGRATED FARMING SYSTEMS CAN INCREASE FARMER'S REVENUE BY TWOFOLD	Sujatha R
AFTEFS/GCH/2024/91	Survey for incidence and	Rupeshkumar J.

	intensity of gummosis and root rot of Nagpur mandarin	Choudhari, R. M. Gade and N. Gurav
AFTEFS/GCH/2024/92	Targeted Weed Control: How Precision AI Drones Are Changing Agriculture	Nandini Singh, Kamalkant Yadav, Shani Gulaiya, Ravindra Kumar
AFTEFS/GCH/2024/93	The importance of the medicinal herb aloe vera and its role in aquaculture	Abhimanyu, Tejpal Dahiya, Ruksar, and Amit Kumar
AFTEFS/GCH/2024/94	Use of Neemastra for managing insect pests in Natural farming	Manisha, Varsha, Pavitra B.V and G shiny Phebe
AFTEFS/GCH/2024/95	Optimizing Fodder Maize Production: Evaluating Vermicompost Influence	Vandana Petwal[1] and Anoop Badoni
AFTEFS/GCH/2024/96	Water Management in Horticulture Crops through Micro irrigation	Madhu Sangwan
AFTEFS/GCH/2024/97	WATER MANAGEMENT STRATEGIES IN INTEGRATED FARMING SYSTEM	RAJU KUMAR, ANKITA KUMARI, RAJ KUMAR
AFTEFS/GCH/2024/98	A Study on Medicinal and Aromatic Plants and Their Utilization	Dusyant and Amit Saini
AFTEFS/GCH/2024/99	A Comprehensive Study on Antioxidant Activity and Antimicrobial Analysis of Broccoli (*Brassica oleracea)* Juice	Prof. A. N. Satwase
AFTEFS/GCH/2024/100	Regulatory Mechanism of Transport of Sugars to Developing Plant Embryos	Deepika , Mukesh & K.S. Nehra
AFTEFS/GCH/2024/101	OVERVIEW OF BIOMEDICAL WASTE MANAGEMENT AND RISK PATHOGENS ASSOCIATED WITH IT	Vivek Kumar
AFTEFS/GCH/2024/102	Assessment of water	Akhil Kumar Jha,

	footprint for growth and milk production in crossbred cattle under field conditions in Northern India	Hari Om Pandey, Mukesh Singh, GK Gaur, Prateek R Wankhade and Patel Dipakkumar A
AFTEFS/GCH/2024/103	Geospatial technology a modern tool in Agricultural development and Management	Manoj Kumar
AFTEFS/GCH/2024/104	Removal of emerging contaminants from water or wastewater using low-cost adsorbents: A comprehensive review	Deepak and Jyoti Rani
AFTEFS/GCH/2024/105	Methanolic extraction of bioactive compounds from fruit peel and synthesis of silver nanoparticles for agriculture applications	Sujeeta, Kamla Malik
AFTEFS/GCH/2024/106	Effect of different weed management and long-term nutrient management practices on weed density	PAWAN KUMAR, VIRENDER SINGH HOODA, DEV RAJ and TODAR MAL
AFTEFS/GCH/2024/107	The Potential of Biotechnology for the Conservation of Environment and its Resources	Niharika Chauhan
AFTEFS/GCH/2024/108	Effect of Pruning on Fruit Size and Yield of Peach – A Review	Aman Kumar, Akshay Mehta and Alkesh Yadav
AFTEFS/GCH/2024/109	IMPROVING PHYSIOLOGY OF WHEAT THROUGH NITROGEN AND FARMYARD MANURE INTEGRATION	Bhupnesh[1], Sarita, Gayatri Kumari, Anita Kumari, Renu Munjal and Dev Raj
AFTEFS/GCH/2024/110	Toxic effects of cadmium chloride on histopathological alterations in gills and	Yugam Dhingra and Shikha Ahalavat

	intestine of freshwater fish *Cirrhinus mrigala*	
AFTEFS/GCH/2024/111	Innovations in Natural Resource Management and Environmental Sustainability	Dr Preeti Parmar
AFTEFS/GCH/2024/112	NATURE IS NOT COMPLETE WITHOUT MATHEMATICS: FIBONACCI SEQUENCE AND GOLDEN RATIO	Dr. Govil Jindal Dr. Jyoti Rani
AFTEFS/GCH/2024/113	Strategies for Soil and Crop Management to Enhance Crop Yield within Sustainably Managed Ecosystems	Mridul Lamba, Naveen Kumar
AFTEFS/GCH/2024/114	Exploration and Utilization of Medicinal and Aromatic Plants: A Comprehensive Review	Dr. Surender Kumar
AFTEFS/GCH/2024/115	Impact of Climate Change on Agricultural Production in Haryana: Current Trends and Future Perspectives	Dr. Asha Lata
AFTEFS/GCH/2024/116	UTILIZING THE MEDICINAL PROPERTIES OF SADABAHAR (*CATHARANTHUS ROSEUS*) FOR ANTIMICROBIAL ACTIVITY	Arpita Grover, Nisha Arya and Neeta
AFTEFS/GCH/2024/117	Diversity of Color Expression in Carnation Flowers	Ritika Dagar , Bijender Singh and Arvind Malik
AFTEFS/GCH/2024/118	Effect of cereal cyst nematode (*Heterodera avenae*) infestation on Barley	Mukul Kumar Bhambhu and Priyanka Duggal
AFTEFS/GCH/2024/119	Environment Sustainability through Plastic Waste Management	Dr. Sandeep Kumar
AFTEFS/GCH/2024/120	A review on the Ethnomedicinal Properties of	Dr. Sushila Sangwan and Dr.

	the *Terminalia arjuna (Roxb.)*	Anupam Sehra
AFTEFS/GCH/2024/121	A Review of Feeding Potential of Mites	Dr Anupam Sehra and Dr Sushila Sangwan
AFTEFS/GCH/2024/122	Floristic and Ethno-Botanical Studies on Some Parts of Hisar District of Haryana, India	Dr. Naina, Ankur Kumari
AFTEFS/GCH/2024/123	NATURE IS NOT COMPLETE WITHOUT MATHEMATICS: FIBONACCI SEQUENCE AND GOLDEN RATIO	Dr. Govil Jindal and Dr. Jyoti Rani
AFTEFS/GCH/2024/124	To study the lethal toxicity of selective Insecticides Cypermethrin on Natural Fish Food (Zooplanktons) and Water Quality	Brijesh chahar & Dr.Tejpal Dahiya
AFTEFS/GCH/2024/125	Interconnected Pathways to Sustainable Action: Understanding the Complexity of Pro-Environmental Behaviour	Mandeep Yadav and Sukriti Sharma
AFTEFS/GCH/2024/126	Effect of Imidacloprid (Neonicotinoid) on Giant Honey bee	Dr Nirmala Rathee and Dr. Anju Choudhary
AFTEFS/GCH/2024/127	Medicinal Values of Phytochemicals	Dr. Poonam Sangwan
AFTEFS/GCH/2024/128	Control of head and body lice infestation on man by using local herbal A case study in Bongaigaon District, Assam, India	Mrs. Mina Kumari Mandal and Dr. Tapanch Kalita
AFTEFS/GCH/2024/129	Natural Resource and Management	Dr Karuna Gupta
AFTEFS/GCH/2024/130	Leveraging Artificial Intelligence for Enhanced Agricultural Sustainability: A Comprehensive Review	Sahadeva Singh, Shani Gulaiya, Kamalkant Yadav and Vimal

		Kumar Sharma
AFTEFS/GCH/2024/131	Evaluation of antioxidant potential of green synthesized *Azadirachta indica* based silver nanoparticles (AgNPs)	Pankaj, Sarita Devi, Gayatri Kumari and Satpal
AFTEFS/GCH/2024/132	Nipah Virus: Emerging Zoonotic Threat	Priyanka Meena, Saksham Mandawat, Rohit Dobwal, Vishnu Meena
AFTEFS/GCH/2024/133	Recent Advancement in Wildlife Conservation in India: A Review	Dr. Nancy Garg
AFTEFS/GCH/2024/134	Role of Chitinolytic Actinobacteria in Biocontrol: A Promising Approach for Sustainable Agriculture	Ravina yadav and Rakesh kumar
AFTEFS/GCH/2024/135	Role of Hindi Literature in Conservation of Natural Resources	Dr. Rajpal
AFTEFS/GCH/2024/136	Unveiling the Impact of Microbes in Human Welfare and Environment Protection	Savita Nagoria
AFTEFS/GCH/2024/137	Production of Yoghurt with Partial Replacement of Cow Milk with Coconut Milk	Phalphale Monika Gangadhar
AFTEFS/GCH/2024/138	Efficacy of fungicides on management of blast disease in rice (*Oryza sativa* L.) and its impact on yield and economics	Longjam Boris Singh, Dr. S. Zeshmarani, Dr. Chuwang Hijam, Salam Prabin Singh, Sribidya Waikhom, Dr. KH. Premlata ,

		R.K. Lembisana
AFTEFS/GCH/2024/139	Study of Arundhati Roy's God of small things from Ecocritical perspective	Sonam
AFTEFS/GCH/2024/140	Effect of heavy metal pollution on earthworms	Kanchesh
AFTEFS/GCH/2024/141	Organic Fish Farming: A sustainable approach to produce healthy and disease free natural fish as food	Priya Singh, Rajender Kumar Gupta, Sudha Shahi, Shubham Janbandhu, Pooja
AFTEFS/GCH/2024/142	A comparative assessment of male reproductive health of some pea varieties under salt stress.	Raj Kumar
AFTEFS/GCH/2024/143	JLN Canal Physicochemical Parameters, Phytoplankton Diversity, and Biochemical Composition of Major Carp Species	Sonal Yadav, Naveen Kumar
AFTEFS/GCH/2024/144	Physical and Chemical Processes in Nature and their Ecological Significance	Kulwant
AFTEFS/GCH/2024/145	Effect of azolla feed on growth and survival of freshwater mussel, *Lamellidens marginalis* (Unionida: Unionidae)	Vikas Kumar Tiwari, Rachna Gulati, Vishal Soni Vijaypal Chaudhary, Amit Singh Kshtari & Satendra Singh
AFTEFS/GCH/2024/146	Sustainability of Honey Bees,	Meenakshi

	Apis mellifera L. Apiary in Summer Season of Semi-Arid Subtropical Region	Devi, Surendra Singh Shekhawat and SS Sharma
AFTEFS/GCH/2024/147	Green Solvents for Sustainable Chemistry: A Futuristic Approach	Meenakshi
AFTEFS/GCH/2024/148	YIELD, QUALITY, SULPHUR UPTAKE AND RESIDUAL NUTRIENT STATUS OF SOIL AS AFFECTED BY DIFFERENT SOURCES AND LEVELS OF SULPHUR TO SUMMER SESAME ON VERTISOLS	Akshay A. Thakare, A. L. Uparkar, Manish R. Pandao
AFTEFS/GCH/2024/149	An insight into the importance and utilization of medicinal plants	Ashima Pahwa
AFTEFS/GCH/2024/150	+Effect of NaCl and Salicylic acid on early seedling growth stage of *Leptadenia pyrotechnica*	Neetu Seervi and B. R. Gadi

AFTEFS/GCH/2024/151	CLIMATE-SMART LIVESTOCK PRODUCTION : EXPLORING SENSOR-BASED METHANE REDUCTIONS STRATEGIES	Akshat Kaushik*, Lavish Chelani, Ankur Pandey, Ajay Patel, Aryak Mishra, Ashutosh Mishra
AFTEFS/GCH/2024/152	An insight into the importance and utilization of medicinal plants	Ashima Pahwa
AFTEFS/GCH/2024/153	SILICON CAST OF TRACHEO-BRONCHIAL TREE OF JAMUNAPARI GOAT	Surya Pratap Gond,Amit Kumar
AFTEFS/GCH/2024/154	AGRICULTURAL IMPACT ON UNDERGROUND WATER IN HARYANA	Dr. Raj Kumar Mehla

AFTEFS/GCH/2024/155	SUSTAINABLE AGRICULTURE AND FOOD SECURITY	Kiran Bhukkal
AFTEFS/GCH/2024/156	A Study on Agricultural Insurance Schemes in Rural Haryana	Vikash Kapoor
AFTEFS/GCH/2024/157	Problems of Sustainable Development in India	MONIKA BHATIA
AFTEFS/GCH/2024/158	Literature and Ecology: a Feminist Perspective on Anita Desai's Environmental Critique	Dr. Valaria Sethi
AFTEFS/GCH/2024/159	Adsorption of SO_2/SO_3 over pristine graphene and Ni/Fe doped graphene-based substrates: A DFT study	Monika, Dr. Anand Malik
AFTEFS/GCH/2024/160	Sustainable Development : An Indian Review	Dr. Kartik Arora
AFTEFS/GCH/2024/161	Seed priming: Significant techniques for vegetable crops	Pavan K. Patel[1], Dr. Khushbu D. Rathod[2] and Dr. B. N. Satodiya[3]
AFTEFS/GCH/2024/162	Conservation status of *Trevesia palmata (*Roxb.ex Lindl*.)* based on paticipants' census of Karbi ethnic tribe of Assam, India	Ms. Gargi Sharma[1] and Dr. K. K. Sharma[2]
AFTEFS/GCH/2024/163	Revolutionizing Carbon Sequestration Through Commercial Agroforestry: Insights from Poplar and Eucalyptus Case Studies in India	*Sumit , Sandeep Arya, Sushil Punia
AFTEFS/GCH/2024/164	A DFT study on Adsorption of Disinfection by-products over graphene oxides and modified graphene substrates	Mandeep and Rita Kakkar*
AFTEFS/GCH/2024/165	EUCALYPTUS IN TRADITIONAL MEDICINE: EXPLORING ITS ANTISEPTIC AND ANTI-	*Dr. Sunita Lega*

	INFLAMMATORY BENIFITS	
AFTEFS/GCH/2024/166	Causes, Effects and Solutions for Depletion of Natural Resources	Sumit Ranolia
AFTEFS/GCH/2024/167	The variation in Biodiversity in the last decade	Dr Ranjeet Singh and Dr Parveen Vats
AFTEFS/GCH/2024/168	Methanolic extraction of bioactive compounds from fruit peel and synthesis of silver nanoparticles for agriculture applications	Sujeeta*, Kamla Malik
AFTEFS/GCH/2024/169	The Role of Environmental Acts in the Protection of Environment	Dr. Shalini Rajput
AFTEFS/GCH/2024/170	Eco Tourism: At a glance	Kulveer Singh Yadav
AFTEFS/GCH/2024/171	Symptoms and Control of *Alternaria porri* (Ellis) Cifferi-caused Purple Blotch disease in Onions	[1]Rishika Dangi, [2]Sandeep Kansal and [3]Sonakshi
AFTEFS/GCH/2024/172	Effect of Volatile Metabolites of Native *Trichoderma* isolates Against Sclerotinia Stem Rot of Indian Mustard	Deepak Kumari, N. K. Yadav and Rakesh Kumar
AFTEFS/GCH/2024/173	Social upliftment of landless farmer with the collaboration of landlords and Increasing of carbon sink	Pramod kumar[1*], Dr Dhruv kumar, Satendra singh[1] Simran Kaur[1]
AFTEFS/GCH/2024/174	Theme of Environmental Sustainability in Wordsworth's Poems: "Nutting" and "The World is Too Much with Us"	Dr. Ved Bhushan
AFTEFS/GCH/2024/175	Salt Tolerance In Tropical And Subtropical Fruit Crops	K. D. Rathod[1] and Pavan K. Patel[2]

AFTEFS/GCH/2024/176	Medicinal and aromatic plants and their utilization	Amandeep, Nita Lakra
AFTEFS/GCH/2024/177	Advancements and Challenges in Organic Farming: A Comprehensive Review	Raveena
AFTEFS/GCH/2024/178	Evaluating the Effects of PGPR Consortium on *Brassica juncea* Cultivars under Drought Stress during Reproductive Stage	Asha Rani[1], Nita Lakra[1] & Baljeet Singh Saharan[2]
AFTEFS/GCH/2024/179	Effect of integrated weed management practices on French marigold	Deepak Kumar[*1], B.S. Beniwal[2], Sonu Kumari[3], V.S. Hooda[4] and Anita Kumari[5]
AFTEFS/GCH/2024/180	Assessment of groundwater quality for irrigation purposes in Jalalabad block of Ferozpur district, Punjab	Sugandh[1*], Anju Malik[2], Shobhana[2], Rahul Kumar Dhaka[3]
AFTEFS/GCH/2024/181	Effect of heavy metal pollution on earthworms	Kanchesh
AFTEFS/GCH/2024/182	Investigating the Influence of Aerosol Composition on Atmospheric Chemistry and Climate Dynamics	Dimple*
AFTEFS/GCH/2024/183	Cool Creations Await: Exploring Innovative Techniques in Ash Gourd Ice Cream Production	Dr. Sonal Zanwar
AFTEFS/GCH/2024/184	Assessment of antioxidant efficacy in wound healing using *Vitex Negundo* Linn	Tuwar A. R. and Arangale K. B*.
AFTEFS/GCH/2024/185	Population and Community Ecology	Dr. Pallavi Singh
AFTEFS/GCH/2024/186	Synthesis and bio-efficacy evaluation of hexaconazole loaded polymeric nanofungicides	Naincy Rani, Anil Duhan

AFTEFS/GCH/2024/187	Drought-Induced Shifts in Bacterial Community Dynamics: Understanding Ecological Resilience	Indu Dhiman1*, Ravina Yadav1and Leela Wati2
AFTEFS/GCH/2024/188	Mathematical approach towards Environmental Studies	Dr Ramesh Kumar and Meena Kumari
AFTEFS/GCH/2024/189	A Study on Agricultural Insurance Schemes in Rural Haryana	Vikash Kapoor
AFTEFS/GCH/2024/190	Enhancing Performance in Direct Seeded Rice (DSR) Cultivation through Seed Priming	Sukham Madaan*, Sumit Saini, Ashish Jain, Lalita, Amit Kumar ,Vishal Gandhi, Ravikant, Sarita Devi , Anita Kumari and P. Bhaskar
AFTEFS/GCH/2024/191	Advancing Natural Resource Management Through Integrated Technologies: Remote Sensing, GIS, AI, and Machine Learning	Shalu Rani
AFTEFS/GCH/2024/192	ENHANCING NATURAL RESOURCE MANAGEMENT THROUGH INFORMATION TECHNOLOGY: INNOVATIONS AND APPLICATIONS	Usha* and Amita Sarova
AFTEFS/GCH/2024/193	Prediction, Cloning and Characterization of *narK* promoter of *Salmonella* Typhimurium	Pashupathi M, Pradeep Kumar Godwal, Rashmi Mishra, Meeta Saxena, Ajay Kumar
AFTEFS/GCH/2024/194	Study on Entrepreneurial Behaviour of Dairy Farmers in Ayodhya District of Uttar Pradesh	Amit Kumar and Surya Pratap Gond
AFTEFS/GCH/2024/195	EFFECTS OF GLOBAL CLIMATE CHANGE AND MITIGATION MEASURES FOR SUSTAINABLE DEVELOPMENT	Aditya Kumar and Chhavi Mangla

AFTEFS/GCH/2024/196	PREVALENCE OF HYPERTENSION AMONG INDIAN ADULTS	Priya Yadav
AFTEFS/GCH/2024/197	Climate, Global Warming and Others Geographical Processes	Dr. Anita Sehrawat
AFTEFS/GCH/2024/198	ASSESSMENT OF CHANGES IN INDICATORS OF CHEMICALLY DEGRADED SOIL THROUGH SOIL HEALTH AND QUALITY INDICATORS	Zafarjon Jabbarov[1], Mashkura Fakhrutdinova, Otamurod Imomov, Shokhrukh Abdullaev
AFTEFS/GCH/2024/199	DETERMINATION OF ANTIFUNGAL ACTIVITY OF ENDOPHYTIC BACTERIA ISOLATED FROM MEDICINAL PLANT *LYCIUM BARBARUM*	Bekpulatova Shaxloxon MA'RUFJON QIZI, Abdusamatov Sokhibjon ABDUSAMATOVICH and Jabborova Dilfuza PUSHKINOVNA
AFTEFS/GCH/2024/200	Determination of antifungal activity of bacteria isolated from *Medicago sativa* grown on the dry bottom of the Aral Sea	Khalillaeva Ruza Umarbek kizi[1], Numonjon Sultanov Nabi ugli[2], Abdusamatov Sokhibjon Abdusamatovich[3] and Jabborova Dilfuza Pushkinovna[4]
AFTEFS/GCH/2024/201	Comparative analysis of the effect of biological products on the protein content and oil content in soybean collection samples	Kurbanbaev I.Dj., Juraev J.N., Abdushukirova S.K.
AFTEFS/GCH/2024/202	REDUCTION OF DEPRESSION BY ECONOMICALLY VALUABLE CHARACTERISTICS OF COTTON SPECIES *G. hirsutum L., G. barbadense L.*	Mamaruziyev A.A., Karimov E.Y., Azimov A.A.

AFTEFS/GCH/2024/203	CLUSTER ANALYSIS AND CLUSTER ANALYSIS OF WATER DEFICIT RESISTANCE INDEXES OF MUNG BEAN PLANT VARIETIES AND LINES	Saitjanov SH. A. Azimov A.A. Shavkiev J.SH.
AFTEFS/GCH/2024/204	MULTIVARIATE ANALYSIS OF DROUGHT RESISTANCE INDICES OF UPLAND COTTON GENOTYPES	Shavkiev J.SH[1]. Tulkinova X. SH[1]. Makamov A[3]. Azimov A.A[1].
AFTEFS/GCH/2024/205	INBREEDING DEPRESSION ON MORPHO-YIELD TRAITS IN HYBRIDS OF UPLAND COTTON (*G. HIRSUTUM* L.)	Azimov A.A. Shavkiev J.SH.
AFTEFS/GCH/2024/206	Chemical composition of Allium motor plant and its beneficial properties for human health	Khasanova Nargiza Ismagilovna[1] and Aziza Aimovna Zohidova[2]
AFTEFS/GCH/2024/207	Histopathology and eco-friendly management of Pseudomonas aeruginosa in brinjal seeds grown in Rajasthan	Dilip Kumar Sharma

AFTEFS/GCH/2024/208	THE CURRENT STATE OF AQUACULTURE AND ITS MANAGEMENT PRACTICES	Dr. Kavya Thottempudi[1], Preeti Y H[2], Arpitha H B[3], Ambruthavarshini[4]
AFTEFS/GCH/2024/209	IMPACT OF RICE STUBBLE BURNING *IN SITU* ON SUCCEEDING GROWN WHEAT CROP YIELD AND ITS ATTRIBUTES	VIJAY KUMAR[1] and SRIDEVI TALLAPRAGADA[2]
AFTEFS/GCH/2024/210	Challenges and Strategies for Water and Soil Resource Management in India	Kiran Kotyal[1], Pooja S Beleri[2] and Dr. Lakshmeesha R[3]
AFTEFS/GCH/2024/211	Technological Methods for Combating Water Pollution in Haryana	Heena Wadhwa[1*], Geeta Kandhol[2], Poonam Rani[1], Ambika Rani[1], Rubi[1]

AFTEFS/GCH/2024/212	Infections of Megalocytiviruses in Ornamental Fish Culture	Amit kumar*, Rachna Gulati, Abhimanyu and Khushbu
AFTEFS/GCH/2024/213	Effect of Salinity Stress on Growth indices of *Sorghum bicolor* L. and Mitigation with Foliar Application of Melatonin	Gayatri Kumari[1*], Sarita Devi[1], Satpal[2] and Charan Singh[3]
AFTEFS/GCH/2024/214	Exploring Potential: Endospore Morphology and Efficacy of Indigenous *Bacillus thuringiensis* Strains against Okra Fruit and Shoot Borer, *Earias vittella*	Jawahar Reddy, A.,[1] *Sai Ram Kumar, D.V.,[2] Sreenivasa Rao, Ch.,[3] Prasannakumari, V.,[4] Roja, V.[5]
AFTEFS/GCH/2024/215	Multi-variate analysis in dark brown sesame (*Sesamum indicum* L.*)*	Gangishetti Ranjithkumar*, Rajani Bisen
AFTEFS/GCH/2024/216	Transgrafting: A Novel Approach for Improved Crop Production	Pooja S Beleri[1], Kiran Kotyal[2] and Dr. Lakshmeesha R[3]
AFTEFS/GCH/2024/217	Biosynthesis of silver nanoparticles of Sapota (*Manilkara zapota*) leaves: An effective catalyst to degradation of pollutant dye	Anuradha Beniwal*, Sushila Singh, Jyoti Rani, Simran kakkar
AFTEFS/GCH/2024/218	The Impact of Digital Transformation on Environmental Sustainability	Dr. Sudesh Rani
AFTEFS/GCH/2024/219	ASSESSMENT OF OFF-SEASON JACKFRUIT ACCESSIONS IN KERALA: BIOCHEMICAL COMPOSITION AND ORGANOLEPTIC ATTRIBUTES	Arathi Balan*[1], B. Bindu[2], S. Simi[3], Pratheesh P. Gopinath[3], P.R. Manju[3]and K. Anees[3]
AFTEFS/GCH/2024/220	Beyond Monoculture: Doubling Farmers' Revenue with Integrated Farming in Fruit Cultivation	Sanjana Singh[1*], Diksha Dhiman[1] and Ghanwat Archana B[1]
AFTEFS/GCH/2024/221	Enhancing Agricultural Sustainability through Post-	Ajay Kumar

	Production Technologies for Stakeholders	
AFTEFS/GCH/2024/222	Pomegranate (*Punica granatum* L.) juice and peel mediated AgNPs against disease causing crop pathogens	[1]Jyoti Rani, [2]Sushila Singh, [1]Anuradha Beniwal
AFTEFS/GCH/2024/223	Effect of Green synthesized Magnetite nanoparticles (Fe_3O_4 NPs) on Various Physiological and Biochemical Parameters of Pear Saplings	Simran Kakkar, Sushila Singh, Anuradha Beniwal, Jyoti Rani
AFTEFS/GCH/2024/224	Finger Millet Fodder: Unlocking the Potential for Livestock Nutrition and Agricultural Sustainability	D. Keerthana[1*] and V K yadav[2]
AFTEFS/GCH/2024/225	Unveiling the Beneficial Microbial World in Foods: A Gateway to Health and Wellness	Neetu[1]* and Shubham[2]
AFTEFS/GCH/2024/226	Organic Farming Innovations: Nurturing Sustainable Agriculture for Tomorrow's World	Kamalkant Yadav[1], Shani Gulaiya[1], Nandini Singh[-1] and Sahadeva Singh[1]
AFTEFS/GCH/2024/227	Natural Resource Conservation: The Vital Role of Political Systems and Constitutions	Ketan[1], Dr Shweta Yadav[2]
AFTEFS/GCH/2024/228	Natural Resource Management Using Smart Farming: A Sustainable Approach for Agricultural Development	Shani Gulaiya, Nandini Singh, Kamalkant Yadav and *Sahadeva Singh*
AFTEFS/GCH/2024/229	Role of Biomedical Technology in attaining Sustainable Development Goals in India	Dr Shweta Yadav
AFTEFS/GCH/2024/230	Ameliorative effect of melatonin improve salinity tolrence of *Brassica juncea L.*	Shweta*[1], Sridevi Tallapragada[1], Anita Kumari[1] and Ashish Kumar[2]
AFTEFS/GCH/2024/231	Exploring Green Energy Techniques for a Sustainable	Netra Sharma[1], Dr Shweta Yadav[2]

	future Netra Sharma[1], Dr Shweta Yadav[2]	
AFTEFS/GCH/2024/232	Determination of total phenolic content and antioxidant capacity of *Carica papaya L.*leaves using thermosonification extraction	Bilal Ahmad langoo[1], Dr N.C.Shahi[2]
AFTEFS/GCH/2024/233	Assessment the spatio-temporal climatic variability during the three-decade wheat Cultivation Period in Haryana (1990-2020)	Suresh*, Pankaj Dahiya, Ram Niwas and M.L. Khichar
AFTEFS/GCH/2024/234	Toxic effects of Arsenic in some fresh water fishes	Dr Sarita
AFTEFS/GCH/2024/235	Management of Water & Soil Resources	Ankita Rani
AFTEFS/GCH/2024/236	Shadow of Byrd-Hagel Resolution on Kyoto Protocol: Back step by USA	Suman Rani
AFTEFS/GCH/2024/237	हरियाणा में वनों का अवरूपण: एक गंभीर समस्या	सरिता देवी
AFTEFS/GCH/2024/238	NATURAL RESOURCES AND THEIR MANAGEMENT	Dr. Atma Ram
AFTEFS/GCH/2024/239	Study of Various Mathematical Models for Natural Resource Management	Dr. Savita Devi
AFTEFS/GCH/2024/240	Applications of Remote Sensing and GIS in Natural Resource Management	Dr. Priya
AFTEFS/GCH/2024/241	Application of Mathematical Modeling in the Sustainable Use of Natural Resources	Mrs. Pawan Kumari
AFTEFS/GCH/2024/242	Environmental and Cultural Resilience in Chinua Achebe's	Dr. Suresh Kumar

	Things Fall Apart	
AFTEFS/GCH/2024/243	The Impact of Media Framing on Public Perception of Climate Change Adaptation Strategies through GIS and Remote Sensing Data	Kusum
AFTEFS/GCH/2024/244	The Relationship between Psychological Well-Being and Natural Resources	*Dr. Chanderkant Gorsy **Muskan
AFTEFS/GCH/2024/245	MICROBES AND THEIR ROLE IN SUSTAINABLE USE FOR HUMAN WELFARE	Arpitha H B[1], Preeti Y H[2], Dr. Kavya Thottempudi[3], Ambruthavarshini[4]
AFTEFS/GCH/2024/246	*Chrysanthemum*: An Emerging Health drink	Seema Mahlawat
AFTEFS/GCH/2024/247	Effects of Acid Rain on Environment	Manoj
AFTEFS/GCH/2024/248	Management of Water Resources	Kirti Singh
AFTEFS/GCH/2024/249	Water Resources Management	Parveen Kumar[1] and Dr. K.S. Gill[2]
AFTEFS/GCH/2024/250	Life Cycle Assessment of Whey Protein Utilization in Feed and Biogas Production Systems	Usha Devi[1], Rajeev Kapila[1], Sudarshan Kumar[2] Suman Kapila[*]
AFTEFS/GCH/2024/251	Hydrothermally synthesized WO_3 nanoplates as potential gas sensor for the detection of NO_2	Suman Rani*[1], Rita Dahiya[1], Priyanka Berwal[1], Smriti Sihag[1] and Vinay Kumar[1]
AFTEFS/GCH/2024/252	Fabrication of ZnO nanoparticles-based gas sensor for detection of NO_2 gas at low ppm	Smriti Sihag[1*], Rita Dahiya[1], Suman Rani[1], Priyanka Berwal[1] and Vinay Kumar[1]
AFTEFS/GCH/2024/253	Economic impact of Agro-meteorological Advisories	Wasim Khan[1*] and M. Sekhar[2]

	Services (AAS) on Paddy crop under Fatehpur district of UP	
AFTEFS/GCH/2024/254	Temporal Variation in Avian Community Composition and assemblage during Conventional Paddy Cultivation Phases	Amit Kour*, Dharambir Singh, Kiran Yodha, Renu Yadav, Rahul Kumar
AFTEFS/GCH/2024/255	Veterinary Science in Human Welfare: Bridging Health Across Species	Dr. Praveen Kumar Agrawal*, Dr.Bharti Yadav, Dr.Manju, Dr.Sheela Choudhary and Dr.Monika Karnani
AFTEFS/GCH/2024/256	Impact of Organic Farming and Green Practices on Socio-economic Development in Indian Agriculture	Megha Goyal[1], Ekta Yadav[2] & Satinder Singh[2]
AFTEFS/GCH/2024/257	Harnessing the Potential of Medicinal and Aromatic Plants in Animal Nutrition: Promoting Health and Performance in Livestock	Bharti Yadav, Praveen Kumar Agrawal, Manju, Sheela Choudhary and Monika Karnani
AFTEFS/GCH/2024/258	Histopathological alterations in mid gut of honey bee workers, *Apis mellifera* on exposure to sublethal concentrations of ZnO nanoparticles	Anshu Kumari* and Ravikant
AFTEFS/GCH/2024/259	Rodent species diversity and damage in major crops in village *Adampur*, Hisar, Haryana	Naveen Kumar*, Ravikant & Lakshay Jangra
AFTEFS/GCH/2024/260	Inoculation of microbial nitrogen fixers improves productivity and profitability for sweet potato (*Ipomoea batatas*) growers	Sanjaya Kumar Pradhan, Jayanta Kumar Pati and Bibhuti Bhusan Sahoo#
AFTEFS/GCH/2024/261	Free Radical Scavenging Potential of Phenolic Compounds from Bark of Some Indian Tree Species to Manage Oxidative Stress	Dr. Sunita Jain

AFTEFS/GCH/2024/262	"Petal to Palate": Production Technology of Exquisite Rose Petal Wine	K.S. Nehra and Mukesh R Jangra
AFTEFS/GCH/2024/263	Physiological responses of okra to different sowing time	Ashish Kumar* Surender Singh and Rahul Punia
AFTEFS/GCH/2024/264	tanding the Magnitude of Post-Harvest Losses in Tomato: Implications for Ensuring Food Security	Anamika[1*] and Suman Ghalawat[2]
AFTEFS/GCH/2024/265	*Heena (Lawsonia inermis)* and *Babool (Acacia nilotica)* bark: Utilizing there potential for antimicrobial activity	[1]Neeta, [2]Nisha Arya [3]Arpita Grover and [4]Namrata Kushwah
AFTEFS/GCH/2024/266	AI-Driven Sustainable Resource Management: Nurturing Nature for Future Generations	Poonam Narwal
AFTEFS/GCH/2024/267	Mathematical Approaches to Assessing Climate Change Impacts on Natural Resource Availability and Sustainability	Ms. Jyoti Bala
AFTEFS/GCH/2024/268	Role of Mathematics in Sustainable Natural Resource Management	Amita Sarova[1*] and Suresh Kumar[2]
AFTEFS/GCH/2024/269	संस्कृत में पर्यावरण चेतना	डॉ. दयानंद आर्य
AFTEFS/GCH/2024/270	Rainwater harvesting as an adaptation to climate change	Ms. Veena Rani
AFTEFS/GCH/2024/271	वैदिकविद्या में प्राणिविज्ञान	Dr. Rajveer Arya
AFTEFS/GCH/2024/272	वेदों में कृषि विज्ञान : एक विवेचन	Dr. Geeta
AFTEFS/GCH/2024/273	पर्यावरणसंरक्षणे यज्ञप्रभाव:	डॉ. मुकेश कुमार:
AFTEFS/GCH/2024/274	Consumerism and Waste: Unveiling the Environmental Costs of Mass Production	Dr. Neha Bishnoi

AFTEFS/GCH/2024/275	Climate Change Adaptation: Using AI for Resilience Planning and Risk management	Dr. Ritu
AFTEFS/GCH/2024/276	Conservation agriculture for enhancing resource use efficiency and sustainability	Praveen H [1], Gunjan Guleria [2] & Pradyumna Deshmukh[3]
AFTEFS/GCH/2024/277	Agroforestry for Climate Change Mitigation	Pradyumna Deshmukh[1], Prabhat Tiwari [2] and Praveen H.[3]
AFTEFS/GCH/2024/278	Building a Greener Tomorrow: Climate Tech Innovations	Bhumika[1], Dr. Shweta Yadav[2]
AFTEFS/GCH/2024/279	Role of Artificial Intelligence in Natural Resource Management: A Comprehensive Review	Vipin Babbar[1], Amit Bansal[2]
AFTEFS/GCH/2024/280	Sustainable Application of Nanotechnology in Aquaculture	Pooja[1*], Dharambir Singh[1]
AFTEFS/GCH/2024/281	Study on the effect of seed coating and foliar spray of nanofertilizers on seed yield and quality parameters of maize (*Zea mays* L.)	Rashmi Jha*, Dr. Umesh Kumar Singh, Dr. Sumeet Kumar Singh
AFTEFS/GCH/2024/282	Enhancing the disease resistance in fishes by using the medicinal herb *Salvia rosmarinus*	Ruksar[1]*, Tejpal Dahiya[1], Abhimanyu[1] and Tannu Goyal[2]
AFTEFS/GCH/2024/283	Natural Resource Management: Concept, Models and Approaches	Sowmya K.L & Ramalingappa. B
AFTEFS/GCH/2024/284	Effect of foliar application of calcium, zinc and boron on biochemical properties of aonla	Mohit S Janbandhu[1]*, Premlata M Chandan[1], Pradip R Hange[2], Shrirang D Temak[1], Narendra G Gadge[3] and Abhinav S Pate[4]

AFTEFS/GCH/2024/285	Effect of Zinc oxide nanoparticles on the viability of fruit fly, *Drosophila melanogaster*	Priyanka* and Ravikant
AFTEFS/GCH/2024/286	Effect of varieties and nitrogen sources on growth parameters of wheat under alternate furrow irrigation method	Jyoti, Parveen Kumar, Pawan Kumar and Surender
AFTEFS/GCH/2024/287	Comprehensive study on nutritionally enriched live feed on rearing of fry of Amur Carp (*Cyprinus carpio* haematopterus)	Sudha Shahi [1*], Gajendra Singh[1], Priya Singh[1], Ravi Kumar[1]
AFTEFS/GCH/2024/288	Cultural and Ecological Aspects of Plant Use in Ladakh	Dr. Sunil Kumari[1], Ms. Manju[2]
AFTEFS/GCH/2024/289	A Comprehensive Overview of Organic Farming Practices	Savita Rani
AFTEFS/GCH/2024/290	Manifestation of Nature in Romantic Poetry	Rinku Rani
AFTEFS/GCH/2024/291	The Ecological Consequences of Nuclear Conflict	Satyajeet
AFTEFS/GCH/2024/292	एक गैर सरकारी संगठन (NGO) की पर्यावरण में भूमिका	Ashok Kumar
AFTEFS/GCH/2024/293	Renewable Energy Sources in India: A Review	Dr. Malti
AFTEFS/GCH/2024/294	Effect of bee attractants on the attraction of *Apis dorsata* and their impact on seed yield of niger, *Guizotia abyssinica* (L.f.) Cass, crop	[1]Dwarka* and [2]Anil Kumar
AFTEFS/GCH/2024/295	Microbial Sustainability: Harnessing Microbes for Human Welfare	[1]Uma Bermaiya*, [2]Shubham Mishra and [3]Shikha Patil
AFTEFS/GCH/2024/296	Response of organic farming and opportunities for agricultural sustainability in changing climate scenarios on Indian agriculture	[1]Anil Kumar* and [2]Dwarka

AFTEFS/GCH/2024/297	रक्त प्रवाह संस्थान और नियमित रूप से व्यायाम करने से रक्त प्रवाह संस्थान में होने वाले स्थायी परिवर्तन	Dr. Sukhbir Singh
AFTEFS/GCH/2024/298	Therapeutic Management of Canine Ehrlichiosis – A Case Report	Aruna, Sita Ram Gupta, A.P. Singh
AFTEFS/GCH/2024/299	Phytohormone Jasmonic Acid Mediated Plant Responses to Abiotic Stresses	Dr. Mamta Bhardwaj
AFTEFS/GCH/2024/300	Therapeutic Management of Canine Ehrlichiosis: Lesson Learned from Bareilly, India	Rashmi Mishra[1], Pashupathi M[2], Priyanka Pal[3], Harshit Saxena[4], Sakshi[4], Priyanshi Yadav[5]
AFTEFS/GCH/2024/301	*In-silico* analysis of genes involved in β-glucan biosynthesis: The critical attributes of monitoring *Hordeum vulgare* malt quality	Shalu Yadav[1], Vinod Chhokar[1]*
AFTEFS/GCH/2024/302	*In-vitro* evaluation of different fungicides against *Rhizoctonia solani* causing sheath blight of Rice	D.M. Pawar*, Pokhar Rawal and Shaik Munnysha, Pawar sahane and G. Golwankar
AFTEFS/GCH/2024/303	The Impacts of Climate Change on Livestock: Strategies for Mitigation and Adaptation to Climate Change	Rishi Kumar[1], Meena Goswami[1], Nagendra Singh[2], Anupama Verma[3]
AFTEFS/GCH/2024/304	Assessment of bacterial biodiversity in fish cultured in Biofloc tank at Hisar, Haryana	Vishal Soni[1*], Rachna Gulati[1], Satendra Singh[2] Vikas Kumar[3] and Amit Singh Kshatri[4]
AFTEFS/GCH/2024/305	Impact of lactobacillus microbial consortia on digestive enzyme activity of *Cyprinus carpio* L.	Priyanka Joshi[1], Gajender Singh[1], Baljeet Singh Saharan[2,*] and Nikita Goyat[2]

AFTEFS/GCH/2024/306	वेदों में पर्यावरण संरक्षण के स्वर	Dr. Nirmla Devi
AFTEFS/GCH/2024/307	Zinc-activated *Azadirachta indica*-based Biochar: An activated Green Solution for Water Pollution	Divya Yadav[1*], Santosh Bhukal[2*]
AFTEFS/GCH/2024/308	Basic study on the properties of bioplastic film prepared using PLA and wheat gluten	Sweta Kumari[1]*, Asha Gupta[2]*, N.R. Bishnoi[3]*
AFTEFS/GCH/2024/309	Natural Resources Management for Climate-Resilient Agri food System	Amit Deep Mishra[1*], Sonu Kumar[2], Krishna Kant[3]
AFTEFS/GCH/2024/310	Streptomyces: An effective plant growth promotor and biocontrol agent under natural farming conditions	Priyanka and *Baljeet Singh Saharan
AFTEFS/GCH/2024/311	Conservation and Management of Fish Diversity in International Important Wetlands in Central India: Challenges and Solutions	Ambrish Singh[1*], Siddharth Kumar Jatav[2], Pragya Mehta[2], Ashish Singh[3], C.P. Singh[1]
AFTEFS/GCH/2024/312	Influence of Teacher Qualification on Social and Emotional Development of Preschool Children	Soumya Hirelingannavar and Manjula Patil
AFTEFS/GCH/2024/313	Phytohormone Jasmonic Acid Mediated Plant Responses to Abiotic Stresses	Dr. Mamta Bhardwaj
AFTEFS/GCH/2024/314	Drone and Remote Sensing Technologies for Disease Detection in Fruit Orchards	Shiv Kumar Ahirwar[1*]
AFTEFS/GCH/2024/315	Microbiome-Assisted Breeding: A Sustainable Strategy for Climate-Resilient Vegetable Crop Improvement	Kadthala Bhargava[1*] and Pole Akhila[2]
AFTEFS/GCH/2024/316	Synthetic Biology Approaches for Next-Generation Cereal Crop Improvement	Kadthala Bhargava[1]* and Pathuri Sadhana[2]
AFTEFS/GCH/2024/317	Effect of Postharvest Treatments and Storage Conditions on Shelf Life and Quality of Ber (*Ziziphus mauritiana* L.) cv. Gola	Bhawna
AFTEFS/GCH/2024/318	Effect of grafting time on graft success and growth in low chill peach cv Shan-i-Punjab in Haryana	Jaipal[1], RPS Dalal, Dinesh Kumar
AFTEFS/GCH/2024/319	Innovations in probiotics and microbial management in aquaculture	Muneshwar PavanKalyan, Arya Singh Nayan Chouhan Muneshwar Tejashwini

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AFTEFS/GCH/2024/01

Advancements in Agricultural Practices and Crop Management: A Holistic Approach

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In recent decades, the agricultural sector has undergone profound transformations driven by technological advancements, environmental concerns, and evolving market dynamics. This abstract encapsulates the essence of contemporary agricultural practices and crop management strategies that contribute to sustainable food production while addressing pressing challenges such as climate change, resource depletion, and food security.

The abstract begins by acknowledging the multifaceted nature of modern agriculture, recognizing the interplay between agronomic practices, technological innovations, and socio-economic factors. It underscores the importance of adopting a holistic approach that integrates traditional knowledge with cutting-edge technologies to optimize resource utilization, minimize environmental impact, and enhance productivity.

Key themes explored in this abstract include precision agriculture, which harnesses data-driven decision-making tools such as remote sensing, GPS technology, and machine learning algorithms to optimize inputs, improve crop yield, and reduce operational costs. The abstract also discusses the pivotal role of soil health management practices, emphasizing the significance of conservation tillage, cover cropping, and organic amendments in preserving soil fertility, enhancing carbon sequestration, and mitigating erosion.

In conclusion, this abstract emphasizes the transformative potential of innovative agricultural practices and crop management strategies in building a resilient, sustainable, and inclusive agricultural sector. It advocates for collaborative efforts among stakeholders, including farmers, policymakers, researchers, and civil society, to accelerate the adoption of these practices and pave the way for a more food-secure and environmentally resilient future.

Keywords - *Environment, market, precision agriculture, resilient, carbon sequestration*

AFTEFS/GCH/2024/02

Appraisalof Entrepreneurial Training Programme on Rural Youth Employment of Krishi Vigyan KendraYamunanagar of Haryana

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Krishi Vigyan Kendra organizes vocational training programs aimed at imparting technological skills and fostering employment opportunities in agriculture and related sectors for rural youth. These programs serve to align education with livelihoods, identifying and nurturing human capabilities for a fulfilling career. A study conducted in Yamunanagar district, Haryana (2020-21), assessed the impact of Krishi Vigyan Kendra (KVK) on the employment prospects of rural youth. The study was conducted with 120 respondents randomly from six villages in the district. The findings indicate that rural youth generally fall within a middle age bracket, with varied educational backgrounds, including illiteracy. They exhibit moderate levels of social participation, possess small land holdings, earn low annual incomes, and have limited exposure to mass media and extension services. Despite attending 3 to 4 training sessions on average, they demonstrate a moderate level of risk orientation, low economic motivation, and medium innovative potential. Overall, the study suggests that the employment generation among rural youth is moderate. The insights gleaned from this research shed light on how these training initiatives influence the establishment of enterprises by rural youth, thus impacting their economic prospects positively.

AFTEFS/GCH/2024/03

Habitat Restoration: Tool of Natural Resource Management

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Gopal Pakshi Vihar is situated in Kanwas tehsil of Kota District about 15 kilometers from Darra on Seemalya road. It is a man-made wetland developed with the efforts of local Government and Forest Department of Kota division during the period of 2018-2023. An area of 400 hectares has been marked, out of which plantation has been done on about 200 hectares and remaining is used for water storage and construction purpose. Annual rainfall is not sufficient for the complete year so a canal from Sawan Bhado dam feeds the wetland which is built on Aru River. Trenches of 4-5 feet deep were dug around the boundaries of the Pakshi Vihar to prevent animals entering it. Later, mounds and passage were made followed by the construction of watch tower of about 15 feet. A watchman is also appointed to prevent poaching and to take care of the wetland. These continuous efforts converted this area into the habitat of many waterbirds like Great cormorant, Herons, Egrets, Black-headed Ibis, Common teal, Spot-billed duck, Common pochard, Gadwall, Red-crested pochard, Purple Swamphen, Common Moorhen, Common Coot, Jacana, Black-winged Stilt, Lapwing, Little Ringed Plover, Common Redshank, Green Sandpiper, Common Sandpiper, Western Marsh-Harrier, Kingfisher, Citrine Wagtail, Grey Wagtail etc are observed in winter season. But along with this agricultural encroachment on the wetland is increasing that should be controlled along with the invasive species.

Keywords: Restoration, Man-made ecosystem, Conservation, Management, Threats.

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TRENDS, ATTRIBUTES AND THREATS TO SACRED GROVES OF THE INDIAN SUBCONTINENT

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Sacred groves are not only distinct forest patches but cultural and spiritual centres associated with taboos and belief systems of people which are now scientifically considered natural resources well recognized for their enormous contribution to native biodiversity conservation over centuries. Apart from documentation of such places, scientific studies also has been done extensively on different aspects by researchers making us enable to recognize it as a multipurpose approach used by ancient humans. The results of such studies are that we are not only realizing their importance as ecological assets but also their socio-economic importance for the livelihood of locals dependent on it. In this particular review-based study authors identified sacred groves as a multidimensional approach for natural resource management. Further analysis concludes culture, ecology and conservation as primary concerns and phytogeography, ethnobotany, and socio-economy as major additional factors associated with sacred groves along with major threats that sacred groves are facing particularly in India. 11 majorly identified factors are further categorized into 3 categories (high, medium and low). The highest category factors are invasive species, lack of awareness, disturbance, development activities (100%), encroachment (80.33%) and overexploitation (83.61%). Analysis gives insights that major work has been done in India during 2005 to 2015. Conservation and restoration are major focus from 2010 and onwards but most of documentation work has been done during the decade of 2005-2015. Authors suggest developing holistic action plans for the conservation and restoration of sacred groves by considering the major factors to ensure the maximum success rate of conservation efforts.

AFTEFS/GCH/2024/05

Assessment of soil health under black rice cultivation in an organic ecosystem of northeast India

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Organic fertilization improves the soil physical, chemical, biological and soil enzymatic activities as well as enhances the water holding capacity of the soil and improve the overall health of soil, thereby sustained soil fertility and productivity. To improve the nation's overall productivity, food security, food sovereignty, and environmental effect of agriculture, it may be essential to bolster that decision with reliable scientific evidence. The difficulty is in fostering an atmosphere where organic farming is viewed as a complementary strategy and efforts are concentrated on reaping the benefits that organic farming may provide for a portion of Indian farmers. Therefore, we have assessed the changes in soil physico-chemical and biological properties undertaken during kharif season of 2019-2020 and 2020-2021 in certified organic block at Instructional-cum-Research Farm of Assam Agricultural University, Jorhat, Assam. The topography of experimental field was uniform and fairly leveled. Three replications of the experiment were set up using a Randomized Block Design (RBD). The soil of the experimental plot was brownish to yellowish brown color with fair drainage and sandy loam in texture with acidic in pH, medium in organic carbon, low in available nitrogen, phosphorous and medium in available potassium. The experimental data recorded during both successive years revealed that there were no significant results observed in relation to soil pH, Bulk density, CEC [c mol (P+)/Kg] except organic carbon. However, the results also showed the significant impact of organic inputs on N, P and K contents, uptake, total uptake by grain and straw, available N, P, K, Beneficial soil microbes such as bacterial and fungal population and enzymatic activities such as Dehydrogenase activity and Phosphomonoesterase were significantly influenced. The highest pooled value

of N content, uptake by grain, straw and total uptake were observed under T_6 treatment *i.e.* RDK through azolla incorporation + mustard oil cake @ 20 kg ha^{-1}and in case of P_2O_5 and K_2O the highest pooled values recorded under T_8 treatment *i.e.* 43.07 kg ha^{-1}, 159.86 kg ha^{-1} respectively. All the enzymatic activities and beneficial microbial population were responded significantly to treatmentT_8 applied with All soil biological properties and enzymatic activities of black rice cultivated soil were significantly influenced by different organic inputs. The highest pooled values of soil microbial biomass carbon (665.11µg/g dry soil, Bacteria population (7.15 log cfu/g soil, fungal population (4.88 log cfu/g soil, dehydrogenase activity (68.36 µg TPF/g/day and Phosphomonoesterase activity (79.05 (µg PNP/g/hr were reported with application of RDK through banana pseudo stem vermicompost along with mustard oil cake @ 20 kg ha-1 (T_8) during 2019–2020 and 2020–2021, respectively.
Keywords: *Organic fertilization, Soil health, Enzymatic activity Microbial activity, Organic black rice, Soil microbial biomass carbon, Nutrient uptake.*

AFTEFS/GCH/2024/06

Honey Bee Diseases and Management: A Comprehensive Overview

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Honey bees (Apis mellifera) play a vital role in global agriculture through their pollination services, contributing significantly to the sustainability of ecosystems and food production. However, honey bee populations worldwide face numerous challenges, with diseases posing a significant threat to their health and survival. This abstract provides an overview of common honey bee diseases, their causative agents, symptoms, and management strategies.

Several pathogens, including viruses, bacteria, fungi, and parasites, can afflict honey bee colonies. Varroa destructor, a parasitic mite, is perhaps the most notorious, capable of causing significant colony losses if left unchecked. Other pathogens such as Nosema spp. (microsporidian parasites), American foulbrood (caused by the bacterium Paenibacillus larvae), and deformed wing virus (associated with Varroa infestations) also pose serious threats to honey bee health.

Effective management of honey bee diseases requires a multifaceted approach, incorporating both preventative and therapeutic measures. Integrated pest management (IPM) strategies, including the use of screened bottom boards, drone brood removal, and hygienic behavior selection, can help mitigate Varroa mite infestations. Additionally, biosecurity practices, such as regular hive inspections, quarantine protocols for introduced colonies, and proper sanitation of equipment, are essential for preventing disease spread within and between apiaries.

Chemical treatments, such as acaricides for Varroa control and antibiotics for bacterial diseases, can be utilized judiciously as part of an integrated management plan. However, their overuse can lead to the development of resistance and environmental contamination, highlighting the importance of alternative, sustainable approaches.

Furthermore, fostering honey bee health requires attention to factors beyond pathogen exposure, including nutrition, habitat quality, and stressors such as pesticide exposure and climate change. Enhancing floral diversity, reducing

pesticide use, and providing supplementary feeding during periods of scarcity can support honey bee resilience and immune function.

In conclusion, effective management of honey bee diseases necessitates a holistic approach that addresses both pathogen control and broader ecosystem health. By implementing integrated management practices, beekeepers can safeguard honey bee populations and ensure their continued contribution to agricultural productivity and biodiversity conservation.

Keywords: *honey bees, diseases, pathogens, management strategies, integrated pest management, bee health.*

AFTEFS/GCH/2024/07

Conservation of Biodiversity of Flora and Fauna

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India is a fascinating tapestry of life on Earth, with its varied landscapes that span from the sun-drenched coastlines of the Indian Ocean to the snow-capped Himalayas. This thorough review study explores the amazing diversity of flora and wildlife that adorn India's ecosystems, going deep into the country's biodiversity. An ecosystem is a large, interconnected system of biotic and abiotic elements. Biologic components include all living things, such as bacteria, plants, and animals. Abiotic elements, on the other hand, are non-living substances like soil, water, and climate that are essential for life to exist. Of all the biotic components, flora and fauna are the most fascinating. India's biodiversity has cultural, economic, and ecological significance in addition to its inherent value. This review takes the reader on a journey across the many ecosystems of India, showcasing the great diversity of life as well as the many difficulties it encounters. This review reveals the mysteries and complexities of India's biodiversity, ranging from the lush Western Ghats to the dry Thar Desert, and from fascinating megafauna like the Bengal tiger to the intricate workings of microbiology. We explore the conservation initiatives and how indigenous knowledge contributes to the preservation of this natural legacy. Threats to this richness do exist, though, including as overexploitation, habitat loss, and climate change. To preserve India's exceptional and priceless biodiversity, the assessment finishes by outlining the urgent need for sustainable development, biodiversity conservation, and additional research.

Key Words: *Biodiversity, Flora and Fauna, India, Ecosystems, Conservation.*

AFTEFS/GCH/2024/08

Green Economics: The Hidden Wealth of Medicinal and Aromatic Plants

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From ancient times, plants have been used for their medicinal properties to cure various diseases and to improve the health and wellness of the communities. As per World Health Organization (WHO), medicinal and aromatic plants (MAP's) are still the essential components of traditional healthcare systems in many developing nations. Due to their natural medical qualities, medicinal plants are traditionally used for therapeutic purposes. Aromatic plants release fragrant compounds from various parts such as leaves, flowers, fruits, seeds, roots, etc. These distinct fragrances or flavour emitted by aromatic plants can vary significantly depending upon the plant species. The characteristic properties of these medicinal and aromatic plants (MAP's) may arise due to the presence of various phytochemicals such as alkaloids, coumarins, flavonoids, terpenoids, and phenolics with in these plants. Medicinal plants are usually used as folk medicine mainly because of their easier and cheaper availability compared to modern medicines. Medicinal plants are also considered as vital sources for new drug and biopesticide development. Numerous modern pharmaceutical drugs have been developed from various compounds isolated from medicinal plants having therapeutic values. In recent years, there has been a growing emphasis in scientific research to allocate the therapeutic values of medicinal plants through pharmacological investigations, clinical trials, and chemical analysis. The increasing interest in medicinal and aromatic plants along with their potential economic benefits leads towards greener economics and lifestyles. With their considerable potential as medicines or biopesticides, plants are creating fresh income-generating prospects for rural communities.

Key words: *Medicinal plants, aromatic plants, phytochemicals, therapeutic values.*

AFTEFS/GCH/2024/09

Microbes: Guardians of Earth's Habitability and Human Health

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The Earth harbors an incredibly diverse assortment of microorganisms, estimated to number at least a trillion species. These microorganisms play indispensable roles in sustaining life and ensuring the habitability of our planet through their beneficial impacts such as biogeochemical cycles like photosynthesis, CO_2 fixation and nitrogen fixation, which are fundamental for the functioning of ecosystem. Microbial metabolic processes like fermentation and respiration ultimately break down organic molecules into carbon dioxide, which is then released back into the atmosphere, supporting the continuous cycle of primary production. With a global focus on cleaner production and green technologies, microorganisms offer promising solutions for achieving sustainability targets. By harnessing their capabilities, industries can minimize environmental impact and reduce resource consumption. While the vast majority of microorganisms are beneficial or benign, around 1400 species are responsible for causing infectious diseases in humans. These diseases contribute to mortality, pandemics, and substantial economic losses globally. Modern human activities such as the widespread use of broad-spectrum antibiotics and disinfectants can disrupt microbial ecosystems, leading to imbalances and potentially negative consequences for both the environment and human health. Recognizing the importance of microbial diversity and its impact on global health, the International Union of the Microbiological Societies (IUMS) is actively guiding microbiological societies worldwide. Their aim is to promote the development of sustainable solutions for controlling infectious agents, while simultaneously preserving global microbial diversity and ensuring the health of the planet.

Keywords: *Microorganisms, biogeochemical processes, broad spectrum antibiotics, sustainable development.*

AFTEFS/GCH/2024/10

Assessment of bird damage to rainy season guava (*Psidium guajava L.*) crop

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Frugivorous birds impose tremendous costs on tree fruit growers by direct consumption of fruits and in form of efforts to control birds. An essential step to reduce damage caused by birds is identification of species responsible for damage and quantification of damage. The present investigation was carried out to study fruit damage and effectiveness of commonly used auditory techniques at experimental orchard of HAU and village Salemgarh from February, 2020 to July, 2020. Evaluation of bird damage to fruit crop was assessed by using weighing method. A total of 33 species belonging to 11 orders and 24 families were recorded during the study period at both locations. Species richness was highest at ripening stage during the morning hours at location I. Out of 33 only 4 species (Rose-ringed Parakeet, Alexandrine Parakeet, Red-vented Bulbul and Brown-headed Barbet) were recorded to inflict damage to guava crop. Rose ringed parakeet was the main depredatory bird at both locations. The damage was recorded maximum at location II because management practices were not used on a regular basis. Adoption of auditory techniques minimise bird damage while simultaneously maximising yields without jeopardising the sustainability of productive ecosystems.

Keywords: *Agriculture, Estimation, Foraging, Species diversity, Management techniques*

AFTEFS/GCH/2024/11

Enhancing Sustainable Agriculture through Efficient Water Management Practices: A Critical Review

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Water scarcity and environmental degradation pose significant challenges to global agriculture, necessitating the adoption of efficient water management practices for sustainable food production. This abstract explores the role of such practices in optimizing water use, enhancing agricultural productivity, and mitigating environmental impacts.

Efficient water management encompasses a spectrum of techniques tailored to specific agro ecological contexts, including precision irrigation, rainwater harvesting, soil moisture conservation, and wastewater recycling. Precision irrigation technologies, such as drip and sprinkler systems, enable precise application of water, minimizing losses due to evaporation and runoff while maximizing crop water uptake efficiency. Rainwater harvesting techniques capture and store rainwater for agricultural use, augmenting water availability during dry periods and reducing reliance on groundwater sources. Soil moisture conservation practices, such as mulching, cover cropping, and contour farming, enhance soil water retention capacity, reduce soil erosion, and improve crop resilience to drought stress. Furthermore, wastewater recycling and reuse in agriculture offer a sustainable solution to alleviate water scarcity, while mitigating pollution and nutrient runoff into water bodies. Implementation of efficient water management practices requires interdisciplinary approaches, stakeholder collaboration, and supportive policies. Farmer education and capacity-building initiatives play a crucial role in promoting the adoption of water-saving technologies and practices. Beyond improving water productivity and resource efficiency, efficient water management practices contribute to broader sustainability goals by conserving ecosystems, preserving biodiversity, and mitigating climate change impacts.

In conclusion, efficient water management practices are indispensable for achieving sustainable agriculture, ensuring food security, and safeguarding water resources for future generations. Embracing a holistic approach that integrates technological innovations, institutional support, and community engagement is essential to realize the full potential of water-efficient agriculture in addressing the complex challenges of the 21st century.

Keywords: *Water management, Sustainable agriculture, Water scarcity, Precision irrigation, Rainwater harvesting, Soil moisture conservation, Wastewater recycling.*

AFTEFS/GCH/2024/12

Organic Farming: An Eco-friendly Agricultural Method for Environmental Sustainability

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In the modern era, increasing pollution levels in all aspects of life are the most significant challenge to our environment's sustainable growth. People's increasing demands and extravagant lifestyles are causing environmental deterioration. Pollution also had a detrimental effect on our agricultural system. Modern agricultural practices, such as utilizing synthetic fertilizers and pesticides to increase the crop yield, contribute to environmental pollution. These methods eventually disrupt the soil's nutrient balance, thus reducing the soil fertility. To address the current issue, organic farming offers a natural method of crop cultivation by utilizing eco-friendly, animal and plant-based local organic resources that are highly enriched in nutrients required by crop plants. Organic food is produced and processed without the use of synthetic fertilizers or pesticides (insecticides, herbicides, and/or fungicides), plant growth regulators such as hormones, livestock antibiotics and genetically modified organisms, or human sewage sludge. Organic farming not only generates high-quality, nutritious food, but it also increases soil fertility and quality. It promotes microbial activity and improves soil health. Organic farming adheres to some fundamental principles of health, ecology, fairness, and care, all of which ensure sustainability.

Keywords: *Environment, Eco-friendly, Organic farming, Sustainability.*

AFTEFS/GCH/2024/13

Genetic characterization of virulence and extended spectrum β-lactamase producing genes of *Klebsiella pneumoniae* isolated from bovine milk

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Mastitis associated *Klebsiella pneumoniae* species were isolated from bovine milk to characterize virulence genes (*wabG* and *kfuBC*) and extended spectrum β-lactamase (ESBL) genes (*bla*CTX-M-1, *bla*CTX-M-2, *bla*CTX-M-9, *bla*TEM, *bla*SHV and *bla*OXA). A total number of 325 bovine milk samples (195 raw and 130 mastitic milk specimens) collected from Banaskantha, a milk-shed district of Gujarat, India, were included in the study. A total number of 27 *K. pneumoniae* isolates were recovered, consisting of 17 (62.96%) isolates from raw milk and 10 (37.03%) isolates from mastitic milk samples, giving an overall prevalence of 8.31%. Antibiotic sensitivity patterns revealed that 20 out of 27 isolates were found to be multi-drug resistant. Based on combination disc diffusion test and HiCrome ESBL agar method, 20 (74.07%) and 25 (92.59%) isolates were detected as ESBL producers, respectively. Among virulence genes studied, presence of *wabG* (25/27; 92.59%) was higher than *kfuBC* (5/27; 18.51%). Beta-lactamase genes *viz.*, *bla*SHV, *bla*TEM and *bla*CTX-M-1 were detected in 23/27 (85.18%), 3/27 (11.11%) and 2/27 (7.40%) of isolates, respectively; while, none of the isolates was found to be positive for *bla*CTX-M-9 and *bla*OXA-1 genes. Outcome of the study provided an insight into virulence genes and ESBL producing *K. pneumoniae* isolated from bovine milk samples in India.

Keywords: *Bovine mastitis, Drug resistance, India, Klebsiella pneumoniae, Virulence factors*

AFTEFS/GCH/2024/14

Exploring the anti-diabetic and cardioprotective potential of *Hibiscus rosa-sinensis* fortified *Aegle marmelos* (L.) Correa extract as a nutraceutical

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The current research work has been done on the extract based on *Hibiscus rosa-sinensis* flower and *Aegle marmelos* (L.) Correa pulp to evaluate its antioxidant, phytochemical and cardioprotective properties. The extract results assessed against DPPH, FRAP exhibited remarkable IC_{50} values in a concentration-dependent manner proving it as a potential antioxidant. The activities of the extract assessed against DPPH and FRAP were concentration dependent with IC_{50} value of 138.58 and 225.12 µg/ml respectively. The phytochemical analysis were also assessed by spectrophotometric method. The flavonoid and phenolic content of the extract were found to be 56.191 mg/ml and 11.660 mg/ml respectively. The alpha-amylase inhibition assay with IC_{50} value of 159.705µg/ml has proved to decrease postprandial hyperglycemia and improve impaired glucose metabolism thus acting as an anti-diabetic agent. The extract was investigated for its antihypertensive properties, utilizing the angiotensin converting enzyme assay. ACE inhibitory activity was determined by spectrophotometer and absorbance was read at 410 nm. The extract inhibited Angiotensin Converting Enzyme activity in-vitro with IC_{50} value of 49.677µg/ml. The findings of the study suggest that the extract prevents the conversion of ACE-I to ACE-II indicating it as an excellent ACE inhibitor and thus playing as an effective cardioprotective agent.

The results of the present comprehensive analysis demonstrated that Hibiscus rosa-sinensis and *Aegle marmelos* (L.) Correa extract exhibited excellent antioxidant activities and could be exploited for further nutraceutical and medicinal applications effective in treating many disorders.

Keywords- *Hibiscus rosa-sinensis, Aegle marmelos (L.) Correa, Angiotensin Converting Enzyme, cardioprotective, anti-diabetic.*

AFTEFS/GCH/2024/15

Effect of foliar application of zinc sulphate and plant growth regulators on yield of guava (*Psidium guajava* L.) cv. Hisar Surkha

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Guava (*Psidium guajava*) is native to tropical America and belongs to the Myrtaceae family with chromosome number 2n= 22. Guava is an important fruit crop of the world and is also known as "Apple of Tropics". 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 and is necessary for their good growth and development. Plant growth regulators play an important role in increasing the fruit set percentage, fruit production, average fruit weight and fruit size without deteorating the fruit quality. NAA plays an essential role in plant growth, fruit set, increasing yield and improving quality. The function of GA_3 is to induce the flowering and increases the fruits 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 of guava (*Psidium guajava* L.) cv. Hisar Surkha. The foliar application of NAA @ 100 ppm proved to be the best treatment in improving the fruit set (73.2%). On the other hand, foliar application of GA_3 @ 100 ppm improved the fruit retention (71.6%), length of fruit (6.89 cm), breadth of fruit (6.92 cm), number of fruits per plant (363.1), average fruit weight (117.6 g) and fruit yield (42.7 kg/plant).

Keywords : *America, micronutrients, deteorating, retention.*

AFTEFS/GCH/2024/16

INTEGRATED FARMING: A SUSTAINABLE SOLUTION FOR ENVIRONMENT AND FARMERS

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In order to maximise productivity, efficiency, and environmental sustainability, integrated farming also known as mixed farming or multi-functional agriculture—is a sustainable method that combines various agricultural activities on the same land. This approach combines, in a synergistic way, agroforestry, aquaculture, livestock husbandry, and crop farming. Effective resource management is one of integrated farming's main advantages. For instance, crop wastes can be fed to cattle, and animal excrement can be utilized as organic fertilizer for crops. As a result, there is less need for outside inputs and waste is reduced, which lowers costs and improves resource management. Additionally, integrated farming improves the farm's natural balance and biodiversity. It produces habitats for a range of species by varying the range of crops and animals, encouraging natural pest management and lowering the need for chemical inputs. Planting trees next to crops is one example of an agro-forestry technique that helps preserve soil and sequester carbon. Moreover, integrated farming lowers the risks involved in relying just on one business and gives farmers access to numerous revenue streams. Diversification provides a more consistent income throughout the year by distributing potential losses. The challenges associated with integrated farming include the requirement for a broad skill set, significant investments in infrastructure, machinery, and inputs, various marketing approaches for a variety of products, and the necessity of effective management techniques, such as crop rotation, integrated pest management, and rotational grazing, to minimize risks and maximize benefits. Crop yields, animal production, and ecosystem dynamics in integrated agricultural systems can all be impacted by climate variability.

Keywords: *Integrated Farming, environment sustainability, consistent income.*

AFTEFS/GCH/2024/17

Crop Residues: A Valuable Resource for Sustainable Development Across Industries

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Crop residues like leaves, stems, and other plant materials are a major by-product of agricultural production left behind in fields after crops are harvested. Effective management of crop residues is important for sustainable farming systems as it will influence soil fertility, water conservation, and emission of greenhouse gases. Crop residues are increasingly recognized as a valuable resource with diverse applications across industries. Innovative technologies are exploring the potential of crop residues creating new economic opportunities and providing sustainable solutions to environmental challenges. Crop residues are utilized in the production of bioplastics, biocomposites, and biofibers for packaging, construction, and automotive industries. Conversion of crop residues into biofuels such as bioethanol, biogas and biodiesel contributes to renewable energy goals along with reduction in greenhouse gas emissions. Recycling of crop residues through composting and mulching improves soil structure, fertility, and preserves the soil moisture. Bioactive compounds extracted from crop waste have the potential to be used in functional foods, dietary supplements, and pharmaceuticals. Innovative food packaging materials derived from crop residue show enhanced biodegradability and barrier properties. Crop residues have been utilized to create sustainable and environmentally friendly fabrics, yarns, and clothing, thereby decreasing the environmental impact of fashion industry. This article explores the transformative potential of innovative applications of agricultural waste across industries, offering sustainable solutions to environmental challenges and creating new economic opportunities. Continued research, investment, and collaboration are crucial to fully exploit the potential of crop waste and to attain the advantages of a genuinely sustainable future.

Keywords: *Crop waste, bio-based materials, renewable energy, sustainable.*

AFTEFS/GCH/2024/18

Harmonizing *in-situ* microbial decomposition of rice residue for increasing wheat productivity and sustainability in Indo-Gangetic Plains of India

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Rice residue burning in the field is the major concern which emits greenhouse gases in the Northern states of India. Conservation agriculture adds nutrient value to the soil and increases farmers' income. So, the impact of *in-situ* microbial degradation of residue on wheat sown with PAU Happy seeder under nitrogen (N) management was studied at PAU, Ludhiana and USF Ladhowal. The bacterial population was found to be significantly higher at 60 days after sowing when compared to different time intervals. Bacterial population was found higher in N150 (25% of total N supplied FYM+ 75% N via urea) at different time intervals. Hence, application of *Delftia* sp. and the treatment of 150 kg N/ha, including a 3% urea spray, after paddy harvest can potentially contribute to faster degradation of rice residue, higher 1000-grain weight, straw and grain yield of wheat. Optimization of N management and the utilization of microbial cultures play pivotal roles in fortifying the resilience of wheat crops and sustaining their productivity, especially amidst the challenges posed by changing climatic condition.

Keywords: *Happy seeder, microbes, soil health, sustainable agriculture, wheat.*

AFTEFS/GCH/2024/19

Bioconversion of vegetable waste into vermiwash a potential biofertilizer

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The present study investigates vermicomposting as an efficient method for organic waste management, using earthworms to break down materials. Specifically, the research focuses on analyzing vermiwash, an extract from vermicompost, as a potential biofertilizer. Earthworms were utilized to convert cow dung and various waste materials (wheat bran, rice bran and vegetable waste) into three different types of vermicomposts. The extracted vermiwashes were then examined for their physico-chemical properties and bacterial diversity through 16S rRNA sequencing. The analysis found that all the vermiwashes contained essential plant nutrients. The predominant bacterial genera in the vermiwashes were *Bacillus* (38.46%), *Pseudomonas* (19.23%) and *Lysinibacillus* (11.54%). Other genera included *Rossellomorea*, *Serretia*, *Acinetobacter* and more. All isolated bacteria had the potential to enhance plant growth. The vermiwashes positively impacted the growth, yield and physiological aspects of okra and chilli plants, with vermiwash (cowdung + vegetable waste) being the most effective. In conclusion, vermicomposting of waste and cow dung not only yields valuable products like vermicompost and vermiwash but also aids in waste reduction.

Keywords: *Vermicompost, Vermiwash, Earthworms, Bio-fertilizer.*

AFTEFS/GCH/2024/20

Elucidating Interaction Between Non-Structural Protein (NS4) Of Bluetongue Virus and Glyceraldehyde-3-phosphate dehydrogenase (GAPDH)

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Bluetongue is a viral, non-contagious disease of domestic and wild ruminants transmitted by Culicoides species. It poses considerable losses to livestock health and the agricultural economy both directly and indirectly. It is primarily an arthropod disease which makes its control difficult. BTV induces diverse clinical manifestations from asymptomatic to fatal haemorrhagic fever in different hosts. In the present study, the role of BTV NS4 protein was taken into consideration in the virus-host interface and the already available Y2H compatible cDNA library from the homologous host sheep lung was used for screening the host proteins interacting with the NS4 protein of BTV. A reliable mating with mating efficiency of 3.3% was observed between NS4 bait and sheep lung library. On preliminary screening, blue colonies grew on DDO/X/A plates and were reduced on higher stringent media QDO/X/A agar plates. All positive colonies were PCR amplified and sequenced to eliminate redundant clones. Eighteen interacting partners of BTVNS4 were identified and three interacting proteins were selected for further validation in which GAPDH interacting protein was confirmed as one of the interacting prey proteins of the BTV NS4 segment. GAPDH is known to bind to AU-rich regions of certain RNA species and either stabilize or destabilize the mRNA and/or the process of translation, besides this downregulation of the GAPDH affects aerobic glycolysis in activated immune cells both in myeloid and lymphoid cells which hinders the process of immune activation.

Keywords: *Bluetongue virus, Non-structural protein, GAPDH.*

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AFTEFS/GCH/2024/21

Conservation of Biodiversity of Flora and Fauna: Strategies and Challenges

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The conservation of biodiversity, encompassing both flora and fauna, is imperative for maintaining ecosystem stability and resilience in the face of increasing anthropogenic pressures. This abstract focuses on the strategies and challenges associated with conserving the rich diversity of plant and animal life on Earth. Effective conservation efforts focus on habitat preservation, species protection, sustainable land use practices, and ecosystem restoration. Protected areas play a pivotal role in safeguarding biodiversity by providing safe havens for a multitude of species and ecosystems. However, ensuring the long-term viability of protected areas requires robust management strategies, adequate funding, and community involvement. In addition to in-situ conservation measures, ex-situ approaches such as seed banks and captive breeding programs contribute to preserving genetic diversity and preventing species extinctions. Challenges to biodiversity conservation include habitat loss, fragmentation, climate change, invasive species, pollution, overexploitation, and poaching. Addressing these challenges necessitates interdisciplinary approaches, policy interventions, and international cooperation. Sustainable development initiatives that balance conservation goals with socioeconomic needs are crucial for achieving biodiversity conservation objectives while promoting human well-being. Education and awareness-raising efforts are essential for fostering a culture of environmental stewardship and promoting public engagement in conservation activities. Furthermore, integrating traditional ecological knowledge and indigenous practices into conservation strategies enhances their effectiveness and promotes respect for diverse cultural perspectives on nature conservation. In conclusion, conserving the biodiversity of flora and fauna requires concerted efforts at local, national, and global levels. By implementing science-based conservation strategies, addressing underlying drivers of biodiversity loss, and engaging stakeholders from diverse backgrounds, we can ensure the persistence of Earth's rich tapestry of life for future generations.

Keywords: *Biodiversity, Ecosystem, Conservation, Flora and Fauna*.

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Exploration of the Antimicrobial and Antioxidant Potential of Essential Oils

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India is home to a large number of medicinal plants that are used in traditional medicine. Herbs and their essential oils (EOs) are well-known for their antimicrobial and antioxidant properties to varied degrees. An *in vitro* experiment was carried out to ascertain the potential of EOs. The EOs like oregano (*Origanum vulgare*) oil, cinnamon (*Cinnamomum verum*) leaf oil, cinnamon (*Cinnamomum zeylanicum*) bark oil, clove (*Syzygium aromaticum*) leaf oil, ajwain (*Trachyspermum ammi*) oil, and clove (*Syzygium aromaticum*) bud oil were assessed for zone of inhibition (ZOI) and minimum inhibitory concentration (MIC) against five calf gut pathogens including *E. coli* (ATCC, 418MFSP and ETEC NM328), *S. typhi* (18UT55), and *S. paratyphi* (20MH11). Three best EOs were selected i.e., cinnamon bark oil and oregano oil showed overall larger ZOI and lower MIC ($P<0.001$) against all the bacterial strains tested followed by clove leaf oil. Further, some combinations of these three oils (cinnamon bark, oregano, and clove leaf oil) showed a synergistic antimicrobial effect (fractional inhibitory concentration, $FIC<0.5$). The antioxidant activity of these three oils was estimated by DPPH, ABTS and total nitric oxide assay. Among all three oils, cinnamon bark oil showed maximum inhibition percentage in DPPH and ABTS assay along with higher total nitric oxide concentration.

Keywords: *Antimicrobial activity*, *Antioxidant activity*, and *Essential oils*.

AFTEFS/GCH/2024/23

IMPLEMENTATION OF NANOMATERIAL FOR SUSTAINABLE CROP MANAGEMENT IN GLOBAL CLIMATE CHANGE

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Global climate change is one of the biggest problems facing the world today, resulting in decreased soil fertility and crop productivity. Plant physiology, structure, and assimilation all suffer as a result of climate change. Nanotechnology, a fast-growing science, plays a vital role in crop management in fostering positive alteration in yield, biochemical content and gene expression in plants. It offers promising solutions for both mitigating the effect of climate change and adapting agriculture practices to new environment conditions. Nanoparticles boost abiotic and biotic stress tolerance in plants by altering various physiological, biochemical and molecular mechanisms. Since nanoparticles, in their nature, are highly versatile, therefore can be used for various purposes. Thus, the main idea behind this adaptive strategy is to find ways to increase the potential of plants in stressful conditions by using nano-preparations. Nanomaterials are being utilized for efficient delivery of fertilizers and pesticides, reducing environmental pollution and optimizing nutrient uptake by plants. Nanomaterials such as nanocarriers and nanosensors can facilitate controlled release of water and nutrients and improve water use efficiency and crop resilience in adverse conditions. In conclusion, nanotechnology presents a multifaceted approach to climate change mitigation and sustainable adaptation in agriculture, offering innovative solutions to enhance efficiency, viability and elasticity in the face of changing environmental condition.

Keywords: *Nanomaterial, Climate change, stress tolerance, sustainable agriculture, crop management.*

AFTEFS/GCH/2024/24

Studies on biochemical parameters of okra germplasm for resistance against jassids, *Amrasca biguttula biguttula* (Ishida)

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Plants use a variety of physio-chemical mechanisms to defend themselves from biotic stresses induced by insect pests. Biochemical components of okra germplasm were assessed for resistance or susceptibility to the leafhopper, *Amrasca biguttula biguttula* (Ishida) at All India Coordinated Research Project on Vegetable Crops, Odisha University of Agriculture and Technology and Central Horticultural Experiment Station, Bhubaneswar during three consecutive seasons of *kharif*, 2018, summer, 2019 and *kharif*, 2019. The results revealed that the total sugar, reducing sugar, total protein, total phenol and total chlorophyll content in different okra germplasm varied from 2.84 % to 5.51 %, 0.28 % to 0.56 %, 0.75 to 2.10 mg/g, 0.52 to 1.35 mg/g and 1.04 to 2.29 mg/g, respectively. The okra germplasm BBSR-37, BBSR-36, Pusa A-4, BBSR-57, BBSR-3, and BBSR-4 were found to be resistant to leafhopper, with BBSR-4 being moderately resistant, BBSR-09-6 susceptible besides Pusa Sawani and BBSR-53 being highly susceptible. Oxidative enzyme activity was estimated spectrophotometrically from leaf samples collected at peak jassid infestation period (49 – 63 days after sowing). The results indicated that the resistance germplasm BBSR-37, Pusa A-4, BBSR-36, BBSR- 57, BBSR-47 and BBSR-3 recorded higher enzymatic activities as compared to susceptible germplasm (Pusa Sawani and BBSR-53). The germplasm BBSR-4 and BBSR-09-6 were observed with moderate level of enzymatic activity. The results revealed that the enhanced activities of the enzymes may contribute to bio-protection of okra genotypes against leafhopper infestation.

Keywords: *Jassid, total sugar, reducing sugar, phenol, protein, chlorophyll, okra, leafhopper, catalase, peroxidase, polyphenol oxidase.*

AFTEFS/GCH/2024/25

Causes, Effect and Solutions of Global Warming

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Introduction: -Numerous analysts, engineers and earthy people are communicating profound concerns almost changes within the generally climate of the planet. Fossil fills are being persistently utilized to deliver power. The burning of these powers produces gasses like carbon dioxide, methane and nitrous oxides which lead to global warming. Deforestation is additionally driving to hotter temperatures.

Objective: the main objectives to investigate the causes, Effects and solutions of the global warming.

Research Methodology: Extensive review of literature, important and relevant publication and agencies, online available material has been used to analysis research**.**

Conclusion and Findings: Worldwide warming could be a enormous danger and fitting measures must be taken to tackle this genuine issue. This issue isn't as it were causing inconvenience to the human creatures but moreover to creatures and plants. Dissolving of polar ice caps will lead to surges which can cause commotion all over. Rise of ocean levels will obliterate agrarian and angling exercises. Recommendations: It is recommended to reduce the utilization of those vehicles and fossil fuels like coal, natural gas etc. That are responsible to discharge the harmful gases and try the increase the use of wind mills, solar energy, hydro plants as these do not generate any type of pollution and harmful gases.

Keywords: *Deforestation, Fossil fuels, Global Warming, Climate, Alternative Energy Sources.*

AFTEFS/GCH/2024/26

CONSERVATION OF BIODIVERSITY OF FLORA AND FAUNA

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Biodiversity is the variety of living organisms (including plants, animals and microorganisms) on this earth. Our planet is inhabited by millions of species of plants and animals that belongs to different groups and phyla. But, as the population is increasing day by day, faunal as well as floral biodiversity is declining globally due to adverse impact of human activities. This decline is alarming and unhealthy for our ecosystem. Ecosystems which have greater biodiversity are more stable and healthier and ensure the sustainable development and food security. In present scenario, the methods and approach used for conserving the biodiversity are not working the way exactly that should be. Therefore, we need a systematic approach and policy which can conserve the floral and faunal diversity in an effective way on a priority basis.
Keywords: *Flora, Fauna, Biodiversity, Ecosystem, Policy.*

AFTEFS/GCH/2024/27

INVESTIGATING CONSUMER PERCEPTIONS OF ENVIRONMENT-FRIENDLY PACKAGING IN KUMARGANJ, AYODHYA.

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Marketing that prioritizes eco-friendly is crucial for sustainable development, which is necessary for both current and future generations. Eco-friendly marketing involves understanding and meeting consumer needs while safeguarding the natural environment.

In this study, the focus is on consumer attitudes, awareness, and satisfaction regarding eco-friendly packaged beauty and food products. A sample size of 100 was used, and data was collected through structured questionnaires employing a seven-point Likert scale for responses. Four psychographic or psychological variables were tested as dependent variables, along with other characteristics related to eco-friendly products. Analysis, primarily through ANOVA, revealed various findings, indicating a high level of consumer awareness about eco-friendly products, particularly in the beauty and food sectors.

Consumer attitudes toward eco-friendly beauty and food products were found to be influenced by factors such as environmental consciousness, new product initiatives, health concerns, beauty considerations, and the price of eco-friendly items. The study demonstrated that positive attitudes among eco-friendly consumers were reinforced by benefits like improved health, new nutritional advantages, and minimal impact on both the body and the environment. Additionally, the availability of eco-friendly packaged beauty and food products was shown to encourage consumer purchases. These findings suggest that marketers can develop more effective promotional strategies to highlight the positive environmental impacts of eco-friendly packaged products.

Keywords: *Consumer, Eco-Friendly, Environment, Packaged Product.*

AFTEFS/GCH/2024/28

Role of Politics in Biodiversity Conservation

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Biodiversity refers to all the species existing on earth that includes animals, plants and microorganisms. Impact of changing climate in the past few decades have affected the biodiversity and a declining trend has been observed on the planet when we talk about the current status of biodiversity. It has been observed in research studies that highly populated countries are facing huge pressure in protecting the declining biodiversity. India is also no exception and its biodiversity is under severe pressure due to complex interactions among change in land use, other human economic activities, and change in climate. Therefore, preservation and restoration of biodiversity is perhaps the cheapest and least risky way to mitigate the impacts of threats such as impact and change in climate, diminishing food and nutritional security, declining economy, absence of affordable healthcare, increasing incidence in zoonotic diseases. National Mission on Biodiversity and Human Well-Being was approved to transform biodiversity science by linking it to the peoples' economic prosperity. Under this Mission, research institutions, government, and non-government organizations will work together to catalogue, map, assess, monitor, and use our vast but declining natural assets sustainably. democratic legitimacy in nature conservation projects and possible trade-offs between participation and scientific rigor. We take a look at biodiversity protection in biosphere reserves and outside protected areas. A key finding is that evidence for an impact of democracy on biodiversity protection is contested. Furthermore, there is no consensus on which form of democratic legitimacy is best for nature conservation.

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AFTEFS/GCH/2024/29

Dried Ornamentals: A new aesthetic approach

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Dried ornamentals can be maintained from few months to years with lesser cost if protected from the damage of high humidity. They have not become so popular because they were looked underrated in front of living plants and flowers, less research and projects have undertaken but can be popularized through research and development. The top genera on dried flower in the global market level are *Helichrysum, Helipterum, Limonium, Nigella* etc about 60% is the contribution of dried ornamentals of the total export from India in which it includes lotus pods, camellia, dahlia, marigold etc .there are different uses of dried ornamentals such as in making floral arrangements, bouquets, gift boxes, collages, sweet smellimg pot pouries in which ornamentals like roses, lilacs, lavender, violets can be used. The drying of dried ornamentals can be done through dehydration which can be natural or through controlled environment such as in hot air oven, micro oven, vaccum chamber, solar drier, press drying, freeze drier. There are some dessicants are also available which are used to remove moisture such as silica gel, borax, saw dust, corn granules etc to maintain the shape, size and to prevent the flowers from wrinkled and shattering. Due to less moisture they are very brittle so the standard carton and boxes can be used for the packaging.

Keywords: *dried ornamentals, pot pouries, dessicants, flower arrangements.*

AFTEFS/GCH/2024/30

Effect of different nitrogen levels on seed production of potato *cv.* Kufri Khyati

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The experiment entitled "Effect of different nitrogen levels on seed production of potato *cv.* Kufri Khyati." was conducted at Research Farm of the Department of Vegetable Science, SGT University, Gurugram during winter season of 2023-24. The experiment comprising of three nitrogen level (100, 125 and 150 N kg/ha) was laid out in a random block design with three replications keeping net plot size 3.6x3.6 m. Five competitive plants were selected randomly from each experimental treatment to record data on various parameters, which were influenced significantly by different nitrogen levels. The per cent plant emergence, plant height, number of shoots per hill, number of tubers >25-50 g, >50- 75 g and >75 g grade, yield of tuber up to 25 g, >25-50 g, >50-75 g and >75 g grade, weight of foliage, yield of seed size tuber, dry matter content of foliage and tubers were statistically higher with nitrogen dose of 150 kg/ha. However, the value for number of tubers per plot up to 25 g grade and harvest index were maximum with nitrogen dose of 125 kg/ha. Effect of different nitrogen level showed remarkable variation for growth and yield for all the parameters. Kufri Khyati produced highest total tuber yield (305.75 q/ha) when tubers were applied with a dose of nitrogen level 150 kg/ha which was followed by total tuber yield of 298.06 q/ha at dose of nitrogen level 150 kg/ha.

AFTEFS/GCH/2024/31

Environment Sustainability through Plastic Waste Management

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The disposal of discarded plastic poses a serious risk to the environment, contributing to pollution and global warming. Plastic waste and climate change are two of the many sustainability challenges that have a big influence on society. Over 8.3 billion metric tonnes of plastic have been created since the 1950s, with 60% of that plastic ending up in landfills or the environment. Around 380 million tons of plastic are manufactured annually worldwide as of 2018. According to some experts, by the year 2050, there may be more plastic in the ocean by weight than fish. To address this issue, plastic must be used in the building of pavement features such pot holes, corrugations, ruts, and other features, among other things. Just 9% of the 6.3 billion metric tonnes of plastic garbage have been recycled, 12% have been burned, and the remainder have ended up in landfills, dumping sites, or the surrounding environment. A number of industries have suffered as a result of plastic garbage, including tourism, fishing, public safety, and human health. The most pertinent research on the various types of plastics produced was reviewed in this paper, along with their effects on the air, water, soil, and human health. Global facts and challenges regarding the management of plastic waste were also discussed, and a number of solutions were proposed to lessen the detrimental effects of the plastic industry. Secondary data for this study is gathered from research publications, articles, and reports on the plastic industry and infrastructure published by the FICCI. The study discovered that a more sustainable management approach can be achieved through the circular economy. We require a swift and concerted effort to implement circular economy strategies, which include stringent anti-plastic pollution laws and recycling procedures. Additionally, controlling plastic trash should make use of various waste management techniques like recycling, incineration, bioremediation, and landfills.Additionally, people's awareness ought to be increased via their participation in cutting-edge initiatives developed by their governments. It will

speed up the decrease of greenhouse gas emissions in all sectors and accomplish economic, social, and environmental goals. A number of initiatives are carried out under the UNDP Plastic Waste Management Program, including the establishment of swachhta Kendras, material recovery facilities, and the empowerment of waste pickers (safai sathis).

AFTEFS/GCH/2024/32

Exploring the Nutritional and Functional Potential: Sea Buckthorn-Based Ingredients for Innovation in the Food Industry

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The incorporation of nutritious ingredients into food products is a priority for the food industry due to the potential added value they can bring. Sea buckthorn stands out as an intriguing option, boasting high concentrations of vitamin C, carotenoids, tocopherols, and various bioactive compounds, along with a unique lipid profile present in the berry pulp, seed, and peel. Current state of application of sea buckthorn in the food industry. Notably, products such as cheese, yogurt and beverages have already experienced the benefits of sea buckthorn incorporation. Furthermore, its utilization in feed products has shown promising results, contributing to enhanced final product quality, including improved meat and egg quality in poultry and fish farming. The incorporation of sea buckthorn into food product formulations remains relatively limited for the development of food products using sea buckthorn, encouraging exploration and innovation in this underutilized area.

Keywords: *Sea buckthorn, carotenoids, bioactive compound, food product.*

AFTEFS/GCH/2024/33

Food, Agriculture and the Environment: Can we feed everyone and preserve the planet at the same time

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Achieving global sustainable development goals requires eradicating hunger and ensuring food security, yet producing food has become more difficult due to climate change sensitivity. In recent decades, there has been an increase in extreme weather events that have a severe influence on agricultural production. These occurrences include heatwaves, droughts, and heavy and persistent precipitation. Although weather fluctuations have always been a risk to agriculture, this sector is becoming even more vulnerable as a result of the fast-changing environment. These days, rising temperatures, precipitation, and carbon dioxide concentrations will not only effect crop output but also meat production, fisheries, and other essential components of our food supply. Weather and climate have an impact on agricultural productivity. By 2050, there will likely be more than 9.7 billion people on the planet, which means that there will be almost 1.9 billion more people to feed than in 2020. Still, there won't be as much land available for farming. It is a challenging mission to feed more mouths with limited land available. It is necessary to optimise climate-smart and resilient agricultural methods and technologies for sustainable productivity in order to counteract the negative consequences of climate change scenarios. In order to address the interconnected issues of food security and climate change, climate-smart agriculture takes an integrated strategy to managing landscapes, including crops, livestock, forests, and fisheries. By utilising agroforestry systems, rehabilitating degraded pastures, and integrating crop-livestock-forestry systems, we may increase food production and simultaneously adapt to climate change. The degree to which climate change will affect food production will rely on our capacity to lessen its negative effects and our degree of adaptation, which will include changes to farming methods and the development of new crop varieties that are more resilient to stressors.

Keywords: *Climate Change, Food, Sustainability, Agriculture*

AFTEFS/GCH/2024/34

Effect of salt stress on medicinal plants

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Medicinal plants are considered as high-value crops, particularly in the medicinal and pharmaceutical fields. The phytochemical constituents found in medicinal plants that possess therapeutic effects have henceforth driven continuous demand for the manufacturing of healthcare products that include these compounds as the main ingredients. High salt concentrations in the soil inhibit the growth of medicinal plants by affecting water uptake and nutrient absorption. Salt stress also lead to reduced yields of medicinal plant parts used for medicinal purposes, such as leaves, roots, or fruits. It alters the biochemical composition of medicinal plants, affecting the concentration of bioactive compounds responsible for their medicinal properties. The levels of essential oils, mucilage content, phenolic compounds, flavonoids, and alkaloids are affected. The medicinal properties of plants also altered under salt stress conditions. This results in changes in their efficacy and potency for treating various ailments. In some cases, medicinal plants respond to salt stress by producing higher levels of secondary metabolites as a defense mechanism. These metabolites may have antioxidant, antimicrobial, or other medicinal properties. Salt stress induces oxidative stress in medicinal plants, leading to cellular damage and decreased overall health. So salt stress have a multifaceted impact on medicinal plants, affecting their growth, productivity, biochemical composition, and ultimately their medicinal properties. Understanding these effects is crucial for managing medicinal plant cultivation in saline environments and for ensuring the quality and efficacy of herbal medicines derived from them.

Keywords: *Medicinal plants properties, salt stress*

AFTEFS/GCH/2024/35

Enhanced Detection of Tomato Leaf Diseases Using Customized CNN Models: Performance and Evaluation

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Tomato plants (*Solanum lycopersicum*) are vulnerable to a variety of diseases caused by fungi, bacteria, viruses, and other pathogens. These afflictions can significantly reduce crop yields and quality, presenting challenges for farmers and threatening global food security. In this study, a customized Convolutional Neural Network (CNN) model was developed for diagnosing tomato leaf diseases. This model was fine-tuned by optimizing hyperparameters such as batch size and CNN layers. It was tested against a spectrum of eleven diseases, including those caused by one bacterial strain, one pest, two viruses, and eight fungi. The model exhibited superior performance in terms of both accuracy and processing time when compared to other models. Its effectiveness was assessed using loss-accuracy graphs and a confusion matrix. Evaluation metrics applied to test images from the original dataset demonstrated an average score of 99.64% for accuracy, precision, recall, and F1 score, with datasets for bacterial spot, leaf curl virus, leaf mold, Cercospora leaf spot, mosaic virus, two-spotted mite, and verticillium wilt achieving 100% in these metrics. The execution time of the custom CNN model on the tomato leaf disease dataset averaged 1339.09 seconds for 25 epochs, 1356.91 seconds for 50 epochs, and a total of 2696 seconds for complete training across all eleven disease classes. This study underscores the potential of advanced machine learning techniques in revolutionizing plant disease diagnostics and contributing to more resilient agricultural practices.

Keywords: *Convolutional neural networks, data augmentation, leaf images, machine learning, tomato.*

AFTEFS/GCH/2024/36

Methane dynamics in upland forest ecosystems

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Methane (CH_4), the second-most important greenhouse gas after carbon dioxide (CO_2) has nearly tripled since pre-industrial times and accounts for 16 –25 % of atmospheric warming. Forests play a significant role in emissions and uptake of CH_4 where living and dead trees transport and emit CH_4 produced in soils as well as inside the trees by the activity of microorganisms and abiotic photochemical processes. Global Forests cover 31 % of the total land surface area and any sink-to-source transitions could have a major impact on global atmospheric CH_4 budgets. Therefore, it is important to understand CH_4 dynamics in forest ecosystems and CH_4 exchange between the atmosphere, trees, and soil. The soil CH_4 sinks in temperate and tropical forests contributed 84 % to the total sink of global forests. On an area basis, nearly 76 % of the total net CH_4 emissions were found in Northern Hemisphere forests, while only 24 % was associated with forests in the Southern Hemisphere. There is growing evidence that CH_4 is emitted through trees in forest ecosystems which challenges the traditional view that forests always consume atmospheric CH_4. Recent studies have delved into upland forest methane dynamics, but there is still a considerable research gap that needs further long-term study in various aspects like species-specific research, interannual CH_4 flux variability, and the impact of dynamic processes on emissions. Specific forest management practices such as conservation, soil protection, and targeted restoration could mitigate emissions and enhance CH_4 uptake in forest ecosystems.

Keywords: *Methane dynamics, Climate change, Global warming, Forest, Greenhouse gas.*

AFTEFS/GCH/2024/37

Assessing Water Use Efficiency and Productivity in Drip Irrigated Horticultural Crops

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Irrigation is essential for global agriculture, covering 270 million hectares and providing 40% of our food, with agricultural water consumption accounting for 70% of total freshwater use. With increasing competition for water resources, optimizing water use efficiency (WUE) becomes crucial, defined as the ratio of crop yield over applied water. To maximize WUE, it is necessary to minimize water losses through runoff, seepage, evaporation and transpiration by weeds, while promoting maximal crop growth through planting high-yielding crops, adapting to local conditions and optimizing growing conditions. Drip irrigation has been shown to significantly enhance crop yield, quality and water productivity while reducing water scarcity and fertilizer usage. The technology allows for precise delivery of water directly to the plant root zone, minimizing water wastage, reducing runoff and preventing evaporation. Additionally, drip irrigation systems are cost-effective, labor-saving and environmentally friendly, making them a preferred choice for both commercial and residential horticultural applications. Assessing WUE and productivity in drip-irrigated horticultural crops involves evaluating crop water requirements, irrigation scheduling strategies and water uptake patterns. Overall, drip irrigation plays a crucial role in modern agriculture by conserving water and enhancing crop productivity.

Keywords: *Drip irrigation, Horticultural Crops, Water use efficiency and Productivity.*

AFTEFS/GCH/2024/38

Identification and characterization of Pathogenic bacteria from *Heteropneustes fossilis*

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Diseases affect the overall productivity of the aquatic ecosystem that directly affects the aquatic food and health management practices. The general public refrains from eating sick and dead animals as food because there is a general possibility that they may become ill due to contaminated aquatic food. People generally avoid skin ulcers on fish as food. Some fish diseases may contain toxins that can affect humans. Therefore, diseases must be controlled to provide healthy food. Bacterial diseases are the most common diseases in fish and are often internal but can also be external. The causative bacteria are generally saprophytic and become pathogenic in fishes with poor nutritional diet, physiological imbalance and non-optimal water. A survey of fish farms focusing on the culturing of *H. fossilis* in Haryana was conducted from March 2021 to August 2021, with monthly intervals. The aim was to monitor health management practices. Across six districts of Haryana, various farmers employed distinct management strategies to mitigate diseases in *H. fossilis*. Water quality parameters were consistently recorded during these surveys to assess any correlation with *H. fossilis* diseases. Our observations indicated that inadequate water quality significantly contributes to diseases in *H. fossilis*. Diseased fish were dissected in the department of Zoology and molecular identification was done for isolated pathogenic bacteria. Fish again challenged with isolated pathogenic bacteria to confirm the diseased in fish.

Keywords: *bacteria, health management, water quality parameters.*

AFTEFS/GCH/2024/39

Management of water and soil resources

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The management of water and soil resources involves strategies and practices aimed at sustainably utilizing, conserving, and protecting the essential natural resources. It encompasses various disciplines such as hydrology, soil science, agriculture, ecology, and engineering. Effective management involves assessing water availability, soil health, and potential impacts of human activities, then implementing measures to ensure long-term sustainability, including conservation, irrigation techniques, soil erosion control, watershed management, and pollution prevention. It involves the sustainable utilization, conservation, and protection of these vital natural assets. It includes assessing their availability, quality, and health, planning strategies and actions to achieve sustainable outcomes, implementing conservation practices such as erosion control and water-efficient irrigation, developing regulations and policies to promote responsible management, educating stakeholders about the importance of conservation, monitoring progress, and adapting to changing conditions and challenges. Effective management ensures the long-term availability and health of water and soil resources for various uses, including agriculture, industry, urban development, and ecosystem health.
Keywords:- *Sustainability, hydrology, Natural assets.*

Govt. College Hisar, AFTEFS and VITAL BIOTECH Education Group
AFTEFS/GCH/2024/40

MANAGEMENT OF WATER RESOURCES IN INDIA

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Water Resources Management (WRM) is the process of planning, developing, and managing water resources, in terms of both water quantity and quality, across all water uses. The first solution for water management is to properly manage rainwater. Rainwater should be conserved in reservoirs. Dams should be built all over the country and the number of dams should be more in drought affected areas. Every drop of rainwater flowing on the land can be collected by building check dams to stop the water in the river and drains. Similarly, groundwater can be recharged by making ditches, trenches and soak pits to carry rainwater from houses, farms, villages and towns to the underground. Rainwater falling on the roofs of houses can be sent to places like tube wells, wells, step wells etc. Government efforts are also necessary for water management. Building canals by building big dams at a cost of billions and trillions of rupees is not enough. Along with these, maintaining traditional water sources is also inevitable. It would be appropriate to give priority to the reconstruction work of ponds and ponds in villages. Do water harvesting at home and be cautious in using water at home. Take steps to stop unregulated exploitation of groundwater. Indiscriminate deforestation should be stopped at all costs, so that the groundwater level can be prevented from decreasing rapidly. It has become necessary to search for alternatives to groundwater. For this, the water available in ponds, lakes and rivers should be protected from pollution and made maximum useful. This is a global crisis, hence considering it as a widespread problem in the context of the whole world, the governments of every country will have to come together and make a concrete policy, only then the future of the entire humanity will be secure.

Keywords: *Rainwater, dams, soak pits, reconstruction of ponds and Government efforts*

AFTEFS/GCH/2024/41

Applications of nanotechnology in horticulture: A new, environmentally beneficial strategy

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Nanotechnology has emerged as a promising avenue in horticulture, offering innovative solutions for various challenges in crop production, pest management, and post-harvest preservation. This study explores the applications of nanotechnology in horticulture, focusing on its potential to revolutionize traditional practices while promoting environmental sustainability. Nanoparticles, nanosensors, and nanoemulsions are among the key nanostructures utilized in horticulture for enhancing nutrient uptake, improving plant growth, and mitigating abiotic stresses such as drought and salinity. Furthermore, nanomaterials exhibit inherent antimicrobial properties, enabling the development of eco-friendly nano-based formulations for pest and disease management, reducing reliance on conventional pesticides. Nanotechnology also facilitates targeted delivery systems for controlled release of agrochemicals, minimizing environmental contamination and optimizing resource efficiency. Additionally, nano-enabled coatings and packaging materials enhance the shelf life of horticultural produce, reducing post-harvest losses and ensuring food safety. This abstract underscore the potential of nanotechnology as a transformative tool in horticulture, offering new avenues for sustainable crop production, resource management, and environmental stewardship. Continued research and innovation in this field are essential to harnessing the full benefits of nanotechnology while addressing potential risks and ensuring its responsible integration into horticultural practices.

Keywords: *Nanotechnology, Horticulture, Nanofertilizer, Microorganisms.*

AFTEFS/GCH/2024/42

Standardization of growing media and container type for improving seed germination and seedling growth in papaya (*Carica papaya* L.) cv. Red Lady

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An experiment was carried out to standardize the suitable growing media and type of the container for improving seed germination and seedling growth of papaya cv. Red Lady during 2019-20. Five different types of media and three designs of containers were used for study. This experiment was conducted in a Complete Randomized Block Design (Factorial) with fifteen treatment combinations replicated thrice. The observations were recorded on seed germination attributes and seedling growth parameters. The results showed that the plastic containers were found better followed by earthen pots, and polybags using media mixture of soil + cocopeat + vermicompost (1:1:1) for improving seed germination (94.76%). However, the maximum plant height (17.40 cm), number of leaves (12.03), stem girth (6.42 mm), leaf area (131.02 cm^2), root length (18.60 cm) and seedling survival (97.30%) was observed in the earthen pots having rooting media mixture made up of garden soil + cocopeat + vermicompost + FYM (1:1:1:1). The seed germination and plant growth parameters, root length and seedling survival was recorded in polybags.

Key words: *Papaya, Growing media, Container, Germination, Seedling growth.*

AFTEFS/GCH/2024/43

Postharvest Management and Value Addition in Strawberry

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Strawberry, a captivating fruit renowned worldwide for its unique flavor and delicacy, is a significant member of the Rosaceae family and the Fragaria genus. Grown globally, it holds a prominent position among small fruit plants. With its deep red color, attractive appearance, luscious taste, and a distinct, pleasant aroma, strawberry captivates consumers. Its economic and commercial importance is further highlighted by its consumption in various forms, including fresh and processed variations like jams and juices. Despite its allure, strawberries pose a challenge due to their highly perishable nature and nonclimacteric fruit characteristics. Techniques such as cool storage, modified atmospheric packaging, controlled atmospheric storage, diverse packaging systems, fumigation with nitric oxide, and various chemical treatments have been employed to extend the shelf life of strawberries. Beyond preservation, it also delves into the realm of value addition, shedding light on how technology and innovation can enhance the sensory experience and market value of strawberries. The economic, nutritional, and biological significance of strawberries positions them as a focal point in the evolving landscape of postharvest management and consumption trends.

Keywords: *strawberry, postharvest, packaging, storage, chemical treatment, jam, jelly.*

AFTEFS/GCH/2024/44

The Influence of Municipal Solid Waste on Soil Physicochemical Characteristics

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Municipal solid waste (MSW) dumping stations are essential to waste management systems around the world. but on the other hand, these are also responsible for disturbing soil physico-chemical properties. In this study to investigate the effects of MSW dumping stations on soil's physico-chemical properties soil samples were collected in proximity to MSW dumping stations from 0-15cm and 15-30cm depth at distance of 5m, 30m and 50m far from dumping station. Selected soil samples were analyzed for physicochemical properties such as pH, electrical conductivity, moisture content, organic carbon, organic matter and chloride. pH of selected soil samples varied from 8 to 8.85, electrical conductivity value ranged from 153 uS/cm to 5660 uS/cm, moisture content varies from 0.91% to 1.66%, organic carbon ranged from 0.372% to 0.517%, organic matter varied from 0.64% to 0.89% and chloride ranged from 23.02 mg/kg to 1774 mg/kg.

Results of this study indicated significant alterations in soil physicochemical properties. The pH value was low in the vicinity of dumping station and its value increase with increase in distance from dumping station. Electrical conductivity, organic carbon and organic matter was highest in close proximity of dumping station but decreases with increase in distance from dumping station. Moisture content was not uniform. To maintain the soil quality and minimizing environmental pollution it is imperative to encourage waste reduction, recycling and reuse.

Keywords: *Soil health, Soil Quality, Municipal solid waste, Soil physicochemical Properties.*

AFTEFS/GCH/2024/45

Soil salinity Tolerance in Vegetable Crops

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Vegetables play a crucial role in human nutrition, but the increasing salinity levels pose a significant challenge to their cultivation. Salinity, among various abiotic stresses, significantly hampers seed germination, plant growth, and overall crop productivity. With a growing human population and limited cultivable land, ensuring sufficient food production is paramount. Salinity, often exacerbated by improper irrigation, is a primary factor reducing cultivable land area. To meet the demand for food, there's a pressing need to develop salt-tolerant vegetable crops capable of thriving in saline environments. Vegetables are essential in human diets due to their nutritional value, providing vital vitamins, carbohydrates, proteins, and minerals. While there's a diverse array of vegetable crops worldwide, many are severely affected by salinity to varying degrees. Similar to other crops, vegetable crops exhibit significant variability in salinity tolerance. Salinity impacts various aspects of vegetable crop development, including morphology, physiological functions, and yield. Despite efforts to comprehend salt tolerance mechanisms in vegetables, they've received less attention compared to staple crops. Various strategies have been employed to enhance vegetable crop salt tolerance, including exogenous application of fertilizers, compatible solutes, or plant growth regulators, utilization of plant growth-promoting rhizobacteria, grafting, development of tolerant varieties, and genetic modification using advanced molecular techniques.

Keywords: - *Vegetable, Salinity, Tolerance, Abiotic Stress.*

AFTEFS/GCH/2024/46

STUDY ON EVALUATION OF SPIDER LILY GENOTYPES FOR PRODUCTIVITY AND QUALITY TRAITS

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Spider lily is one among the important hardy ornamental bulbous crops, grown for both loose flower and for landscape purpose. In landscaping spiderlily found its importance as hedge and edge plant, as a potted plant, ground cover, as specimen plant because of its spider like flower appearance and also adds fragrance in the garden. By evaluating the genotypes, can go for selection of best genotypes for aesthetic point of view. An experiment entitled 'Evaluation and Morphological characterization of Spider lily genotypes' was conducted at experimental field of College of Horticulture, Bagalkot, during 2022. The experiment was laid out in simple randomized complete block design with eight genotypes in three replications. The study resulted in morphological variation with respect to growth, flowering, yield and quality traits. The genotype UHSSS – 8 showed maximum plant height (83.33 cm), number of leaves (23.40), plant spread in North-South (70.67 cm) and East-West direction (69.13 cm) and number of flowers per spike (21.00). The genotype UHSSS – 7 took minimum number (168.33 days) of days for first spike emergence and maximum days (30.33 days) from first floret harvest to last floret harvest in a spike. UHSSS – 1 recorded highest flower bud diameter (9.36 mm) and bulb diameter (85.86 mm). The genotype UHSSS – 5 had maximum (11.50 cm) diameter of flower, UHSSS – 6 for maximum flower bud length (22.03 cm). Genotype UHSSS – 3 recorded highest shelf life (33.33 hrs), number of spikes per plant (3.67), number of flowers per plant (52.67), total number of flowers per hectare (9.74 lakhs), flower yield per plant (380.45 g/plant) and flower yield per hectare (7.02 t/ha), similarly the genotype UHSSS – 4 has showed highest individual bulb weight (780.00 g).

Key words: *Flowers per spike, Flower yield, Spider lily, UHSSS.*

AFTEFS/GCH/2024/47

Potential of Nano – Technology in Sustainable Agriculture

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Nano-technological applications in agriculture such as nano-pesticides and nano-fertilizers (smart fertilizers) are used to track products and nutrient levels without decontaminating soils or water and to protect against various insect pests and microbial diseases. Nanotechnology in agriculture can transform how we grow our crops and increase yields while minimizing environmental impact. It brings up a vast scope in agriculture to cope up with the rising demand of the food, as the world population is increasing day by day. Nutrients in farms get depleted year after year due to continuous farming system in particular farms. Though chemical fertilizers added regularly may sustain the yield, yet quality of yield gets affected nutritionally which may seriously affect human health. One of the most promising ways to address the drawbacks of conventional agricultural methods is nanotechnology. It is a sustainable way of farming which improves quality, quantity and security of foods. scientists working in NF development must aim to create procedures that would results in cost savings and carefully evaluate the risks and benefits and to resgulate its use to ensure that it is safe and sustainable. The cost of chemical fertilizers and pesticides expected to increase at alarming rate due to limited resources of fuel. To overcome these constraints, precision farming is a better option to reduce production coast and to maximize output. Though, advancement in nanotechnology, a number of state-of-the-art techniques are available for the enhancement of precision farming practices that will allow precise control at nanometer scale. The importance of nanotechnological application in farming is to offer a healthy and complete food. It also improve the efficacy, bioavailability and nutritional status of food. Agro nanotechnology is proven to be the eco-friendly method of farming, this technology decreases the toxicity of soil and increases its fertility. The products obtained from the application of nanotechnology to agricultural and food system might put farmers and manufacturers in a strong competitive position and benefit nearly everyone. Commercialization of nano-fertilizers improved nutrient uptake by

plants, reduced fertilizers amount, improve crop yields, reduce risk of over-fertilization and fertilizers runoff. Therefore, use of nanoparticles and fertilizers enhances growth, nutritional quality, affordability and sustainability of the crop.

Keywords: *Nanotechnology; Nano-fertilizers; Human Health; Sustainability*

AFTEFS/GCH/2024/48

Sustaining Nature with Commerce: How Businesses Can Help Protect the Environment

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In the face of environmental challenges that threaten the sustainability of our planet, it is increasingly crucial for businesses to consider not only their financial gains but also their environmental impact. This paper explores practical ways in which companies can operate profitably while also contributing positively to the environment. We delve into real-world examples of companies that have successfully adopted sustainable practices, highlighting their strategies such as reducing resource consumption, managing their operations and supply chains in an eco-friendly manner, and adopting recycling and reuse practices to minimize waste. We also examine the role of technological innovations and government regulations in supporting these business practices. Technology can offer new methods of production and operation that consume fewer resources and produce less waste. Meanwhile, government policies can guide and sometimes push businesses towards greener practices through incentives or regulations. However, adopting these green practices comes with its challenges. Scaling these practices to have a wider impact, ensuring economic feasibility, and securing cooperation across different stakeholders can be difficult. Despite these hurdles, the transition towards sustainable business practices opens up new opportunities. Companies that adopt these practices often find new markets, improve their brand loyalty among environmentally conscious consumers, and increase their resilience against resource scarcity and new regulations. The paper concludes by emphasizing the importance of collaboration among businesses, governments, and consumers to create a commercial landscape that supports economic growth and environmental sustainability. This collaborative effort is essential for developing effective strategies that ensure businesses can thrive economically while protecting the environment. By fostering an environment where commerce and nature coexist harmoniously, we can secure a healthier planet for future generations.

AFTEFS/GCH/2024/49

Jojoba towards Natural Resource Management

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Simmondsia chinensis commonly known as jojoba (pronounced as "ho-ho-ba") is the sole species in the family simmondsiaceae and is native to Sonoran desert of South Western USA and Northern Mexico. It is an economically important wind pollinated, evergreen, perennial dioecious shrub, reaching a height of 3-5 meters with leathery, greyish green leaves. It is a drought resistant crop which thrives well under unfavourable soil conditions due to its deep root system. Jojoba can be grown in all types of soils except heavy soils. Its pH requirement ranges from 5-8 indicating its tolerance to acidic as well as alkaline conditions. It can also tolerate extreme temperatures ranging from -5 to 54°C and hence can be grown on marginal lands that are not used for conventional agricultural crops. In India, it was introduced in 1965 at Central Arid Zone Research Institute, Jodhpur, from Israel.

The seeds of this plant contain a light-gold coloured wax ester (commonly known as jojoba oil) that makes up 50-55% of the seed weight. The oil contains only traces of saturated wax, steroids, tocopherol and has no resins and tars. During the past few years, jojoba has become the focus of attention all over the world as hunting of whales (now endangered) has been banned and jojoba oil has almost the same properties as the oil obtained from the sperm whale. The liquid wax and its derivatives have potential in a wide range of applications in cosmetics (lipsticks, face creams, skin fresheners, winter care lotions, shampoos, moisturizers, soaps), lubricants, anti-foaming agents, pharmaceutical (antibiotic production, coating of tablets, to treat skin disorders, sores, wound, burnt skin and to remove stretch marks), electrical insulators and plastic industries. It has no cholesterol or triglycerides and therefore can be used as low calorie edible oil. Indigenous Americans and Indians used jojoba seed and oil for cooking, hair care and for medicinal treatments such as poison ivy, sores, wounds, colds, cancer and kidney malfunction. It can also be used as an alternate fuel oil with fewer pollutants and exhaust is free of harmful SO_2. Owning to all above properties, jojoba oil is claimed as one of the nature's gift to human race or liquid gold from the desert. Efforts have been made for micropropagation, biochemical and genetic fidelity studies on jojoba.

AFTEFS/GCH/2024/50

A palynological assessment of natural honeys of *Apis dorsata* F. bees from Nalgonda district of Telangana state S.India.

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Melissopalynological studies deals with the identification of bee forage plants and has a significant application in apiculture. In Telangana state, beekeeping activity involving the hive bees is practically non-existing. On an ongoing melissopalynological studies of Telangana state, efforts are made to study the honeys samples of Nalgonda district, in order to identify the nectar source plants and to assess this area for any bee keeping activity. Eleven honey samples of *Apis dorsata* collected from Nalgonda district during summer April-May months of 2021 and 2022 were palynologically analysed with a view to identify the botanical origin of honey samples. For the recovery, analysis, and quantification the methodology recommended by International Commission for Bee Botany(ICBB), Louveaux et al, 1978, was followed. Six samples were unifloral/monofloral in nature and five multifloral. *Borassus flabellifer* pollen was recorded in predominant condition in the unifloral samples studied. The other noteworthy pollen types recorded include *Prosopis juliflora, Ageratum conyzoides, Tridax procumbens, Eucalyptus globulus, Psidium guajava, Lannea coromandelica, Leucaena leucoce phala, Feronia elephantum, Justicia procumbens, Sphaeranthus indicus, Bassia la tifolia, Chenopodium album, Brassica nigra, Coccinia grandis, Albizia lebbeck, Ph yllanthus sp,Phoenix sylvestris, Manilkara zapota, Alangium salvifolium, Cucumis sativus, Sapindus emarginatus, Blumea oxyodonta, Peltophorum pterocarpum Pe dalium murex,Citrus aurantaefolia Centipeda minima, Sonchus oleraceus*and *Bar lleria prionitis etc.* Altogether 40 pollen types referable to 23 families were recorded. The information from melissopalynological studies plays a very important role in the identification of the bee flora of the study area.

Keywords: *Apis dorsata* honey, Pollen analysis, Nectar source, Nalgonda district, Telangana State.

AFTEFS/GCH/2024/51

Millets Crops are Environmentally Sustainable: A Geographical Analysis

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Millets are environmentally sustainable crop which provide food security, nutritional security, good soil health and economically sustainable agriculture. This study covers millet's historical significance, climate resilience, impact on soil health, nutritional value, economic contributions and its role in promoting sustainable farming practices in Haryana state. The main objective of the paper is to improve understandings of sustainability in millets production considering geographical perspectives. Through the current analysis, we can reveal millet's importance in a viable approach which offers food security with environmental sustainability. The major valuable outcome from this paper is a framework for understanding the components of sustainability of millets production. With the promotion of millets production we can conserve not only water and soil but also we can make our agriculture climatic resilient and preservation of farmer's well-being.

Keywords: *Millets, agriculture, food security, sustainability, climate resilience, nutrition.*

AFTEFS/GCH/2024/52

Knowledge of the farm women about KVK activities

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This study was conducted in randomly selected Krishi Vigyan Kendras (KVK) representing all the divisions of Haryana state. One district from each division, i.e., Kurukshetra, Faridabad, Mahendragarh, Hisar, Rohtak, and Kaithal, was selected at random in consultation with the Directorate of Extension Education . Two blocks were selected from each district on the basis of simple random sampling. Twelve (12) villages were selected from twelve selected blocks. A fixed size of 25 women farmers was taken from each village, thus a total of 300 women respondents formed the sample of the study. The data with regards to level of knowledge revealed that majority of the respondents (66.00%) in KVK Hisar, 58.00 percent in Rohtak KVK, 62.00 percent in Kaithal KVK, 66.00 percent in Faridabad KVK, 60.00 percent in Mahedragarh KVK and 68.00 percent in Kurukshetra KVK possessed medium level of knowledge followed by high and low level of knowledge about various activities undertaken by KVKs. Some activities conducted by KVK like demonstrations, training camps and exhibitions, had great to moderate impact on the respondents and so on.

Keywords: *Training, Knowledge, technologies.*

AFTEFS/GCH/2024/53

Role of Political System and Constitution in Conservation of Natural Resources

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The political system and constitution of a country play a crucial role in the conservation of natural resources. A well-designed political system can establish and enforce laws, policies, and regulations that protect the environment and manage natural resources sustainably. A constitution that nourishes environmental protection and the right to a healthy environment can provide a strong foundation for conservation efforts.

In a democratic system, citizens can hold their elected representatives accountable for environmental decisions, and public participation in decision-making can ensure that the interests of all stakeholders are considered. A strong institutional framework, including independent regulatory bodies and judicial systems, can ensure compliance with environmental laws and policies.

On the other hand, a weak or corrupt political system can lead to environmental degradation and resource depletion. The absence of effective governance and regulation can result in overexploitation of resources, pollution, and habitat destruction.

A constitution that recognizes the rights of indigenous peoples and local communities to their lands and resources can help protect biodiversity and traditional knowledge. Additionally, a political system that prioritizes sustainable development and environmental protection can foster international cooperation and adherence to global environmental agreements.

In conclusion, the political system and constitution of a country are critical determinants of the conservation of natural resources. A strong, democratic, and accountable political system that prioritizes environmental protection, is essential for ensuring the long-term sustainability of natural resources and the health of the planet.

Keywords: *Constitution, Conservation, democracy, Environment, Bio-diversity, Protection.*

AFTEFS/GCH/2024/54

Aquaculture and its management in present context

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Aquaculture, the farming of aquatic organisms, has become increasingly vital in meeting the growing demand for seafood and addressing food security challenges in the present context. This abstract explores the significance of aquaculture and its management practices in the contemporary world. It highlights the sustainable practices and technological advancements that have revolutionized the aquaculture industry, enabling efficient production while minimizing environmental impacts. The abstract also discusses the role of regulatory frameworks and management strategies in ensuring the responsible and ethical conduct of aquaculture operations. Furthermore, it addresses emerging trends and challenges facing the aquaculture sector, such as climate change, disease management, and social responsibility, emphasizing the need for adaptive management approaches to safeguard the long-term viability of aquaculture systems. Overall, this abstract underscores the critical importance of effective management practices in sustaining the growth and development of aquaculture in the present global context.

AFTEFS/GCH/2024/55

Catalytic Reduction of Organic Pollutant p-nitrophenol using Phytofabricated Silver Nanoparticles (AgNPs)

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Nanotechnology has become the most promising and emerging field of research because of its applications in various fields such as health care, cosmetics, energy science, electronics, mechanics, space industries, biomedical sciences, drug and gene delivery etc. Nanoparticles are the basic component of nanotechnology. Green synthesis of nanoparticles is regarded as safer alternative to usual physical and chemical methods as it does not require high pressure, energy, temperature, or hazardous chemicals. Green synthesis makes it easier to regulate the shape, size, and distribution of produced nanoparticles by optimizing reaction conditions. Biosynthesis of Silver nanoparticles (AgNPs) was carried out by dissolving aqueous silver nitrate solution and aqueous extract of Fenugreek (*Trigonella foenum-graecum* L.) seeds under optimised reaction conditions. Phytofabricated AgNPs were characterised using various techniques. Additionally, the catalytic reduction of organic pollutant p-nitrophenol to p-aminophenol has also been carried out using these phytofabricated AgNPs and the reaction exhibited pseudo first order kinetics.

Keywords: *Nanotechnology, Green synthesis, Silver nanoparticles, Organic pollutant.*

AFTEFS/GCH/2024/56

WATER QUALITY AND ALGAL DIVERSITY IN RELATION TO INDICATION OF POLLUTION STATUS IN KOT DAM, SHAKAMBHARI CONSERVATION RESERVE, RAJASTHAN (INDIA)

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Present time Multiple Regression Analysis highlighted for salinity and trophic elements as the major impact factors for algal diversity in water bodies. Seasonal distribution of Algal diversity and nutrient status of water were studied in Kot Dam present in Shakambhari Conservation Reserve for a period of one year covering three seasons from March 2023 to February 2024. Maximum Algal diversity was observed in the summer season followed by monsoon and winters showing the increase in pollution status in Kot Dam due to major anthropogenic activities in summers. Higher phytoplankton populations was resembled to the changeability of existing turbidity, dissolved oxygen and better organic material. There are 65 algal species used as indicators of pH, salinity, and organic pollution. The methods of the indication of the influence of climatic changes on the diversity of algae, and also integral tables essential to classify water quality from the ecological point of view from the data obtained algal biodiversity and trophic status of these lentic water bodies were assessed using standard indices.

KEYWORDS: *algal diversity, Seasonal distribution, water quality, Pollution.*

Govt. College Hisar, AFTEFS and VITAL BIOTECH Education Group
AFTEFS/GCH/2024/57

Analysis of Growth and Yield Optimization of *Clarias magur* (Hamilton, 1822) Integrated with *Lactuca sativa* in an Aquaponics system

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Aquaponics is a sustainable farming technique that combines aquaculture (the cultivation of aquatic organisms) with hydroponics (growing plants in water). This system represents a promising approach to sustainable agriculture, offering a way to produce food efficiently in this present world overpopulation situation. Indian magur (*Clarias magur*) and Lettuce (*Lactuca sativa*) were selected for this study due to their nutritional value, market demand, and ability to thrive in aquaponic systems. The study was conducted in three different culture systems namely P1 (magur stocking rate 200 fish/m^3 in fish tank without plant integration), P2 (magur stocking rate 200 fish/m^3 & 80 pieces of lettuce in NFT aquaponics), followed by P3 (magur stocking rate 150 fish/m^3 & 80 pieces of lettuce in NFT aquaponics). In P2 and P3 a constant water circulation of 200L/h was maintained. The specific growth rate (SGR) of magur was P1 (3.25%), P2(3.69%), P3(3.72%) respectively, while survival rate was 79%, 88% and 88.5% respectively. Lettuce production from P2 and P3 was 5.72 kg/m^2 and 4.92 kg/m^2 respectively. Out of the three-culture study, the SGR of magur showed high in P3 while lettuce yield was high in P2. On the other side, both P2 and P3 aquaponics systems evidenced better productivity than P1 where a conventional tank culture study was conducted.

Keywords: *Aquaponics, Clarias magur, Lactuca sativa, growth, production.*

AFTEFS/GCH/2024/58

Effect of nutrients and biofertilizers on growth and yield of guava (*Psidium guajava* L.) cv. Hisar Safeda

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The experiment entitled "Effect of nutrients and biofertilizers on growth and yield 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 T_8 (RDF 75 % + $ZnSO_4$+$MnSO_4$ + Borax + PSB + *Azotobacter*+ FYM) .
Keywords: *Biofertiliser, guava, micronutrient ,vermicompost.*

AFTEFS/GCH/2024/59

PORTRAYAL OF MOTHER NATURE IN INDIAN WRITING IN ENGLISH

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The portrayal of Mother Nature in Indian writing in English plays a significant role in reflecting the deep reverence, spiritual connection, and cultural significance that the natural world holds in Indian traditions and beliefs. Authors draw upon indigenous wisdom, mythology, and symbolism to depict Mother Nature as a nurturing, powerful, and sacred entity that sustains all life on Earth. This paper explores the importance of the portrayal of Mother Nature in Indian writing, highlighting the themes of interconnectedness, harmony, and the intrinsic value of the environment. The portrayal of Mother Nature in Indian writing in English embodies a profound sense of respect, reverence, and interconnectedness between humans and the natural world. Through their works, Indian authors celebrate the transformative, regenerative, and nurturing qualities of Mother Nature, highlighting the sacredness and vitality of the environment. This portrayal underscores the urgent need for environmental awareness, conservation, and stewardship, urging individuals to cultivate a harmonious relationship with the Earth for the well-being and prosperity of all. Ultimately, the depiction of Mother Nature in Indian literature inspires readers to reconnect with the sacredness and beauty of the natural world, leading them to embrace a lifestyle that honours, protects, and preserves the Earth for generations to come.

Keywords: *Mother Nature, Spiritual Connection, Cultural Significance, IWE, Indian Traditions.*

AFTEFS/GCH/2024/60

A Review on Chia seeds (Salvia hispanica): health promoting properties and therapeuticapplications

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Cereals and pseudocereals are the foods that human race has sustained itself from times immemorial. They are usually consumed as bread, breakfast cereals or cereal bars in developed countries. Chia has been known for over 5,500 years. Chia seeds were one of the most important components of the diet of Mayas and Aztecs. The chemical composition and technological properties of chia give the plant a high nutritional potential. Chia (*Salvia hispanica* L.) is a pseudo cereal that has been consumed by the world population due to its protective, functional and antioxidant properties attributed to the presence of lipids, dietary fiber, phenolic compounds, proteins with good quality of amino acids, lipids, B complex vitamins and minerals like calcium, potassium, magnesium, iron, zinc and phosphorus. Chiais a good source of polyunsaturated fatty acids: *omega*-3 and *omega*-6, soluble dietary fiber. Studies have shown that chia has hypoglycemic, anti-inflammatory, antioxidant, anti-hypersensitive and cardio protective actions. Nutritional value of chia is the reason why it is used in prophylaxis of several non-infectious diseases such as obesity, hypertension, cardiovascular diseases (CVDs), diabetes and some types of cancer. These benefits result primarily of the high concentration of essential fatty acids, dietary fiber, antioxidants, flavonoids, anthocyanins, vitamins, carotenoids and minerals present in this seed. Poor lifestyle choices have led to people suffering from stress, high blood pressure, and a surge in cholesterol levels. Due to this, people are opting for the use of various functional foods that have more than one health benefit to combat such disorders. It can be eaten on its own or mixed into yoghurt, salads, fruits, pastries, and beverages. Chia seed gum can be used as an alternative in food as an emulsifier, additive and foam stabilizer and considered as superfood.

Keywords: *anthocyanins, antioxidant, carotenoids, diabetes, hypertension.*

AFTEFS/GCH/2024/61

INTEGRATED FARMING SYSTEM: A HOLISTIC APPROACH

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India is swiftly developing country mainly based on agriculture and its allied components which shares major portion of the gross domestic product (GDP) value. Most of the farmers are either on small or marginal scale in terms of cultivated areas. Although modernization in agricultural practices undoubtedly resulted in more output per hectare of cultivated land but several other aspects need to be addressed also. Intensified production system drains higher inputs, dependency on one enterprise, fluctuations in market demands and prices, climate uncertainty, vulnerability to natural calamities and generation of waste products which has negative impacts on environment are some of the major challenges encountered by modern farmers. To confront such issues, integrated farming system could be seen as practical holistic approach to be adopted by the farmers. Integrated Farming System (IFS) provide a way to efficiently use different components of agriculture and its allies (livestock, poultry, piggery, sericulture, duck rearing, apiculture, aqua culture, etc.) in synchronous and sustainable basis where output/ waste of one system could be potent input for another system. Integration of various components in friendly manner generates self-sustaining cycle of available resources with optimum production and maximum net profits. Thus, IFS vitalizes ecological intensification by minimizing anthropogenic interventions whilst enhancing nutrient recycling, soil fertility and overall environmental functioning. IFS makes pavement for stable income and better livelihood along with desirable nutritional and environmental security. For large scale validation of IFS among farmers, there should be dissemination of information regarding potential socio-economic and environmental benefits of adopting this method.

Keywords: *agricultural, environmental, economic, optimum, sustainable.*

AFTEFS/GCH/2024/62

Agronomic practices to improve forage sorghum yield

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India supports 535.8 million of livestock, which includes 35.9% cattle, 27.8% goat and 1.7% pig. Despite having a large population of animals, their inadequate nutrition results in low production in terms of milk and meat yield. Just 4.4% of India's land is used for fodder crops. There is currently a net shortage 10.95% dry fodder and 35.6% green fodder in the nation. Consequently, it becomes critical to raise fodder crop yield. In *kharif* and summer season, sorghum is one of the important fodder crops. Sorghum [*Sorghum bicolor* (L.) Moench] is also known as great millet, Indian millet, jowar or milo. It belongs to grass family (Poaceae). It is especially valued in hot and arid regions for its resistance to drought and heat. Hence, it also known as camel crop. It yields considerably higher biomass production with less use of fertilizers and irrigations. So, appropriate agronomic management strategies hold the key in bridging the gap between forage sorghum yield and potential.

Appropriate variety selection, pre-sowing seed priming and seed treatment with fungicide, fine seed bed preparation, line sowing, balanced use of fertilizers at optimum time, irrigation management, insect-pest management and harvesting at 50% flowering stage are few of the strategies which can increase the forage sorghum yield to a great extent. It is inevitable that using the right agronomic management techniques would boost the output of feed sorghum as well as its quality characteristics, especially its protein content. By providing a steady supply of green fodder throughout the summer, the severe consequences of fodder scarcity can be mitigated and ultimately, sustained milk production can be guaranteed to meet the demands of an expanding population.

Key words: *Agronomy, Dairy farming, Drip irrigation, Forages and Fodders, Fertilizers.*

AFTEFS/GCH/2024/63

Optimization of Agro-Waste Treatments for Reduction of Heavy Metal from the Effluent Using a PBD-RSM Approach

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Heavy metals, a major source of pollution in the environment, pose a substantial threat due to their non-biodegradability and ability to accumulate in living organisms, causing health problems. Research into the creation of inexpensive substitutes for widely available agricultural waste has sparked in recent years due to the need for safe and cost-effective technologies for removing heavy metals from polluted waterways. The present study focused on the low-cost treatments for the reduction of chromium Cr metal from the effluent, wherein it has been found that chemically and bacterially treated agro-waste had increased heavy metal ion adsorption capabilities. A sequential optimization of the process parameters was attempted using (PBD) Plackett-Burman design and (CCD-RSM) central composite design of response surface methodology for the maximum reduction of the chromium metal from the effluent. Total eight parameters were screened out using a 12 run PBD experiment. Out of the 12 parameters, time, HCl, NaOH and bacterial treatments were found to be significantly affecting the maximum reduction of Cr from the effluent. To investigate the interactions' effects of the chosen parameters, they were evaluated using CCD-RSM. Maximum 74% Cr reduction was achieved under the optimum treatment to RH of HCl 4.52 N, NaOH 3.53 N, bacterial 7.41& with interaction time was 14.32 min using 30 run CCD-RSM experiment. A scanning electron microscope (SEM) was used to confirm the Effects of selected factors on the agro-waste for the Cr reduction, as well as a Fourier transform infrared spectrometer (FTIR)

Keywords: *Rice husk; Chromium; Plackett–Burman design; central composite design; SEM analysis; FTIR*.

AFTEFS/GCH/2024/64

Efficacy of essential oils against bacterial isolates from *Litopenaeus vannamei* (Boone)

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This study aimed to determine the effectiveness of essential oils and antibiotics against bacteria associated with *Litopenaeus vannamei*. The study involved isolation and characterizing of bacteria from morbid or sick shrimp samples from farms around Hisar and Fatehabad. Standard biochemical and morphological testing was used to identify the bacteria. Study of bacterial isolates from *L.Vannamei*; end up with isolation of eleven bacterial species (*Staphylococcus sp., Streptococcus sp., Alcaligenes faecalis, Salmonella* sp*., Enterobacter* sp*., Psudomonas* sp*., Klebsiella pneumoniae, Yersinia enterocolitica* and *Staphylococcus aureus*). Isolated bacteria were tested for commercially available antibiotics (IC001-1PK Hi-Media) ™ and herbal extracts. Five bacteria were found multidrug resistance (MDR), *A. faecalis* was towards Clarithromycin, Ceftazidime, *Y. enterocolitica* towards Ampicillin/Cloxacillin, *Staphylococcus* sp. I_1towards Ceftazidime, Penicillin, Ampicillin/Cloxacillin, Cefuroxime, *K. pneumonia* towards Ciprofloxacin, Cefaclor and *Streptococcus* sp. towards Ceftazidime and Roxithromycin. Carrom essential oil was found most effective against most of the bacteria at different concentration, showed maximum zone of inhibition and neem leaf herbal extract was found least effective against most of the bacterial isolates. *Alcaligenes faecalis* and *Yersinia enterocolitica* were found resistant towards lemon extract. *Staphylococcus* sp*., Streptococcus* sp*., Psudomonas* sp.and *Staphylococcus aureus* was found maximum susceptible to neem essential oil. Carrom essential oil was very effective against *Pseudomonas* sp. at all three concentrations. However, lemon essential oil was found least effective against all the bacterial isolates

Key words: Essential oils, bacterial isolates, *Litopenaeus vannamei.*

AFTEFS/GCH/2024/65

Role of Political System and Constitution in Conservation of Natural Resources

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The political system and constitution of a country play a crucial role in the conservation of natural resources. A well-designed political system can establish and enforce laws, policies, and regulations that protect the environment and manage natural resources sustainably. A constitution that nourishes environmental protection and the right to a healthy environment can provide a strong foundation for conservation efforts.

In a democratic system, citizens can hold their elected representatives accountable for environmental decisions, and public participation in decision-making can ensure that the interests of all stakeholders are considered. A strong institutional framework, including independent regulatory bodies and judicial systems, can ensure compliance with environmental laws and policies.

On the other hand, a weak or corrupt political system can lead to environmental degradation and resource depletion. The absence of effective governance and regulation can result in overexploitation of resources, pollution, and habitat destruction.

A constitution that recognizes the rights of indigenous peoples and local communities to their lands and resources can help protect biodiversity and traditional knowledge. Additionally, a political system that prioritizes sustainable development and environmental protection can foster international cooperation and adherence to global environmental agreements.

In conclusion, the political system and constitution of a country are critical determinants of the conservation of natural resources. A strong, democratic, and accountable political system that prioritizes environmental protection, is essential for ensuring the long-term sustainability of natural resources and the health of the planet.

Keywords: *Constitution, Conservation, democracy, Environment, Bio-diversity, Protection.*

AFTEFS/GCH/2024/66

Status of Plant Biodiversity in India: Challenges and Conservation Efforts

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India is renowned for its rich biodiversity, with a significant portion of it comprising plant species. However, this biodiversity faces numerous challenges due to various anthropogenic activities and environmental factors. This paper aims to explore the current status of plant biodiversity in India, the challenges it encounters and the conservation efforts being undertaken to mitigate these challenges. By analyzing existing literature, policies and initiatives, this paper provides insights into the importance of preserving plant biodiversity and outlines strategies for effective conservation.

Keywords: *Plant Biodiversity, Conservation efforts, Challenges, India*.

AFTEFS/GCH/2024/67

Effect of indigenous herbs on growth parameters of common carp (*Cyprinus carpio* L.) challenged with *Aeromonas hydrophila* infection.

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The study was conducted for 90 days to evaluate the effects of neem and tulsi leaf extracts on the growth of common carp that were challenged with *Aeromonas hydrophila*. The fishes were fed with experimental diets that contained different herbal extracts, including T1 (basal diet+5% neem leaf extract), T2 (basal diet+5% tulsi leaf extract), T3 (basal diet+5% combined neem and tulsi leaf extract), and T0 (control diet). T3 demonstrated the mean length gain percentage for all treatments over 30, 60, and 90 days was 13.29%, 14.27%, and 16.01%, respectively. The control group had the lowest mean weight gain percentage of 72.87%. There were no significant differences observed in the length gain percentage between the different treatments. T3 had the lowest Feed Conversion Ratio (FCR) at all time points, with a mean FCR of 1.95 at 30 days, 2.35 at 60 days, and 2.55 at 90 days. The mean Specific Growth Rate (SGR) value for the control treatment (T0) was 0.84, while T1, T2, and T3 had slightly higher mean SGR values of 0.88, 0.87, and 0.90, respectively.

Keywords:- Herbal diets, Common carp, *Aeromonas hydrophila*, Challenge study, Growth.

AFTEFS/GCH/2024/68

Aeroponics – New Era of Farming

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Aeroponic is a concept of modern era, in which farming of crops, vegetables and plants are cultivated without soil or ample amount of water. It is practice by growing plants and vegetables in close environment, where plant is suspended in air and hydroponic solution are provided to roots in form of mist to grow and develop. Aeroponic is a subgroup of hydroponic in which plants are grown only with the help of water and nutrients required by the plants. Aeroponic is extended version of hydroponic in which use of water is reduce to minimum. Aeroponic system comes in different types of setups some are lpa, hpa, ultrasonic fogger aeroponic system which works on low and high pressure principle. One of the biggest advantage is that it requires 95% less water to grow compare to conventional method which makes it modernized farming for people. The cost setup and maintenance is the big hurdle to cross by common man. The method and apparatus, developed by Richard stoner which was later in 1997 research and study went in the space by NASA organization in ocd method, which was a success. The world with declining fresh water supplies and mega tons of soil erosion, aeroponics is emerging star for new era of farming for humans. In coming future, aeroponic will have greater meaning in agriculture and crop production.

Keywords- *Aeroponic, hydroponic, fogger, NASA.*

AFTEFS/GCH/2024/69

Comparative performance of phosphate solubilizers with varying phosphorus levels in wheat under mollisols of Uttarakhand

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A field experiment was conducted during *Rabi* season of 2021-22 at Norman E. Borlaug Crop Research Centre of G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand to evaluate the effect of phosphate solubilizers under different P levels on growth, yield attributes and yield of wheat. The soil of the experiment site was sandy loam in texture having medium organic carbon (0.77%), low available nitrogen (167.3 kg/ha), medium available phosphorus (15.6 kg/ha) and low available potassium (166.1 kg/ha). Soil reaction was neutral (pH 7.11). The experiment consisted of 12 treatments, having three P levels (0, 50 and 100% as 0, 30 and 60 kg P_2O_5/ha) and four P solubilizers (control, humic acid (HA) @ 10 kg/ha, phosphorus solubilizing bacteria (PSB) @ 10 g/kg seed and HA @ 10 kg/ha + PSB @ 10 g/kg seed) and was laid in factorial randomized block design with three replications. The wheat variety HD 2967 was sown on 12th of November in rows 22.5 cm apart with a seed rate of 100 kg/ha. 100% P led to a significant increase in plant height, tiller count, dry matter accumulation; grain, straw and biological yields compared with 50% P application and control. Significantly higher grain, straw and biological yield was found under HA + PSB application compared to sole application of HA, sole application of PSB and control. 100% P with HA + PSB led to statistically greater growth and grain yield compared to other treatments. Grain yield obtained in 50% P with HA + PSB was statistically similar with 100% P.

Keywords: Wheat, Phosphate solubilizers, Humic acid, Phosphorus solubilizing bacteria

AFTEFS/GCH/2024/70

Medicinal and aromatic plants and their utilization

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Medicinal and aromatic plants are crucial in traditional and modern healthcare systems. These plants possess a wide range of bioactive compounds that have therapeutic properties are natural sources of pharmaceutical compounds and have been used for centuries in traditional medicine practices. They are rich in secondary metabolites such as alkaloids, flavonoids, terpenoids, and phenolic compounds, which exhibit diverse biological activities. These bioactive compounds exert pharmacological effects and contribute to the plant's medicinal properties. They contain essential oils, complex mixtures of volatile compounds responsible for their characteristic aroma. Essential oils have numerous applications in perfumery, cosmetics, food, and beverage industries. The utilization of medicinal and aromatic plants is multifaceted. In traditional medicine, these plants are used to treat ailments ranging from minor illnesses to chronic diseases. They are also utilized in the production of herbal medicines, dietary supplements, and natural remedies. Furthermore, the pharmaceutical industry extensively utilizes medicinal plant extracts as a source of active ingredients for the development of novel drugs. In recent years, there has been a growing interest in the scientific exploration of medicinal and aromatic plants due to their potential therapeutic benefits. Research studies have focused on elucidating the mechanisms of action of bioactive compounds, identifying new sources of medicinal plants, and optimizing cultivation and extraction techniques. Further research and development in this field can lead to the discovery of new drugs and the improvement of existing healthcare practices.

Keywords – *Medicinal, Aromatic, Secondary metabolites and Bioactive compounds.*

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AFTEFS/GCH/2024/71

Natural Farming: An Approach towards Sustainability

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Natural farming, an age-old agricultural practice, has garnered renewed interest in recent times due to its promise of sustainability and ecological harmony. This approach advocates for the minimal intervention of external inputs and emphasizes the utilization of locally available resources to promote plant growth and protect crops. One of the cornerstone techniques in natural farming is the use of various natural concoctions, such as beejamrutha, jeevamrutha, brahmashtra, and neemashtra, which serve as natural plant growth promoters, fertilizers, and protectants. Beejamrutha involves fermenting seeds with cow dung and urine to enhance seed vigor and nutrient uptake, while jeevamrutha utilizes beneficial microorganisms to improve soil health and plant resilience. Brahmashtra and neemashtra are natural formulations derived from specific plants like neem, which act as potent biopesticides, safeguarding crops from pests and diseases without harming the environment or beneficial insects. These natural farming practices not only reduce reliance on synthetic chemicals but also contribute to the conservation of biodiversity and preservation of soil fertility. By harnessing the power of indigenous knowledge and sustainable agricultural techniques, natural farming offers a viable pathway towards long-term agricultural resilience and food security in a rapidly changing world.

Keywords: *Natural farming, sustainability, conservation, beejamrutha, jeevamrutha, brahmashtra, and neemashtra,*

AFTEFS/GCH/2024/72

Prawn Farming for Food Security in India

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Aquaculture includes the culture of water organisms such as fish prawns, shellfishes etc. Prawns or shrimps are cultured in controlled aquatic environmental condition for purpose of their maximum production. Prawn farming has started in India since 1970 and now India is the major prone food producing country of the world. Prawn production is taking place in coastal states of the India like Tamil Nadu, Andhra Pradesh, Gujarat and Kerala. Prawns like to grow in brackish water with salinity 10 to 30 ppt. Two species of prawn named *Penaceous monodon* (Tiger prawn) and *Litopenaeus vannamei* (White Leg Shrimp) are cultured popularly in India and their export has crossed 3 billion annually. Prawn farming is a profitable business for farmers due to its high demand in market, more protein content and multiple batches to harvest in a year. Prawn as a food is delicious, nutritious and a very good source of Omega-3 fatty acids and other essential nutrients. They are cooked by different ways and are ingredient of my many dishes. Though prawn farming is preferred business, but disease outbreak in it is the biggest challenge. More than one million tons of prawns were died between 2009 to 2014 due to diseases. Sustainable economic loss in prawn production occurred due to spread of White Spots Syndrome Virus, Acute Hepatopancreatic Necrosis Disease, *Enterocytozoon hepatopenaei* and White feces Syndrome diseases during 2009 to 2014. Feed used for Prawn cost higher for farmers and it mainly accounts 60% of the total expenses. Prawn farming adversely affect the environment due to pollution of water by excessive use of chemicals and antibiotics. Government of India has taken the good initiative to promote prawn farming and have established National Fisheries Development Board (NFDB) which provides technical assistance and financial help to farmers. The government has also implemented coastal Aquaculture Authority (CAA) to control the measures of prawn farming in coastal areas of India. Prawns are the good source of protein food, so can helpful to ensure food security of the country. For it, research projects should be intensified for development of disease resistant prawn with good food quality and minimum negative impact on environment ensuring sustainable and profitable prawn farming.

Keywords: Aquaculture, Prawn Farming, Sustainable, Disease, Food Security.

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AFTEFS/GCH/2024/73

Effect of nutrients and biofertilizers on growth and yield of guava (*Psidium guajava* L.) cv. Hisar Safeda

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The experiment entitled "Effect of nutrients and biofertilizers on growth and yield of guava (*Psidium guajava* L.) cv. Hisar Safeda" was carried out in a well maintained guava orchard of a progressive farmer at Aryanagar, and PG-Laboratory of Department of Horticulture 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, number of fruits, fruit weight, yield in kg /tree and yield q/ha was recorded in T_8 (RDF 75 % + $ZnSO_4$+$MnSO_4$ + Borax + PSB + *Azotobacter*+ FYM) whereas, increase in plant girth was shown in T_4 (RDF 100 % + $ZnSO_4$+$MnSO_4$ + Borax + organic mulch)

Keywords: *Biofertiliser, guava, micronutrient ,vermicompost.*

AFTEFS/GCH/2024/74

Effect of zinc oxide nanoparticle on growth of maize crop under salinity stress

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Salinity stress is a major abiotic stress that limits crop productivity worldwide. Zinc oxide nanoparticles (ZnO NPs) have emerged as promising nanomaterials to mitigate salinity stress and improve plant growth and yield. In this study, we report the green synthesis of ZnO NPs using Eucalyptus globulus leaf litter extract and their application in mitigating salinity stress in maize (Zea mays L.). NPs were characterized by using, FTIR which revealed the presence of phenols, the carboxyl and hydroxyl functional groups. XRD patterns matched the standard wurtzite ZnO structure, and FESEM imaging revealed spherical and rod shaped ZnO NPs with an average size of 83 nm. Zeta analysis showed a hydrodynamic diameter of 239 nm with a zeta potential of -40 mV, indicating high stability. Maize seeds were primed with different concentrations (20, 40 and 60 mg/L) of the green-synthesized ZnO NPs before sowing. Under salinity stress (50 and 100 mM NaCl), seed priming with 20 and 40 mg/L ZnO NPs significantly improved seed germination, water uptake, seedling growth, vigour index and hydrolytic enzymes morphological parameters for 30 day plant, chlorophyll content, protein content as compared to control. Overall, this eco-friendly approach of using green-synthesized ZnO NPs as seed primers could be a promising strategy for improving crop productivity under saline conditions.

Keywords: *nanopriming, zinc oxide. salinity, plant growth.*

AFTEFS/GCH/2024/75

Exploring the Potential and Utilization of Medicinal and Aromatic Plants (MAPs) in India: A Multifaceted Approach to Health, Economy, and Sustainability"

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India is endowed with a rich diversity of medicinal and aromatic plants (MAPs) owing to its varied climate, geography, and cultural heritage. These plants have been integral to traditional healing systems like Ayurveda, Siddha, and Unani for millennia, and continue to play a significant role in modern medicine, aromatherapy, and various industries. Certain plants have allelopathic properties, which can suppress weeds and pests naturally, reducing the reliance on chemical pesticides and herbicides. Additionally, integrating MAPs into agroforestry and mixed-cropping systems can enhance soil fertility, biodiversity, and resilience to climate change. Aromatic plants like rose, lavender, and sandalwood are highly valued for their essential oils, which are widely used in cosmetics, perfumery, and aromatherapy. Many rural communities in India depend on MAPs for their livelihoods, engaging in collection, cultivation, and processing activities. India's MAPs are an integral part of its rich biodiversity, providing habitat and sustenance for numerous species of flora and fauna. Conservation efforts aimed at protecting endangered species and habitats contribute to maintaining ecological balance and preserving genetic resources for future generations. India's diverse flora, including MAPs, attracts tourists interested in nature-based tourism, wellness retreats, and cultural experiences. The diversity of MAPs in India represents a valuable resource with multifaceted potential spanning healthcare, pharmaceuticals, agriculture, cosmetics, livelihoods, biodiversity conservation, and cultural heritage. Harnessing this potential in a sustainable and equitable manner requires concerted efforts from government, industry, academia, and local communities to promote research, innovation, and responsible stewardship of natural resources.

Keywords- *MAPs, medicine, agroforestory, cosmetics, biodiversity, conservation*

AFTEFS/GCH/2024/76

Ground water management strategy of Kaithal District of Haryana region in India

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Due to ever greater demand for water usage in modern society, the water need for watering crops is deteriorated in terms of quantity and quality. Ground water development of all five blocks of kaithal district has seen rapid growth of ground water recourses, resulting in over exploitation of recourses in the blocks in question. That the groundwater is stressed and that the groundwater level is dropping are indicators of a water shortage. Blocks situated in the northern part of the district, especially Guhla kaithal and Pundari, have a relatively high.

The District Ground water issues may be classified as follows: depletion of ground water supplies, poor quality of ground water, particularly in the deeper aquifers, and pollution of ground water with fluoride, to name a few. There has been a decrease in water levels across most of district, with the exception of kalayat, where there has been an increase in water levels owing to the low water table situation that exists in the block kalayat. Water levels in the district are declining at a pace of 0.18m/yr to 1.16 m/yr, according to a study of long-term water levels in the district, with the rate varying between 0.18 and 1.16 m/yr. From the standpoint of mobility, the ground water in certain areas of the district has low ground water quality owing to salt, which makes it difficult to use. The presence of high fluoride concentrations has been observed on an irregular basis in certain areas. The ground water in shallow aquifers is, for the most part, fresh and drinkable.

Keywords - Kaithal, Ground Water.

AFTEFS/GCH/2024/77

COMPUTATIONAL AND PHYLOGENETIC ANALYSIS OF *WITHANIA SOMNIFERA* PROTEINS

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Withania somnifera is an important medicinal plant belonging to the family *Solanaceae*. It is widely used in the traditional system of medicines like Ayurveda, Unani and Siddha as it has been known for its therapeutic benefits for more than 5000 years. It is popularly known as Ashwagandha and is favoured herbal medicine that possessanti-cancer, anti-oxidant, anti-inflammatory, anti-stress, anti-tumour, haemopoietic and anti-immunomodulatory activity. The plant is a known rich reservoir of pharmaceutically bioactive constituents known as Withanolides (a group of 300 naturally occurring C-28 steroidal lactones with an ergostane-based skeleton).To provide a scientific basis for traditional uses of *W. somnifera* the primary step is to study new biologically active genes which will lead to the discovery of new drugs.In the present work, computational and phylogenetic analysis of *W. somnifera* proteins namely,Cytochrome P450 CYPII and Cytochrome P450 CYPIII proteinswas conducted.For this, the sequenceswere retrieved from NCBI followed by physical and chemical properties prediction. The GRAVY score and aliphatic index pointed towards globular structure of proteins. Their predicted 3-D structure was prepared and validated computationally. The phylogeny study of both the protein sequences along with other sequences yielded 2 major clusters which also helps to investigate the uniqueness of the medicinal plant.

AFTEFS/GCH/2024/78

KOMBUCHA FERMENTATION BY SCOBY

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A beverage made by fermenting sweet tea using a symbiotic culture of bacteria and yeast (SCOBY). The end result is typically a sour, refreshing, non-alcoholic beverage that isn't naturally effervescent. During Kombucha fermentation, yeast cells hydrolyze sucrose to produce fructose and glucose, which are subsequently converted to ethanol. The acetic acid bacteria (AAB) oxidize the ethanol to make acetic acid, which lowers the pH and gives kombucha its sour flavor. The popularity of kombucha tea is rising because of the tea's supposed health benefits. A lot of people are drinking it. Consuming kombucha has been linked to a number of health benefits, including lowered blood pressure and cholesterol, a decreased risk of cancer spreading, and enhanced immunological, gastrointestinal, and liver functioning. At the moment, small-scale, naturally occurring fermentation processes remain the primary method of producing kombucha. Due to the growing consumer demand for this beverage, the market needs more dependable and thorough information than what is currently accessible regarding the kombucha fermentation process. The aim is to create an innovative beverage with enhanced physiochemical, sensory, and bioactive qualities and an understanding of kombucha production, microbiology, safety, and marketing.

Keywords: *Kombucha, symbiotic culture, acetic acid bacteria, fermentation, yeast.*

AFTEFS/GCH/2024/79

Heena (Lawsonia inermis) and *Babool (Acacia nilotica)* bark: Utilizing there potential for antimicrobial activity

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In the context of sustainability, natural dyes are gaining commercial importance due to their eco-friendly and biodegradable nature, offering alternatives to hazardous synthetic dyes. Biomordants and enzyme pretreatments further enhance the green and environmentally friendly aspects of natural dyeing, while the diverse sources of natural dyes provide beautiful shades on various natural fabrics, addressing concerns about environmental pollution and emphasizing the importance of ecological and environmental considerations. The development of a functional finish for cotton fabric that is antibacterial properties through the utilization of medicinal plant *heena* as a biomordant in conjunction with *babool* bark dye. Cotton fabric, widely used for its comfort and breathability, often lacks inherent antimicrobial characteristics, making it susceptible to degradation due to bacterial growth. In this study, we present a sustainable and eco-friendly approach to address these issues. *Heena*, derived from the *Lawsonia inermis* plant, is used as a biomordant to enhance the dyeing and functional properties of cotton fabric. The addition of *babool (Acacia nilotica)* bark dye, known for its antimicrobial attributes, not only imparts colour to the fabric but also endows it with natural antibacterial capabilities. Furthermore, the incorporation of *babool* bark dye imbues the fabric with inherent antibacterial properties, inhibiting the growth of microorganisms that cause odours and fabric deterioration. It is a sustainable and environmentally friendly approach to enhance the functionality of cotton fabric by utilizing medicinal and aromatic plants like *heena* and *babool* bark dye. This novel finish not only provides antibacterial properties but also contributes to the sustainability of textile processing through the use of biomordants and natural dyes. The findings of this study have promising implications for the textile industry, offering a path towards the development of functional and eco-conscious cotton textiles.

Keywords: *Heena, antibacterial, Aromatic, medicinal plant and sustainability.*

AFTEFS/GCH/2024/80

Microgreens for Enhancing Nutritional Security

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Tiny salad greens known as microgreens are cultivated for their completely developed, non-senescent cotyledons, which frequently have one or two genuine leaves still developing. Usually, they are harvested rootless. In the past two or three decades, microgreens have gained popularity as culinary ingredients to improve the texture, color, taste, aroma, and aesthetic appeal of many food dishes. More recently, they have been marketed as nutritious supplements to diets. Numerous species from the Amaranthaceae, Brassicaceae and other vegetable and plant families have been investigated for their ability to produce microgreens. A few of the more well-known species, subspecies, and variants are mustard, radish, broccoli, kale, cabbage and amaranth in the Brassicaceae family and beet, chard and amaranth in the Amaranthaceae family. Grain crops like rye, wheat and buckwheat have also been cultivated. In the 1980s and 1990s, microgreens made their debut in the California produce market as a garnish, primarily in upscale dining establishments. It's common to hear claims that microgreens are healthier than fully grown leafy greens like head lettuce. According to a study that looked at 30 different kinds of microgreens from 10 different species, microgreens are an excellent source of microelements like Fe and Zn as well as K and Ca. Since then, they have experienced a sharp rise in popularity, and they are currently served in informal dining establishments. One of the most well-known providers of micro produce in the United States is A Chef's Garden, a farm that dates back to the establishments of the 1980s. However, greenhouses of all sizes now grow microgreens all over the world. Microgreens have gained popularity since the 2000s as functional foods that promote longevity and health have grown in popularity.

Keywords: Microgreens, Food security, Nutritional security.

AFTEFS/GCH/2024/81

Unveiling the Potential of Artificial Intelligence in Natural Resource Management: Applications and Challenges

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Artificial Intelligence (AI) has become a revolutionary approach for addressing current environmental concerns in natural resource management and enhance sustainability. AI powered algorithms are deployed to analyse the satellite images for biomass mapping, forecast emissions, and detect environmental threats such as wildfires. This paper explores the applications, challenges, and future directions of AI in the domain of natural resource management. AI algorithms are used efficiently for optimizing agricultural practices, conserve water and mineral resources, monitor wildlife, and mitigate climate change impacts. AI approaches like machine learning, neural networks and data mining are transforming resource allocation, conservation initiatives, and sustainable development practices. Despite the fact that AI has extremely high potential, the implementation of artificial intelligence in natural resource management faces several challenges such as the quality of the data, the interpretability of the model, and ethical considerations etc. Through reviewing the applications of AI in water and mineral resource management, forestry, agriculture and biodiversity conservation, this paper highlights prospects for innovation and discusses strategies to overcome existing challenges.

Keywords: *Artificial Intelligence, Natural Resource Management, Machine Learning, Deep Learning, Data Mining, Sustainability etc.*

AFTEFS/GCH/2024/82

Applications of nanotechnology in horticulture: A new, environmentally beneficial strategy

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Nanotechnology has emerged as a promising avenue in horticulture, offering innovative solutions for various challenges in crop production, pest management, and post-harvest preservation. This study explores the applications of nanotechnology in horticulture, focusing on its potential to revolutionize traditional practices while promoting environmental sustainability. Nanoparticles, nanosensors, and nanoemulsions are among the key nanostructures utilized in horticulture for enhancing nutrient uptake, improving plant growth, and mitigating abiotic stresses such as drought and salinity. Furthermore, nanomaterials exhibit inherent antimicrobial properties, enabling the development of eco-friendly nano-based formulations for pest and disease management, reducing reliance on conventional pesticides. Nanotechnology also facilitates targeted delivery systems for controlled release of agrochemicals, minimizing environmental contamination and optimizing resource efficiency. Additionally, nano-enabled coatings and packaging materials enhance the shelf life of horticultural produce, reducing post-harvest losses and ensuring food safety. This abstract underscore the potential of nanotechnology as a transformative tool in horticulture, offering new avenues for sustainable crop production, resource management, and environmental stewardship. Continued research and innovation in this field are essential to harnessing the full benefits of nanotechnology while addressing potential risks and ensuring its responsible integration into horticultural practices.

Keywords: Nanotechnology, Horticulture, Nanofertilizer, Microorganisms

AFTEFS/GCH/2024/83

Microbes and their sustainable use for human welfare

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Microbes play a vital role in human life and have immense potential for promoting human welfare and their impact on various aspects of human well-being, including agriculture, medicine, environmental remediation, and industrial processes, agriculture, microbes Improve soil fertility, enhance nutrient availability, and combat plant diseases. Such as nitrogen-fixing bacteria and mycorrhizal fungi, contribute to increased productivity and reduce the need for chemical fertilizers, biopesticides, and biocontrol agents providing environmentally friendly for pest and disease management. Microbes have revolutionized medicine through the discovery and development of antibiotics, and probiotics, comprising beneficial bacteria and yeasts, health and boost immunity, including gastrointestinal disorders. Furthermore, microbes exhibit remarkable potential in environmental remediation. Microorganisms degrade toxic pollutants, such as hydrocarbons and heavy metals, thereby aiding in the cleanup of contaminated sites. Microbial-based technologies, such as bioremediation and biofiltration, offer cost-effective and sustainable approaches for restoring polluted environments. In industrial processes, microbes serve as versatile biocatalysts for the production of biofuels, bioplastics, and various biochemicals, and fermentation processes enable the conversion of renewable resources. Additionally, enzymes derived industries, ranging from food and textiles to pharmaceuticals and detergents. The sustainable utilization of microbes for human welfare requires of ecological balance, biodiversity preservation, and ethical practices. Strategies such as microbial strain improvement, genetic engineering, and synthetic biology hold promise for enhancing microbial capabilities and expanding their potential applications while addressing safety concerns and regulatory frameworks. Continued research, innovation, and responsible practices are crucial to unlocking the full potential of microbes for the benefit of humanity.

Keywords – *Microbes, Nitrogen-fixing, Microorganisms, Genetic Engineering*

AFTEFS/GCH/2024/84

Understanding the phytotoxic effects of gliotoxin on *Sesamum indicum*

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The study conducted on the phytotoxicity effect of gliotoxin on sesame plants through both *in vitro* and *in vivo* results revealed the absence of adverse impacts on plants. Gliotoxin-treated sesame seeds exhibited no detrimental effects on various growth parameters including germination rate, shoot and root growth, as well as vigor index. These findings imply that the application of gliotoxin did not induce phytotoxicity in sesame plants. The absence of phytotoxicity is significant as it suggests that gliotoxin, under the conditions tested, does not hinder the normal physiological processes crucial for seed germination and subsequent plant growth. This could have practical implications for agricultural practices, as sesame is an economically important crop cultivated for its seeds, which are rich in oil and have various culinary and industrial uses. Furthermore, these results open avenues for potential applications of gliotoxin in agriculture. If gliotoxin does not pose a risk to sesame plants and can be effectively control the target pests or pathogens, it could be further considered for integrated pest management strategies, offering a potentially environmentally friendly alternative to traditional pesticides. However, further research is necessary to comprehensively assess the safety and efficacy of gliotoxin in agricultural contexts, including its long-term effects on soil health, non-target organisms and potential accumulation in the food chain. Nevertheless, the current study provides valuable insights into the initial effects of gliotoxin on sesame plants, laying a foundation for future investigations in this area.

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AFTEFS/GCH/2024/85

Evapotranspiration, Its Different Method for Calculation and Importance in Agriculture

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Evapotranspiration is the integrated process of evaporation and transpiration and is affected by meteorological variables, crop characteristics, and management practices, as well as environmental characteristics. There have been many studies into the estimation of ET_o around the world. Although there are some advancements in each study, one or more limitation also leads to decreasing reliability of the models those were introduced by researchers as the best for the estimating the ET_o. It is essential to assess the key components of the hydrological cycle and also to manage water resources efficiently at the basin scale (Ngongondo *et al.* (2012). Thus, it is crucial to have an accurate estimation of reference evapotranspiration (ET_o) over the Cauvery basin, which is one of the important river basins of peninsular India. ET_o is a climatic factor, estimated from climatic variables such as air temperature (Ta), solar radiation (Rs), relative humidity and wind speed. Owing to the difficulty in direct measurement of ET_o, indirect methods have been proposed, classified on the basis of their requirements of climatic variables, such as combination-type, radiation-type, temperature- type and mass-transfer-type methods. The Penman-Monteith (PM) method of the Food and Agriculture Organization (FAO) is a combination method, and has a record of deriving accurate ET_o in most climatic regions, since it considers all the above-mentioned climatic variables (Blaney and Criddle 1962, Hargreaves and Samani 1985, De Bruin 1987). The reliable estimation of ET_o is essential to estimate the net irrigation requirement, regional water resources planning, and management and to model the climate change effect. The direct approach to quantify ET_o is using lysimeter measurement, or it could be indirectly calculated using the energy balance approach (or empirical models). However, the lysimetric approach is time-consuming and requires precise instrumentation. The indirect approach (methods) is based on site specific meteorological data, altitude, and latitude. The FAO56PM method is the most suitable indirect approach for accurate estimation of ET_o and evaluation of other empirical models.

Keywords: Potential Evapotranspiration, Penman-Monteit, Air Temperature

AFTEFS/GCH/2024/86

Role of Hindi literature in nature conservation

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In Hindi literature, love for nature and environment and its conservation has been talked about since ancient times. Hindi literature with its depth and diversity is helpful in making us understand the importance of nature and environment. Environment is not only an integral part of our lifestyle, but it has also been an important source of inspiration in Hindi literature. In ancient Hindi literature, nature and its elements were seen as God or Supreme Soul. It is well known that an unhealthy environment is fatal not only for humanity but for all living beings on earth. Messages of love and conservation of nature in Hindi literature have been expressed from time to time. are given on. It is very clear that whenever there is a calamity on nature or any such reason arises due to which nature gets shaken or creates fear, then also it gives some points of writing to the poet or writer. Environment is a very sensitive point. It is present in human life just like sorrow and happiness. All our religious texts like Vedas, scriptures, Puranas etc. are completely related to natural beauty and environment. The poet is in favor of clean environment in nature. Because if the environment is clean then the society will be healthy. And if the society is healthy then a good literature can be imagined. Development has given rise to environmental problems like change in the quality of environment, whose immediate effect is visible in the form of decline in the quality of human life. Therefore, for balanced and coordinated development and environmental conservation, it is necessary that scientific analysis of the areas of environmental degradation be done. It is the urgent need of the present world that environment friendly ecological development should be done. So that environmental conservation can be done, along with that the rapidly increasing population can also be sustained. Population control, sustainable development and ecological conservation are the needs and parts of the present world and are also essential for the future of humans.

"Man is from nature, nature is not from man".

Keywords- environmental, sensitive, natural, quality, balanced, instantaneous.

AFTEFS/GCH/2024/87

DOMESTICATING NATIVE WILD FRUITS FOR DIVERSIFICATION IN MAHARASHTRA'S MELGHAT REGION

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Wild edible plants (WEPs) are the species that are neither cultivated nor domesticated but growing wild and are however edible (Beluhan and Ranogajec, 2010). Different wild edible plants have played a significant role in all geographical regions of the world throughout human history. Poor communities throughout the world are dependent on these wild plants for their food, nutrition and subsistence needs and improving rural livelihoods as well. The data available on their identification, composition or nutritional properties, use and management or user's preferences is scanty or less documented.

Maharashtra is one of the rich states in terms of floristic and ethnic diversity in India. Vartak and Gadgil (1980) reported 120 wild food plants from Maharashtra and Goa out of which the six wild edible plants from Maharashtra i.e. *Diospyros peregrina, Grewewia tillifolia, Optunia elatior, Capparis zeylanica, Flacourtia indica, Elaeagnus conferta* found potential for commercial exploitation. These wild edible plants are rich in nutrients, vitamins and fibers.

These plants may become the supplementary source of food for common people if brought under cultivation. Such edible plants and wild relatives of the established crop plants are reservoirs of important desirable genes for resistance against fungal, bacterial and especially viral pathogens. They also harbor resistant genes for adverse climatic conditions such as drought, frost, water lodging, etc.

Domestication of wild relative plants can broaden genetic diversity which will help to fight against pests, diseases and climate change. Wild edible plants are hardy and can grow in adverse conditions with minimum inputs. Need to aware farmers consumers about the importance and potentiality of wild edible plants.

Keywords: Wild plants, edible plants, diversity, rural, nutrition.

AFTEFS/GCH/2024/88

Unveiling the Impact of Microbes in Human Welfare and Environment Protection

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Microbes or microorganisms (e.g. bacteria, viruses, protozoa, fungi etc.) make up a large portion (1 trillion species or 60%) of the Earth's living stuff as they are abundant and diversified in nature. Microbes are harmful as well as beneficial. In daily life, humans benefit greatly from the use of several bacteria and products derived from microorganisms. Despite being essential to human wellbeing and ecosystems, their contributions are frequently overlooked or underappreciated. The present article aims to highlight and discuss the role of microorganisms in environment protection and human welfare. Microbes are essential to many aspects of life, including ecology, medicine, food production, biofuel or energy production, drug research, nitrogen and carbon fixation, biocontrol agents, biofertilizers, soil formation etc. Microbes have the potential to be magic bullets in the biodegradation and bioremediation of polluted areas. They are used to treat sewage water (by creating activated sludge) which aids in recycling of water in the environment. Plant waste is degraded by methanogens to produce methane, or biogas. Microorganisms and nanotechnology are collectively used to clean-up radioactive waste by using nano-bioremediation process. Further, genetically modified organisms can be used to combat pollution in extremely contaminated conditions. So, it is possible to efficiently revive the environment by utilizing the special properties of microbes. Therefore, prioritizing study on microbes can enhance human growth and well-being, as they have the ability to both ensure the proper functioning of Earth's ecosystem and promote human welfare.

Keywords: *Ecosystem, Environment protection, Human welfare, Microbes*

AFTEFS/GCH/2024/89

Accessing light and moisture reduction under casuarina (*Casuarina junghuhniana*) based agroforestry system and its impact on performance of wheat crop

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The study, entitled "Accessing light and moisture reduction under casuarina (*Casuarina junghuhniana*) based agroforestry system and its impact on performance of wheat crop," was conducted at the Department of Forestry, CCS Haryana Agricultural University, Hisar, during the Rabi season of 2022–23 under 2 year old already established *Casuarina junghuhniana* tree plantations planted at 5×3 m spacing. Four wheat varieties (WH 1270, WH 1184, WH 1142 and WH 1124) were grown in three replications. During the study period, the average light reduction was 56.8% under casuarina plantations compared to control. During the study period, the highest moisture reduction (42.9%) was observed at a soil depth of 0–15 cm and 1.0m away from the tree line before the fifth irrigation and the minimum reduction (16.3%) was found at a soil depth of 30-45 cm and 2.5 m away from the tree line after 7 days of the first irrigation. The wheat variety WH 1142 seemed to be shade sensitive under casuarina based agroforestry system, as its biological yield was reduced by 33.6% and the number of effective tillers was reduced by 20.6%, while the WH 1184 variety showed the maximum spike length reduction (10.3%) among all wheat varieties. Although light and moisture reduction bring complications, this study opens the way for the development of resilient casuarina based agroforestry models, which will help to diversify and sustain the agricultural landscape.

Keywords: Agroforestry, Casuarina and Moisture reduction

AFTEFS/GCH/2024/90

INTEGRATED FARMING SYSTEMS CAN INCREASE FARMER'S REVENUE BY TWOFOLD

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Integrated farming methods can significantly increase farmer revenue. Farmers can enhance land use efficiency and reduce input costs by diversifying their agricultural activities and including multiple components such as crops, livestock, aquaculture, and agro forestry. It spreads the risks associated with farming and provides a consistent income throughout the year. Integrated systems maximize resource efficiency by recycling nutrients and reducing waste. This eliminates the demand for external inputs like chemical fertilizers and feed, which lowers production costs. For example, animal manure can be utilized as organic fertilizer for crops, while agricultural wastes can be fed to cattle. Livestock dung adds organic matter and nutrients to the soil, improving crop growth and output. Furthermore, integrated systems frequently have synergistic effects, in which outputs from one component act as inputs for another, resulting in greater production and profitability. Integrated farming approaches enhance environmental sustainability by lowering the use of synthetic inputs, avoiding soil erosion, saving water, and preserving biodiversity. Many governments offer support and incentives to farmers that embrace integrated farming systems. Overall, installing an integrated farming system has the potential to greatly increase farmers' revenues, often tripling them. Integrated farming systems offer the potential to increase farmers' revenue while also increasing resilience, sustainability, and food security in agricultural landscapes.

Keywords: Sustainable, efficiency, integrated, twofold

AFTEFS/GCH/2024/91

Survey for incidence and intensity of gummosis and root rot of Nagpur mandarin

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Rapid roving field survey was conducted in the month of October, 2016 to know the incidence and intensity of Nagpur mandarin gummosis in Warund and Morshi tahsils of Amravati district (MS). The peak period of disease progress for incidence and intensity of gummosis was recorded in month of October to November. The disease incidence and intensity of Nagpur mandarin gummosis was in the range from 25.00 to 50.00% and 6.94 to 29.16%, respectively in all the location surveyed. The incidence and intensity of Nagpur mandarin gummosis was maximum in Nimbhi (50.00%) and Bhaipur (29.16%) of Morshi tahsil whereas minimum incidence and intensity of gummosis was recorded in Lehgaon which was (25.00%) and Lakhara (6.94%), Similarly to rapid roving field survey was conducted in the month of September 2016 to know the incidence and intensity of Nagpur mandarin root rot diseases in Warud and Morshi tahsils of Amaravati district (MS).. The peak period of disease progress for incidence and intensity of root rot was recorded in month of August to November. The disease incidence and intensity of Nagpur mandarin root rot was in the range from 29.00 to 50.00% and 7.40 to 17.51%, respectively in all the location surveyed. The Nagpur mandarin root rot incidence and intensity was maximum in Nagziri (50.00%) and Jamgaon (17.51%) of Morshi tahsil whereas minimum disease incidence and intensity was recorded in Yawali which was (29.00%) and Khadka (7.40%).

Keywords: Survey, disease incidence, Disease intensity, gummosis, root rot, Nagpur mandarin.

AFTEFS/GCH/2024/92

Targeted Weed Control: How Precision AI Drones Are Changing Agriculture

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Weed management in agriculture is crucial for maintaining crop productivity. Interspecific competition between crops and weeds results in significant yield losses globally. Integrated Weed Management (IWM) strategies, aided by advancements in technology such as Unmanned Aerial Vehicles (UAVs) and Convolutional Neural Networks (CNNs), have shown promise in addressing this challenge. Unmanned Aerial Vehicles (UAVs) offer a versatile platform for precision agriculture, enabling farmers to monitor and control weeds more efficiently and effectively than traditional methods. UAVs equipped with cameras and sensors can efficiently identify weed patches, enabling targeted herbicide application and reducing selection pressure against herbicide-resistant weeds. Recent advancements in drone technology have opened up new possibilities for weed management in farmland. Drones equipped with lightweight Vision Transformers have been proposed for high-resolution weed mapping, providing more accurate data for targeted interventions. The ability of drones to collect high-resolution data rapidly and consistently make them ideal for monitoring weed infestations across large agricultural areas. This review discusses the impact of UAV technology and CNNs in weed control, emphasizing the need for specific application techniques to optimize efficiency. Studies have demonstrated the effectiveness of using low-cost drones for remote sensing to assess weed populations and improve weed management practices. Overall, leveraging drone technology in weed management offers a sustainable approach to mitigating the adverse effects of weeds on agricultural productivity while facilitating informed decision-making for farmers.

Keywords – Integrated weed Management (IWM), Weed management, Drones, Precision agriculture, UAV technology, Crop productivity, Sustainable agriculture.

AFTEFS/GCH/2024/93

The importance of the medicinal herb aloe vera and its role in aquaculture

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This abstract aims to address the aloe vera plant, its valuable and extremely essential medical capabilities, and the latest research on using aloe vera products as supplemental feed to improve aquaculture productivity. Aloe vera comes in around 420 different varieties, most of which are utilized for therapeutic purposes worldwide, particularly in India, China, Japan, West Indies etc. and *Aloe barbadensis* is one of the most efficient types. Since ancient times, it has been utilized as a medicinal herb. Humans can get a lot of animal protein and vitamins from aquaculture products, however, overuse of chemicals and antibiotics in aquaculture can cause resistance in pathogenic bacteria, immunosuppression, pollution, and accumulation of harmful chemical residues in water bodies and cultured animals. Aloe vera plant is made up of 70-80% gel-containing polysaccharides and 75 potentially active compounds, which are anthraquinones such as aloe-emodin, aloin, and barbaloin. These substances are significant to the immune system of fish because they alleviate stress, stimulate hunger, promote growth, modulate the immune system, lessen toxicity, and improve fish reproductive health. In aquaculture, it is strongly advised to employ medical plants and their products rather than chemicals and antibiotics. Aloe vera extract is especially recommended because it is widely accessible, extremely affordable, and has a variety of therapeutic benefits.

Keywords: Aloe vera, medicinal plant, aquaculture, immunostimulatory

AFTEFS/GCH/2024/94

Use of Neemastra for managing insect pests in Natural farming

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In natural farming, insect-pests on plants are managed by the farmers with natural products prepared easily by them from local resources at almost negligible cost. Neemastra is a natural pesticide derived from neem extracts, cow urine and cow dung. Neem leaves boast remarkable pesticidal properties due to their neem extract content, making them a potent organic pesticide effective against a broad spectrum of pests such as sucking pests, rice weevils, and caterpillars. Cow urine and cow dung is believed to possess natural pesticidal properties and is commonly used in traditional agricultural practices. Additionally, this pesticide enhances soil fertility. Neemastra presents a promising eco-friendly alternative to synthetic pesticides, potentially offering sustainable pest control. However, it's crucial to evaluate its efficacy, environmental impact, and resistance management. Integrating neemastra into an overall integrated pest management strategy can optimize its benefits while mitigating any potential drawbacks. By incorporating naturally derived and environmentally friendly formulations, crops can be safeguarded from insect pests and diseases while also addressing the harmful effects of conventional pesticides.

Keywords: Neemastra, sucking pests, IPM, neem leaves, Cow urine

AFTEFS/GCH/2024/95

Optimizing Fodder Maize Production: Evaluating Vermicompost Influence

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His study investigates the effect of vermicompost on the growth and yield of fodder maize (Zea mays) and aims to determine the suitable dose for optimal results. Fodder maize holds significant importance as a feed source for livestock, particularly in agricultural communities. Vermicompost, a nutrient-rich organic fertilizer produced through the decomposition of organic matter by earthworms, has gained attention for its potential to enhance soil fertility and crop productivity in a sustainable manner.The research employs a randomized complete block design (RCBD) with multiple treatment groups receiving varying doses of vermicompost.Preliminary findings suggest that vermicompost application positively influences the growth and yield of fodder maize.It is evident from the results that vermicompost on growth and yield of fodder maize for 30 days shows Plant height was maximum (13.77) in treatment T3 while it was minimum (12.97) T4; No of leaf per plant was maximum in T4 (5.40) while minimum in T3 (5); Stem girth was maximum in T4 (3.63) and minimum in T2 (3.60) and Plant height was maximum (37.03) in treatment T4 while it was minimum (33.07) T2; No of leaf per plant was maximum in T3 (13.77) while minimum in T4 (12.97); Stem girth was maximum in T3 (7.37) and minimum in T2 (7.20). Increased plant height, larger leaf area, and higher biomass accumulation are observed in plots treated with vermicompost compared to control groups. Furthermore, analysis of yield components such as ear length, number of grains per ear, and grain weight indicates a significant improvement in maize yield with vermicompost supplementation. Overall, this study contributes to the understanding of vermicompost as an effective organic fertilizer for enhancing fodder maize production. The findings have implications for sustainable agriculture practices aimed at improving soil health, increasing crop yields, and ensuring food security, particularly in resource-constrained agricultural systems.

Keywords: vermicompost, fodder maize, organic fertilizer, growth, yield, dose-response relationship, sustainable agriculture.

AFTEFS/GCH/2024/96

Water Management in Horticulture Crops through Micro irrigation

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The demand for land and water in India is continuously escalating due to increased population. Water management to increased production is very essential and crucial for the development. Several Research studies conducted in India by various institutions have indicated that by even by saving 40–80% water yield can be increased up to 100% in different crops by using micro-irrigation. It has also been proved that micro irrigation is technically feasible and socially acceptable not only for large farms but also in small and marginal farms. Drip irrigation can be adopted in large areas for proper utilization of water especially for wide spaced high value crops. Sprinkler irrigation is an advanced irrigation technique for water saving and fertigation and in accurately controlling irrigation time and water amount. *Ayars* et al. 1999 evaluated the use of subsurface drip irrigation (SDI) for both perennial and annual crops. Research was conducted for 15 years on tomato, brinjal, sweet corn, and cantaloupe for both plot and field applications. Use of surface irrigation resulted in less percolation and increased use of it was found that micro irrigation have more uniformity when compared to traditional irrigation methods. The drip irrigation system reduced the water consumption to 50%. *Phene* et al, 1987 demonstrated that significant increase in yield of tomatoes was recorded with micro irrigation techniques. The micro irrigation system has major advantages as watering high efficiency, use less water pressure, high yield, saving water.

AFTEFS/GCH/2024/97

WATER MANAGEMENT STRATEGIES IN INTEGRATED FARMING SYSTEM

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Water management is a critical aspect of sustainable agriculture, particularly in the context of integrated farming systems. This paper explores various water management strategies that can enhance the efficiency and sustainability of water use in integrated farming. The study reviews the principles and practices of water management, focusing on rainwater harvesting, drip irrigation, mulching, and the use of efficient water-saving technologies.

Integrated farming systems are characterized by the integration of crops, livestock, and aquaculture, which can lead to increased water demand. However, integrated farming also offers opportunities for synergistic water management practices. For example, the use of livestock manure as organic fertilizer can improve soil structure and water retention, reducing the need for irrigation. Similarly, agroforestry practices can help to maintain soil moisture and reduce evaporation, contributing to water conservation.

Rainwater harvesting is a key water management strategy in integrated farming, particularly in regions with limited access to freshwater sources. By capturing and storing rainwater, farmers can reduce their dependence on irrigation and groundwater resources. Drip irrigation is another effective water-saving technique that delivers water directly to the roots of plants, minimizing evaporation and runoff. Mulching, or covering the soil with organic materials, can also help to retain soil moisture and suppress weed growth, reducing the need for irrigation.

The use of efficient water-saving technologies, such as soil moisture sensors and precision irrigation systems, can further enhance water management in integrated farming systems. These technologies allow farmers to monitor soil moisture levels and apply water only when necessary, reducing water wastage and improving crop yields.

Keywords: Water management, integrated farming systems, sustainable agriculture, rainwater harvesting, drip irrigation, mulching, water-saving technologies.

AFTEFS/GCH/2024/98

A Study on Medicinal and Aromatic Plants and Their Utilization

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Medicinal and aromatic plants (MAPs) have played an essential role in human culture for countless years, providing us with a wide range of traditional medicines, tastes, aromas, and medicinal substances. This research explores the wide range of MAPs and their many uses, including in the pharmaceutical, cosmetic, food, and agricultural industries, among others.A survey of the wide variety of MAPs found in plants is presented at the outset of the study, with an emphasis on the specific biochemical profiles and medicinal uses of each. The pharmacological actions of these plants are attributed to their phytochemical components, which include phenolic compounds, alkaloids, flavonoids, and terpenoids. Also included are indigenous ways of knowing and doing things related to MAPs production, harvesting, and processing as they pertain to various cultures and areas. It delves into the economic and social impact of MAPs, especially in rural areas where they provide revenue and sustain people's lives.In addition, the use of MAPs in contemporary businesses is examined, particularly in relation to their integration into herbal supplements, aromatherapy products, natural cosmetics, and pharmaceutical formulations. The research assesses the scientific data that MAP-derived chemicals are safe and effective in treating a variety of diseases and improving health. In addition, the role of MAPs in sustainable agriculture and environmental conservation is examined, considering their potential in crop protection, soil fertility enhancement, and biodiversity conservation. The study underscores the importance of adopting agroecological practices and promoting the cultivation of MAPs for ecological resilience and socio-economic development.

Keywords: Medicinal and aromatic plants (MAPs),Traditional medicine, Phytochemical constituents, Pharmacological actions, Indigenous knowledge,Socio-economic impact.

AFTEFS/GCH/2024/99

A Comprehensive Study on Antioxidant Activity and Antimicrobial Analysis of Broccoli (*Brassica oleracea)* Juice

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In the present investigation the study on broccoli juice was carried out. firstly the sample held for preliminary inspection with respect to acidity (1.06%), pH (6.2),Total phenolic content (270mg/100g), Total caretenoid content (40mg/100g), Total ascorbic acid content (145mg/100g). The antioxidant activity of the compound Sulforaphane was determined by the use of DPPH. The antioxidant activity of Sulforaphane was found to be 83 mol /g FW. Finally the sample evaluated for Antimould and antibacterial analysis of different PPM solutions broccoli juice. Results obtained for the antimould analysis of Sulforaphane show that the 10 PPM concentration of Sulforaphane was found to have the best antimould activity as there was no any mould growth observed in the media containing 10 PPM sample till 10th day of observation. The 10 PPM solution prepared from the extracted compound was found to be the most suitable for the purpose of prevention of mould growth in the products prone to get spoiled by moulds.

Key words: Broccoli, Brassica oleracea, Antioxidant Activity, Antimicrobial Analysis Antimould Analysis, Antibacterial Analysis

AFTEFS/GCH/2024/100

Regulatory Mechanism of Transport of Sugars to Developing Plant Embryos

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Sucrose, the major product of photosytnthesis in higher plant is transported from source to various sink tissues via phloem for plant growth and development. Sugar loading of developing seed comprises of transport event that contribute to reproductive success and seed yield. A lot of progress has been made in identifying and characterizing genes and proteins involved in the transport of photosynthetically produced sugars from leaves to sink. A major step forward is the identification and characterization of genes encoding proton sucrose co-transporters of the SUT family. Strong evidence suggests that SUTs are responsible for the import of sucrose present in the cell wall space of leaves into the phloem Using pea as a model system, showed that pea SUT sucrose transporters are probably crucial players for the uptake of sugars into developing seeds. Enhanced uptake of sugars by filial tissues leads to a decrease in osmolality of the seed apoplasmic sap resulting in an increase in the turgor of seed coat cells. When the turgor of the seed coat exceeds a 'set point', a regulatory system activates the efflux transporters in the seed coat in order to meet the demand of the embryo. Under conditions of sustained nutrient demand, the turgor set point decreases to enable higher rates of phloem import.

Keywords: *sucrose, embryo, sucrose transporter, phloem*

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OVERVIEW OF BIOMEDICAL WASTE MANAGEMENT AND RISK PATHOGENS ASSOCIATED WITH IT

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Biomedical waste is the waste generated by healthcare activities such as diagnosis, treatment or immunization of animals or human beings or through research activities that include a wide range of materials from used syringes and needles to diagnostic samples, medical devices, pharmaceuticals, chemicals, blood, body parts, solid dressings, and radioactive materials. Biomedical waste is a potent hazard to human and animal health, so its efficient management becomes necessary. Examination of various guidelines and efficient measures to deal with the biomedical waste particularly with biomedical waste management and risk pathogens associated with it. Classification of biomedical waste along with the guidelines both old and new and some significant differences between them need to be understood. Covering all rules and guidelines for biomedical waste management minimizing the risk from pathogens, categories of biomedical waste, basic outline of steps in management hazardous waste. Emphasis given on biosafety levels hazard control and separate management of hazardous pathogens according to four different biosafety level laboratories. Different techniques and processes involved in biomedical waste management along with their demerits and possible alternative measures to avoid risk to environment and animal health. Standards of procedure of the biomedical waste management especially in microbiological and pathological laboratories was the major concern recently during COVID-19 pandemic. Overview of various basic aspects of management and risk associated with improper handling of biomedical waste. It was estimated that more than 5.2 million people, including 4 million children, die as a result of diseases caused by medical waste throughout the world.

Keywords: *Biomedical waste, biosafety levels, hazard, pathogens, radioactive materials.*

AFTEFS/GCH/2024/102

Assessment of water footprint for growth and milk production in crossbred cattle under field conditions in Northern India

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The livestock industry is estimated to use 8% of the worldwide water supply, with a majority of it being consumed in feed-intensive production. The ever-increasing water demands of livestock elevate their water footprint which is a critical scientific indicator for assessing the environmental sustainability of livestock as well as any production process including milk production. The study was performed to assess the water footprint for growth and milk production in lactating (N= 75) and growing (N= 73) crossbred cattle reared under field conditions in Northern India. The water footprint estimation was done by the volumetric methodology to determine the total consumptive water use (CWU) which encompasses both direct (water utilized for drinking and operational purposes) and indirect water footprint (water incorporated in the feed). Drinking water intake of the individual animals, total operational water requirement and the water required to grow feed and fodder consumed by the animals were considered for the calculation of different components of water footprint. The measurement of parameters and data assessment was carried out in winter, summer and rainy seasons for better understanding of seasonal impact on the water footprint. Results revealed that the overall water footprint of lactating and growing crossbred cattle was 4711.77 ± 39.19 L/animal/day and 447.81 ± 22.96 L/animal/day, respectively. The water footprint of milk production in lactating crossbred cow was 760.24 ± 8.60 L/kg milk yield and for growing crossbred calves, it was 1080.74 ± 62.06 L/kg ADG under field conditions.

Keywords: Water footprint, milk, growth, crossbred cattle, calves, field conditions**.**

AFTEFS/GCH/2024/103

Geospatial technology a modern tool in Agricultural development and Management

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Geospatial technology is a umbrella term that is include Remote sensing, Geographical information technology, GPS(Global Positioning system) and satellite imagery to capturing, storing, checking, visualizing and displaying spatial and non-spatial data related to positions on Earth's surface. GIS can show many different kinds of data on one map. This enables people to more easily see, analyse, and understand patterns and relationships. With GIS technology, people can compare the locations of different things in order to discover how they relate to each other. For example, using GIS, the same map could include sites that produce pollution, such as gas stations, and sites that are sensitive to pollution, such as wetlands. Such a map would help people determine which wetlands are most at risk GIS can use any information that includes location. The location can be expressed in many different ways, such as latitude and longitude, address, or ZIP code. Many different types of information can be compared and contrasted using GIS. The system can include data about people, such as population, income, or education level. It can include information about the land, such as the location of streams, different kinds of vegetation, and different kinds of soil. It can include information about the sites of factories, farms, and schools, or storm drains, roads, and electric power lines.

Geospatial technology have an essential role in agricultural development and management. The technology providing day to day agriculture related data like: Crop area, soli health, soil moisture, crop health, crop production etc. These information helped to take effective and appropriate decisions that help improve productivity and sustainability in the field of agricultural development and management.

Keywords: *Geospatial, GIS, Agriculture Development*

AFTEFS/GCH/2024/104

Removal of emerging contaminants from water or wastewater using low-cost adsorbents: A comprehensive review

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The presence of emerging contaminants in water has become a growing global concern due to their adverse effects on human and environmental health. Traditional water treatment methods are often inadequate in effectively removing these contaminants, necessitating innovative and cost-effective solutions. This comprehensive review explores the promising approach of using low-cost adsorbents to remove emerging contaminants from wastewater. This review covers a wide range of emerging contaminants, including pharmaceuticals, personal care products, hormones, pesticides, laundry detergents, and surfactants. It provides an in-depth analysis of various low-cost adsorbent materials such as activated carbon, natural and waste materials, nano adsorbents, and biochar highlighting their adsorption mechanisms and performance in removing specific contaminants. The effectiveness of these low-cost adsorbents is critically assessed, considering factors such as adsorption capacity, kinetics, and isotherms. The influence of operational parameters, such as pH, temperature, and contact time is analyzed. Furthermore, the challenges and future prospects of using low-cost adsorbents for emerging contaminants are also outlined. In conclusion, this comprehensive review serves as a valuable resource for researchers, policymakers, and practitioners in wastewater treatment.

Keywords: Wastewater, Emerging contaminants, Low-cost adsorbents, Remediation

AFTEFS/GCH/2024/105

Methanolic extraction of bioactive compounds from fruit peel and synthesis of silver nanoparticles for agriculture applications

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The study you described explores the potential of banana peel and sweet lemon peel extracts for the green synthesis of silver nanoparticles and investigates their impact on the growth of wheat plants. Methanolic extracts of banana peel and sweet lemon peel were used to synthesize silver nanoparticles. The nanoparticles were characterized using UV-visible spectrophotometry and FTIR, confirming their formation and structure. TEM imaging revealed nanoparticles with average sizes of 48 nm for banana peel and 16 nm for sweet lemon peel. The synthesized nanoparticles exhibited high efficiency in inhibiting the growth of pathogenic bacteria, particularly. The study investigated the effect of these nanoparticles on seed germination and seedling growth of wheat plants. Treatment with nanoparticles at a concentration of 50 µg/ml resulted in the highest seed germination rates (92% for banana peel and 95% for sweet lemon peel), as well as longer root and shoot lengths. However, a higher concentration (100 µg/ml) led to lower seed germination rates and shorter root and shoot lengths.

The study suggests that one-step synthesized silver nanoparticles from fruit peel extracts can effectively control bacterial pathogens and promote the growth of plants, specifically wheat in this case. This research highlights the potential of utilizing agricultural waste, such as banana peel and sweet lemon peel, for the eco-friendly synthesis of nanoparticles with agricultural applications, including plant growth promotion and disease control.

Keywords: Fruit peel, FTIR, TEM, Silver nano particles, Pathogens

AFTEFS/GCH/2024/106

Effect of different weed management and long-term nutrient management practices on weed density

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At the Research Farm of the Department of Soil Science, CCS Haryana Agricultural University, Hisar, Haryana (India), during the rabi season of 2021–2022, a long-term experiment that began in 1995 was chosen to investigate the effects of weed management techniques in wheat under long-term nutrient management practises. The experiment was set up using a split plot design, with seven nutrition management treatments in the main plot and four weed control treatments in a subplot that was replicated three times. Nutrient management treatments were evaluated: recommended N (150 kg/ha) & P (60 kg/ha); FYM @ 15 tonnes/ha; FYM @ 15 tonnes/ha + N (150 kg/ha) & P (30 kg/ha); poultry manure @ 5 tonnes/ha; poultry manure @ 5 tonnes/ha + N (150 kg/ha) & P (30 kg/ha); Press mud @ 7.5 tonnes/ha and Press mud @ 7.5 tonnes/ha + N (150 kg/ha) & P (30 kg/ha); and weed control treatments, such as pendimethalin @ 1.5 kg/ha (PRE), pendimethalin @ 1.5 kg/ha (PRE) *fb* clodinafop + metsulfuron methyl (RM) 64 g/ha, weedy and weed free. *Anagallis arvensis, Melilotus indica, Coronopus didymus, Rumex dentatus, Phalaris minor* and miscellaneous weeds (*Chenopodium album, Chenopodium murale, Avena ludoviciana* and *Convolvulus arvensis*) were the dominated weed flora in the experimental field. Weed density of *Anagallis arvensis* and *Melilotus indica* were observed lower with application of FYM 15 t/ha along with N 150 kg/ha and P 30 kg/ha and higher where PMUD 7.5 t/ha applied. Weed density of *Coronopus didymus, Rumex dentatus* and *Phalaris minor* weeds were observed higher with application of PMUD 7.5 t/ha along with N 150 kg/ha and 30 kg/ha compared to all other treatments. In case of herbicide treatments, lower weed density was observed in pendimethalin treatment at 30 DAS but at later stages of observations lower density was observed under sequential application of pendimethalin *fb* clodinafop + metsulfuron methyl (RM) treatment.

Keywords: Wheat, weed, nutrients and long-term.

AFTEFS/GCH/2024/107

The Potential of Biotechnology for the Conservation of Environment and its Resources

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For the purpose of ecological balance and our continued existence on this planet, protecting natural resources is crucial. Biotechnology can aid in the conservation of natural resources, enhancement of nutrient cycling, reduction of nutrient runoff into rivers and bays, improvement of soil health, and assistance in meeting the growing global need for food and land. Biotechnology or Genetic Engineering is a science for genetic modification and application of different living organisms or their derivatives for human benefits. This technology is very useful for the management of plant resources. The use of computers in bioinformatics, medicine production, gene testing, and other methods can help identify and make use of a significant portion of India's untapped vegetation resources. A relatively recent field of biotechnology, "Green biotechnology" focuses mostly on agriculture. Biotechnology has applications in the management of environmental resources, encompassing both biotic (living) and abiotic (non-living) elements of the environment. For instance, certain types of microbes can be added to soil to improve soil fertility and structure, inhibit plant diseases, and encourage plant development. Applications of biotechnology in environmental resource management are numerous and include waste treatment, bioremediation, sustainable agriculture, production of biofuels, pollution monitoring in the environment, recovery of resources and preservation of biodiversity. Environmental biotechnology, a branch of biotechnology, employs biological processes to tackle environmental problems. It can support efforts to preserve and improve environmental quality. Thus, the novel biotechnological tools and techniques can be effectively employed to attain the overall goal of a safe, clean and sustainable environment.

Keywords: *Conservation, Environmental biotechnology, Genetic Engineering, Microbes, Natural Resources*

AFTEFS/GCH/2024/108

Effect of Pruning on Fruit Size and Yield of Peach – A Review

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Peach (*Prunus persica* L.) is grown commercially in the temperate regions of Europe, North America, South Africa, Asia, and Australia. In commercial fruit cultivation, it's essential to modify the natural form and shape of fruit trees through specific pruning practices. Pruning has been recognized for quite some time as a crucial aspect of tree management, capable of influencing and controlling tree balance. It alters both vegetative and reproductive functions, as well as the process of carbon assimilation and distribution within the tree. An experiment was conducted and medium pruning intensity in the Florda sun peach produced highest yield (45.59 kg/plant) and Heavy pruning level gave highest weight and size of fruits in Florida sun (43.11 g). In another trial, four different pruning methods were tested: 4,8,12-bud pruning, and a control. The findings revealed significant improvements in various fruit characteristics such as weight, volume, size, stone weight, pulp weight, and pulp stone ratio across all pruning methods compared to the control. However, as the severity of pruning increased, the number of fruits and yield per plant decreased. Overall quality, the 12-bud pruning method exhibited superior performance compared to the other pruning techniques. Another study show reduced fruit set percentage as pruning intensity increased, with unpruned trees recording the highest fruit set at 76.30%. Likewise, a decrease in fruit yield was observed with higher pruning levels, where unpruned trees yielded the most at 28.55 kg/tree, while the lowest yield (18.73 kg/tree) was observed in the 60% pruning treatment. Compared to the unpruned control, a decrease in fruit set and yield by up to 11.20% and 34.30%, respectively, was estimated.

Key Words: *Peach, Pruning, Bud, Growth, Yield.*

AFTEFS/GCH/2024/109

IMPROVING PHYSIOLOGY OF WHEAT THROUGH NITROGEN AND FARMYARD MANURE INTEGRATION

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Wheat (*Triticum aestivum* L.) is a self-pollinating annual grass. It is widely cultivated for its grain which is a worldwide staple food. The experiment was carried out at the research site of the Department of Soil Science, CCS Haryana Agricultural University, Hisar, to investigate the impact of nitrogen and farmyard manure (FYM) on the yield and quality of wheat during the rabi season of 2023-24. The experiment involved two levels of nitrogen (0 and 120 kg/ha) and four levels of FYM (0, 5.0, 10, and 15 t/ha) arranged in a Split Plot Design with three replications. The findings indicated a significant increase in wheat yield with the application of 120 kg N/ha and 10 t FYM/ha compared to their respective controls. Integrated use of FYM and nitrogen fertilizer demonstrated superiority in enhancing wheat productivity compared to the sole application of nitrogen fertilizer. The response of wheat crop was linear up to 120 kg N/ha across FYM levels ranging from 0 to 15 t/ha. Physiological traits such as Chlorophyll Content Index (SPAD), photosynthetic rate, transpiration rate, and stomatal conductance, as well as morphological traits, were assessed at both vegetative and grain-filling stages, while yield attributing characters were recorded at maturity. Plots treated with a combination of 10 t/ha FYM and 120 kg/ha nitrogen showed the highest values for physiological traits, yield, and its attributes. A significant correlation was observed between yield, its attributes, and physiological parameters, highlighting the importance of these physiological traits in enhancing wheat productivity.

Keywords: *Wheat, Chlorophyll content index, photosynthetic rate, transpiration rate.*

AFTEFS/GCH/2024/110

Toxic effects of cadmium chloride on histopathological alterations in gills and intestine of freshwater fish *Cirrhinus mrigala*

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Cadmium pollution of the aquatic environment has increased significantly in the past few decades due to industrialization and increase in population growth rate. Exposure to cadmium can result in histological alterations in different tissues and organs of aquatic organisms such as fish, shellfish, shrimps, crabs etc. The objective of the study was to evaluate the effects of different doses of cadmium chloride i.e. 0.12, 0.16, 0.20 and 0.24mg/l on histological alterations in gills and intestine of freshwater fish *Cirrhinus mrigala*. For the proposed study, fish were procured from certified fish production farms and randomly allocated into four groups, each with three replicates. In each group, thirty fishes were exposed to each concentration of $CdCl_2$ through waterborne exposure for 60 days. At the end of the experiment, one fish per replicate from each treated group were collected and dissected for excision of gill and intestine after anesthetized with clove oil. Dose dependent histological alterations in gills such as fusion, shortening, curling, disorganization, hyperplasia and complete loss of secondary gill lamellae besides vacuolization, blood cells congestion, haemorrhage, detachment and uplifting of epithelia and intestinal deformities such as fusion and desquamation of intestinal layers, shortening of villi, vacuolization, necrosis, haemorrhage and eosinophilic penetration were observed in all the treated groups compared to control group.

Keywords: *Cirrhinus mrigala*, Cadmium, Histopathology, Gill, Intestine

AFTEFS/GCH/2024/111

Innovations in Natural Resource Management and Environmental Sustainability

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Natural resource management and environmental sustainability are two critical issues that are interconnected and require urgent attention from policymakers, researchers, and the general public. Natural resources, such as water, soil, forests, and minerals, are essential for human survival and economic development. However, their overexploitation and mismanagement have led to severe environmental degradation, loss of biodiversity, and climate change. Environmental sustainability refers to the responsible use of natural resources to meet the needs of the present without compromising the ability of future generations to meet their own needs. It involves adopting practices that minimize waste, reduce pollution, and promote biodiversity conservation. Sustainable natural resource management is essential for achieving environmental sustainability. Effective natural resource management requires a holistic approach that considers the social, economic, and environmental dimensions of resource use. It involves the development of policies and practices that promote the sustainable use of natural resources, such as integrated water resource management, sustainable forestry, and responsible mining. The integration of traditional knowledge and modern science is essential for effective natural resource management. Indigenous peoples and local communities have a wealth of knowledge and experience in managing natural resources sustainably. Their involvement in decision-making processes and the recognition of their rights to natural resources are crucial for achieving environmental sustainability. Technology and innovation also play a critical role in natural resource management and environmental sustainability. The use of renewable energy sources, such as solar and wind power, can help reduce greenhouse gas emissions and dependence on fossil fuels. Digital technologies, such as geographic information systems (GIS) and remote sensing, can help monitor and manage natural resources more efficiently. In conclusion, natural resource management and environmental sustainability are critical issues that require urgent attention from all stakeholders. The sustainable use of natural resources is essential for achieving environmental

sustainability, which is crucial for human survival and economic development. The modern science, technology, and innovation can help promote sustainable natural resource management and environmental sustainability. However, achieving these goals requires political will, public awareness, and collective action.

Key words: *Natural resources management, sustainable forestry, technology, innovation, climate change, biodiversity conservation, greenhouse gas emissions, renewable energy, geographic information systems, public awareness.*

AFTEFS/GCH/2024/112

NATURE IS NOT COMPLETE WITHOUT MATHEMATICS: FIBONACCI SEQUENCE AND GOLDEN RATIO

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Mathematics is the universal language through which nature expresses its underlying order and beauty. Among its numerous manifestations, the Fibonacci sequence and the Golden Ratio stand out as recurrent patterns that exemplify the intrinsic harmony of the natural world. This paper explores how these mathematical phenomena are not merely abstract concepts but fundamental components of the universe's design, highlighting their prevalence in natural structures, from the microcosm of DNA to the macrocosm of galaxies. Through an interdisciplinary approach, we underscore the importance of mathematics in understanding the complexity and beauty of nature, asserting that the Fibonacci sequence and the Golden Ratio are pivotal in revealing the interconnectedness of all things.

AFTEFS/GCH/2024/113

Strategies for Soil and Crop Management to Enhance Crop Yield within Sustainably Managed Ecosystems

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In the face of a burgeoning global population and diminishing arable land and resources, agricultural producers are under immense pressure to escalate food production. The overreliance on fertilizers and chemicals, in an attempt to meet these demands, is exacerbating environmental conditions. The relentless pursuit of agricultural yield, devoid of ecological consideration, is precipitating soil degradation and a host of environmental quandaries. Consequently, the imperative to nourish the expanding populace necessitates an escalation in agricultural output, harmonized with sustainable practices. To this end, a departure from conventional policies is requisite, as they are inadequate for surmounting the present challenges. The paradigm of agricultural sustainability and delineates an array of soil and crop management strategies (SCMS) devised to augment crop productivity within the confines of environmental sustainability. The nutrient management, site-specific nutrient management (SSNM), integrated nutrient management (INM), integrated soil fertility management (ISFM), integrated soil-crop system management (ISSM), ridge-furrow mulching systems (RFMS), sustainable water management (SWM), conservation agriculture (CA), sustainable land management (SLM), vertical farming, and integrated crop management, alongside breeding strategies and other methodologies synergized with technological and behavioural innovations, are important for sustainable development. A sustainable production paradigm can be actualized through the amalgamation of SCMS practices with proactive and preventative strategies. Curtailing the use of agrochemicals, such as fertilizers and pesticides, and enhancing the efficiency of crop inputs, could substantially mitigate greenhouse gas emissions whilst safeguarding the environment. Sustainable agriculture harbours the potential to fulfil the needs of humanity and preserve the integrity of our planet, contingent upon a unified commitment from both developed and developing nations to forge a collective path towards 'our common future'- one that yields an abundance of food with minimal environmental impact.

Keywords: Agricultural Sustainability, Soil Tillage, Land Degradation, Soil Erosion, Greenhouse Gas Emissions.

AFTEFS/GCH/2024/114

Exploration and Utilization of Medicinal and Aromatic Plants: A Comprehensive Review

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Medicinal and aromatic plants (MAPs) have been integral to human societies for centuries, offering a vast array of benefits ranging from therapeutic to aromatic and culinary. This paper provides a comprehensive overview of the utilization of MAPs, encompassing their diverse applications in various industries and traditional medicinal systems worldwide. These plants contain bioactive compounds such as alkaloids, flavonoids, and terpenoids, which exhibit pharmacological activities including anti-inflammatory, antimicrobial, and antioxidant effects. Additionally, the cultivation and sustainable harvesting of MAPs are also important with emphasizing the importance of conservation efforts to preserve biodiversity and ensure a stable supply of these valuable resources. Furthermore, the aromatic qualities of certain plants are yet to be explored, detailing their utilization in perfumery, aromatherapy, and flavouring, along with industrial applications in cosmetics, food, and beverage industries. Moreover, the socio-economic significance of MAPs may be evaluated emphasizing their contribution to rural livelihoods, agroforestry practices, and the global trade market. Issues such as cultivation challenges, market demand fluctuations, and the potential for biopiracy may also be addressed, underscoring the need for sustainable management practices and equitable distribution of benefits. In conclusion, this this paper underscores the multifaceted utilization of MAPs, encompassing their medicinal, aromatic, and socio-economic dimensions. Future research endeavours should focus on advancing cultivation techniques, exploring novel bioactive compounds, and promoting ethical sourcing practices to maximize the benefits of these invaluable botanical resources.

Keywords- Medicinal, Aromatic, Agroforestry, Bioactive compounds, Sustainable

AFTEFS/GCH/2024/115

Impact of Climate Change on Agricultural Production in Haryana: Current Trends and Future Perspectives

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The Economy of Haryana predominantly based on agriculture sector. However, increasing population and continuous changes in the climate poses significant challenges to the agricultural sector in the region. This research paper aims to examine the impact of climate change on Haryana's agriculture, focusing on current trends, vulnerabilities, and potential adaptation strategies. The present study is based on secondary data and measure the impact of climate change on production of agriculture in state during 2000-2024. Through a comprehensive review of existing literature, statistical data analysis, and expert insights, this paper examines how changing climatic patterns, including shifts in temperature and precipitation are affecting crop yields, water availability, and overall agricultural productivity in Haryana. Furthermore, this paper explores various adaptation measures such as crop diversification, improved water management techniques, adoption of climate-resilient crop varieties, and policy interventions to mitigate the adverse effects of climate change on agriculture in Haryana. By synthesizing empirical evidence and expert opinions, this research contributes to a better understanding of the complex interplay between climate change and agriculture in Haryana, and offers insights into sustainable strategies to build resilience and ensure food security in the face of a changing climate.

Keywords: Climate change, Agriculture, Crop Productivity, Adaptation strategies, Water management, Crop diversification, Policy interventions.

AFTEFS/GCH/2024/116

UTILIZING THE MEDICINAL PROPERTIES OF SADABAHAR (*CATHARANTHUS ROSEUS*) FOR ANTIMICROBIAL ACTIVITY

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The escalating significance of medicinal plants in contemporary times is attributed to their remarkable therapeutic attributes. *Catharanthus roseus,* commonly known as Periwinkle or Sadabahar, is a standout example in this realm mostly used in traditional medicines. Belonging to the *Apocynaceae* family and ubiquitously found in tropical and subtropical regions, *C. roseus* is a treasure trove of phytochemicals, particularly alkaloids. Alkaloids are considered the major chemical constituents of this plant. Employing plant materials for medical textile presents a myriad of advantages, rendering the process not only environmentally friendly but also less toxic and more cost-effective. The leaves and roots of *C. roseus* enriched with alkaloids, have been extensively studied for their medicinal prowess, showcasing anticancer, antiviral, antioxidant, antimicrobial activity and antihypertensive effects. The resulting aqueous extract exhibited notable antifungal efficacy, particularly against *A. Awamori* (4.16 ±0.22 mm) and *Trichoderma* (3.5±0.47mm). They possess a wide range of applications in medicine; including pharmaceutical, cosmetics, and medical devices because of their broad bactericidal and fungicidal spectrum.

Keywords: Sadabahar, medicinal plant, sustainable, extract and antifungal

AFTEFS/GCH/2024/117

Diversity of Color Expression in Carnation Flowers

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Carnation (*Dianthus caryophyllus* L.), also known as divine or clove-gilly flower, is one of the most important commercial cut flowers in world and ranks second in world after rose. Carnation possesses innumerable usage for aesthetic purpose, value addition such as bouquets, vase arrangements, essential oils etc. Essential oils extracted can be used for medicinal, perfumery or fungicidal purposes. With profound potential for research and economical aspect, carnation is considered as high value crop. A total of ten carnation varieties namely Kleo, Master, Holmes, Kiro, Merida, Bizet, Baltico, White dona, Zepplin and Realism were grown under polyhouse to observe the diversity of flower color. The experimental varieties exhibited a diverse array of colors: Kleo and Realism displayed light pink hues, while Master showcased a vibrant red. Baltico and White Dona exhibited a pristine white, while Kiro presented a striking yellow. Merida presented a peach color with subtle red margins, while Holmes displayed white flowers accented by purple margins. Bizet and Zepplin showcased rich dark pink shades, adding further diversity to the spectrum of colors observed in the experiment. Therefore, it can be concluded that there is colour variation in carnation which can be fruitful for beautification, dye industry and enhancing marketable value of flower.

Keywords: *carnation, color, Holmes, value addition.*

AFTEFS/GCH/2024/118

Effect of cereal cyst nematode (*Heterodera avenae*) infestation on Barley

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Barley (*Hordeum vulgare* L.), a member of the Poaceae family, ranks as the fourth most important cereal grain crop globally, following maize, wheat, and rice, contributing approximately 7% to global cereal production. In India, barley holds significant importance as a winter cereal crop, second only to wheat, both in terms of cultivation area and production. It is often regarded as a crop accessible to resource-limited farmers due to its minimal input requirements and resilience to harsh environmental conditions. However, barley faces various challenges, including susceptibility to different plant pathogens, leading to considerable yield losses and compromised grain quality. Among these challenges, plant-parasitic nematodes (PPNs) are a notable concern, estimated to reduce barley production by up to 10%. One such nematode, the cereal cyst nematode (*Heterodera avenae* Woll.), responsible for molya disease, not only manifests symptoms above ground, such as yellowing, stunting, reduced tillering, patchy growth, and smaller heads with shriveled grain kernels but also exhibits foliar irregularities. Infected barley plants display an increase in root production, resulting in a characteristic "bushy knotted". The nematodes attack the roots of barley, disrupting the plant's ability to uptake water and nutrients efficiently. This can lead to physiological stress in the plant, including chlorosis or yellowing of the foliage. The substantial reduction in chlorophyll content is observed. Overall, cereal cyst nematode infestation poses a significant threat to barley cultivation, causing yield losses and compromising grain quality. Effective management strategies are essential to mitigate the impact of nematode infestation and ensure sustainable barley production.

Keywords: *Barely, cyst, chlorosis, nematode, stunting.*

AFTEFS/GCH/2024/119

Environment Sustainability through Plastic Waste Management

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The disposal of discarded plastic poses a serious risk to the environment, contributing to pollution and global warming. Plastic waste and climate change are two of the many sustainability challenges that have a big influence on society. Over 8.3 billion metric tonnes of plastic have been created since the 1950s, with 60% of that plastic ending up in landfills or the environment. Around 380 million tons of plastic are manufactured annually worldwide as of 2018. According to some experts, by the year 2050, there may be more plastic in the ocean by weight than fish. To address this issue, plastic must be used in the building of pavement features such pot holes, corrugations, ruts, and other features, among other things. Just 9% of the 6.3 billion metric tonnes of plastic garbage have been recycled, 12% have been burned, and the remainder have ended up in landfills, dumping sites, or the surrounding environment. A number of industries have suffered as a result of plastic garbage, including tourism, fishing, public safety, and human health. The most pertinent research on the various types of plastics produced was reviewed in this paper, along with their effects on the air, water, soil, and human health. Global facts and challenges regarding the management of plastic waste were also discussed, and a number of solutions were proposed to lessen the detrimental effects of the plastic industry. Secondary data for this study is gathered from research publications, articles, and reports on the plastic industry and infrastructure published by the FICCI. The study discovered that a more sustainable management approach can be achieved through the circular economy. We require a swift and concerted effort to implement circular economy strategies, which include stringent anti-plastic pollution laws and recycling procedures. Additionally, controlling plastic trash should make use of various waste management techniques like recycling, incineration, bioremediation, and landfills. Additionally, people's awareness ought to be increased via their participation in cutting-edge initiatives developed by their governments. It will

speed up the decrease of greenhouse gas emissions in all sectors and accomplish economic, social, and environmental goals. A number of initiatives are carried out under the UNDP Plastic Waste Management Program, including the establishment of swachhta Kendras, material recovery facilities, and the empowerment of waste pickers (safai sathis).

AFTEFS/GCH/2024/120

A review on the Ethnomedicinal Properties of the *Terminalia arjuna (Roxb.)*

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In ancient India, *Terminalia arjuna (Roxb.)* was found to possess many ethnomedicinal properties as documented in Ayurveda, which is recognized as ancient Indian medical science. Along with Ayurveda, many indigenous communities used this plant traditionally in curing cardio vascular, hepatic, urogenital venereal and viral diseases. Research works have been carried out by various scientists in recent decades in view of modern scientific knowledge, to investigate medicinal properties of this plant as prevalent in indigenous traditions and ancient Sanskrit literature. Investigation results showed that different parts of this plant have medicinal properties. The biochemistry and pharmacology of different parts of *Terminalia arjuna (Roxb.)* were investigated and it was found that the parts of this tree contains Triterpenoids, flavonoids, β-sitosterol and glycosides, which have beneficial antioxidant properties. These antioxidant properties act as medicine and are beneficial in cardiovascular diseases, mild hypertension, dysentery and dyslipidemia, but the exact role in primary/ secondary coronary disease is still to be investigated.

Keywords: *Terminalia arjuna (Roxb.),* ethnomedicinal and antioxidant properties.

AFTEFS/GCH/2024/121

A Review of Feeding Potential of Mites

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Mites play a crucial role in agricultural production because they can damage to livestock, agricultural crops, ornamental plants and their stored products. Mono-cropping for long time over large area increases the chances of the mite pest related problems. Mites of Phytoseiidae family are recognized as most efficient predatory mites as they have shorter life span than their prey, equivalent reproductive potential and ability to feed on alternative food. It was observed that different mite species feed on weeds along with crops as alternate host, which proves that mites have strong potential of feeding on various type of plants and their stored products. Predatory mites feed on other pest mites of crops. Predatory mites can be used as biological control in IPM strategies and their use in IPM reduces the use of pesticide and in turn minimize the chemical pollution related issues.

Keywords: Mites, Predatory, IPM and Feeding Potential.

AFTEFS/GCH/2024/122

Floristic and Ethno-Botanical Studies on Some Parts of Hisar District of Haryana, India

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Studies on floristic diversity and ethno botany of Narnaund region of district Hisar was conducted during 2019-2020-during different seasons of the year to gather data about the knowledge and the traditional use of wild plants by local inhabitants, medicine practitioners, hakims through interviews and questionnaire. A total of 78 species were collected during study out of which 51 species are of ethno-botanical importance belonging to 47 genera and 31 families have been documented. The study reveals a practise of using various parts of wild plants by local inhabitants. It is reported that leaves (32%) are the most commonly used plant parts followed by whole plant (15%), roots (14%), fruits (12%) seed (9%), flower (5%) etc. Various diseases like fever, stomach ache, indigestion, asthma, wounds, kidney stone, snake bites, cough, and rheumatism are treated with the help of these plants in the area.

AFTEFS/GCH/2024/123

NATURE IS NOT COMPLETE WITHOUT MATHEMATICS: FIBONACCI SEQUENCE AND GOLDEN RATIO

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Mathematics contains the answers to most of universe's questions. Mathematics manifests itself everywhere. One such example is the Fibonacci sequence. This famous Fibonacci sequence has fascinated mathematicians, scientist and artists for many hundreds of years. The Golden Ratio manifests itself in many places across the universe, including right here on Earth, it is part of Earth's nature and it is part of us. The Fibonacci sequence is the ordering of numbers in the following integer sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144… and so on forever. Examples of the Golden Ratio in nature are Petals in a flower, Seed heads, Pineapples, Cauliflowers, Tree branches, Animal flight patterns, Spiral galaxies and many more.

AFTEFS/GCH/2024/124

To study the lethal toxicity of selective Insecticides Cypermethrin on Natural Fish Food (Zooplanktons) and Water Quality

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The optimum dose of Cypermethrin for the control of aquatic insects viz. *Notonecta* has been selected on the basis of 100 percent insect mortality and bioassay studies. Notonectidae is a cosmopolitan family of aquatic insects in the order Hemiptera. Considering the possible effect of insecticides on non-target species, the six concentrations of cypermethrin (i.e. 300, 400, 500, 600, 700 & 800 ml/ha meter) used for aquatic insects were further tested on zooplanktons using static bioassay. In the control and lowest dose of 300 ml/ha meter there was no mortality of experimental animal (Cladocerans). The higher doses have also shown less toxic effect on zooplankton as there was no mortality sign in first 6 hours of exposure. In the higher doses of 600, 700 & 800 ml/ha meter only 40% mortality was observed between 30 to 48 hours and after this period there was no mortality. These values of LC_{50} for zooplanktons were significantly higher than the $LC_{50\ values}$ obtained for experimental insects and fish seed. However, it was observed that there was no significant difference in water quality parameters with reference to concentration of cypermethrin. The experimental water was slightly alkaline and the values of alkalinity varied between 165 to 210 mg/I.

Keywords: *Cypermethrin, Morphology, Haematological changes.*

AFTEFS/GCH/2024/125

Interconnected Pathways to Sustainable Action: Understanding the Complexity of Pro-Environmental Behaviour

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The research delves into the intricate realm of pro-environmental behaviour (PEB), portraying it as a nuanced phenomenon moulded by a tapestry of interconnected variables spanning individual, social, cultural, and environmental spheres. It underscores the imperative of grasping these interconnections to effectively advocate for sustainability and combat urgent environmental crises. Firstly, it illuminates the labyrinthine complexity of PEB, accentuating its susceptibility to myriad influencing factors across diverse domains. This intricate web demands a holistic comprehension to drive meaningful change. Secondly, it champions the necessity of such comprehension in fostering sustainable behaviours and confronting environmental adversities head-on. By acknowledging the intricate interplay shaping PEB, policymakers and practitioners are poised to craft targeted strategies that resonate across various levels of influence. Thirdly, it extols the pivotal role these interwoven variables play in nurturing a conscientious environmental ethos. By dissecting and addressing the determinants of PEB, a culture steeped in sustainability and ecological stewardship can flourish, heralding widespread adoption of pro-environmental actions and aiding in the battle against environmental degradation and climate upheaval. In sum, the abstract serves as a prelude to a profound exploration of the multifaceted nature of PEB. Through an exhaustive examination of interconnected variables, it aims to illuminate pathways toward sustainable behaviours and offer insights crucial for mitigating environmental challenges and steering society towards enduring environmental harmony.

Keywords: *Pro-environmental Behaviour, Sustainability, Environmental challenges, Interconnectedness.*

AFTEFS/GCH/2024/126

Effect of Imidacloprid (Neonicotinoid) on Giant Honey bee

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Giant honey bees are the largest of the honey bee species. This bee is widely distributed throughout south-east Asia, ranging from the Indian subcontinent up to southern China and down throughout Indonesia and Malaysia. The nests of honey bees are large single combs which can measure upton1.5 m in width and 1 m in depth. A single large comb can contain up to sixty thousand bees. The bee nests are usually built in exposed places far off the ground on thick branches of tree limbs, overhanging rocks or cliffs, or on buildings or other man-made structures. These bees are excellent pollinators of crops, fruits and vegetables in cultivated and natural landscapes. The use of pesticides have become inevitable in modern agriculture. During the last four decades, the consumption of pesticides in India has increased several folds. One such class of pesticides is Neonicotinoids. The neonicotinoid used in our study is Imidacloprid. It is a systemic insecticide which affect the Central Nervous System of living organisms resulting in paralysis and eventually death of insects. It was found to have moderate effect on systemic and contact toxicity. It initially facilitated the enzyme Acetylcholinesterase activity but as the concentration of the pesticide increased enzyme inhibition increased. Thus it proved to be not bee friendly pesticide.

Keywords: *Acetylcholinesterase, Neonicotinoids, Giant honey bee, Systemic.*

AFTEFS/GCH/2024/127

Medicinal Values of Phytochemicals

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Phytochemicals are chemical compounds produced by plants as a defence mechanism against pathogens. They are used to treat various immunological, metabolic and neurological disorders in humans. The use of indigenous medicinal plants in commercial medicine is rising now a days. The phytochemicals not only protect plants, but also humans and animals against certain diseases due to their antimicrobial property. Till date, a number of phytochemicals have been discovered based on difference in chemical structure and have been classified as major groups. The major groups of phytochemicals are phytosterols, flavonoids, terpenoids, saponins, alkaloids, carotenoids, aromatic acid, organic acid, essential oils and protease inhibitors. Due to certain properties like antimicrobial, anti-inflammatory, anthelmintic, anticarcinogenic, antigenotoxic, antiproliferative, antimutagenic and antioxidative, the metabolites can provide direct or indirect defensive mechanism against pathogens or harmful ailments. Most phytochemicals have antioxidant activity and protect our cells against oxidative damage and reduce the risk of developing certain types of cancer. Phytochemicals with antioxidant activity are allyl sulfides (onions, leeks, garlic), carotenoids (fruits, carrots), flavonoids (fruits, vegetables), polyphenols (tea, grapes). Isoflavones, found in soy, imitate human estrogens and help to reduce menopausal symptoms and osteoporosis. Indoles, which are found in cabbages, stimulate enzymes that make the estrogen less effective and could reduce the risk for breast cancer. Other phytochemicals, which interfere with enzymes, are protease inhibitors (soy and beans), terpenes (citrus fruits and cherries). Saponins found in beans interfere with the replication of cell DNA, thereby preventing the multiplication of cancer cells. Capsaicin, found in hot peppers, protects DNA from carcinogens. The phytochemical allicin from garlic has anti-bacterial properties. Some phytochemicals bind physically to cell walls thereby preventing the adhesion of pathogens to human cell walls. Proanthocyanidins are responsible for the anti-adhesion properties of cranberry. Consumption of cranberries will reduce the risk of urinary tract infections and will improve dental health.

Keywords: *Phytochemicals, medicinal, plants.*

AFTEFS/GCH/2024/128

Control of head and body lice infestation on man by using local herbal: A case study in Bongaigaon District, Assam, India

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Present study has been conducted to assess the present scenario of infestation of external ectoparasites head louse (Pediculuscapitis) and body louse (Pediculushumanus) among different peoples in Bongaigaon district of Assam. The investigation reveals that the infestation of head lice is more frequent in women than man and the report of body lice infestation is feeble in the studied area. The infestation rate is higher among the age group of 9-15 years especially in rural girls of economically backward and illiterate peoples.

In the present study an attempt has been made to aware the people about this social problem through creation of awareness among the common people about the prevention of infestation of lice. On the other hand a series of experiments have been conducted to control and eradicate the infestation of head and body lice among infested peoples by using low cost, easily available herbal extract such as Neem, tea plant, onion etc. The present experiments clearly indicate that use of crude extract of Neem (Azadirachtaindica A. Juss) leaves is much more effective to eradicate and control the head lice and body lice infestation in all age groups. Similarly the crude extracts of green leafs of Tulsi (Osimum Sanctum L.) Crude extract of green leafs of Jetuka (Lawsoniamica L.) and a mixture of the crude extract of green leafs of tea plant (Camellia sinensis or Theaassamica) extract of onion (Allumcepa L.) and crude extract of green leafs of sirata (Swertiachirata (Wall) CL.) is also found more effective to control the infestation of head louse.

Keywords: Pediculuscapitis, Pediculusumanus, Infestation extract Azadirachtaindica, Osimum sanctum, Theaassamica, Swertiachirata, Allumcepa.

AFTEFS/GCH/2024/129

Natural Resource and Management

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Natural resource management is the management of natural resources with a particular focus on how management affects the quality of life for both future and present generations. Natural resource management gives out managing the way in which people and natural landscapes interact. It also includes together natural heritage management, land use planning, water management, bio-diversity conservation, and the future sustainability of industries like fisheries and forestry agriculture, mining etc. It acknowledges that people rely on the health and productivity of our landscapes. Natural resource management focuses on a scientific understanding of resources and ecology and the Life-supporting capacity of those resources. Natural resources management refers to the plain of action related to renewable and non-renewable sources. Natural resources like land, soil, water, plant and animal are affected by global warming, overpopulation, industrial expansion and other related reasons. Management of natural recourses is important to maintain a balance in ecosystem and to avoid further destruction of environment and to avoid over consumptions of natural resources. The 3 R`s of waste management are: Reduce, Reuse and Recycle.

Keywords: *Natural, resources, management , global warming, 3 R`s, environment, ecosystem*

AFTEFS/GCH/2024/130

Leveraging Artificial Intelligence for Enhanced Agricultural Sustainability: A Comprehensive Review

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The agricultural sector is facing unprecedented challenges due to population growth, climate change, and resource scarcity. To address these challenges, there is a growing need to adopt sustainable practices that enhance productivity while minimizing environmental impact. Artificial Intelligence (AI) has emerged as a transformative technology with the potential to revolutionize agriculture. This comprehensive review examines the role of AI in promoting agricultural sustainability, focusing on its applications through sophisticated algorithms and data analysis to enhance farm operations and decision-making in optimizing the resources and enhancing production and productivity The agricultural sector is undergoing a significant transformation, driven by technological advancements such as Artificial Intelligence (AI). AI technologies, including machine learning, robotics, and data analytics, are revolutionizing various aspects of agriculture, improving traditional agricultural practices, enabling growers to use the resources efficiently, ranging from crop management to supply chain optimization and at the same time safeguarding our ecology and environment. This review explores the role of AI in agriculture, focusing on its applications, benefits, and challenges. Despite the significant benefits, the adoption of AI in agriculture faces challenges such as high initial costs, data privacy concerns, and limited access to technology in rural areas. Addressing these challenges requires collaboration among stakeholders, including farmers, policymakers, and technology providers. In conclusion, AI holds immense potential to transform agriculture into a more sustainable and profitable venture. By harnessing the power of AI, farmers can improve productivity, reduce environmental impact, and ensure food security.

Keywords: Artificial Intelligence, agriculture, sustainability, machine learning, robotics, precision agriculture, environmental impact, productivity, data analytics, technology adoption, challenges, opportunities.

AFTEFS/GCH/2024/131

Evaluation of antioxidant potential of green synthesized *Azadirachta indica* based silver nanoparticles (AgNPs)

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Biosynthesis of silver nanoparticles using plant parts has proven more environmental friendly, cost-effective, energy saving and reproducible as compared to chemical and physical methods In the present study, silver nanoparticles (AgNPs) were synthesized using *Azadirachta indica* leaf extract as a reducing agent and evaluated for their in vitro antioxidant activity. The flavonoids and terpenoids present in the extract act as both reducing and capping agent. Characterization of silver nanoparticles was carried out by UV–vis spectroscopy, XRD spectroscopy and surface electron microscopy (SEM). The antioxidant activity of the synthesized AgNPs, *Azadirachta indica* leaf extract was evaluated using standard assays such as DPPH radical scavenging assay. The results demonstrated a dose-dependent antioxidant activity of the AgNPs as compared to ascorbic acid the standard reference used. It demonstrates role of AgNPs in boosting antioxidant defense mechanisms and developing tolerance for abiotic stress-induced oxidative damage. Therefore, *Azadirachta* indica leaf extract based silver nanoparticles can be further utilized to increase abiotic stress tolerance in crop plants.

Keywords: Silver Nanoparticles, DPPH assay, *Azadirachta indica*, antioxidant activity.

AFTEFS/GCH/2024/132

Nipah Virus: Emerging Zoonotic Threat

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Nipah virus (NiV) stands as a formidable emblem of zoonotic viruses, posing a significant threat to both human and animal populations. Initially identified in Malaysia in 1998, NiV swiftly captured global attention due to its high fatality rate and potential for human-to-human transmission. The virus, primarily hosted by fruit bats of the Pteropodidae family, demonstrates a broad host range, affecting various mammals including pigs and humans. Its transmission dynamics encompass both direct bat-to-human contact and indirect transmission through contaminated fruits or secretions. Clinical manifestations of NiV infection range from asymptomatic carriage to severe respiratory illness and encephalitis, with mortality rates reaching up to 75%. Lack of specific therapeutics or vaccines further amplifies the urgency in understanding and mitigating its spread. The virus's ability to undergo genetic mutations underscores the perpetual challenge in surveillance and outbreak control. Recent outbreaks in South Asia underscore the persistent threat posed by NiV, necessitating multidisciplinary approaches encompassing epidemiology, virology, and public health interventions. Mitigation strategies entail early detection, stringent infection control measures, and community engagement to curb transmission chains. In conclusion, NiV epitomizes the complex interplay between humans, animals, and the environment, emphasizing the imperative for proactive surveillance, research, and collaborative efforts to mitigate its impact and prevent future outbreaks.

Keywords: Nipah virus, zoonotic transmission, epidemic control.

AFTEFS/GCH/2024/133

Recent Advancement in Wildlife Conservation in India: A Review

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Wildlife is closely connected to the environment. It continuously interacts with all the components of ecosystem, influencing them and being dependent on them as well. The impact of human activities on the environment and biodiversity is becoming more widely recognized. Every year, a large number of species are added to the endangered species list, and the rate of habitat destruction is frightening. Even worse, species that haven't even been found have gone extinct as a direct or indirect result of human action. Ecological stability depends critically on biodiversity, which will continue to decline in the absence of serious mitigating measures. Effective wildlife conservation and management require a holistic and multi-faceted approach. The Wildlife Protection Act of 1972 is a law that was enacted to safeguard wild animals, birds, and plants in order to ensure India's ecological and environmental security. First, habitat preservation and restoration are paramount. The government of India has initiated many wildlife conservation projects like Project Snow Leopard, Project Tiger, Indian Rhino Vision 2020, Project Hangul, Crocodile Conservation Initiative, etc. India achieved its 'St. Petersburg declaration' target by doubling Tiger population (in 2019) ahead of 2022 target. Some of the modern technologies that are successfully transforming the field of wildlife conservation are Sensors Technology, Drones and Artificial intelligence (AI). Lastly, investment in research to understand wildlife ecology, coupled with public education and awareness programs, is crucial for fostering a culture of conservation. Through these concerted efforts, significant strides can be made towards preserving wildlife and their habitats, ensuring the sustainability of our planet's ecosystems for future generations.

Keywords: Wildlife, Protection, Environment, Management.

AFTEFS/GCH/2024/134

Role of Chitinolytic Actinobacteria in Biocontrol: A Promising Approach for Sustainable Agriculture

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Actinobacteria are ubiquitously present a group of gram-positive bacteria having high G+C content in their genome. In agriculture, chitinolytic actinobacteria play important role in biocontrol strategies due to their ability to degrade chitin, a major component of fungal cell walls and insects. Chitin a polymer of ß - (1- 4)-N acetyl - D - glucosamine, is the second most abundant organic matter present on earth. Chitin degradation by a number of microrganisms can cause extensive harm, including death in pests and pathogens that have this polymer on their external surfaces. Chitinolytic actinobacteria produce various chitinolytic enzymes, such as chitinases and chitin-binding proteins, which enable them to degrade chitin and disrupt the integrity of fungal cell walls. These enzymes can degrade chitin polymer into oligomeric and monomeric forms, this mechanism offers a natural and effective means of controlling fungal pathogens in agricultural systems. Furthermore, chitinolytic actinobacteria have several modes of action, including mycoparasitism, antibiosis, and the induction of systemic resistance in plants. Their ability to colonise plant roots and boost the plant's immune response to pathogens enhances their biocontrol capabilities. These chitinolytic actinobacteria are compatible with current agricultural practices and have the minimum adverse effects on the environment. They can be included in integrated pest management strategies, minimising dependency on chemical pesticides and promoting sustainable farming practices. In conclusion, the utilization of chitinolytic actinobacteria represents a promising approach for biocontrol in agriculture.

Keywords: *Actinobacteria, biocontrol, chitin, chitinase, degradation*

AFTEFS/GCH/2024/135

Role of Hindi Literature in Conservation of Natural Resources

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There is unity between man and nature. Man may live in big cities away from forests, mountains and river pools, but his love for nature has never diminished. The expression of this complete relationship has been going on since ancient times in religion, philosophy, art and literature. Literature is a reflection of man and in this reflection, his companion nature has to be reflected. Hindi poets have done the work of resource conservation by depicting many beautiful scenes of nature in their poetry. Although mountains, rivers, trees, plains, all these are becoming victims of scientificism. Houses and cities are being built by cutting mountains and rocks to solve housing related problems. Despite this, the love of poems for nature has never diminished. Chhayavadi poems have given superiority to the love for nature even more than female beauty. The writer has always protected the natural remains. Water, forest, land, food, energy etc. are the main among these bases. Many poems have been written for their protection and at the same time, the society has also been inspired.

In Hindi prose, Acharya Hazariprasad Dwivedi's essays have also been a beautiful medium to express environmental problems. He not only wrote about improper exploitation and pollution of the environment, but also gave important suggestions and instructions about the proper use and conservation of environmental resources. In essays like Aam Phir Baura Gaye, Ashok Ke Phool, Manushya Ka Bhavishya etc., his thoughts on global warming, pollution and man's self-centered viewpoint are worth seeing. If this type of literature is included in the curriculum and taught to students, then certainly we can make efforts towards the conservation of the environment by making the vision of the future citizens of the country nature-loving.

Keywords- Environment, Hindi, Literature, Development, Education, Association, Conservation, Natural Resources etc.

AFTEFS/GCH/2024/136

Unveiling the Impact of Microbes in Human Welfare and Environment Protection

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Microbes or microorganisms (e.g. bacteria, viruses, protozoa, fungi etc.) make up a large portion (1 trillion species or 60%) of the Earth's living stuff as they are abundant and diversified in nature. Microbes are harmful as well as beneficial. In daily life, humans benefit greatly from the use of several bacteria and products derived from microorganisms. Despite being essential to human wellbeing and ecosystems, their contributions are frequently overlooked or underappreciated. The present article aims to highlight and discuss the role of microorganisms in environment protection and human welfare. Microbes are essential to many aspects of life, including ecology, medicine, food production, biofuel or energy production, drug research, nitrogen and carbon fixation, biocontrol agents, biofertilizers, soil formation etc. Microbes have the potential to be magic bullets in the biodegradation and bioremediation of polluted areas. They are used to treat sewage water (by creating activated sludge) which aids in recycling of water in the environment. Plant waste is degraded by methanogens to produce methane, or biogas. Microorganisms and nanotechnology are collectively used to clean-up radioactive waste by using nano-bioremediation process. Further, genetically modified organisms can be used to combat pollution in extremely contaminated conditions. So, it is possible to efficiently revive the environment by utilizing the special properties of microbes. Therefore, prioritizing study on microbes can enhance human growth and well-being, as they have the ability to both ensure the proper functioning of Earth's ecosystem and promote human welfare.

Keywords: *Ecosystem, Environment protection, Human welfare, Microbes*

AFTEFS/GCH/2024/137

Production of Yoghurt with Partial Replacement of Cow Milk with Coconut Milk

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Yoghurt is one of the most popular fermented milk products worldwide. Yoghurt can provide the body with significant amounts of calcium in a bioavailable form. Furthermore, yoghurt has many health benefits, such as improved lactose tolerance, a possible role in body weight and fat loss, and a variety of health attributes associated with probiotic bacteria. Coconut yogurt is usually made from fermented coconut milk. This food is essentially a plant-based yogurt that's usually made without animal milk. This makes it ideal for people following vegan diets or people who are intolerant of other plant-based products, like soy. Coconut yogurt is lactose and casein free, naturally creamy, and naturally sweet. Addition of different fruits is also possible with coconut yoghurt. The chemical analysis of the product shows that the coconut milk yoghurt was high in fats, ash content and solid-not- fat with respect to cow milk yoghurt. Coconut Milk Yoghurt can be made with complete replacement of Cow Milk with Coconut Milk without adverse effects on the sensory quality of yoghurt. However, 85% replacement of Cow Milk with Coconut Milk is also a favorable option.

Keywords- *Coconut Yoghurt, Lactose Intolerance, Cow Milk, Coconut Milk*

AFTEFS/GCH/2024/138

Efficacy of fungicides on management of blast disease in rice (*Oryza sativa* L.) and its impact on yield and economics

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Rice is the most common grain consumed by a large proportion of the global population. The rice blast appears with varied degrees of intensity in several ecological systems, resulting in significant annual losses**.** The current study was conducted in Thoubal District, Manipur, to assess rice output, growth, rice blast disease incidence, and economic aspects in the *Kharif* seasons of 2022 and 2023. A random block design (RBD) with four treatments and five replications was utilised. The treatments employed in this study consisted of T1 (seed treatment with carbendazim 50WP), T2 (dipping the seedling roots in hexaconazole 5 EC), T3 (application of Azoxystrobin 11% + tebuconazole 18.3% SC) and farmers' practice (FP). In both years, T3 had the highest values for plant height at various growth stages, effective tillers, pikelet panicle, and test weight. Additionally, the study demonstrated a decelerated rate of disease occurrence in T3, with an average incidence rate of 6.30% in 2022 and 5.23% in 2023. Furthermore, the disease control rate in T3 in relation to control was found to be 87.12% in 2022 and 88.68% in 2023, with the lowest area under disease progress curve (AUDPC) of 433.5% in 2022 and 311.25% in 2023. The treatment T3 exhibited the highest yield (5713 kg ha^{-1} and 5753 kg ha^{-1}) and shown an increased yield compared to the control (28.13% and 31.17%) in the corresponding years. In the following years, the benefit-cost ratios were seen to be 25.42% and 22.22% greater compared to the control. The technology gap was the lowest in T3 (287 kg ha^{-1} and 247 kg ha^{-1}) with technology index of 4.78 % and 4.11 %. The comprehensive evaluation affirms the notable superiorities of T3 i.e application of Azoxystrobin 11% + tebuconazole 18.3% SC in all aspects.

Keywords: Azoxystrobin, carbendazim, hexaconazole, rice blast, seed treatment, tebuconazole.

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Study of Arundhati Roy's God of small things from Ecocritical perspective

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This paper aims to explore how theory of Ecocriticism has been incorporated in the novel God of small things. Ecocriticism studies relationship between literature and physical environment. Roy has articulated her concern how civilization, technological advancement and modernisation is a camouflage that is degrading natural environment to irreparable extent. Human being's negligence towards environment is quite evident in various instances. As condition of river Meenachal which used to be pristine, serene and lively drastically converted into toxic drain due to polluting activities as flow of adulterated factory drainage, washing of clothes and pots and defecation by children. Population explosion also imbalances natural environment in the novel. In a due course village population exploded to a small town's size and consequently natural scenic beauty, rustic landscape converted into baked, iced, gulf money houses. Technological advancement shifts Baby Kochamma's interest from gardening to watching television. Animals, birds, insects are also victims of deleterious impact of modernization. In the novel an elephant is depicted as a victim of electrocution due to fall of high-tension wire on his body. An entomologist Pappachi's indifferent attitude towards conservation of endangered moth species and Rahal killing of ants to relax her nerves. Moreover, transformation of history house into a five star hotel "Heritage." Traditional artform of Kathakali, dramas based on mythical plots are shortened drastically. Velutha is portrayed as a man of nature. His tormented soul gets solace is lap of nature. He used to make toys and other items by using wood and other natural materials. Roy seems to convey how human beings have become mechanized and ignorant in blind chase of advancement and development it will pose threat for human race as well other components of ecosystem. Sustainable development seems to be the only solution of this degrading natural
environment.

Keywords- Ecocriticism, Environment, advancement, modernization, sustainable development.

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Effect of heavy metal pollution on earthworms

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The earthworms are immensely valuable soil organisms to agriculture and ecosystems because they recycle nutrients, improve soil fertility, soil structure, drainage, aeration and repairing the damaged soils. The soil dwellers and particularly earthworms are the worst affected by the soil pollutants. Heavy metal pollutants most common in the environment are Cr, Mn, Ni, Cu, Zn, Cd, Pb, As, Hg and Al. Earthworms bioaccumulate the heavy metals by the direct and continuous contact by moist and permeable skin and lining of the alimentary tract through intake of polluted soil and litter in form of food. The heavy metal pollution affects the morphology, growth, reproduction and mortality of the earthworms. The low level exposure to the heavy metals can induce behavioural, morphological and physiological changes in the earthworms. Heavy metal accumulation in body of worms lead to oxidative stress, defined as a disturbance in the balance between the production of reactive oxygen species and antioxidant defenses. The production of reactive oxygen species causes DNA damage, destructions of proteins and lipids by various biochemical pathways. Changes in innate immunological parameters and decrease in coelomocytes have been observed due to the heavy metal stress. Heavy metal pollution can affect the human beings through bioaccumulation and biomagnification via the food chain. The heavy metals pollution influence on the earthworms can alter the soil health, agricultural productivity and terrestrial ecosystems.

AFTEFS/GCH/2024/141

Organic Fish Farming: A sustainable approach to produce healthy and disease free natural fish as food

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Over the years, environmental awareness has grown all over the world and consumers are increasing in number for the consumption of organic food products. Organic aquaculture refers to the farming of aquatic organisms such as fish, shellfish and aquatic plants in a manner that is environmentally sustainable and follows organic principles. The general principles of organic aquaculture is to produce healthy, disease free natural fish as food, without the use of any antibiotics, hormones, chemicals, genetically modified organisms (GMOs) and at the same time, protecting the environment from all adverse conditions. Organic aquaculture relies on natural inputs and techniques such as organic feed, rotational grazing and biological pest control to promote the health and welfare of the farmed species and minimize environmental impact. Sustainability, environmental stewardship and holistic approaches are key principles of organic systems. Certification bodies typically oversee and regulate organic aquaculture operations to ensure compliance with organic standards. Although standards for terrestrial farming have long existed, adapting them to aquatic species remains a significant challenge for organic aquaculture. The International Federation of Organic Agricultural movement (IFOAM) is a global umbrella body for organic food and farming. In order to implement the programme, Marine Product Export Development Authority (MPEDA) initiated the **India Organic Aquaculture Project (IOAP)** during 2007, with the support of the Swiss Import Promotion Programme (SIPPO), Switzerland.

Keywords: *Organic*, *Aquaculture*, *Sustainable.*

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A comparative assessment of male reproductive health of some pea varieties under salt stress.

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Pea is an important food legume for food, nutritional security and sustainability of the production systems. Six different varieties of pea (*Pisum sativum* Linn.) viz. Hisar Harit, Arkel, Azad P1, Utara, Aparna and Jayanti were grown in range of chloride predominant salinity (control, 2.0, 4.0, and 6.0 dSm^{-1}) created by adding appropriate amount of different salts viz., NaCl, $CaCl_2$, $MgCl_2$ and $MgSO_4$ to N-free nutrient solution to river sand in polybags. The salinity was created by using NaCl, $CaCl_2$, $MgCl_2$ and $MgSO_4$ in such a way that Na: Ca + Mg =1:1, Ca: Mg = 1:3 and Cl: SO_4 = 7: 3 on milli equivalent basis. The pollen count per flower, pollen germination and pollen tube growth was studied. A significant ($p < 0.05$) decline in pollen grains per flower was noticed in all the varieties. The HFP 4 and arkel were seen to be most sensitive and least sensitive to salt stress. The pollen germination was significantly ($p < 0.05$) affected by various salinity levels. In the plants growing in saline soil of conductivity 7.5 dSm^{-1} the pollen germination varied from a low of 88.40% in HFP 8909 to a high of 91.06% in Azad P 1. The pollen tube length was found to be sensitive in all varieties grown under 2.5, 5.0 and 7.5 dSm-1. The per cent decrease in pollen tube length over the control was seen to vary from 14.56% in HFP 8712 to 37.20% in Arkel at the conductivity level 7.5 dSm^{-1}.

AFTEFS/GCH/2024/143

JLN Canal Physicochemical Parameters, Phytoplankton Diversity, and Biochemical Composition of Major Carp Species

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This study delves into the complex dynamics of the JLN Canal ecosystem, focusing on the intricate interplay among physicochemical parameters, phytoplankton diversity, and the biochemical composition of three prominent Indian major carp species - *Catla catla, Labeo rohita*, and *Cirrhinus mrigala*. Situated within the Jawahar Lal Nehru Lift Irrigation Project in Rewari, the JLN Canal provides a unique habitat supporting diverse aquatic life forms. Through extensive physicochemical analyses, we unveil a harmonious environmental setting within the canal. Furthermore, our investigation reveals dynamic variations in phytoplankton and zooplankton communities along the canal's stretch. Biochemical assessments of muscle and liver tissues of the major carp species highlight gender-specific disparities, presenting valuable insights crucial for fisheries management and ecological conservation efforts. This comprehensive study significantly contributes to enhancing our understanding of anthropogenic canal ecosystems and their ecological intricacies.

Keywords: JLN Canal, physicochemical parameters, phytoplankton diversity, major carp species, biochemical composition

AFTEFS/GCH/2024/144

hysical and Chemical Processes in Nature and their Ecological Significance

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Understanding the intricate interplay between physical and chemical processes in *nature* is crucial for comprehending *ecosystem dynamics* and ensuring *environmental sustainability*. This paper delves into the multifaceted realm of these processes, elucidating their fundamental roles and intricate interactions within natural systems. *Physical processes*, such as erosion, weathering, and hydrological cycles, shape landscapes and regulate the distribution of resources. *Chemical processes*, including photosynthesis, nutrient cycling, and biogeochemical transformations, govern the composition and functioning of ecosystems. The synergy between physical and chemical phenomena orchestrates the delicate balance necessary for life to thrive on Earth.Exploring the implications of these processes unveils their profound influence on ecosystem structure, function, and resilience. From regulating climate patterns to shaping biodiversity hotspots, the dynamic interplay of physical and chemical processes dictates the health and stability of natural environments. Moreover, anthropogenic activities are increasingly perturbing these delicate balances, leading to environmental degradation and loss of biodiversity.

In conclusion, fostering a holistic understanding of physical and chemical processes in nature is imperative for informing sustainable resource management practices and mitigating the impacts of human-induced environmental changes. By recognizing the intricate connections between these processes, we can strive towards harmonizing human activities with the resilience of natural systems, thereby safeguarding the planet's ecological integrity for future generations.

Keywords: Nature, physical processes, chemical processes, ecosystem dynamics, environmental sustainability

AFTEFS/GCH/2024/145

Effect of azolla feed on growth and survival of freshwater mussel, *Lamellidens marginalis* (Unionida: Unionidae)

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Freshwater mussels are filter feeders which clean the water by reducing algae, particulates and toxic materials in the water column. The study was conducted for seven months on effect of Azolla feed on growth parameters and survival of fresh water mussel, *Lamellidens marginalis* was recorded under four stocking densities, 20, 40, 60, 80 individuals/m^3 under triplicate conditions. During study period with different stocking density significantly affected the growth parameters of fresh water mussel. The weight, length, and breadth of *L. marginalis* in given azolla feed were highly impacted by stocking density. Mussels are typically non selective feeders they can be depending on various factors like particle size and nutritional value. For instance, they could feed on some kinds of algae or organic materials more than others. Study on feeding habit of *L. marginalis* provide baseline work for future research and open the path for captive aquaculture. In aquaculture, the genus Azolla of aquatic ferns is frequently used to feed. Rich in proteins, vital amino acids, vitamins, and minerals, it provides an affordable and nutrient-dense food source for a variety of aquatic creatures, including freshwater mussels The mean initial measurements of *L. marginalis* shell length, weight and width were 5.85 cm, 30.45 g, and 3.67 cm, respectively. After seven months shell length, weight and width observed 7.87 cm, 34.12 g, and 4.34 cm. respectively. *L. marginalis* showed 90% survival at stocking density 60 individuals/m^3 of the four stocking densities.

Keywords: Freshwater mussel, *Lamellidens marginalis,* Stocking density, Growth, Azolla.

AFTEFS/GCH/2024/146

Sustainability of Honey Bees, *Apis mellifera* L. Apiary in Summer Season of Semi- Arid Subtropical Region

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It can be difficult to keep honey bee (*Apis mellifera* L.) colonies alive in a semi-arid and subtropical area in the summer season because of high temperatures (the temperature reaches up to 50 ^{0}C), scarce water supplies, and dwindling floral resources. However, honey bee apiaries can survive in such environments if suitable management practices are applied such as fresh water availability and sprinkling of water nearby apiary, shade of plants and ventilated boxes (Pine wood), Shelter belt to avoid the heat stroke in peak summer, supplement feeding, cultivation of California poppy in shade and early Bajra crop. This experiment was conducted in the field of SGT University, Gurugram, Haryana from March to August 2023. Total four treatments (California poppy+Sugar – T_1, California poppy – T_2, Bajra + Sugar feeding – T_3, Bajra - T_4) in three replications were taken including control. Results revealed that highest brood population and honey area was observed with T1-California poppy+Sugar (Mean: 13.00 &11.66 squares, F: 58.20, P<0.05) significantly similar to the California poppy alone followed by Bajra+Sugar (11 squares)/ All treatments were proved superior over the control (1.66 squares) and least survival was observed in Bajra crop without feeding (8.33 square).
Keywords: *Apis mellifera*, bajra, california poppy, summer season.

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Green Solvents for Sustainable Chemistry: A Futuristic Approach

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Sustainable solvents are a topic of growing interest in both the research community and the chemical industry due to a growing awareness of the impact of solvents on pollution, energy usage, and contributions to air quality and climate change. Solvents are used as a reaction medium for chemical transformations and also in a wide variety of processing steps in many industrial sectors. These solvents contaminate our environment due to their toxic properties. In spite of the fact that organic solvents, like acetone, DMSO, DMF as well as aromatic compounds e.g. benzene, toluene and chlorinated solvents contribute to the environmental pollution, they are still used in large amounts. In these circumstances, the notion of Green Chemistry has been identified as the efficient medium of synthesis of chemicals and procedures to eradicate the toxic production of harmful substances. The most important intention of green chemistry is to decrease the use of solvents or substituting them with less toxic green solvents. Green solvents are environment-friendly and less hazardous than traditional organic solvents. Solvents like water, ionic liquids, deep eutectic mixtures, bio solvents, organic carbonates and liquid polymers can be used as green solvents. Among all, ionic liquids are the best replacement of traditional solvents because of their versatile behaviour like: high stability, biodegradability, low vapor pressure and low toxicity etc. A wide range of technical, economic, and environmental factors are considered, giving a more complete picture of the current status of sustainable solvent research and development. Solvent selection and its physico-chemical properties on a specific chemical reaction is also important for environmental protection and sustainable development.

Keywords: *Green chemistry, green solvents, ionic solvents, deep eutectic mixtures*

AFTEFS/GCH/2024/148

YIELD, QUALITY, SULPHUR UPTAKE AND RESIDUAL NUTRIENT STATUS OF SOIL AS AFFECTED BY DIFFERENT SOURCES AND LEVELS OF SULPHUR TO SUMMER SESAME ON VERTISOLS

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Sesame (*Sesamum indicum* L.) is an important oilseed crop in the tropics as major source of high quality, unique edible oil and thus occupies premier place in farming system. India ranks first in area, production and export of sesame in the world. The role of sulphur on yield and quality improvement of sesame is well established as sulphur is key constituent of oilseeds and directly involved in formation of fatty acids in oil compounds. It is constituent of three amino acids viz., methionine (21 % S), cysteine (26 % S) and cystine (27 % S) and these are building blocks of proteins. Hence, it is vital for protein production (Tandon, 2011 and Marschner, 2011). Uptake of S by oilseeds is 3 to 4 times greater than cereals (Tandon, 1991). Crop removal is the major cause of sulphur depletion in soil. This suggests that maximum economical crop production cannot be expected from the use of NPK fertilizers alone, but that sulphur must be included in the fertilization programme. There is a paucity of information regarding the response of sesame to application of sulphur in the typical black cotton soils of the region and therefore, the study of their effect on quality, uptake by sesame and residual nutrient status in soil needs special consideration.

Keywords: Seasame, Sulphur, fatty acid, amino acids, residual nutrient, vertisols.

AFTEFS/GCH/2024/149

An insight into the importance and utilization of medicinal plants

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Since the beginning of human history, medicinal plants—one of the largest resources of the ecosystem, have been used in human life and the healthcare system. They still serve a fundamental therapeutic and curative purpose, which makes them significant in the current era. Medicinal plants account for a large proportion of the world's flora and are the source of many different herbal medications used for medicinal purposes. Medicinal plants are now recognized as a vital resource for the treatment and prevention of many diseases. Every plant has a number of significant components that are useful in the medical industry and may be utilized to create various types of medications. Many underdeveloped nations, as well as some industrialized nations, use herbal medicine to preserve population health. The preservation of medicinal plants is turning into problem that needs to be addressed due to fast increase in population, deforestation and urbanization. Even while herbal medicines have gained popularity over the past few decades, concerns about its efficacy, safety, and quality still exist. High-value medicinal plants face extinction due to overexploitation. It is essential to conserve these plants. It has been demonstrated that several of these plants possess antibacterial, anti-asthmatic, and anti-illness qualities. Keeping in view of this, the present article gives an insight into the importance and utilization of medicinal plants that are useful in pharmacologically avoiding diseases.

Keywords: *Medicinal plants; Flora; Herbal; Antibacterial, Anti-asthmatic*.

AFTEFS/GCH/2024/150

Effect of NaCl and Salicylic acid on early seedling growth stage of *Leptadenia pyrotechnica*

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Leptadenia pyrotechnica (Forsk.) Dence, belongs to family Ascepiadaceae, locally known as Kheep or Khimp is a multipurpose perennial shrub of Thar desert. It is a source of fiber, fuel, forage and pod-like fruits in vegetables. This plant has ethnobotanical and medicinal importance as antifungal, antibacterial, antimutagenic, antioxidant, anthelmintic, antidiabetic, hypolipidemic. It has long and extensive roots system which plays important role in soil binding in Thar desert. Sterilized seeds of *L. pyrotechnica* were germinated in petri plates containing whatman No. 1 filter paper and treated with deionized water (control) , 50 mM, 100 mM Sodium chloride (NaCl), 0.3 mM salicylic acid (SA), 0.3 mM SA with combination of 50 mM, 100 mM NaCl. In the present study, NaCl treatments (50 mM and 100 mM) reduced seed germination, chlorophyll content, chlorophyll stability index (CSI) and membrane stability index (MSI) while SA treatment (0.3 mM) increased the parameters of the seedlings. SA and both concentrations of NaCl increased the carotenoids and phenols content in the seedlings. Present study suggests that SA treatment can be used for alleviation of the NaCl toxicity by increasing seed germination, seedling growth, membrane stability, pigments and phenols content in seedlings of *L. pyrotechnica*.

Keywords: *Leptadenia pyrotechnica; Thar desert; Pigments; Salicylic acid; Sodium chloride.*

AFTEFS/GCH/2024/151

CLIMATE-SMART LIVESTOCK PRODUCTION: EXPLORING SENSOR-BASED METHANE REDUCTIONS STRATEGIES

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Livestock production is believed to be adversely affected by the extreme climatic conditions. Also, climate change is widely regarded as a significant peril to the survival of numerous species, ecosystems, and the long term viability of livestock production systems in various regions across the globe. FAO reported that the supply chains for livestock are responsible for 7.1 GT CO2, or 14.5% of the world's anthropogenic greenhouse gas emissions. About two thirds of the amount come from cattle (beef and milk), mostly from methane emissions from rumen fermentation. Thirty percent of methane emissions worldwide are caused by enteric bacteria. As per IPCC accounting, Livestock accounts for approximately 8-10.8% of worldwide greenhouse gas (GHG) emissions and the Global surface temperature was around 1.1°C above 1850–1900 in 2011–2020 (1.09 [0.95 to 1.20]°C)64, with larger increases over land (1.59 [1.34 to 1.83]°C) than over the ocean (0.88 [0.68 to 1.01]°C). Reducing greenhouse gas emissions is a critical response to the threat posed by climate change, but adaptation to the changing climate will also be a critical component of that response. The incorporation of novel technologies into research and technology transfer frameworks presents several prospects for advancing the implementation of climate change adaption approaches. In order to mitigate the effects of climate change on livestock production, interdisciplinary strategies that prioritize animal welfare, housing, and nutrition are needed. Thus, in order to maintain livestock output in the face of a changing climate, attention should be focused on all three components of adaptation, mitigation, and amelioration techniques. Methane is believed to be a significant contributor to global warming and climate change. It is a dangerous greenhouse gas that, over a 100-year period, has an impact 28 times larger than carbon dioxide. Various methane detection sensors, including

optical sensors, calorimetric sensors, pyroelectric sensors, semiconducting oxide sensors, and electrochemical sensors are recently developed and used for the competent methane mitigation strategies. Therefore, efficient climate change mitigation strategies include adopting recent technologies and developments in order to alleviate the enteric methane emissions and to elevate sustainable livestock production.

Keywords: Climate change, Methane emissions, Livestock Production, Sensors.

AFTEFS/GCH/2024/152

An insight into the importance and utilization of medicinal plants

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Since the beginning of human history, medicinal plants—one of the largest resources of the ecosystem, have been used in human life and the healthcare system. They still serve a fundamental therapeutic and curative purpose, which makes them significant in the current era. Medicinal plants account for a large proportion of the world's flora and are the source of many different herbal medications used for medicinal purposes. Medicinal plants are now recognized as a vital resource for the treatment and prevention of many diseases. Every plant has a number of significant components that are useful in the medical industry and may be utilized to create various types of medications. Many underdeveloped nations, as well as some industrialized nations, use herbal medicine to preserve population health. The preservation of medicinal plants is turning into problem that needs to be addressed due to fast increase in population, deforestation and urbanization. Even while herbal medicines have gained popularity over the past few decades, concerns about its efficacy, safety, and quality still exist. High-value medicinal plants face extinction due to overexploitation. It is essential to conserve these plants. It has been demonstrated that several of these plants possess antibacterial, anti-asthmatic, and anti-illness qualities. Keeping in view of this, the present article gives an insight into the importance and utilization of medicinal plants that are useful in pharmacologically avoiding diseases.

Keywords: *Medicinal plants; Flora; Herbal; Antibacterial, Anti-asthmatic*.

AFTEFS/GCH/2024/153

SILICON CAST OF TRACHEO-BRONCHIAL TREE OF JAMUNAPARI GOAT

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Using specimens is essential for teaching more and making learning interesting, especially when it comes to subjects like anatomy. The tracheo-bronchial specimen is a synthetic specimen made of silicon resin. Visual aids are essential because the tracheo-bronchial tree's interior anatomy is very difficult to understand mentally. The silicon sealant will be used to generate a corrosion cast that faithfully reproduces the structure. After being injected with a cannon into the trachea lumen, the silicon sealant was physically massaged to the lobes. It's quite sturdy and has a fantastic look.Commercial silicone resin has an inherent ability to self-cure. The cast was obtained by acid maceration of the excised tissue following the fixing period. corrosion castings of the lungs' airways.

Keywords: Silicon Cast, Tracheo-bronchial tree, Jamunapuri Goat.

AFTEFS/GCH/2024/154

AGRICULTURAL IMPACT ON UNDERGROUND WATER IN HARYANA

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Agriculture is the main area of the Indian economy from the perspective of poverty reduction and the entrepreneurial era. The Green Revolution in India achieved autonomy in the creation of food. This has led to constant natural pollution, especially of the soil, vegetation and water resources in Haryana. The content of common substances in the soil is decreasing and the use of substance inputs is increasing. Agricultural development however required both increased compost distribution and the use of a water frame, leading to contamination of the water by nitrates and phosphates, as well as changes in

the level of groundwater. Reduced ability to use food supplements, soil physical and substance contamination, and inefficient use of water have limited production efficiency, while monoculture use, mechanization, and extravagant reliance on composite plant confirmation has reduced recently the variety of crops, plants and animals. Sustainable progress has been described as "economic improvement will be an improvement that solves the problems of the present without affecting the future limits of the individual to solve their own problems." The possibility of achievable advancement has two evaluations, namely, improvement and awareness and the fundamental point of convergence of legitimacy lies in the question of esteem. between generations. Adopting delicate agriculture and horticulture without a real understanding of the various consequences, may very well lead to what has happened in the past for some time.

Keywords: Agriculture, Economy, Poverty, Substances, Contamination, Supplements, Sustainable, Advancement etc.

AFTEFS/GCH/2024/155

SUSTAINABLE AGRICULTURE AND FOOD SECURITY

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Over one-third of the world's land surface is used for agriculture, making it the single largest land use. The best terrain has already been farmed to a large extent, and much of the remaining land is insufficiently high, steep, shallow, dry, or cold to support food production. Growing population are putting pressure on the quantity and quality of land available for food production. Production has increased due to intensification, which has been fueled by a profitable but mainly ineffective food system. On the other hand, it has also exacerbated pollution, water scarcity, and land and soil degradation, disrupting cultural landscapes. In a world where there should be plenty, agricultural expansion is contributing to the rapid extinction of species, the degradation of natural habitats, and widespread food insecurity. There is an urgent need for sustainable agriculture, as Sustainable Development Goal 2 (SDG target 2.4) calls for the "ensure sustainable food production systems and implementation of resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to

climate change, extreme weather, drought, flooding, and other disasters, and that progressively improve land and soil quality."
Keywords: Agriculture, Crop Pattern, Soil Degradation, Food Security, Sustainability.

AFTEFS/GCH/2024/156

A Study on Agricultural Insurance Schemes in Rural Haryana

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In the form of risk mitigating strategy insurance may play a vital role in anchoring a stable growth of agricultural sector through reduction of the financial losses suffered by the farmers due to damage and destruction of their crops, contents, machinery or accident with the farmer. The awareness regarding governmental initiatives has always been among the major hindering factors to take full advantage of the developmental efforts. The present study conducted in two districts (Palwal and Faridabad) of southern Haryana (vulnerable to Earthquake, Industrial & Chemical Disaster, Floods, Drought, Accidents, Fire, Health related Disaster, Hailstorm, Bio Terrorism etc.) shows that farmers awareness level regarding the agricultural insurance schemes was found at lowest ebb in terms of its components and sub components. Number of constraints were reported by the respondent farmers hindering the acquisition of Agricultural Insurance Scheme.
Keywords: Agricultural Insurance, Southern Haryana, Awareness.

AFTEFS/GCH/2024/157

Problems of Sustainable Development in India

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This paper analysis the increasing economic activity in modern conditions is often connected with a harmful impact on our planet mother earth. If this process of increasing economic activity remain continue, it will be next to impossible for man to survive. This trend is a serious cause for concern and leads numerous initiatives realized at both the international and the national levels and contributing to the development of green economy. The purpose of this paper is to systematise the main challenges in the area of social, economic and environmental development taking into account their specific features and provide recommendations relevant to the guidelines for public policies related to the reduction of the impact of economic activity on the environment. Theoretical and empirical methods such as literature review, retrospective analysis, logical and system analysis, and graphic-analytical methods of visualisation of system analysis are used in this research. This paper presents an analysis of social, economic and environmental development worldwide and particularly in India. This research proves that environmental problems are global in nature and the development of green economy is in the current interest across countries. They are in line with global trends in sustainable development policies. The involvement of both activists and civil society institutions in the relevant processes is considered to be a sign of the greening of the economy. The proposed guidelines for public policies in the area of green economy may become part of sustainable development programmes in India.

Keywords: Sustainable Development, Green Economy, Environment, Pollution, Earth.

AFTEFS/GCH/2024/158

Literature and Ecology: a Feminist Perspective on Anita Desai's Environmental Critique

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Ecology and eco-criticism have become popular areas of study for literary critics, as they delve into the intricate relationship between nature and human beings as portrayed in literature. Ecology refers to the study of the relationship between living organisms and their natural environment, while eco-criticism focuses on the relationship between living organisms and the physical environment as depicted in literature. Throughout history, stories about the inseparable bond between man and the ecosystem he inhabits have been documented, and this bond has persisted even in the digital age. This research paper seeks to highlight the ecological concerns presented in two novels by Anita Desai, *Cry the Peacock* and *Fire On the Mountain*. The paper's hypothesis is that the exploitation of both nature and women by a male-dominated society is a prevalent theme in contemporary literary discourse, particularly in the concept of eco-feminism. The paper explores how the works of Desai reveal the extent of exploitation and depletion of nature, as well as the social and cultural oppression of women. The key terms for this paper include ecology, environment, exploitation, depletion, and eco-feminism. By analyzing the works of Anita Desai through the lens of eco-criticism and eco-feminism, this paper aims to shed light on the importance of preserving the natural environment and the fundamental connection between human beings and the ecosystem they inhabit. The paper argues that the neglect and exploitation of nature and women by a patriarchal society have far-reaching consequences, both socially and ecologically. Ultimately, this paper serves as a call to action, urging readers to consider the impact of human actions on the environment and the vital importance of ecological and social sustainability.

Keywords: ecology, eco-criticism, environment, exploitation, depletion, eco-feminism.

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Adsorption of SO_2/SO_3 over pristine graphene and Ni/Fe doped graphene-based substrates: A DFT study

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Graphene has attracted many scientists over the years after its discovery in year 2004. Graphene is the building block of graphitic materials. The unique physicochemical structure and properties make graphene as a promising material in the field of separation and adsorption. The chemical inertness and strong hydrophobic character of graphene is a major limitation to applications in adsorption technology and separation science. Therefore, structural alteration by creating vacancies or doping metal atoms can tune the electronic properties and reactivity of graphene. Graphene-based nanomaterials are an appropriate choice for removing life-threatening contaminants from water and air because of their enhanced surface reactivity compared to their bulk counterparts. In this work, the adsorption of air pollutant gases SO_2 and SO_3 on pristine
graphene and Ni/Fe-doped graphene systems have been investigated using density functional theory (DFT) studies. Different adsorption modes have been considered, based on the interaction of SO_2/SO_3 with pristine and modified graphene surfaces. While adsorption of SO_2/SO_3 on the pristine graphene is purely physisorption, it has been found that the adsorption capacity of pristine graphene can be significantly enhanced by doping with Ni/Fe metals. As a result, effective and favorable adsorption occurs. Graphene doped with transition metals is noted to exhibit high adsorptive reactivity.

AFTEFS/GCH/2024/160

Sustainable Development : An Indian Review

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Sustainable development is a common agenda for worldwide concern, but the socio-cultural-economic conditions of one country vary from the other. It calls for a serious domestic introspection of the needs, opportunities, strategies and level of sustainable development. According to the Brundtland report, sustainable development means "To meet the needs of present without compromising the ability of future generations to meet their own needs". It advocated the idea of "sustainable growth". The World Conservation Strategy report (1980 suggested that for development to be sustainable it must take into account the social and economic factors as well as the ecological ones. India is presently emerging as an economic superpower, but in contrast, there is another profile of India. We constitute around 17% of the world's population, which consists of about 35% of the poor and 40% of the illiterates in the world. While India is pushing hard to achieve higher and static economic growth, various national and international reports and findings are indicating towards deteriorating ecological condition in India. This calls for the formulation of India-centric and viable sustainable development policy while maintaining pace with the International community. This shall uphold the spirit of 'vasudhaiv kutumbakam' as advocated by our forefathers to promote universal brotherhood as well.

Keywords: Sustainable development, future generations, economic growth, ecological conditions.

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Seed priming: Significant techniques for vegetable crops

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Seed is a mature ovule consisting of an embryonic plant together with a stored food, surrounded by a protective coat. Seed germination is affected by various abiotic factors such as low temperature, high temperature, drought, and salinity in the conventional system. These factors can be mitigated by seed enhancement strategies such as film coating, pelleting, liquid density separation and priming. Among these, seed priming is the most effective method for increasing germination, seedling growth and plant yield. Seed priming is a pre-sowing treatment that involves the controlled hydration of seeds, sufficient to allow pre germinative metabolic events to take place but insufficient to allow radicle protrusion through the seed coat. It permits early DNA replication, increase RNA and protein synthesis, enhances embryo growth, repairs deteriorated seed parts and reduces leakage of metabolites. Through this technique we can reduce the time for germination, increase rate of germination, uniformity in seed germination and it extend the range of temperature for germination. Main advantages of used for small seeds, enhances the yield. There are different techniques used for seed priming like halo, hydro, osmo, thermo, matrix, bio and PGR improve germination, nutrient, yield and biochemical parameters. After seed priming drying is an important operation and it done at proper safe limits. It is also used in high value crops.

Keywords: Seed priming, seed enhancement, priming techniques.

AFTEFS/GCH/2024/162

Conservation status of *Trevesia palmata (*Roxb.ex Lindl.*)* based on paticipants' census of Karbi ethnic tribe of Assam, India

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Traditional knowledge of indigenous communities plays a crucial role in the conservation and sustainable utilization of plant genetic resources. The North-East India is one of the wealthiest reservoirs of various plant species. The *Karbi* ethnic tribe, one of the major tribes of Assam is known for their rich cultures and traditions. Wild food plants constitute a major component of food basket of the *Karbi* tribe. One of the important wild food species is *Trevesia palmata (*Roxb.ex Lindl.*)* [Araliaceae]

This plant grows wild in Karbi anglong and its leaves and buds are used as vegetable. But the conservation status of this plant has not been evaluated yet. Therefore, with this backdrop, the present study focuses on the estimation of the assessment of conservation status of *Trevesia palmata* based on paticipants' census of Karbi ethnic tribe of Assam, India. Data was collected using semi-structured questionnaires and interviews employing the snowball sampling method.

The plant part use value analysis revealed inflorescence as the most frequently utilized part, holding the highest importance score followed by leaves.

Conservation status was estimated using five variables viz., occurrence, availability, conservation efforts, threatened factors and reproductive potential. Principal Component Analysis of these factors reveal that occurrence and availability contribute most to the variation of the conservation status. The score for conservation status was estimated to be 1.68. This signifies that *T. palmata* is 'vulnerable' in the study area. The findings of the study emphasize the crucial need to incorporate indigenous knowledge in planning and executing works for conservation of *T. palmata*.

Keywords: Conservation, traditional knowledge, T*revesia palmata*, *Karbi* ethnic tribe, North-east India.

AFTEFS/GCH/2024/163

Revolutionizing Carbon Sequestration Through Commercial Agroforestry: Insights from Poplar and Eucalyptus Case Studies in India

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Climate change, land degradation, and desertification result in the depletion of carbon in soil and plants. The atmospheric concentration of carbon dioxide (CO2) has surged to 412 ppm, marking a 47% increase since the onset of the industrial era when levels were around 280 ppm. Consequently, there is a critical need to sequester carbon from the atmosphere to the Earth's surface. Many scientists advocate for agroforestry as a powerful tool for mitigating climate change and generating economic benefits. The Indian government is actively promoting tree-based systems to achieve a 33% tree cover across the total geographical area for climate change mitigation. The expansion of commercial agroforestry, particularly with fast-growing tree species that yield higher biomass, is seen as a sustainable and environmentally friendly method to sequester carbon, enhance green cover, and boost farmers' financial well-being.

Tree species like poplar, nilgiri, subabul, tree of heaven, willow, malabar neem, cadamba, and white teak are identified as suitable for carbon sequestration in agroforestry. Poplar and eucalyptus stand out as major agroforestry tree species widely adopted by millions of Indian farmers since the 1990s, particularly in the Indo-Gangetic plains where commercial agroforestry originated. The review indicates that poplar and eucalyptus have the capacity to sequester carbon stocks of 212.7 Mg C ha−1 and 237.2 Mg C ha−1, respectively. In conclusion, while the commercial agroforestry system has been notably successful in the Indo-Gangetic regions, there is a pressing need for its expansion with compatible crops in different parts of the country.

Keywords: Biomass production; Climate change; land degradation; Poplar and eucalyptus.

AFTEFS/GCH/2024/164

A DFT study on Adsorption of Disinfection by-products over graphene oxides and modified graphene substrates

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Disinfection by-products (DBPs) are present ubiquitously in drinking water. These are the by-products of the water disinfection process and are a matter of great concern, as they affect human health. In this work, the adsorption of a model DBP, bromonitromethane (BNM), on pristine graphene, graphene oxide and Ni/Pd/Pt-doped graphene systems have been investigated using density functional theory (DFT) studies. Two adsorption modes have been considered, based on the interaction of BNM with graphene surfaces *via* the Br atom and the NO_2 functional group. While adsorption of BNM on the pristine graphene is purely physisorption, it has been found that the adsorption capacity of pristine graphene and graphene oxide can be significantly enhanced by doping with Ni/Pd/Pt metals. Particularly, for Ni, graphene oxide substrate gets involved in H-bonding with adsorbed BNM. As a result, effective and favorable adsorption occurs. Partial density of states (PDOS) plots reveal the effect of metal doping on the band gap and reactivity of different substrates. Electron density difference plots give insights into the adsorption behavior of BNM.

AFTEFS/GCH/2024/165

EUCALYPTUS IN TRADITIONAL MEDICINE: EXPLORING ITS ANTISEPTIC AND ANTI-INFLAMMATORY BENIFITS

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Eucalyptus plants, belonging to the Myrtaceae family, are renowned for their diverse medicinal and aromatic properties. Native to Australia but now cultivated worldwide, these trees and shrubs are valued for their essential oils, extracted from their leaves, which contain potent compounds like eucalyptol. Eucalyptus oil is extensively utilized in pharmaceuticals, cosmetics, and aromatherapy due to its respiratory benefits, including its ability to relieve congestion and ease breathing. Additionally, eucalyptus leaves are employed in traditional medicine for their antiseptic and anti-inflammatory properties, used in treating ailments ranging from coughs and colds to muscle pain and skin conditions. Eucalyptus trees play significant ecological roles, providing habitat for wildlife and contributing to soil and water conservation. However, sustainable management practices are crucial to balance commercial exploitation with environmental preservation. Overall, the utilization of eucalyptus plants underscores their multifaceted importance in health, industry, and ecosystem sustainability.

AFTEFS/GCH/2024/166

Causes, Effects and Solutions for Depletion of Natural Resources

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A natural resource refers to materials from the Earth that are used to support life and meet people's needs and wants. The natural substance available for humans use in any form can be considered a natural resource. Materials like ores, coal, crude Oil, natural gas, metals and nonmetals, precious stones etc., are some examples of natural resources. Materials like ores, coal, crude Oil, natural gas, metals and non-metals, precious stones etc., are some examples of natural resources. Along with the mentioned materials Animals, birds, trees, fish and plants are also the natural resources available for satisfying human needs and wants. These materials support humans in preparing food, fuel and raw materials for the production of goods for business houses. The food that humans consume primarily comes from various plants and animals. The mainfeature of natural resources is that they dictate the survival of humans and other forms of life on the earth. The Present paper titled "Causes, Effects and Solutions of Depletion of Natural Resources" was majorly focused on Causes for resource depletion, Effects on environment for resource depletion and Solutions of Depletion of Natural Resources.

AFTEFS/GCH/2024/167

The variation in Biodiversity in the last decade

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On the earth, a variety of plants, animals and microorganisms interact with each other and complete their life cycle represent the biodiversity. This diverse nature of life forms can be divided into genetic, species and ecosystem biodiversity. It changes at various levels due to emergence of new species and extinction of some other species. It is high in tropical regions as compared to the other regions on the earth. The forest ecosystem at global level cover around 9% of land area and about 50% of species in tropical area in comparison to the other area. In the same way, biodiversity at coastal area is high due to warm and tropical environmental conditions. In the nineteenth century, the pattern of biodiversity loss have been noticed and observed due to urbanization and changes in environment. In this regard it has been estimated that about 30% decrease or loss of different kind of species will be extinct up to mid of twentieth century. This lose comes to be as 140,000 species per year related to the different groups can be undergo the risk of extinction. Further, we have lost up to 58% of our important species at the end of year 2016. As a mega diversity nation, India accounts for 8% in world biodiversity over 2.4% of land mass. This includes 91,000 animal species and around 45,000 plant species. The species of angiosperms are 21,984; Bryophytes are 2800; Gymnosperms are 82 and Pteridophytes are 1314 in Indian biodiversity. It is very much essential to conserve our natural resources at every cost because these protect us from harmful effects of Green House Gases.

Key Words: biodiversity, species, environment, extinction

AFTEFS/GCH/2024/168

Methanolic extraction of bioactive compounds from fruit peel and synthesis of silver nanoparticles for agriculture applications

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This study explores the potential of banana peel and sweet lemon peel extracts for the green synthesis of silver nanoparticles and investigates their impact on the growth of wheat plants. Methanolic extracts of banana peel and sweet lemon peel were used to synthesize silver nanoparticles. The nanoparticles were characterized using UV-visible spectrophotometry and FTIR, confirming their formation and structure. TEM imaging revealed nanoparticles with average sizes of 48 nm for banana peel and 16 nm for sweet lemon peel. The synthesized nanoparticles exhibited high efficiency in inhibiting the growth of pathogenic bacteria. The study investigated the effect of these nanoparticles on seed germination and seedling growth of wheat plants. Treatment with nanoparticles at a concentration of 50 µg/ml resulted in the highest seed germination rates (92% for banana peel and 95% for sweet lemon peel), as well as longer root and shoot lengths. However, a higher concentration (100 µg/ml) led to lower seed germination rates and shorter root and shoot lengths. The study suggests that one-step synthesized silver nanoparticles from fruit peel extracts can effectively control bacterial pathogens and promote the growth of plants, specifically wheat in this case. This research highlights the potential of utilizing agricultural waste, such as banana peel and sweet lemon peel, for the eco-friendly synthesis of nanoparticles with agricultural applications, including plant growth promotion and disease control.

Keywords: Fruit peel, FTIR, TEM, Silver nano particles.

AFTEFS/GCH/2024/169

The Role of Environmental Acts in the Protection of Environment

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The management of natural resources is mainly for the regulation and judicial use of resources for upcoming generations. For this, different policies are regularly framed by the experts for the protection of dynamic ecosystem, prevention of exploitation and uniform availability of resources for the society at the national and international level. To achieve this, the results depend upon the way in which policies implemented for conservation of natural resources and their equitable distribution among the stockholders. In view of this, the Indian Constitution was amended in 1976 through 42nd amendment act by adding Article 48A and 51G in the constitution of the country. This provide opportunities to the states for the improvement and protection of their environment. The uncontrolled development results in the formulation of Wildlife Protection Act, 1972, Water Act, 1974, Air Act, 1981 and Environment Protection Act, 1986. These all acts are came in to existence after United Nations Conference on Human Environment, Stockholm held in 1972. The main objectives of this is to coordinates activities of different agencies that are operating under the existing laws, Enhancing laws for the protection of the environment, formation of government authority to regulate industry, imposing punishment and penalties on the enemy of the environment and engaging the society in sustainable development process of the environment. This act has the provision of environmental quality standards, testing of equipment's, collection of samples, regulatory disposal of environmental pollutants and handling of hazardous substances. This act empowers the central government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms. Later on in 1991, the amendment was made in this act. It is a concept that attempts to reconcile anthropogenic developmental activities with environment protection by assessing the impact of such activities on the environment and addressing them at the planning and design stage of the project itself. This act involves identifying the future implications of a proposed activity on the environment.

Key Words: Environment, Pollution, Sustainable Development.

AFTEFS/GCH/2024/170

Eco Tourism: At a glance

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Ecotourism is about more than simply visiting natural attractions or natural places; it's about doing so in a responsible and sustainable manner. The term itself refers to traveling to natural areas with a focus on environmental conservation. The goal is to educate tourists about conservation efforts while offering them the chance to explore nature. The International Ecotourism Society (TIES) defines ecotourism as "responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education (both in its staff and its guests). It is of two types i.e. mass tourism which is a traditional tourism system where income increment is the main motive by short-term, free-market principles and alternative tourism which is the complementary approach to tourism and becomes a better option than mass tourism an alternative tourism is a generic term that encompasses a whole range of tourism strategies (e.g., appropriate, eco, soft, responsible, people to people and green tourism) all of which purport to offer a more benign alternative to conventional mass tourism in certain types of destination. Ecotourism reduces negative effects on the body, mind, behavior and spirit, foster respect and understanding for the environment and culture, ensure that both guests and hosts have a great time, offer immediate monetary rewards for environmental preservation and produce economic advantages for the community and private sector.

Keywords: Ecotourism, natural areas, mass tourism, alternative tourism and environment.

AFTEFS/GCH/2024/171

Symptoms and Control of *Alternaria porri* (Ellis) Cifferi-caused Purple Blotch disease in Onions

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One of the most common diseases in Himachal Pradesh's onion-growing regions is caused by *Alternaria porri* (Ellis) Cifferi. The disease manifested itself in a mild to severe form in various onion-growing locations in the Solan and Sirmour districts of Himachal Pradesh, according to survey surveys carried out for this inquiry. Onion foliar portions were showing signs of the illness. Typical target board has such as similar to the lesion's appearance. Under the microscope, strange obclavate to obpyriform conidia with a lengthy beak were discovered. While field evaluation studies showed that four foliar sprays of Cabrio Top (metiram + pyraclostrobin) @ 0.2 percent or Folicur (tebuconazole) @ 0.10 percent were effective in limiting the purple blotch of onion (83.41%), in vitro evaluation studies revealed that Cabrio Top (metiram + pyraclostrobin), Folicur (tebuconazole), and Amistar (azoxystrobin) were the most effective fungicides in inhibiting the mycelial growth of Alternaria porriBy increasing the bulb yield (255.32 q/ha) using a 1:8.78 ICBR ratio.

Keywords: Purple Blotch, *Alternaria porri,* Cabrio Top (metiram + pyraclostrobin)

Govt. College Hisar, AFTEFS and VITAL BIOTECH Education Group

AFTEFS/GCH/2024/172

Effect of Volatile Metabolites of Native *Trichoderma* isolates Against Sclerotinia Stem Rot of Indian Mustard

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Sclerotinia stem rot, caused by *Sclerotinia sclerotiorum,* poses a significant threat to Indian mustard (*Brassica juncea*) and other crops worldwide. *Trichoderma* species are well-recognized biocontrol agents with the capability to produce volatile organic compounds (VOCs) and secondary metabolites that inhibit pathogen growth. This study investigates the efficacy of volatile metabolites from native *Trichoderma* species against Sclerotinia stem rot in Indian mustard. A total of fifteen *Trichoderma* isolates which were isolated from soil samples collected from different mustard growing areas of Haryana were evaluated for their volatile metabolites production against *S. sclerotiorum* using paired plate technique under *in vitro* conditions in the Department of Plant Pathology, CCS Haryana Agricultural University, Hisar. Studies indicated that Isolate HHT was most effective in reducing the mycelial growth of *S. sclerotiorum* HSR isolate whereas, isolate HBT accounted for maximum reduction in mycelial growth of *S. sclerotiorum* BWL isolate. Overall, this study underscores the promising role of native *Trichoderma* species and their volatile metabolites in managing Sclerotinia stem rot of Indian mustard. The environmentally friendly nature of this approach, coupled with its efficacy, suggests its potential as a sustainable alternative to chemical fungicides.

Keyword: *Brassica juncea,* Paired plate technique, *Sclerotinia sclerotiorum, Trichoderma,* Volatile organic compounds

AFTEFS/GCH/2024/173

Social upliftment of landless farmer with the collaboration of landlords and Increasing of carbon sink

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Shrimp, being a rich source of DHA, antioxidants, and highly exportable products, are increasingly luring farmers and entrepreneurs. As the fisheries sector, especially aquaculture (traditional land-based and sophisticated technological tank farming), becomes more and more prominent and promising for livelihood and income generation, prevention to migration as well as helping to care for sustainability and combating to worldwide warming and climate change related issues through expanding carbon sink, increasing numbers of farmers and entrepreneurs have been experimenting with high value shrimp in different culture systems. Assessing the demographics of the shrimp cultivation facilities in Punjab's southwest district was the study's main objective. During the study, the majority of farmers provided their thoughts and Remarks difficulties with labor availability, marketing, and shrimp pricing. I visited about 75 shrimp farms in the districts of Muktsar and Fazilka. The study's findings indicate collaboration between landless farmers and land farmers, as well as value addition to shrimp crop production and social upliftment through sustainable practices.

Keywords: Shrimp farms, Rural demography, land farmers, livelihood, exportable.

AFTEFS/GCH/2024/174

Theme of Environmental Sustainability in Wordsworth's Poems: "Nutting" and "The World is Too Much with Us"

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This research paper delves into the theme of environmental sustainability as portrayed in two seminal works by the renowned Romantic poet William Wordsworth: "Nutting" and "The World Is Too Much with Us." Through a comprehensive analysis of these poems, this study seeks to elucidate Wordsworth's profound concern for the natural world and his advocacy for its preservation, thereby offering valuable insights into the intersection of literature and environmentalism during the Romantic era.

In "Nutting," Wordsworth employs vivid imagery and sensory details to depict the speaker's intimate encounter with nature, particularly focusing on the act of nutting in a secluded woodland. Through this exploration, Wordsworth not only celebrates the beauty and abundance of the natural world but also highlights the ethical responsibility of humans towards the environment.

Similarly, in "The World Is Too Much with Us," Wordsworth critiques the materialistic and consumerist tendencies of society, lamenting humanity's estrangement from nature and its disregard for its intrinsic value. Through poignant language and a poignant sonnet form, Wordsworth urges readers to reevaluate their relationship with the environment and embrace a more sustainable way of living.

By analyzing these poems within the context of Wordsworth's broader philosophical and literary oeuvre, this paper aims to shed light on the poet's environmental consciousness and his enduring relevance in contemporary ecological discourse. Moreover, it underscores the enduring relevance of Romantic literature in fostering a deeper understanding of environmental issues and advocating for responsible stewardship of the natural world.

Key Words: Sustainability, imagery, materialism, consciousness, woodland.

AFTEFS/GCH/2024/175

Salt Tolerance In Tropical And Subtropical Fruit Crops

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Soil salinity is a serious issue worldwide. Salt stress is the accumulation of excessive salt contents in the soil which eventually result in the inhibition of crop growth and leads to crop death. It is caused due to high accumulation of the Na^+ , Ca^{2+} , Mg^{2+} , K^+ , SO_4^{-2} , CO_3^{-2} , HCO_3^- and Cl^-, *etc*. The most seriously salt affected areas in arid, semi-arid and coastal line where evapo-transpiration exceeds precipitation resulting in accumulation of salts in the soils rather than leaching out. Excess salt in soil reduce the water potential of the soil and making the soil solution unavailable to the plants. As per the Central Soil Salinity Research Institute (CSSRI), Haryana in India, 6.73 M ha area is salt-affected and would increase to 16.20 M ha by 2050. It is challenge for tropical and subtropical fruit production and quality due to its detrimental effects. Among horticultural crops the tropical and subtropical fruits are mostly regarded as salt sensitive. Therefore, strategies for improving salt tolerance in fruit crops are necessary. There are some strategies to develop tolerance against the salt stress such as use of salt tolerant cultivars and rootstocks, biofertilizers, nanoparticles and growth substances.

Key words: Salinity stress, coastal line, salt tolerance, fruit crops.

AFTEFS/GCH/2024/176

Medicinal and aromatic plants and their utilization

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Medicinal and aromatic plants are playing remarkable role in primary health care of human and livestock. Worldwide, it is estimated that up to 70,000 species are used in folk medicines. The number of medicinal and aromatic plant species varies in different countries which makes determining exactly the number of all medicinal and aromatic plant species used worldwide impossible. However, it can be stated, that at least every fourth plant is in use, a calculation based upon the estimated total number of 300–350,000 flowering plants. The numbers of medicinal and aromatic plant species used in some regions are impressive: In India, which is said to have probably the oldest, richest and most diverse cultural traditions in the use of medicinal plants, about 7,500 species are used in ethnomedicines, which is half of the country's 17,000 Indian native plant species. In Indian traditions, all the plants on earth are considered as medicinal. However, a simple definition is "*Medicinal plants are those plants which are approved in various official and traditional systems of medicines all over the world*". Aromatic plants are a special class of plants used for their aroma and flavour. Many of them are exclusively used for medicinal purposes in aromatherapy as well as in other systems of medicine. The biomasses of different aromatic plants have been widely identified as a source of phenolics/antioxidants. Due to the presence of the rich amount of polyphenols, the biomass can be exploited as a new avenue for health-promoting bioactive compounds, used as antioxidants in food and feed or as ingredients for developing anti-aging compounds in the cosmetic industry. Ashwagandha (*Withania somnifera* L Dunal) is well known for its medicinal uses and the major phyotchemical constituents reported from its roots are withanolides and alkaloids, similar to roots, leaves of *W. somnifera* also contain the anti-cancer therapeutic compounds withanolides. *W. somnifera* contains bioactive withanamides which are potential antioxidants as well as have a protective effect on beta-amyloid-induced cytotoxicity, which is responsible for Alzheimer's disease. Therefore, an understanding about medicinal and aromatic plant is crucial for mankind.

Keywords: Medicinal palnts , Aromatic plants.

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Advancements and Challenges in Organic Farming: A Comprehensive Review

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Organic farming has gained significant momentum as a sustainable agricultural practice, offering promising solutions to mitigate environmental degradation, enhance biodiversity, and ensure food security. This review synthesizes recent advancements and challenges in organic farming practices, focusing on key aspects such as soil health management, pest and disease control, crop diversification, and socio-economic implications. Innovative soil management techniques, including composting, cover cropping, and crop rotation, play a pivotal role in enhancing soil fertility, structure, and microbial activity, thereby promoting long-term sustainability and resilience against environmental stressors. Additionally, the integration of agroecological principles, such as intercropping and polyculture systems, enhances ecosystem services and improves resource use efficiency. Organic farming also emphasizes natural pest and disease management strategies, encompassing the use of biological control agents, crop diversity, and habitat manipulation to minimize reliance on synthetic pesticides and promote ecological balance. However, challenges such as limited access to organic inputs, knowledge dissemination, and certification requirements hinder the widespread adoption of organic practices, particularly among small-scale farmers in developing regions. Furthermore, the socio-economic dimensions of organic farming, including market dynamics, consumer preferences, and policy support, significantly influence its adoption and scalability. Addressing these socio-economic barriers requires collaborative efforts from policymakers, researchers, and stakeholders to promote inclusive and equitable agricultural systems. In conclusion, organic farming presents a holistic approach towards sustainable agriculture, offering multifaceted benefits for environmental, social, and economic well-being.

Keywords: *Agriculture, Conservation, Environmental, Organic, Farming*.

AFTEFS/GCH/2024/178

Evaluating the Effects of PGPR Consortium on *Brassica juncea* Cultivars under Drought Stress during Reproductive Stage

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Brassica juncea (AABB, 2n = 36), or Indian mustard, is an annual herb belonging to the mustard family (*Brassicaceae*). It was originated as an amphidiploid crop through natural hybridization between *Brassica nigra* (BB, 2n = 16) and *Brassica rapa* (AA, 2n = 20). Mustard holds significant economic importance as the third most vital oilseed crop globally, following soybean and palm. However, the changing climate, rising temperatures and increased instances of drought stress, poses challenges to its cultivation. Drought stress, a multifaceted challenge affecting crops at various levels including morphology, physiology, and molecular processes, is exacerbated by environmental disruptions. This research delves into the potential of Plant Growth-Promoting Rhizobacteria (PGPR) as a sustainable approach to enhance drought tolerance. Soil microbes were isolated and thoroughly assessed for their ability to promote plant growth and mitigate drought stress. The research investigated how a consortium of the three most potent PGPR strains affected four *Brassica juncea* cultivars (RH 725, RH 761, RH 749, and RH 30) during the reproductive phase, at 60 days after sowing (DAS), in conditions of drought stress caused by withholding water. The results showed that PGPR application improved shoot and root length in all cultivars and enhanced relative water content, membrane stability, and chlorophyll content. Notably, PGPR treatment increased osmolyte accumulation like proline and sugars, while decreasing reactive oxygen species and lipid peroxidation levels. The present study highlights the potential of PGPR as a sustainable and promising approach to bolster drought resilience in *Brassica juncea*.

Keywords: *Drought Stress, Osmolytes, Chlorophyll, PGPR, Biofertilizer*.

AFTEFS/GCH/2024/179

Effect of integrated weed management practices on French marigold

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Marigold (*Tagetes* sp.) belongs to the family Asteraceae and is one of the most important commercially exploited flower crops and flowers are used in the preparation of garlands and as loose flower on religious ceremonies, festive occasions, offerings etc. and quality is seriously hampered by weeds present in field. 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. The field was mainly infested with *Coronopus didymus, Rumex dentatus, Spergula arvensis* the dominant dicot weeds and *Chenopodium album, Cirsium arvense* and *Anagallis arvensis* were the miscellaneous dicot weeds. Among sedges *Cyprus rotundus* was major weed. Among different weed control treatments, use of black polyethylene mulch of 100µ (T_7) was found highly effective in controlling weeds at 15, 30, 60 & 90 DAT% followed by (T_8) Pendimethalin at 1000 g ha^{-1} as pre-emergence *fb*# two hand weeding (30 and 60 DAT) only at 15 DAT during both the years. However, at 30, 60 & 90 DAT it was followed by (T_{16}) Glyphosate as protected spray (2%) as post- emergence (15 & 30 DAT). Also, the treatment (T_{16}) recorded minimum flower yield because of phytotoxic effect of Glyphosate on marigold plants. The lowest weed intensity, weed dry weight and highest weed control efficiency was recorded in T_7 at 15, 30, 60 and 90 DAT during both the years.

Keywords: *French marigold, black polyethylene mulch, Pendimethalin, Glyphosate, weed intensity, weed control efficiency, weed dry weight.*

#*fb*- Followed by, %DAT- Days after Transplanting

AFTEFS/GCH/2024/180

Assessment of groundwater quality for irrigation purposes in Jalalabad block of Ferozpur district, Punjab

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India being the largest user of groundwater, uses 230 km^3 of groundwater annually, which is above 1/4th of the global total. More than 85% of drinking water and 60% of irrigation supplies depend of groundwater in India. Rapid population growth, industrial and agricultural advancements have world-wide threatened groundwater resources. Punjab is an agriculture-dominating Indian state, having 83% of its total geographical area under intensive cropping, and it used groundwater for irrigation in 73% of its total irrigated area. The fertilizer consumption rate in 2019–20 was 243.1 kg/ha in the state of Punjab against 133.4 kg/ha, the Indian average. These modern agricultural practices are liable to have caused the groundwater pollution through agriculture return flows in the state. To meet the increased demand of water for irrigation, the overabstraction of groundwater has led to deterioration of quantity and quality of groundwater resources in Punjab. A limited number of investigations on groundwater quality of other districts of Punjab state have been carried out. Considering these facts, the present study on groundwater of Jalalabad block, district Ferozpur, Punjab was taken up. With the aim to assess the groundwater suitability for irrigation purposes, groundwater sampling from 50 different villages of Jalalabad block, was done. Various types of irrigational parameters i.e., Base exchange index (BEI), Meteoric genesis index (MGI), Magnesium hazard (MH), Sodium adsorption ratio (SAR), Sodium percentage (%Na), Permeability index (PI), Residual sodium carbonate (RSC), Residual sodium bicarbonate (RSB) and Kelly's index (KI) were analysed for groundwater samples. RSC, RSBC, %Na, KI and PI in groundwater samples

were found unsuitable for irrigation purposes while MH and SAR indices were found fit which indicate that majority of groundwater have high salinity.

Keywords: *Groundwater, Agricultural, Irrigation.*

AFTEFS/GCH/2024/181

Effect of heavy metal pollution on earthworms

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The earthworms are immensely valuable soil organisms to agriculture and ecosystems because they recycle nutrients, improve soil fertility, soil structure, drainage, aeration and repairing the damaged soils. The soil dwellers and particularly earthworms are the worst affected by the soil pollutants. Heavy metal pollutants most common in the environment are Cr, Mn, Ni, Cu, Zn, Cd, Pb, As, Hg and Al. Earthworms bioaccumulate the heavy metals by the direct and continuous contact by moist and permeable skin and lining of the alimentary tract through intake of polluted soil and litter in form of food. The heavy metal pollution affects the morphology, growth, reproduction and mortality of the earthworms. The low level exposure to the heavy metals can induce behavioural, morphological and physiological changes in the earthworms. Heavy metal accumulation in body of worms lead to oxidative stress, defined as a disturbance in the balance between the production of reactive oxygen species and antioxidant defenses. The production of reactive oxygen species cause DNA damage, destructions of proteins and lipids by various biochemical pathways. Changes in innate immunological parameters and decrease in coelomocytes have been observed due to the heavy metal stress. Heavy metal pollution can affect the human beings through bioaccumulation and biomagnification via the food chain. The heavy metals pollution influence on the earthworms can alter the soil health, agricultural productivity and terrestrial ecosystems.

AFTEFS/GCH/2024/182

Investigating the Influence of Aerosol Composition on Atmospheric Chemistry and Climate Dynamics

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Aerosols, minute particles suspended in the atmosphere, significantly impact atmospheric chemistry and climate dynamics. This abstract presents a laboratory experiment aimed at elucidating the influence of aerosol composition on these processes. Using a controlled chamber simulating atmospheric conditions, the experiment systematically explores the effects of varied aerosol compositions—ranging from organic carbon to sulfate and nitrate—on chemical reactions and climate-relevant phenomena. Employing advanced spectroscopic techniques, the experiment monitors real-time interactions between aerosols and gases, quantifying reaction rates and identifying chemical products. By manipulating environmental parameters like aerosol properties and atmospheric conditions, the experiment aims to unravel the mechanisms governing aerosol-induced chemical transformations. Key areas of investigation include modulation of gas-phase chemistry, atmospheric oxidation processes, and cloud nucleation efficiency by aerosol composition. The experiment also delves into feedback mechanisms linking aerosols, clouds, and radiation, crucial for Earth's energy balance and climate variability. Integrating experimental findings with atmospheric models enhances understanding of aerosol-cloud interactions and their implications for regional and global climate patterns. Insights from this study contribute to refining climate predictions, mitigating air pollution, and guiding environmental policy interventions. In summary, this laboratory investigation advances comprehension of aerosol composition's role in shaping atmospheric chemistry and climate dynamics, enabling effective responses to environmental challenges

Keywords: Aerosols, atmospheric chemistry, climate dynamics, atmospheric modeling, spectroscopic techniques, atmospheric oxidation, cloud nucleation.

AFTEFS/GCH/2024/183

Cool Creations Await: Exploring Innovative Techniques in Ash Gourd Ice Cream Production

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We delve the creativity, focusing on the value-added product development techniques for producing Ash Gourd Ice Cream. By selecting the ash guard fruit as the natural goodness and infusing it into a beloved dessert, we aim to introduce a new innovative refreshing, and nutritious treat to culinary customer satisfaction. With the need for stable and convenient products, there needs to be more innovative means of preservation and marketing these goods to offer to the consumer.

Keywords: Ash Gourd, culinary, creativity, ice cream, preservative.

AFTEFS/GCH/2024/184

Assessment of antioxidant efficacy in wound healing using *Vitex Negundo* Linn

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Several medicinal plants and their isolated compounds have shown significant therapeutic promise. Several herbs and spices have been shown to have antioxidant properties. Antioxidant action is mostly attributed to flavonoids, isoflavones, anthocyanins, coumarin husks, catechins, and isocycin, making plant products suitable substitutes for synthetic antioxidants. The present tendency in numerous industries, including food production and medicine, is to do research on medicinal items. This study aims to assess the antioxidant properties of fresh *Vitex negundo* Linn leaves stored in a refrigerator due to their high flavonoid content. The fresh juice of V. negundo exhibited catalase activity and elimination activity of GPx. We find that fresh water juice from V.

negundo leaves contains a substantial quantity of active principles and enhances synergistic antioxidant activity.
Key words: antioxidant, Vitex negundo, leaves, catalase.

AFTEFS/GCH/2024/185

Population and Community Ecology

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Population and community ecology are two interconnected branches of ecology that study the dynamics and interactions within ecosystems. Population ecology focuses on the study of populations of organisms of the same species living in the same area and the factors that influence their abundance, distribution, and dynamics over time. Key concepts in population ecology include population size, density, distribution patterns, growth rates, and factors affecting population growth such as birth rates, death rates, immigration, and emigration. Population ecology also examines how populations respond to environmental changes, such as resource availability, predation, competition, and disease. Whereas, Community ecology explores the interactions among populations of different species living together in the same area. It investigates how species coexist, compete, and collaborate within ecosystems, and how these interactions shape community structure and function. Community ecology examines species diversity, community stability, trophic interactions (such as predation, herbivory, and parasitism), mutualism, and the role of keystone species and ecosystem engineers in maintaining ecosystem balance. Additionally, it explores ecological succession, the process by which communities change over time in response to disturbances or environmental gradients. These two branches of ecology are closely related, as the dynamics of populations within a community influence the structure and function of the community as a whole, and conversely, community interactions can have significant impacts on population dynamics. Understanding both population and community ecology is essential for comprehensively studying ecosystems and their responses to environmental change.

Keywords: Ecology, Population, Community, Environment, Resources.

AFTEFS/GCH/2024/186

Synthesis and bio-efficacy evaluation of hexaconazole loaded polymeric nanofungicides

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Nanoformulations have the potential to decrease the usage of harmful pesticides, thereby mitigating their negative effects on the environment and human health. Nano-formulations of agrochemicals hold promise in enhancing food productivity while maintaining ecological balance. The present work represents the preparation of two kind of nanocapsules i.e. chitosan-TPP based nanoparticles (CSNPs) and alginate-chitosan (AG-CS) based nanoparticles for the encapsulation of a fungicide hexaconazole by ionic gelation and polyelectrolytic complexation methods. The size, encapsulation efficiency, and chemical interaction studies were investigated by DLS, HPLC and FTIR respectively. The average particle sizes of CSNPs were 158 and 387 nm and AG-CS nanocapsules were 147.6 and 207.3 nm for blank and hexaconazole loaded nanoformulations, respectively. The encapsulation efficiencies of CSNPs and AG-CS nanocarriers were found to be 73.70 and 88.87% respectively. The synthesized nano-formulations were evaluated and compared with the conventional hexaconazole (Hexacon-5% EC) for their in-vitro antifungal activities against *Rhizoctonia solani* by poisoned food technique. At 10 ppm, the hexaconazole loaded CSNPs were showing the maximum growth inhibition followed by AG-CS and then by the conventional formulation. Hence, these nanoformulations have the capability to decrease both the dosage and application frequency of fungicides, resulting in reduction of their harmful impacts on both biotic and abiotic aspects of the environment.

Keywords: Nanoformulations, Hexaconazole, Alginate, Chitosan, Agrochemicals.

AFTEFS/GCH/2024/187

Drought-Induced Shifts in Bacterial Community Dynamics: Understanding Ecological Resilience

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Drought conditions exert profound effects on bacterial communities across various ecosystem including plant rhizosphere. These effects manifest as alterations in community composition, diversity and metabolic activities with implications for ecosystem functioning and resilience. In soil ecosystem, drought stress can lead to decreased soil moisture levels, altering physicochemical properties such as pH and nutrient availability. The rhizobacteriome produces phytohormones that are important for encouraging growth and development and assisting plants in escaping abiotic stress, such as ethylene, gibberellin (GA), abscisic acid, cytokinin, and indole-3-acetic acid (IAA). Another plant growth promoting trait involved in providing drought tolerance is the enzyme 1-aminocyclopropane-1-carboxylate deaminase (ACC). The plant hormone ethylene is kept below inhibitory levels by ACC activity, which prevents senescence during drought and promotes normal root growth. Drought-tolerant bacterial symbionts or plant growth-promoting rhizobacteria (PGPR) may play crucial roles in enhancing plant resilience to water limitation by facilitating nutrient acquisition, modulating hormone levels, or inducing systemic resistance against pathogens. Integrating PGPR-based strategies into agricultural practices offers a sustainable and eco-friendly approach to mitigate the detrimental effects of abiotic stress, ensuring better crop yields and food security for a growing global population.

Keywords: Abiotic stress, Bacteria, Drought, Ecosystem, Phytohormones, Resilience.

AFTEFS/GCH/2024/188

Mathematical approach towards Environmental Studies

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This paper formulates a mathematical theory of physical processes that arise in considering stimulus-response and state-transition components of causality. There are two concepts of environment with respect to an H -system. The first H ', stimulus (or originally, input) environment . The second concept of environment is the response environment H ". There exists a creaon function C , and there also exists a genon function G . A system can be constructed as a set union of mutually disjoint and exhaustive object/environment elements (environs). The following stimulus structure/function and response transformation functions can be recognized: (a) Stimulus-to-creaon transformation, (b) Creaon-to-genon transformation, (c) Genon-to-response transformation. The purpose is to develop a mathematical characterization of causal phenomena as a formal approach to understanding ecological systems as open, complex, structurally causative systems. We refer to these as "eco-systems."

AFTEFS/GCH/2024/189

A Study on Agricultural Insurance Schemes in Rural Haryana

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In the form of risk mitigating strategy insurance may play a vital role in anchoring a stable growth of agricultural sector through reduction of the financial losses suffered by the farmers due to damage and destruction of their crops, contents, machinery or accident with the farmer. The awareness regarding governmental initiatives has always been among the major hindering factors to take full advantage of the developmental efforts. The present study conducted in two districts (Palwal and Faridabad) of southern Haryana (vulnerable to Earthquake, Industrial & Chemical Disaster, Floods, Drought, Accidents, Fire, Health related Disaster, Hailstorm, Bio Terrorism etc.)

shows that farmers awareness level regarding the agricultural insurance schemes was found at lowest ebb in terms of its components and sub components. Number of constraints were reported by the respondent farmers hindering the acquisition of Agricultural Insurance Scheme.

AFTEFS/GCH/2024/190

Enhancing Performance in Direct Seeded Rice (DSR) Cultivation through Seed Priming

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Rice (*Oryza sativa*) is the major staple and cereal component that sustains the two-third of the world population, commonly grown by transplanting seedlings into puddled soil (wet tillage) under extensive range of environments from tropical to sub tropical regions. However, the water-use efficiency of rice is low and growing rice demand copious amount of water. Thus elevated water requirements, increasing labor costs and reduction in the final yield due to high mortality are the major constraints of the traditional rice productivity. Therefore, to assure environment and food availability in future, it is essential to produce rice with a limited expenditure of water, labor and agrochemicals

Direct seeding of rice (DSR) in aerobic cultures involves sowing pre-germinated seeds directly into the field without the need for transplanting seedlings from a nursery, not only emerged as resource conservation technology that substantially reduce crop water requirements, soil organic-matter turnover, nutrient relations, carbon sequestering, weed biota and greenhouse-gas emissions but also prevent the seeds that are vulnerable to various stresses such as soil crusting, submergence, and uneven emergence spent on puddling in transplanted rice cultures. Various seed priming techniques including hydropriming, osmopriming, hormonal priming, nutrient priming, biological priming, redox priming and chemical priming etc. employed in rice has demonstrated that germination and emergence rates are accelerated and seedling vigor is enhanced. However, effectiveness of different priming agents varies with different stresses and in different crops. Thus, seed

priming contribute greatly to the establishment and expansion of a stable rice production system via enhancement of seed vigor, germination and uniformity of plant stand and ultimately enhancement in the crop yield.

Keywords: direct seeding rice, abiotic stress, priming agents.

AFTEFS/GCH/2024/191

Advancing Natural Resource Management Through Integrated Technologies: Remote Sensing, GIS, AI, and Machine Learning

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The integration of remote sensing, Geographic Information Systems (GIS), Information Technology (IT), Artificial Intelligence (AI), and machine learning techniques has revolutionized natural resource management practices. Remote sensing technologies, including satellite imagery, radar, LiDAR, and multispectral imaging, provide crucial data on land cover, vegetation health, and water quality. GIS facilitates spatial analysis, decision support, and web-based mapping, enabling professionals to understand complex spatial relationships. IT infrastructure supports data storage, processing, and integration, while AI and machine learning algorithms extract insights from spatial data, enabling tasks such as land cover classification and predictive modeling.

In practice, these technologies find applications across various domains of natural resource management. Forest monitoring utilizes remote sensing data to track deforestation and assess forest health, while water resource management relies on GIS and AI for monitoring water quality and flood risk assessment. Agriculture benefits from remote sensing insights into crop health and yield predictions, aided by machine learning algorithms for pest detection and irrigation optimization. Wildlife conservation efforts leverage GIS for habitat mapping and AI for species identification using camera trap images.

By integrating these technologies, natural resource managers can make informed decisions, optimize resource allocation, and mitigate environmental risks effectively. This abstract highlights the transformative potential of

modern technology in advancing sustainable natural resource management practices.

Keywords: Natural resource management, Forest monitoring, Water resource management, Agricultural management, Wildlife conservation, Sustainability.

AFTEFS/GCH/2024/192

ENHANCING NATURAL RESOURCE MANAGEMENT THROUGH INFORMATION TECHNOLOGY: INNOVATIONS AND APPLICATIONS

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The effective management of natural resources is critical for sustainable development, environmental conservation, and the mitigation of climate change impacts. Information Technology (IT) has emerged as a pivotal tool in advancing the management strategies and operational efficiencies in this field. Information Technology such as Geographic Information Systems (GIS), remote sensing, big data analytics, and the Internet of Things (IoT) have various applications in natural resource management. GIS and remote sensing technologies have revolutionized the mapping and monitoring of natural resources by providing accurate, up-to-date spatial data that aid in decision-making processes. Through the analysis of satellite images and aerial photography, stakeholders can track changes in land use, vegetation cover, and water bodies, enabling proactive management practices. Big data analytics further enhances this by processing large volumes of data from various sources, including climate models, biodiversity databases, and socio-economic datasets, facilitating comprehensive resource management strategies that are responsive to both ecological and human needs. IoT applications in natural resource management have shown significant promise in real-time data collection and monitoring. Sensors and networked devices deployed in various ecosystems can monitor parameters such as soil moisture, weather conditions, and forest fire occurrences, transmitting data instantaneously to centralized

systems. This integration enables dynamic response mechanisms, predictive analytics for resource depletion, and enhanced regulatory compliance.

The convergence of IT and natural resource management not only increases operational efficiencies but also promotes sustainable practices by improving the precision and speed of interventions. It can be concluded that IT solutions can holds great potential in natural resource management, provided data privacy, cybersecurity, and the digital divide are properly be addressed through technology integration for better stewardship of the our natural resources.

***Keywords**: Information technology, GIS, IoT, remote sensing, resources management.*

AFTEFS/GCH/2024/193

Prediction, Cloning and Characterization of *narK* promoter of *Salmonella* Typhimurium

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Salmonella Typhimurium (STM) is a zoonotic bacterium and is a member of *Enterobacteriaceae* that has to transform its complete metabolism from aerobic-respiration to anaerobic respiration for the successful colonization and infection into host cell in an environment with little oxygen. During anaerobic respiration, the nitrate will be imported into the cytoplasm while nitrite is exported to an extracellular location with the assistance of NarK, an antiporter in the membrane. This study we tried predicting, cloning and characterizing the *narK* promoter of *Salmonella* Typhimurium. The *narK* promoter region was identified using two different promoter prediction bioinformatic servers. One was "BDGP" and another was "BPROM" web servers. Around 340bp upstream to *narK* coding sequence was selected for predicting the promoter presence. The BDGP server predicted 3 promoter regions with scores 0.96, 0.79 and 0.72, respectively. The BPROM server predicted one promoter at 217bp site. Finally, we designed the primers for cloning around 304bp predicted promoter sequence from *Salmonella* Typhimurium into the *lac* promoter region into pUC19 vector replacing its *lac* promoter. The cloning of predicted *narK* promoter was confirmed by colony PCR and insert release method. The

functionality of the cloned promoter was confirmed by its ability to express beta-galactosidase in presence of 1mM IPTG and 40µg/ml X-gal substrate in the LB agar plate. The colonies gave blue colonies but were less intense compared to *lac* promoter bearing colonies.
Keywords: narK, promoter, BPROM, Salmonella, Nitrate

AFTEFS/GCH/2024/194

Study on Entrepreneurial Behaviour of Dairy Farmers in Ayodhya District of Uttar Pradesh

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In the present scenario, Entrepreneurship development in dairy sector is a key driver for promoting and sustaining the momentum of growth and providing employment. Hence, the present study has been conducted in purposively selected Ayodhya district of Uttar Pradesh to understand the Entrepreneurial behaviour of dairy farmers. A total of 120 dairy farmers were selected randomly from 12 villages of 4 blocks namely Haringtonganj ,Milkipur Sohawal and Masodha. A village-wise list of dairy farmers were prepared and from that list, ten dairy farmers were selected randomly from each village. The quantitative and qualitative data were collected through interview schedule, discussion, observation and available secondary sources. The study revealed that majority (55.83%) of the dairy farmers belonged to medium age group, middle school level of education status, small size of family, nuclear family system, Agriculture and dairy farming in dairy occupation, not participated in training, medium level of mass media utilization, marginal land holding, medium milk producers, medium size of herd, annual gross income ranged were less than 95379 and medium entrepreneurial behaviour.

AFTEFS/GCH/2024/195

EFFECTS OF GLOBAL CLIMATE CHANGE AND MITIGATION MEASURES FOR SUSTAINABLE DEVELOPMENT

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The perspective we get on earth, our home planet is the only planet, which appears to be surrounded by a large number of natural resources, which is one of the greatest examples we have of God's power. It is increasingly realized that the planet earth is facing grave environmental problems with fast depleting natural resources and threatening the very existence of most of the ecosystems. The global climate change or global warming is a bitter reality. Many investigators, engineers and environmentalists are expressing their deep concerns on overall change in climate. There are many causes of climate change. Many are natural and involve processes which influence the flows of energy into, out of and within the climate system. However, concern has grown that man's activities may be affecting these processes, thus also affecting climate. If one wishes to understand, detect and eventually predict the human influence on climate, one need to understand the system that determines the climate of the earth and the processes that lead to climate change. The preliminary cause of climate change is increased green house gases, deforestation and anthropogenic activities. Climate has a profound influence on life on earth. It affects landforms, soil types and biodiversity thereby becomes a serious global concern. However, there is a need of the hour to mitigate the effect of global warming and the associated climate change. Intergovernmental Panel on Climate Change (IPCC) defines mitigation as: "An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases". However, remedial steps need to be taken in order to embark upon these climatic issues. To end these hazards, innovative solutions must be brought forward.

Key Words: Climate Change, Global Warming, IPCC, Mitigation.

AFTEFS/GCH/2024/196

PREVALENCE OF HYPERTENSION AMONG INDIAN ADULTS

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India is witnessing a concerning surge in non-communicable diseases, a trend that persists alongside the nation's ongoing struggles with infectious diseases and maternal and child health concerns. Among these NCDs, hypertension stands out as a formidable risk factor, contributing substantially to preventable and premature deaths on a global scale. The aging of India's population coupled with heightened exposure to lifestyle risk factors, including unhealthy dietary habits characterized by high salt intake and inadequate potassium consumption, as well as sedentary lifestyles lacking sufficient physical activity, significantly contribute to the escalating prevalence of hypertension and other non-communicable diseases. As life expectancy rises and urbanization progresses, these factors converge to create a perfect storm for the proliferation of hypertension and its associated complications. The data from the National Family Health Survey Fifth Series (NFHS-5) of India, which was conducted between 2019-2021. The NFHS-5 sample included 695,707 women and 93,267 men aged between 15 to 49 years. In the NFHS-5 survey, it was found that 21.3% of women and 24.0% of men were taking medication to control their blood pressure. Additionally, mildly elevated blood pressure was observed among 12.4% of women and 15.7% of men. Furthermore, moderately elevated blood pressure was discovered among 5.7% of women and 5.2% of men. Addressing the root causes demands a multifaceted approach encompassing public health interventions, education campaigns promoting healthier lifestyle choices, urban planning initiatives facilitating physical activity, and policy measures aimed at curbing the availability and consumption of unhealthy foods. By tackling these underlying determinants, India can mitigate the burden of hypertension and foster a culture of wellness and longevity among its populace. It is imperative to identify high-risk demographics for opportunistic screening, institute community-centered screening initiatives, fortify primary healthcare services, and sensitize affiliated healthcare practitioners without delay.

Keywords*:* Hypertension, Non-Communicable Diseases, Lifestyle, Blood Pressure.

AFTEFS/GCH/2024/197

Climate, Global Warming and Others Geographical Processes

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Climate change refers to long-term shift in weather pattern. Global warming is the increase in plant's average surface temperatures caused by human activities such as the burning of fossil fuel. Causes of climate change related to human activities are referred to as anthropogenic many researchers and environmentalists are expressing deep concerns about changes in the climate of the planet. The hazards of global warming are continuously causing major damage to the Earth's environment. Fossil fuels are being continuously used to produce electricity. The burning of these fuel produce gases like carbon dioxide, methane and nitrous oxide which lead to the global warming. And on the other hand geographical processes affect the environment physical processes are the natural forces that change Earth's physical features including forces that build up and wear down Earth's surface. Let's we have to understand of these for main physical processes tectonic movement, volcanic activity, erosion and glaciations have shaped earth's surface. Most of the people are still unaware of these major issues. Because of the treacherous effect of climate change & global warming some solutions must be devised. The paper introduced climate change global warming, its caused and its solutions.

Keywords: Fossil fuels, Treacherous, Glaciations, Global warming, Deforestation, Anthropogenic.

ASSESSMENT OF CHANGES IN INDICATORS OF CHEMICALLY DEGRADED SOIL THROUGH SOIL HEALTH AND QUALITY INDICATORS

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Understanding soil health and quality is one of the best ways to manage soil indicators, allowing you to think about how to analyze soil and use soil change parameters to improve soil productivity. Indicators for assessing the quality of soil health - it is studied through the technologies of scientific analysis of the quality and condition of the soil by studying its productivity, indicators and ability to support the growth of plants. Decline in soil fertility under the influence of chemical degradation of land - the reasons for stagnation in production and food security in the agricultural sector of Uzbekistan and a decrease in growth rates depend on physical, chemical, and biological indicators of the soil. Assessing the quality of soil health is important for sustainable agricultural farming, proper management of chemically degraded irrigated lands, and soil and environmental protection. It includes the analysis of soil indicators to determine the fertility of the soil, its effect on the quality of nutrients and the quantitative concentration of the soil solution, its structural properties, the content of organic matter and the activity of enzymes. These indicator factors provide useful information on soil health and quality status and ensure that plant growth development can effectively identify impacts that may limit agricultural productivity. In the chemical degradation of the soil, as a result of changes in the soil, chemical pollution of the environment, biological, physical, and chemical stress, heavy metals, industrial wastes are caused by wind irrigation water, rains, chemical pollution of the soil is dense as a result of improper soil treatment. increase, decrease of organic matter, increase of salinity stress pressure and increase of stress in plants and soil, decrease of biodiversity, enzyme activity, nutrient elements, decrease of soil health quality is observed. As a result, resource-saving scientific economic efficiency in

agriculture has significantly decreased. It is important to select suitable biological and physical chemical indicators for the soils of our country. Among the soil indicators, physical indicators are soil total density, porosity, granularity, moisture capacity, penetration resistance, saturated water permeability, dry and wet aggregate volume, surface and soil internal hardness, infiltration rate, and biological indicators. assessment of plant root health, useful and harmful nematode population, potential mineralizable nitrogen, carbon decomposition rate, amount of organic particles, active carbon, weed seed reserve, microbial respiration rate, glycoprotein, content of humus organic derivatives. It is determined by analyzing potential indicators such as nitrogen, phosphorus, potassium (NPK), soil pH environment, dynamics of micro and macro elements from chemical indicators, and evaluating changes in indicator indicators of chemically degraded soils. These indicators are used to evaluate the quality and fertility of the soil, as well as its ability to grow plants and circulate nutrients. Some common indicators of soil health quality are organic matter content. Organic matter is an important component of soil health because it contributes to soil structure, porosity, water holding capacity, and nutrient enrichment. Determining the amount of organic matter helps determine soil fertility and its ability to support plant growth. Soil pH is an indicator of soil acidity or alkalinity. It is important and urgent to carry out research through scientific analytical study of the potential indicators of the state of soil health and quality. From this point of view, it is important to study the quality indicators of soil health, which show the quality of the soil health of Uzbekistan, in which the relationship of the soil to the environment, the conditions of pollution, the state of land reclamation in terms of salinity, the dynamics of soil and water. secret, the quantitative share of soil organic matter requires the proper study of soil health quality indicators in order to maintain and improve the quantitative content of nutrients. Currently, this soil is indicative are carried out together with scientific research. These data are planned to be presented for the use of researchers who are doing research in soil science.

AFTEFS/GCH/2024/199

DETERMINATION OF ANTIFUNGAL ACTIVITY OF ENDOPHYTIC BACTERIA ISOLATED FROM MEDICINAL PLANT *LYCIUM BARBARUM*

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Lycium barbarum is a species of woody plants of the Solanaceae family, the fructs of which are widely used as a medicinal remedy for several diseases. In traditional Chinese medicine, the dried fruit is used to treat wet dreams, lower body pain, dizziness and amblyopia. For many centuries, berries of *Lycium barbarum* have been used in traditional Asian medicine as a general tonic. An alcoholic drink is prepared from them in China and Japan. The fruits are the small coral-red berries. Usually bears fruit from May to September. During this period, the fruits are harvested 13 times. For information, fruits in August are the most expensive. In this research, from different organs such as stem, fruit and leaves of *Lycium barbarum* several enriched selective nutrient media including PA, NA, MPA, KDA were used to isolate endophytic bacteria. Plant parts were collected and brought to the laboratory. Washed with distilled sterilized water to remove bacteria from the outer surface of the plant. It was then washed sequentially with a solution of 3% sodium hypochlorite, followed by 70% ethyl alcohol and sterile distilled water. A total of 33 endophytic isolates were isolated, 15 from the leaf, 7 from the fruit, and 6 from the stem of *Lycium barbarum* plant. The morphology, size and mobility of the isolates were observed using a Leica universal microscope. Antifungal test was conducted to check the resistance of isolated isolates with different plant pathogenic fungi such as *Fusarium moniliforma, Fusarium oxysporum, Fusarium solani.* Among the selected isolates, Lb ph12, Lb C7, Lb C8, Lb F3, Lb F6, Lb F8, Lb F9 strains showed high activity against pathogenic fungi.

Keywords: *Lycium barbarum,* medicinal plant, endophytic bacteria, antifungal activity*, Fusarium moniloforma, Fusarium oxysporum, Fusarium solani.*

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Determination of antifungal activity of bacteria isolated from *Medicago sativa* grown on the dry bottom of the Aral Sea

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Rhizosphere bacteria play an important role in plant growth and development. In particular, it promotes easy assimilation of substances by plants, synthesis of biologically active substances and positive change of soil composition. As a result of the active activity of rhizobacteria in and around plant roots, the plant has a persistent and antagonistic effect on phytopathogenic microorganisms. Alfalfa - *Medicago sativa* plant is the main fodder plant rich in protein. As a result of crop rotation, it enriches the soil with organic matter, improves water-air circulation and contributes to higher crop yields. In addition to the fact that it is a crop that cleanses the soil from the cause of wilting, the presence of antagonists in the rhizosphere of the plant root system, killing dangerous fungi (fungi, bacteria, simple animals) saprophytic microorganisms (fungi, microorganisms, protozoa) accumulate in the crop fields for three consecutive years has also been established.

The aim of this study is to investigate bacteria isolated from *Medicago sativa* plant growing on the dry bottom of the Aral Sea and their antagonistic relationships with fungi. The research base is the northern restoration of Uzbekistan, the soil cashews of alfalfa roots and around the roots in the high salinity state of the Aral Sea, plant rhizobacteria were brought to the laboratory for materials, and 92 types of isolates were established from the samples. Selected isolates were planted against the fungi *Fusarium solani*, *Fusarium oxysporum* and *Alternaria alternata* in order to determine the relationships of microorganisms. 30 isolates showed no activity against all three fungi, 22 isolates had high antifungal activity against *Fusarium oxsyporum* and *Fusarium solani*, and 18 isolates in *Alternaria alternata*. MF3, MF4 isolated from leaves and MR28 isolated from roots were highly active against all three fungi, isolates MS10, MS18, MR14 were inactive against all three fungi. Some isolates MR35, MS26, MF16, MF22 were active against *Fusarium oxysporum*, inactive against *Alternaria alternata* and isolates MF12, MS 6, MR 3, MR25 showed high antagonism index against *Alternaria alternata*. So, depending on their chemical composition and specific indices, the bacteria are in active interaction with some fungi and inactive with others.

Keywords: *Medicago sativa*, endophytic microorganisms*, Fusarium oxysporum, Fusarium solani, Alternaria alternate,* antifungal activity.

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Comparative analysis of the effect of biological products on the protein content and oil content in soybean collection samples

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In terms of cultivated areas, soybeans are the second largest crops after wheat, rice, and corn. According to the data, 122 million soybeans are grown in the countries of the world. 53% of the world's population consumes only soybean oil. More than four hundred different products are prepared from soybean grain and protein and they are used in all sectors of the national economy. In the chemical composition of soy, it is faster digested by the human body, harmless than cotton and other vegetable oils. Soybean contains up to 45% protein and up to 25% vegetable oil. Soybeans also contain all the essential amino acids found in animal protein.

Protein and oil in the seeds of Genetic-1, Sochilmas, Extiyozh, Memory varieties of soybean and Gen-8, Gen-9, Gen-19, Gen-26, Gen-40, BK-84 and BK-98 varieties of the genetic and botanical collection. The amount was studied in control and experimental versions of the study. Experimental variants Bradyrhizobium sp. It was treated with D24-1 and bionitrogen biopreparations. The amount of protein and oil in soybeans was measured on the infrared bioanalyzer "Infraskan-3150".

As a result of the conducted research, the amount of protein and oil in the grain of soybean varieties and variety samples was higher in the variety samples treated with biopreparations compared to the control version of the study. In particular, relatively high protein content results were found in genetic and botanical collection Gen-9 and BK-84 varieties of soybean, Genetic-1, Sochilmas, Khatira varieties and 40.07% to 41.50%, respectively. Relatively low indicators were found in the samples of the Ehtiyozh variety and the Gen-8, Gen-19, Gen-26, Gen-40 and BK-98 varieties of the Genetic and Botanical Collection and were recorded as 38.13% to 39.75%, respectively.

Before sowing the seeds of the experiment Bradyrhizobium sp. It was found that the amount of protein and oil in the grain was slightly increased in the variants treated with D24-1 and bionitrogen biopreparations compared to the

control variant. These positive results can be explained by the effect of bradyrhizobium japonicum and bionitrogen biopreparations. During the research, the variety and variety samples with high values of protein and oil content in grain were selected for further research and selection processes. Including: high results in terms of protein content were recorded in Genetic-1 (40.56-41.20%), Khatira (40.84-41.50%) varieties and Gen-9 (40.31%) of the genetic and botanical collection and BK-98 variety samples, Khatira (21.515%) and BK-84 (20.18%) variety samples were selected for further research.

AFTEFS/GCH/2024/202

REDUCTION OF DEPRESSION BY ECONOMICALLY VALUABLE CHARACTERISTICS OF COTTON SPECIES *G. hirsutum L., G. barbadense L.*

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In recent years, breeders have been tasked with developing new varieties of cotton with a high yield of 50–60 c/ha; an urgent question also arises in connection with the environmental situation in the region, with a decrease in water resources, due to the lack of irrigation water, not to mention high summer temperatures, plus new strains of *Verticillium* and *Fusarium wilt* emerging.

The complex of tasks facing breeders imposes requirements at all stages of the breeding process when assessing and selecting diverse and rich source material for basic economically valuable traits. On cotton, in particular, there are few published data on depression.

In particular, interspecific hybridization between *G. hirsutum L.* and *G. barbadense L.* is a useful tool in increasing genetic diversity among elite germplasm for fiber traits such as fiber length and strength. Depression may also be beneficial in the long term, since through consanguinity, harmful genes responsible for producing sick and nonviable offspring are washed out of the population.

In this work, to study the degree of depression during hybridization, medium-fiber cotton varieties of the species *G. hirsutum L.* were taken, such as the Mekhnat variety, Namangan -77, UzFA-705, Kelazhak, Yulduz, S-6524, Sulton and the Humo variety. We also used varieties of fine-fiber cotton of the type *G. barbadense L.* varieties Duru-Gavkhar-4, Termez-31, Surkhon-10. After carrying out intraspecific

and interspecific crossings, hybridological analyzes were studied, after which the following conclusions can be drawn: in intraspecific hybrids in the F0 generation, the number of normal seeds was lower compared to the obtained empty seeds.

It should be noted that during interspecific hybridization, compared with intraspecific hybridization, the percentage of empty empty seeds was much higher. In this regard, we can make the assumption that with intraspecific hybridization, the process of fertilization, the passage of pollen through the pollen tube, and the process of double fertilization proceed more moderately than with interspecific hybridization. The process of fertilization of the ovary proceeds normally, meiotic cell processes occur with less disruption.

During interspecific hybridization, due to the different sizes of pollen, the composition located inside, where the process of infusion of the pollen tube into the stigma of the style between two species (*G.hirsutum L.,* and *G.barbadense L.*), a selective process is observed. As a result of the studies, it can be assumed that depression occurred to a greater extent in interspecific crosses.

AFTEFS/GCH/2024/203

CLUSTER ANALYSIS AND CLUSTER ANALYSIS OF WATER DEFICIT RESISTANCE INDEXES OF MUNG BEAN PLANT VARIETIES AND LINES

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Legumes are an essential part of a healthy and balanced human diet and play an important role in preventing many serious diseases. Legumes are one of the most important components of the human diet for many people, and they are useful for dieting.

Mung bean is one of the legumes. It is a diploid, self-pollinating, fast-growing, and short-duration crop that helps in the efficient use of summer plants to increase cropping intensity and productivity. It is a crop rich in plant proteins, trace elements, and antioxidants such as flavonoids and phenolics, and can be used as fodder and green manure. As a result of the influence of various biotic and abiotic factors, the yield potential of mung bean is reduced. Under drought stress, the wet and dry weight and productivity of mosh are significantly reduced.

As a research object, 10 cultivars of mung bean (*Vigna radiata* (L.) Wilczek.), of different genetic origins, were used.

The seeds of the experimental and control variants were sown in 2 backgrounds with different water regimes, that is, the background of optimal water supply and the background of water deficit. In this case, the modeled drought, i.e., the background of water deficit, was established by the number of waterings once during the gross flowering period of the vegetation and not watering before and after flowering.

In our experiment, control, that is, in the conditions of optimal water supply, according to the indicator of plant productivity (total grain theft in pods per plant) in 10 mung bean varieties and lines. There were close and sharp differences between them. In the conditions of water deficit, a sharp decrease in plant productivity was noted in mung bean varieties and lines compared to the conditions of optimal water supply.

In the experiment, when 10 mung bean genotypes were studied to evaluate the water deficit resistance in terms of plant productivity under field conditions, the yield index was 1.83 at the highest level in the Ishonch cultivar and the lowest level in the L-59 and L-92 lines (0.52, respectively) and 0.52) was determined. According to the yield stability index of the resistance to water deficit, the Barkaror variety of the mash plant has the highest ratio of 0.80 and the lowest ratio of 0.29 in the L-59 line. This shows that the Barkaror and Ishonch varieties are resistant to drought. The sign of stress intensity in the mosh plant was found to be 0.94 at the highest level in the L-59 line and 0.13 at the lowest level in the L-92 line. When the percentage index of susceptibility to stress in plants was studied, the highest index was recorded in the L-59 range at 46.87%, while the stable and L-92 genotypes had the lowest index (7.0% and 6.56%, respectively), or the last two varieties and line water deficit showed lower sensitivity compared to other varieties. When the stress sensitivity index of mush bean genotypes was studied under field conditions, this index was 1.21 in the control Durdona variety, 1.50 in the L-59 range, and 0.52 and 0.42 in the Barkaror and Ishonch varieties, respectively. formed, that is, the last two varieties showed low sensitivity to water shortage compared to other varieties. This shows that the Barkaror and Ishonch mash varieties are resistant to water stress compared to other genotypes in traits of these parameters, while the L-59 line is extremely resistant to water stress. The highest indicator of stress resistance index in mush bean varieties and lines in the experiment was determined in the ratio of 1.22 in the Durdona variety and 0.19 in the L-92 line.

Based on the results of the experiment, a cluster analysis of the evaluation of resistance to water deficit of mush bean varieties and lines under different

water regime conditions was performed. In this case, it was found that the percentage index of stress susceptibility index, drought tolerance index, and relative drought tolerance index are stable compared to other indices that evaluate resistance to water deficit. As a result, the cluster analysis of the stress susceptibility index, drought resistance index, and relative drought resistance index allows the selection of genotypes resistant to water deficit and it was found that the genotypes Barkaror, Ishonch, and L-92 are resistant to water deficit.

AFTEFS/GCH/2024/204

MULTIVARIATE ANALYSIS OF DROUGHT RESISTANCE INDICES OF UPLAND COTTON GENOTYPES

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Current global climate change will exacerbate water deficit in the future. Given that these changes will continue soon, the water deficit is becoming a serious obstacle to crop production worldwide. In this situation, the need to create varieties resistant to water shortage increases. The decrease in the yield of the cotton plant in drought conditions is mainly explained by the decrease in the number of yield elements under the influence of this stress.
22 varieties and lines of cotton belonging to the G. hirsutum L. species, with different genetic origins, were used as the object of research.
The experimental and control options were planted in 2 backgrounds that differ in terms of water regime, i.e. in the background of optimal water supply (water volume 4800-5000 m3/ha), water deficit background (water volume 2800-3100 m3/ha).
The indicators of 19 drought resistance indices were determined in the experiment. A dendrogram of Ward's method was developed based on cluster analysis of drought resistance indices of intraspecies and interspecies cotton genotypes. According to him, when Upland cotton genotypes were studied according to drought tolerance indices in different water regimes, T-1001, T-1002, Navbahor-2, Arg'umon, and T-1050. It was found that certain varieties and lines are resistant to water deficit. On the contrary, it was found that Samara, C-6524, Zamin, T-1037, and T-1023 cotton varieties and lines are susceptible to water deficit. In addition, moderately resistant plants to water

deficit were also identified. These are Gulbahor-2, Sadaf, Gulshan, Hasilot, Zafar, T-500, T-1033, T-1068, T-1048, and T-1024 varieties and lines. In conclusion, the above T-1001, T-1002, Navbahor-2, Argumon, and T-1050 cotton varieties and lines are drought-resistant, and according to yield indicators the difference in reduction under water deficit conditions was not significantly differentiated. Hence, the above plants can do well when planted under water deficit conditions.

According to the above indicators of drought resistance indices and cluster analysis, it is a valuable starting for the planting of genotypes T-1001, T-1002, Navbahor-2, Arg'umon, and T-1050 in water deficit regions.

AFTEFS/GCH/2024/205

INBREEDING DEPRESSION ON MORPHO-YIELD TRAITS IN HYBRIDS OF UPLAND COTTON (*G. HIRSUTUM* L.)

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In our republic, the task of creating new varieties of cotton adapted to the local soil and climate conditions of the environment from technical crops has been set. The creation and introduction of new varieties of cotton remains relevant until now. Traditional and staged hybridization methods are used to create and carry out selection and seed production. A number of varieties have been created through the use of genetic hybridization using the scientific principles of breeding and seed breeding. The need to carry out selection and seed breeding work and constantly update the varieties remains urgent. Because of this, inbreeding depression may occur in the plant organism. This leads to a decrease in the productivity of vegetable crops. Inbreeding depression leads to a decrease in plant yield, the appearance of anomalies and deformations. This is explained by the fact that harmful recessive genes are homozygous in the genome. Inbreeding depression is a decrease in the viability of genotypes caused by inbreeding. This manifests itself as a low value of heredity in the phenotype, low biological adaptability and a decrease in immunity against diseases. As a result, there is a decrease in survival and reproductive success. Based on this, it is necessary to create new varieties, because the presence of

variety changes and variety renewal requires constant stabilization work to maintain the positive characteristics of a particular variety. To do this, we need to reduce inbreeding depression in the genome.

4 varieties of cotton of *G. hirsutum* L. of different genetic origin and its hybrids were used as research objects.

In the experiment, in field conditions, the highest plant productivity of the F_2 combinations of cotton cultivars was Ishonch x Tashkent-6 and Ishonch x C-6524 (respectively 112.83±1.4 g and 111.76 ±1.04 g). It was determined at the lowest rate in Navbahor-2 x Tashkent-6 and C-6524 x Navbahor-2 combinations (70.04±1.83 and 76.93±1.54 g, respectively). The highest level of heritability (71% and 70%, respectively) was recorded in the Navbahor-2 x Inshakh and Tashkent-6 x C-6524 combinations. The variation index in F2 hybrids was found to change from 13.0 to 19.2%. Indicators of inbreeding depression in F1-2 hybrids of the plant productivity trait were strongly negative (ID=-12.70) in the combination Trust x C-6524, strongly positive in the combination Navbahor-2 x Tashkent-6 and Trust x Navbahor-2 (ID=13.18 and ID=11.06, respectively) depression was recorded. In terms of the in-plant productivity indicator, Ishonch x Navbahor-2, Navbahor-2 x Tashkent-6 and Navbahor-2 x C-6524 combinations showed positive inbreeding depression indicators compared to all other hybrids. It was found that the productivity of the F_2 combinations of cotton varieties, the heritability and variability of this trait, and the indicators of inbreeding depression in the hybrids were positive in the combinations of Ishonch x Navbahor-2 and Navbahor-2 x Tashkent-6. According to the sign of productivity in the plant, it was noted that the varieties Ishonch, Navbahor-2 and Tashkent-6 are positive donors.

In the experiment, according to the average parameters of F_2 combinations of cotton varieties, the number of bolls per plant in the experiment was the highest Navbahor-2 x Ishonch (19.14±0.84 pieces), It was in the hybrids of Navbahor-2 x Ishonch (19.14±0.84 units) and C-6524 x Ishonch (18.3±0.81 units). The lowest and the highest degree of heritability of F_2 combinations of cotton cultivars for the number of bolls in a plant was in the combinations C-6524 x Tashkent-6 and C-6524 x Ishonch (54% and 74%, respectively). The index of variation in F_2 hybrids of cotton varieties was determined from 11.21% to 15.98%. Indicators of inbreeding depression in the F_{1-2} hybrids of the number of bolls trait in the plant were strongly negative in the combinations of Ishonch x C-6524 and Navbahor-2 x Ishonch (ID=-27.35 and ID=-32.00, respectively), A strong positive (ID=18.49) was noted in the combination of Tashkent-6 x Ishonch. F2 combinations of cotton varieties according to the number of bolls in the plant, heritability and variability of this

trait, and inbreeding depression indicators in hybrids Ishonch x Tashkent-6, Tashkent-6 x Ishonch, Tashkent-6 x Navbahor-2 and C-6524 x Navbahor-2 combinations were found to be positive.
Heredity, variability and inbreeding depression indicators were studied in the manifestation of morpho-yield traits of cotton plant. In this case, it was found that the morpho-yield characteristics and inbreeding depression were positive in the hybrids of the cotton varieties "Ishonch", Tashkent-6 and Navbahor-2.

AFTEFS/GCH/2024/206

Chemical composition of Allium motor plant and its beneficial properties for human health

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It grows mainly at the foot of the Chotkal Mountains of the Western Tien Shan. It is a common plant in the mountain ranges of the Parkent district of the Tashkent region. It belongs to endemic plants, because it grows only in a limited area. Motor grows at the foot of mountains, in sandy places, among bushes, in open deserts, in shady places. There are 250 types of bulbous plants in our republic, but they differ sharply from other representatives of the motor plant belonging to this family by the external morphological types of vegetative and morphological organs (blade, stem, leaf, flower) and taste.
Mador grass belongs to the "onion" family, it grows in the cool places of the mountains only for two months - April-May. In translation, it means "power", "help". The herb is like an onion. People also call it "mator". The unique epithet "motor" is derived from the Latin root used in different languages, and the Uzbek and Tajik names of this plant in the Parkent region are: "motor", "ma-tor", "madar". The Tajik and Uzbek spelling is mador, and the Arabic is also pronounced madar, which means "loss of strength," "endurance," and other meanings in each of the three languages. Ukrainian "motor" corresponds to the concept of "movement" and goes back to the Latin "mōtor" - "to set in motion". Narrow, soft leaves of this species.
Chemical analysis showed that the leaves collected at the budding stage contained fiber 12.3%, crude protein 22.6%, soluble protein 7.7%, water 10.4%, flavonoids 0.7%, phosphorus 0.11% , soluble sugar content 3.6%,

moisture [4.5%. 6-9]. Among the country's flora, "Motor" (Alliummo-tor) is distinguished by its medicinal properties and rich vitamin content. It contains vitamins C, B, B2, PP, E and provitamin A. It also contains sugar, proteins, macro and microelements. Therefore, people have long used the motor to prepare Uzbek samsa from greens and other food products and cooking products. According to the stories of the elderly, during the years of famine experienced by our ancestors, the local population saved their lives by eating wild grass, maple, shepherd's purse, and hawthorn.

The life of grasses in Central Asia is very short. By the end of May, the plains and foothills are already turning yellow from the heat. In June, the mountain slopes also turn yellow. Spring greens are high - retreating to the snow in March-April. Therefore, in the Western Tien Shan region, the growing season occurs with furious force.

Mador grass belongs to the "onion" family, the grass grows in cool areas of the mountains only for two months - April-May. In translation, it means "power", "help". The herb is like an onion. People also call it "mator".

The plant called "motor" is used for samsa and manti. Contains iodine - increases immunity, improves the functioning of the digestive system, but increases blood pressure.

In short, allium motor plant is the most useful among medicinal plants, containing macro and micro elements and substances useful for the human body.

Govt. College Hisar, AFTEFS and VITAL BIOTECH Education Group
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Histopathology and eco-friendly management of Pseudomonas aeruginosa in brinjal seeds grown in Rajasthan

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Brinjal or eggplant (Solanum melongena L.) is one of the most common, popular and principal vegetable crop grown in India and other parts of the world. It is pharmaceutically and therapeutically relevant owing to the existence of different secondary metabolites. The gram negative bacteria Pseudomonas aeruginosa attacked on the plant and showed the yield losses. To know the incidence and effects on plant about 110 seed samples were collected from the surrounding areas of Jaipur to the incidence of the pathogen. Out of 110 samples, the bacterium was recorded in 46 (02-56%) samples in untreated, in 42 (02-32%) samples in pretreated seeds in SBM and in 53 samples in King's medium B (agar medium) (20-82%). The bacterium was identified on the basis of morphological, biochemical and molecular characteristics. Two seed samples carrying natural infection of Pseudomonas aeruginosa with untreated, pretreated seeds on SMB and KMB (semi-selective medium) were selected for the study. These seeds were categorized as asymptomatic, moderately discolored and heavily discolored seeds. The heavily discolored (shriveled) seeds were distorted, reduced in size as compared to asymptomatic seeds and revealed infection at hilum, outer layer of testa, inner layer of testa, in space in between and inner layer of seed coat and endosperm cuticle. The endosperm cells showed lysogenous cavities, necrosis and depletion of cell contents and clumps of bacterial cells. Clumps of the bacterial cells were observed in space in between endosperm and embryonal axis and cotyledons. The bacterium was found in extra and inter embryo. The bacterium was controlled by using extracts of various plant parts.
Key words: *Brinjal, Pseudomonas aeruginosa, incidence, histopathology*

AFTEFS/GCH/2024/208

THE CURRENT STATE OF AQUACULTURE AND ITS MANAGEMENT PRACTICES

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The farming of aquatic organisms, or aquaculture, is becoming essential to both economic growth and global food security. Aquaculture faces many opportunities and challenges in the current environment, necessitating creative management strategies for productivity and sustainability. These dynamics are examined in the abstract. The rising demand for seafood, along with the depletion of wild fish stocks and environmental concerns, has spurred the growth of aquaculture. Because of this, sustainable practices are emphasized in contemporary aquaculture management in order to minimize negative environmental effects, guarantee resource efficiency, and satisfy strict quality standards.

One method that shows promise is integrated multitrophic aquaculture (IMTA), which encourages the co-culture of species to maximize resource utilization and reduce waste. Recirculating aquaculture systems (RAS) also provide controlled environments for intensive production, lowering the risks of pollution and water consumption. However, disease outbreaks, habitat degradation, and genetic concerns are also major issues facing aquaculture management. Vaccination, selective breeding for disease resistance and biosecurity measures are essential for effective disease management. Restoring habitat and using ecosystem-based strategies also promote resilience and biodiversity conservation.

Policy frameworks are essential for guiding aquaculture management, guaranteeing social responsibility, fair resource distribution, and regulatory compliance. Governments, businesses, and communities must work together to promote cooperative projects that promote openness, creativity, and equitable development in the aquaculture industry. To sum up, contemporary aquaculture management incorporates ecological principles, policy frameworks, and technology developments to tackle sustainability issues and

seize opportunities for conscientious expansion. The aquaculture industry can navigate the complexity of the current situation and move toward a more resilient and equitable future by embracing innovation and collaboration.
Keywords: Aquaculture, Integrated multitrophic aquaculture (IMTA), Recirculating aquaculture systems (RAS) and Selective Breeding.

AFTEFS/GCH/2024/209

IMPACT OF RICE STUBBLE BURNING *IN SITU* ON SUCCEEDING GROWN WHEAT CROP YIELD AND ITS ATTRIBUTES

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In agriculture-intensive states of India such as Punjab, Haryana, Rajasthan, and Uttar Pradesh, the practice of burning crop residue is widespread. This activity poses significant environmental challenges, including air pollution, climate change, and soil contamination. Additionally, residue burning adversely impacts the physical and biological properties of the soil. Moreover, it results in the loss of essential nutrients like nitrogen (N), phosphorus (P), and potassium (K), while also depleting valuable carbon reserves. Apart from these physico-chemical properties, agricultural productivity of succeeding grown wheat crop is also impacted. The annual agricultural yield loss attributed to crop residue burning (CRB) in India is approximately INR 5000 million. Therefore, stubble burning may influence soil properties, as well as the physiology and yield of subsequent wheat crops. Given these considerations, the investigations aimed to assess the influence of in situ rice crop residue burning on the yield of subsequently cultivated wheat crops at CCSHAU, Hisar. Soil samples (0-15cm depth) were collected from the pre burning and post burnt fields nearby villages of Tohana, Fatehabad (Haryana). Wheat crop were cultivated in pots under screen house conditions on soil collected from pre and post burnt fields. Yield and yield atrributes included biological yield per plant, grain yield per plant, grain weight per spike and number of grains per spike were investigated.

Result analysis showed a decrease in yield and other yield parameters of wheat cultivated in soil after burning compared to soil samples before burning.

Keywords: Crop Residue Burning (CRB), Physico-chemical properties, Yield and yield attributes.

AFTEFS/GCH/2024/210

Challenges and Strategies for Water and Soil Resource Management in India

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Water and soil resources are critical for sustaining life, agriculture and economic activities in India. Despite being home to 17.76% of the world's human population and 15% of the global livestock population, India faces challenges in managing its limited water resources, with only 2.4% of the world's land area. Factors such as population growth, urbanization and agricultural expansion have led to a decline in per capita water availability and increased water scarcity, especially in dry seasons. Additionally, groundwater depletion and uneven distribution of water resources further exacerbate these challenges. Healthy soil is essential for sustainable agriculture and ecosystem stability. Soil degradation due to imbalanced fertilizer use, low organic manure addition and erosion poses significant threats. Erosion of soil from land, coupled with the runoff of pesticides and fertilizers from fields, flows into streams and water bodies. This sedimentation and pollution can harm freshwater and marine ecosystems, as well as the communities reliant on them. Conservation measures such as terracing, contour farming and afforestation are essential for soil erosion prevention. Addressing the challenges related to water and soil resources requires integrated approaches and sustainable practices. Efficient irrigation techniques, rainwater harvesting and groundwater recharge are vital for water management. Similarly, soil erosion prevention, balanced fertilizer uses and soil conservation practices are crucial for maintaining soil health. Policy interventions, stakeholder engagement and climate-resilient strategies are essential for sustainable water and soil resource management.

Keywords: Conservation, Water scarcity, Soil degradation, Sustainable agriculture, groundwater.

AFTEFS/GCH/2024/211

Technological Methods for Combating Water Pollution in Haryana

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Haryana, the land of bountiful fields and rich history faces a growing threat – water pollution. The state's once pristine rivers and vital underground water supplies are burdened by contamination, threatening public health, ecosystem, and backbone of state's economy – agriculture. Fortunately, advancements in technology provide hope in this battle. Monitoring and analysis of pollutants can be achieved through sensors and remote sensing techniques. Deploying sensor networks in rivers and streams yields real-time data on water quality parameters like pH, dissolved oxygen, and pollutant levels. Satellite imagery and aerial photography allow for monitoring of large water bodies, identifying areas with high pollution concentrations. Existing sewage treatment plants can be upgraded with advanced technologies like electrocoagulation and ion exchange to effectively remove a wider range of pollutants from wastewater before release into rivers or for reuse. Furthermore, AI algorithms can analyse real-time water quality data to predict pollution events. Integrating data from sensors, remote sensing, AI, and decision support systems empowers water management authorities with the ability to make informed decisions regarding pollution control strategies and resource allocation. However, implementing these technologies can be costly and requires technical expertise. To ensure their accessibility, government funding and innovative financing models are essential. In conclusion, technological advancements offer a potent arsenal in Haryana's fight against water pollution.
Keywords: *Water pollution; Technological advancement; AI.*

AFTEFS/GCH/2024/212

Infections of Megalocytiviruses in Ornamental Fish Culture

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Megalocytiviruses are a group of viruses that can affect ornamental fish and cause megalocytosis, in which infected cells get enlarged. These viruses can lead to significant mortality in ornamental fish populations and are a concern for aquaculture. Due to the infection of this virus, the aquaculture industry has suffered high economic losses throughout the world. *Megalocytiviruses* have a large single-linear dsDNA genome that is icosahedral in shape and has a diameter measuring 120–200 nm. The red sea bream iridovirus (RSIV), infectious spleen and kidney necrosis virus (ISKNV), and turbot reddish body iridovirus (TRBIV) belong to the megalocytiviruses that affect the fish. *Megalocytiviruses* have revealed a distinct genome organization.

The global trade of ornamental fish has been identified as a potential means of spreading megalocytivirus infections. These viruses can be introduced to new areas through the movement of infected ornamental fish across different regions. *Megalocytivirus* infections in ornamental fish often lead to non-specific clinical signs such as lethargy, loss of appetite, abnormal swimming behaviour, skin discoloration, and changes in overall appearance.

Indeed, infectious spleen and kidney necrosis virus (ISKNV) has been found in various freshwater ornamental fish species, including *X. helleri* (swordtail) and *P. sphenops* (black molly). These viruses have been detected through techniques like immunofluorescences testing, loop-mediated isothermal amplification and two-step polymerase chain reaction, which is a molecular method used to identify the presence of specific genetic material, such as viral DNA. High water temperatures can indeed promote the replication of the virus, and the transportation and movement of ornamental fish can facilitate its transmission to new areas.

Prevention and control methods are vital to managing megalocytiviruses infections. These methods might include implementing strict quarantine protocols for new fish arrivals, practicing good biosecurity measures, practicing proper hygiene, and conducting regular health screenings.

Keywords: *clinical signs, detection, Megalocytivirus, ornamental fish, risk factors.*

AFTEFS/GCH/2024/213

Effect of Salinity Stress on Growth indices of *Sorghum bicolor* L. and Mitigation with Foliar Application of Melatonin

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Sorghum (*Sorghum bicolor* L.) is a major staple crop in arid and semi-arid parts of the world and is also a potential crop for studying salt tolerance mechanisms in cereal crops. all over the world and especially in drier parts of the world e.g. in Africa, Asia, Nigeria and India. Sorghum is commonly grown for feed, fodder and biofuel. Salinity emerged as a serious problem affecting our growing agriculture. However sorghum is somewhat tolerant, but the major constrain that reduces its productivity and growth is salinity. Therefore, eight sorghum varieties (HC 136, HC 171, HC 260, HC 308, HJ 513, HJ 541, CSV 32F and CSV 35F) were evaluated under field conditions with varying salinity from 6 to 8 dS m^{-1} for their salt tolerance with foliar application of phytohormone melatonin with three different concentrations *viz.* 0, 50 and 100 µm. The foliar application of melatonin effectively mitigated the salinity stress in crop plants by improving different growth indices in the plants and can also be used in different crops growing under salinity.

Keywords: Sorghum bicolor, salinity, melatonin.

AFTEFS/GCH/2024/214

Exploring Potential: Endospore Morphology and Efficacy of Indigenous *Bacillus thuringiensis* Strains against Okra Fruit and Shoot Borer, *Earias vittella*

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Six native *Bacillus thuringiensis* strains were cultured on T3 agar plates and incubated at 30 degrees Celsius for 96 hours. Subsequently, detailed examination of the endospores was conducted using a NanoSem 450 scanning electron microscope (SEM) to discern intrinsic differences between endospores from the six isolates. Bioassays were performed using the six native *Bacillus thuringiensis* cultures at various concentrations. A fruit dip bioassay experiment was conducted with the reference strain, *Bacillus thuringiensis subsp. Kurstaki* (HD 1), to assess the insecticidal toxicity of the six native *Bacillus thuringiensis* isolates against the okra fruit and shoot borer, *Earias vittella*. Scanning electron microscope studies on *Bt* endospores revealed a range of sizes, with a notable proportion being spherical. Endospore sizes were quantified using Image J software, showing a normal distribution. Qualitative insecticidal bioassays were used to predict their insecticidal activity. In laboratory evaluations against *Earias vittella* larvae with the fruit dip method, all native Bt isolate treatments resulted in over 50% mortality. The highest mortality was observed with native Bt isolate 493 (90.00%), while the lowest mortality was recorded with isolate 49 treated larvae (60.00%). In summary, isolate 493 emerged as the most effective native Bt isolate among those tested, exhibiting the smallest endospore size compared to the other native Bt isolates.

Key words: *Bacillus thuringiensis*, Endospores, Image J, Bioassay, *E. vittella,* Mortality.

AFTEFS/GCH/2024/215

Multi-variate analysis in dark brown sesame (*Sesamum indicum* L.*)*

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Sesame (*Sesamum indicum L.*) is annual in nature and commonly known as Til, gingelly, bennised, simsim having diploid chromosome number 2n=26 and belongs to family Pedaliaceae of Order Tubiflorae. It is considered as "Queen of Oil seeds" because of its high-quality oil and protein content. A total number of 150 accessions were evaluated for two seasons (*Kharif*-2019 and *Kharif*-2020). The experimental trials conducted under Project Co-ordinating Unit (Sesame and Niger), JNKVV, Jabalpur, Madhya Pradesh. The observations were recorded in all the two seasons on the following different quantitative traits *viz.,* Days to flower initiation, Days to 50% flowering, Days to maturity, Plant height (cm), Number of primary branches per Plant, Number of secondary branches per plant, Number of capsules per plant. Capsule length (cm), Number of seeds per capsule, 1000-seed weight, Oil content (%) and Seed yield per plant (g) on five randomly selected plants from the experimental plot. Principal component analysis has been proved to be useful tool in selecting genotypes for improvement. This analysis is a useful device for representing a set of variables by a much smaller set of composite variables that account for much of the variance among the set of original variables. By the use of this analysis best genotypes may be selected according to the highest PC scores contributing yield or yield attributing traits. In Principal component analysis results revealed that out of 12 principal components, only four components (PCs) exhibited more than 1.0 eigen value and covered about 62.61% variability among the traits under this study. The PC1 had the highest variability (22.639%) followed by PC2 (19.640%), PC3 (11.648%) and PC4 (8.680%).

Keywords: Sesame, Principal component analysis.

AFTEFS/GCH/2024/216

Transgrafting: A Novel Approach for Improved Crop Production

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Conventional plant breeding focuses on improving traits within a single variety. Transgrafting emerges as a revolutionary technique that combines a genetically modified (GM) rootstock with a non-modified scion (fruit-bearing part). This approach leverages the movement of RNA molecules within the grafted plant, allowing the rootstocks beneficial characteristics, such as disease resistance, to be conveyed to the scion through RNA, hormones or signaling proteins. This communication pathway allows the non-GMO scion to benefit from the desirable traits of GM rootstocks while remaining genetically unmodified itself. Importantly the fruit itself remains non-GMO. Transgrafting offers a promising strategy for developing commercially valuable fruit varieties with enhanced qualities. It holds potential for manipulating flowering time, fruit maturity, resistance to various biotic and abiotic stresses. Research has demonstrated successful application of transgrafting in achieving these goals. It was confirmed in the study that plum pox virus resistance can be transferred in non-transgenic scions grafted onto GM rootstocks. Additionally, earlier flowering was observed in both transgenic and non-transgenic blueberry plants when grafted together. This technique addresses public concerns about GMO's include safety, potential environmental harm and impact on small farmers. It was observed that the final product (fruit) is not genetically modified. Studies indicate that signals exchanged between grafted plants, even if the rootstock is genetically modified, may resemble natural plant communication, suggesting minimal risk. While research on transgrafting is encouraging, further studies are required to fully elucidate the underlying mechanisms and ensure its effectiveness across diverse plant species, especially considering its compatibility issues.

Keywords: Transgrafting, GMO-free, GM rootstocks, Non-Modified Scion, RNA Movement Early flowering, Disease resistance, Crop improvement.

AFTEFS/GCH/2024/217

Biosynthesis of silver nanoparticles of Sapota (*Manilkara zapota*) leaves: An effective catalyst to degradation of pollutant dye

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The term "nanotechnology" describes the process of manipulating atoms and molecules to create materials with nanoscale dimensions, such as a nanometre. The properties of matter at the nanoscale differ from those of bulk matter in terms of their chemical, biological, magnetic, electrical, and other characteristics. The realm of nanotechnology lies between 1 and 100 nm. It creates and uses structures that have novel properties because of their small size. The physical processes take a long time to reach thermal stability, use a lot of energy to raise the temperature of the atmosphere around the source material. The chemical methods for the synthesis of nanoparticles employ harsh reducing agents and solvents. These chemical reagents are highly toxic to the living beings and environment. Because of the aforementioned factors, biological synthesis pathways are chosen for producing nanoparticles over physical and chemical processes. These diverse physiochemical and biological routes for the creation of nanoparticles can be divided into two groups: top-down and bottom-up. Green synthesis of silver nanoparticles (AgNPs) from the aqueous extracts of Sapota (*Manilkara zapota*) leaves was carried out by using a bottom-up approach. Stable AgNPs could be made quickly, easily, and practically. Several techniques, including FESEM, XRD, PSA, UV-Visible Spectrophotometer, and FTIR, were used to characterize the generated AgNPs. Adsorption, catalysis, and other surface reactions are encouraged by the high surface energy that AgNPs' huge surface area offers. By enhancing the reduction kinetics of $NaBH_4$ in methyl orange dye reduction, AgNPs, and their composites show strong catalytic activity. Work is under progress

Keywords: Nanotechnology, Plant extract, Green synthesis, and Characterization.

AFTEFS/GCH/2024/218

The Impact of Digital Transformation on Environmental Sustainability

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The advent of digital transformation has ushered in a new era of possibilities for addressing pressing environmental sustainability challenges. This paper examines the multifaceted impact of digital transformation on environmental sustainability, exploring the opportunities it presents, the challenges it poses, and the future directions it suggests. Through an analysis of current literature and case studies, the paper demonstrates how digital technologies such as Internet of Things (IoT), artificial intelligence (AI), blockchain, and big data analytics are being leveraged to enhance resource efficiency, optimize processes, and enable informed decision-making in areas ranging from energy management to waste reduction. Despite the significant benefits, the paper also acknowledges the complexities and limitations associated with digital transformation, including issues related to data privacy, cybersecurity risks, and technological barriers. Furthermore, it highlights the importance of integrating digital and environmental strategies, fostering cross-disciplinary collaboration, and addressing ethical and social considerations to maximize the positive impact of digital transformation on environmental sustainability. Looking ahead, the paper identifies promising avenues for future research and innovation, underscoring the critical role of policymakers, businesses, and society at large in harnessing the full potential of digital technologies to drive positive environmental change.

Keywords: Digital transformations, environmental sustainability, IoT, AI, Big data analytics.

AFTEFS/GCH/2024/219

ASSESSMENT OF OFF-SEASON JACKFRUIT ACCESSIONS IN KERALA: BIOCHEMICAL COMPOSITION AND ORGANOLEPTIC ATTRIBUTES

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Jackfruit (*Artocarpus heterophyllus* Lam.) is renowned for its genetic diversity, due to its high degree of heterozygosity and heterogeneity. The tree is notable for its off-season bearing, initiating flowering from August to September, with fruits maturing between October and January. The present study was conducted at the Department of Fruit Science, College of Agriculture, Thiruvananthapuram, from September 2022 to July 2023 with an objective to evaluate the biochemical properties and sensory attributes of off-season jackfruit accessions. A preliminary survey was conducted at various regions of Kasaragod, Kannur, Kozhikode, Malappuram, and Thrissur districts in Kerala and 67 off-season jackfruit trees were located. Among these, 44 trees were geotagged, and considered for analysis. Nine biochemical parameters and six sensory attributes were assessed. Accession KZK9 exhibited highest reducing sugar (12.31%) and total sugar (19.53%), while MPM5 displayed the lowest total sugars (5.68%). KNR6 recorded the highest non-reducing sugar (13.93%). TSS (32º B) was observed highest in KSD2 and KZK9. Acidity level was maximum in KNR5 and KNR7 (0.51%) but was minimum in KZK9 (0.12%). KZK9 also exhibited the highest TSS/Acidity ratio (218.75), while KNR1 displayed the lowest (10.25). The ratio of reducing sugar to acidity was highest in KZK9 (102.67) and lowest in MPM5 (7.43). KNR2 exhibited the highest ascorbic acid content (22.43%), whereas MPM5 had the lowest (4.51%). While total carotenoid content was highest in KSD1 (1276.66 µg/100g). Statistical

analyses including Principal Component Analysis (PCA), Kendall's test, and Kruskal- Wallis test were conducted. Among the 44 accessions, those identified as elite were KSD2, MPM6, MPM9, KZK9, TSR1, TSR2, KZK7, KZK5, MPM7, and MPM11.

***Keywords**:* jackfruit, survey, accessions, biochemical analysis, organoleptic evaluation.

AFTEFS/GCH/2024/220

Beyond Monoculture: Doubling Farmers' Revenue with Integrated Farming in Fruit Cultivation

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Fruit cultivation is a vital element of agriculture globally, providing essential nutrients, economic opportunities, and livelihoods to millions of farmers. However, it often relies on traditional monoculture systems entail high input costs, risks of pests and diseases outbreak, and environmental degradation and biodiversity loss which ultimately limiting revenue potential. Integrated Farming Systems offer a viable solution to these challenges by promoting synergies between diverse agricultural activities within a single farm. By incorporating various components such as agroforestry, intercropping, livestock integration, apiculture integration and organic farming techniques, Integrated Farming Systems can effectively enhance the productivity and resilience of fruit orchards. For instance, intercropping fruit crops (mango) with nitrogen-fixing legumes (cowpea) reduces fertilizer needs and increases overall farm income. Similarly, integrating fishponds with litchi orchards creates a symbiotic system where fish waste fertilizes litchi trees and litchi trees filter water for the fish, reducing reliance on external inputs. Additionally, including beehives within cherry orchards significantly improves fruit set and yield through enhanced pollination. Through the implementation of Integrated Farming Systems, farmers can diversify their income streams, reduce production risks, and improve overall farm profitability. Therefore, IFS in fruit cultivation can lead to a twofold increase in farmers' revenue while promoting environmental sustainability, resilience and ensure food security in the long term.

Keywords: Integrated farming, Intercropping, Fruit set, Food security.

AFTEFS/GCH/2024/221

Enhancing Agricultural Sustainability through Post-Production Technologies for Stakeholders

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The abstract delves into the critical need for a 70% increase in food production to meet the demands of a projected 9.1 billion population by 2050. Despite efforts to enhance agricultural productivity, postharvest losses remain a significant challenge, with around one-third of globally produced food, valued at US $1 trillion, lost annually during postharvest operations. Addressing these losses is crucial as it requires modest investments but yields significant returns compared to solely increasing crop production. The integration of technology in post-production processes, such as digital transformation, collaboration software, and stakeholder management strategies, plays a pivotal role in reducing losses, enhancing marketability, and optimizing supply chain efficiency. Cold chain logistics and traceability systems are essential components in safeguarding product quality and safety throughout transportation and storage, while market reforms aim to enhance productivity and competitiveness in the agricultural sector. The abstract emphasizes the importance of integrating technology into post-harvest processes to improve efficiency, reduce losses, and ensure food quality, ultimately contributing to sustainable agricultural development and global food security.

Keywords: Post-production Technologies, Supply Chain Efficiency, Cold Chain Logistics, Traceability Systems.

AFTEFS/GCH/2024/222

Pomegranate (*Punica granatum* L.) juice and peel mediated AgNPs against disease causing crop pathogens

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The field of nanoscience has become the most tremendous area of research with potential application for generating new and unique types of nanoparticles. Use of plants in synthesis of nanoparticles provide advancement over chemical and physical method as it is cost effective and environment friendly, easily scaled up for large scale synthesis. Bottom-up approach has been usedin the biosynthesis of silver nanoparticles from *Punica granatum* juice and peel aqueous extracts. UV-Visible, DLS, FTIR, XRD, FE-SEM and HR-TEM techniques were used to characterize the synthesized AgNPs. Biosynthesized AgNPs exhibited antifungal activity against *Colletotrichum gloesporioides* and *Colletotrichum graminicola* species which are the causative agent for Anthracnose of Guava and Anthracnose of Sorghum respectively. Studies showed that pomegranate peel mediated AgNPs exhibited greater antifungal activity than pomegranate juice mediated AgNPs. The concentrations of AgNPs typically utilised for antifungal activity did not exhibit significant toxicological effects according to the biosafety evaluation. As an efficient substitute for traditional fungicide and antibiotic, these greenly synthesised AgNPs might boost crop output, improve hospital administration, and facilitate large-scale manufacturing for the pharmaceutical industry.

Keywords: Pomegrante, AgNPs, Antifungal activity.

AFTEFS/GCH/2024/223

Effect of Green synthesized Magnetite nanoparticles (Fe_3O_4 NPs) on Various Physiological and Biochemical Parameters of Pear Saplings

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Iron is one of the essential micronutrient elements for plant growth and development needed by plants in small quantities, consequent deficiency of iron causes physiology malfunction. Iron activates several enzymes and it is very important for chlorophyll formation and improves the performance of photosystems and many other vital processes of plants. Nutrients are very important for plant growth and development; there are many factors that reduce their availability to plants. Thus, it is necessary to reduce nutrient losses to increase crop yields through using new applications such as nanotechnology. Nanotechnology improve crop productivity by reducing nutrients loss in plants. Modern agriculture has benefited greatly from nanotechnology, which has emerged as a promising technology with enormous promise to address the undernutrition of plants. Nanotechnology has various functions in all stages from production, processing, storage, postharvest and transportation of agricultural products.

Nanoparticles have important characteristics such as high surface to volume ratio, optical, thermal and electrical properties which makes them better than their macroscopic counterparts. Physical, chemical and biological approaches are generally used for the preparation of nanoparticles. The physical and chemical methods are expensive and energy intensive and also involves the use of hazardous chemicals and surfactants. So, biological method is most favourable and greener route. The nanoparticles have a beneficial effect on plants growth and development. The optimum dose of nanoparticles is expected to improve crop productivity. Additionally, the usage of an optimum dose of nanoparticles might minimize the risk of the presence of nanoparticles in the plant environment. Fe_3O_4NPs facilitate enhanced nutrient uptake from the soil and show positive impact on the growth and development of plants. In this research, it has been attempted to synthesize Fe_3O_4NPs using leaves

extract of Maulsari (*Mimusops elengi L.*) and applied to determine the effect of foliar sprays with Fe_3O_4NPs on various physiological and biochemical parameters of pear saplings. Sapling was subjected to five treatments including foliar spraying with Fe_3O_4NPs of concentration of 50, 100, 150, 200 and 250 ppm. Results showed an increase in biomass parameters like sapling height, stem diameter, leaf area and dry weight. Additionally leaf bio-chemical parameters showed a tremendous increase in total carbohydrates percentage, total amino acids concentrate, nitrogen and iron content, carotenoids content. Further research on the topic is going on.

Key Words: Magnetite nanoparticles, Foliar spray, Pear, Saplings, Nutrients**.**

AFTEFS/GCH/2024/224

Finger Millet Fodder: Unlocking the Potential for Livestock Nutrition and Agricultural Sustainability

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Finger millet, also known as *Eleusine coracana*, is a hardy and versatile cereal crop that holds great potential as a fodder source for livestock. With its high protein content and nutrient-rich composition, finger millet can serve as a valuable addition to animal feed, providing essential nutrients for growth and development. This crop is well-suited to a variety of environments and is known for its drought tolerance and resilience to adverse conditions. In this abstract, we will explore the benefits and potential of finger millet as a fodder crop, highlighting its importance in sustainable agriculture and livestock production. Using finger millet as a dual-purpose crop for grain and fodder production can enhance farmer income and reduce dependence on external feed sources, promoting agricultural sustainability.

Finger millet, a highly nutritious crop, is fed to livestock in several African and Asian countries. Its nutrient concentration includes crude protein (CP; 10.7%), Ca (1.20%), P (0.44%), K (4.53%), and Mg (0.31%), which are higher than forage corn (*Zea mays* L.) and forage sorghum. Despite having

favorable nutritional profiles with 598 to 734 g/kg Neutral Detergent Fiber (NDF), 268 to 382 g/kg Acid Detergent Fiber (ADF), 597 to 730 g/kg in vitro true digestibility, and 387 to 552 g/kg Neutral Detergent Fiber (NDF) digestibility, finger millet remains relatively unknown as a global forage crop due to a lack of extensive scientific research and limited availability of diverse genotypes for conclusive evidence. Finger millet stover has been recognized as a valuable fodder source, containing upto 61% total digestible nutrients offering the potential for a thriving livestock industry. However, challenges such as limited improved varieties and inadequate crop management practices have hindered the production and utilization of finger millet and its products. Looking towards the future, further research and investment in breeding programs for finger millet fodder are needed to unlock its full potential. By focusing on developing varieties with higher nutritional content, improved digestibility, and disease resistance, we can ensure a sustainable source of feed for livestock production. Incorporating finger millet fodder into livestock diets has the potential to revolutionize animal nutrition and contribute to a more sustainable and resilient agricultural system.

Keywords: Finger millet, fodder, nutrition, ADF, NDF.

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Unveiling the Beneficial Microbial World in Foods: A Gateway to Health and Wellness

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In recent years, there has been a paradigm shift in understanding the intricate relationship between food and human health, largely fueled by discoveries in the realm of beneficial food microbes. Beneficial food microbes encompass a diverse array of microorganisms, including probiotics, prebiotics and symbiotic cultures, which exert multifaceted health benefits when incorporated into the diet. Probiotics, such as Lactobacillus and Bifidobacterium, are live microorganisms that confer health advantages by modulating gut microbiota, enhancing digestion, bolstering immune system and mitigating various gastrointestinal disorders. Prebiotics serve as nourishment for beneficial gut

bacteria, fostering their growth and activity. These indigestible dietary fibers, notably found in fruits, vegetables and whole grains, regulate blood sugar levels and reduce the risk of chronic diseases. Furthermore, symbiotic cultures combine the synergistic effects of probiotics and prebiotics, amplifying their health-promoting properties. This symbiotic approach holds promise for personalized nutrition strategies tailored to individual microbiota profiles, thereby optimizing health outcomes. In addition to their physiological effects, these microbes contribute to food preservation, safety and flavor enhancement. Fermented foods extend the shelf life of perishable items and offer a sensory delight. There is need to understand the mechanisms of action and ensuring product quality and safety. In conclusion, the exploration of beneficial food microbes heralds a new era in nutrition and health, offering a holistic approach to wellness through the integration of dietary interventions targeting the microbiome. Harnessing the potential of these microscopic allies holds promise for disease prevention, personalized nutrition and promotion of overall health and vitality in the modern era.

Keywords: food microbes, probiotics, preservation and microbiome.

AFTEFS/GCH/2024/226

Organic Farming Innovations: Nurturing Sustainable Agriculture for Tomorrow's World

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As the global community increasingly recognizes the imperative for sustainable agricultural practices, organic farming emerges as a beacon of innovation and resilience. This conference aims to delve into the latest advancements and strategies within the realm of organic farming, exploring diverse topics such as agroecology, regenerative agriculture, biodynamic farming, and permaculture. Through interdisciplinary discussions and case studies, participants will unravel the multifaceted benefits of organic farming, spanning environmental conservation, soil health improvement, biodiversity enhancement, and climate resilience. Key themes to be addressed include the integration of cutting-edge technologies, such as precision farming and bioinformatics, into organic agricultural systems, as well as the fostering of sustainable supply chains and market access for organic producers. Moreover, the conference will shed light on the socio-economic dimensions of organic farming, examining its role in rural development, food security, and equitable livelihoods. With a focus on

practical insights, policy implications, and future directions, this conference seeks to catalyze dialogue and collaboration among researchers, practitioners, policymakers, and stakeholders towards harnessing the full potential of organic farming for building a more sustainable and resilient food system for generations to come.
Keywords: Sustainable, Regenerative, Biodiversity and Agroecology.

AFTEFS/GCH/2024/227

Natural Resource Conservation: The Vital Role of Political Systems and Constitutions

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The conservation of natural resources presents a critical challenge in today's world and demands a nuanced understanding of how political systems and constitutions influence environmental stewardship. In this study we explored the intricate relationship between governance structures and the protection of natural resources, offering insights drawn from diverse global perspectives. Political systems play a pivotal role in shaping conservation efforts through policy development and implementation. Constitutions serve as the foundation for legal frameworks governing natural resource management. By enshrining environmental rights, delineating state responsibilities, and advocating for intergenerational equity, constitutions can foster a culture of conservation. However, deficiencies or ambiguities within constitutional provisions may hinder effective resource management, perpetuating unsustainable exploitation. Costa Rica included a provision in its constitution for environmental protection in legal framework which facilitated the establishment of guarded areas and promotes sustainable development practices. This lead to significant outcomes of biodiversity conservation. The establishment of Australia's Great Barrier Reef Marine Park Authority has played a crucial role in coordinating conservation efforts, regulating activities within the park, and implemented policies to protect a precious natural resource. Drawing on many such case studies from around the world, we found that the effectiveness of political systems and constitutions in conservation hinges on their adaptability to changing environmental and socio-economic dynamics. Flexible policy formulation, coupled with robust enforcement mechanisms, is essential for addressing complex ecological challenges such as

climate change and biodiversity loss. Integrating environmental considerations into governance structures, promoting holistic approaches that prioritize the long-term health of natural resources for current and future generations is the only way that we may be able to reach our conservation goals. Therefore, we can safely say that the role of political systems and constitutions in natural resource conservation is indispensable and by fostering inclusive governance structures, upholding constitutional principles of environmental protection, and embracing adaptive management strategies, nations can forge a path toward a more sustainable and equitable relationship with the natural world.

Keywords: environmental stewardship, governance structures, biodiversity conservation, sustainable development practices, climate change, adaptability

AFTEFS/GCH/2024/228

Natural Resource Management Using Smart Farming: A Sustainable Approach for Agricultural Development

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Smart farming, also known as precision agriculture, is revolutionizing the agricultural sector by integrating modern technologies to optimize crop production while minimizing environmental impact. This approach involves the use of sensors, drones, GPS technology, and data analytics to monitor and manage farm operations with precision. Natural resource management is a critical aspect of smart farming, as it focuses on sustainable practices that ensure the efficient use of resources such as water, soil, and energy. Natural Resource Management (NRM) refers to the sustainable utilization of major natural resources, such as land, water, air, minerals, forests, fisheries, and wild flora and fauna. Together, these resources provide the ecosystem services that provide better quality to human life. Sustainable utilization of natural resources is the proper management of natural resources for the benefit of the entire human community. The main aim of sustainable development is to provide resources for present generations without compromising the needs of future generations. This paper explores the concept of natural resource management using smart farming techniques and its implications for sustainable agricultural development. It discusses the various technologies and tools available for smart farming and how they can be applied to enhance

resource efficiency and productivity. Key findings suggest that smart farming can significantly improve resource management by enabling farmers to make informed decisions based on real-time data. This approach can help reduce water consumption, minimize chemical use, and optimize crop yields. However, challenges such as high initial costs, lack of technical expertise, and data privacy concerns need to be addressed to ensure the widespread adoption of smart farming practices.

Keywords: Smart farming, precision agriculture, GPS, Natural resource management and Sustainable

AFTEFS/GCH/2024/229

Role of Biomedical Technology in attaining Sustainable Development Goals in India

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India has made tremendous development in the field of biomedical technology in the recent years addressing multifaceted health challenges, and promoting overall well-being. With a burgeoning population and diverse healthcare needs, India faces significant obstacles in providing equitable access to healthcare services. These latest techniques serves as a catalyst in overcoming these hurdles by facilitating early diagnosis, innovative treatments, and efficient healthcare delivery systems. One of the critical areas where innovations in biomedical technology contribute to SDGs is in improving maternal and child health. Advanced imaging techniques, such as ultrasound and MRI, aid in prenatal monitoring, ensuring safe pregnancies and reducing maternal mortality rates. The development of affordable medical devices, such as portable diagnostic tools and neonatal care equipment, enhances healthcare accessibility, particularly in rural and remote areas. Moreover, innovations in disease prevention and management like, vaccines, screening tests, PPEs, purification systems etc. focus on ensuring healthy lives and promoting well-being for all ages. India's biotechnology sector has made substantial strides in vaccine development, disease surveillance systems, and precision medicine, which are instrumental in combating infectious diseases, reducing morbidity, and improving healthcare outcomes. Furthermore, biotechnological interventions in agriculture and environmental conservation have contributed immensely to the goals of zero hunger and climate action, respectively, by

enhancing food security and fostering sustainable agricultural practices. Collaborative efforts between the government, research institutions, and private enterprises are essential in harnessing the full potential of biomedical technology to address India's developmental challenges and achieve the SDGs. By prioritizing research and innovation, promoting technology transfer, and ensuring equitable healthcare access, India can leverage biomedical technology as a transformative tool in its journey towards sustainable development and inclusive growth.

Keywords: imaging techniques, prenatal monitoring, screening tests, zero hunger, climate action.

AFTEFS/GCH/2024/230

Ameliorative effect of melatonin improve salinity tolrence of *Brassica juncea L.*

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Brassica juncea L. often known as "Indian mustard," is India's second largest oil seed crop after soybean. It is commonly cultivated in Russia, China, Canada, Australia, and India. One of the major obstacles to high yield and production for Indian mustard is the lack of synchronized crop establishment due to soil conditions caused by salinity. Most of this salt influenced soil has arisen due to natural causes, as result of the accumulation of salts over a long period of time in arid and semi-arid zones. The salinity problem is increasing every year due to the use of poor quality irrigation water as well as poor drainage system. Salinity stress is a critical factor impacting plant growth, distribution, and production *via* influencing several intracellular processes such as photosynthesis, ion homeostasis, protein, and lipid synthesis as well as hormonal and metabolic imbalance. The experiment was carried out at the screen house of Department of Botany and Plant Physiology, CCS Haryana Agricultural University, Hisar, to investigate the impact of melatonin on the yield and quality of mustard genotype (RH-1928) during the rabi season of 2022-23. The experiment involved four levels of salinity (control, 2.5, 5 and 7.5

dS/m). Physiological traits such as photosynthetic rate, stomatal conductance, transpiration rate, Chlorophyll Content, as well as morphological traits, were recorded at 7th to 10th day after foliar application of melatonin, while yield attributing characters were assessed at maturity. The findings indicated a significant increase in mustard yield with the application of melatonin 50 µM as compared to their respective controls.

Key words: Mustard, salinity stress, melatonin, Physiological traits, yield attributes

AFTEFS/GCH/2024/231

Exploring Green Energy Techniques for a Sustainable future

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As the world grapples with the urgent need to transition towards sustainable energy sources, green energy techniques have emerged as crucial solutions to mitigate environmental degradation and combat climate change. In this study we explored various alternative resources and their efficiency in promoting sustainable energy. Solar energy stands out as a leading green energy source, harnessing the power of sunlight through photovoltaic cells to generate electricity. With advancements in technology and decreasing costs, solar energy has become increasingly efficient and accessible, offering a viable solution for decentralized power generation. Bhadla Solar Park, India (2,245 MW), Kurnool Ultra Mega Solar Park, India (1,000 MW), Longyangxia Dam Solar Park, China (850 MW), Noor Complex Solar Power Plant, Morocco (580 MW) are some of the instances of impactful solar energy initiatives yielding substantial megawatt output. Wind power is another promising green energy technique, utilizing wind turbines to convert kinetic energy into electricity. Wind farms, both onshore and offshore, have witnessed significant growth, contributing to the global renewable energy capacity. The Jiuquan Wind Power Base, China (7,965 MW), The Gansu Wind Farm, China (6,000 MW), The Alta Wind Energy Centre, California (1,548 MW) are some of success stories of wind energy. Hydropower remains a longstanding renewable energy source, tapping into the kinetic energy of flowing water to generate electricity. Large-scale

hydroelectric dams have been instrumental in meeting energy demands, yet concerns over environmental impact and displacement of communities underscore the importance of sustainable practices and small-scale hydro projects. Bioenergy, from biomass, biogas, and biofuels, offers renewable energy but requires careful management due to land use, resources, and emissions. Thus, green energy techniques leveraging alternative resources play a pivotal role in achieving sustainable energy goals.

Keywords: photovoltaic cells, electricity generation, alternative resources, technology advancements, renewable energy capacity.

AFTEFS/GCH/2024/232

Determination of total phenolic content and antioxidant capacity of *Carica papaya* L. leaves using thermosonification extraction

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Growing fruit and vegetable processing businesses produce a significant amount of by-products, such as rind, pomace, seed, skin, and leaves, which contain a significant amount of bioactive substances like carotenoids, polysaccharides, and dietary fibre. There are significant constraints associated with conventional extraction in terms of energy, time, and solvent requirements. Bioactive components can be extracted by ultrasound aided extraction (UAE) in a fraction of the time, at low temperatures, and with less energy and solvent needed. UAE is a non-thermal extraction method that is more suited to maintaining the bioactive chemicals' functionality. This study offers an overview of the theories, mechanisms, and variables influencing the extraction of bioactive chemicals, with an emphasis on the by-products of fruits and vegetables. Using response surface methodology (RSM) in conjunction with a Box–Behnken design, thermosonification extraction (TSE) was examined for the extraction of total phenolic compounds (TPC expressed as Gallic acid equivalents, GAE) and antioxidant activity from the aqueous

solution of Carica papaya L. leaves. The 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay was used to determine the antioxidant activity of the extract, and the results showed that the extract had an antioxidant activity of 73.12 ± 0.19% and TPC yield as 47.46 ± 3.61 at ideal processing parameters. The ideal TSE processing parameters found were power 200W, temperature 60° C, extraction time 30 min, and liquid/solid ratio 50:1. 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.

Keywords: Bioactive substances, Thermosonification, Response Surface Methodology, Total phenolic compounds and Antioxidant activity.

AFTEFS/GCH/2024/233

Assessment the spatio- temporal climatic variability during the three-decade wheat Cultivation Period in Haryana (1990-2020)

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The wheat plant, scientifically known as Triticum aestivum L., belonging to the Gramineae (Poaceae) family, plays a significant role in India's agriculture. India ranks third globally in wheat production, cultivating over 31.1 million hectares in 2020-21 and yielding 109.6 million metric tons at a rate of 3521 kilograms per hectare. In Haryana, wheat cultivation covered 2.35 million hectares, yielding 11.40 million metric tons at a rate of 4687 kilograms per hectare. This study highlights the adverse impact of climate change on wheat yields, especially due to temperature fluctuations during various growth stages. Warmer temperatures shorten vegetative crop duration, resulting in sparse tillering, poor growth, and premature heading during the early vegetative phase, and forced maturity during grain filling.

The study examined the spatio-temporal variability of climate on wheat cultivation from 1990 to 2020, utilizing long-term climatic data on maximum temperature, minimum temperature, and rainfall. The data, processed in a GIS environment and converted into TIFF format, revealed that districts Panchkula and Yamunanagar had the lowest average annual maximum temperature at

28°Cover the thirty-year period. An inverse relationship between air temperature and wheat yield was observed, indicating that higher temperatures during the growing season lead to lower yields. The study emphasizes the combined impact of climate factors in reducing wheat yield.

Keywords: Wheat, climatic variability, GIS Analysis.

AFTEFS/GCH/2024/234

Toxic effects of Arsenic in some fresh water fishes

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Arsenic is widely distributed in the Earth's crust and occurs naturally in various minerals. It can also be found in trace amounts in soils, rocks, and groundwater. Human activities, such as mining, industrial processes, agriculture, and combustion of fossil fuels, can release arsenic into the environment, contributing to arsenic pollution. Arsenic and many of its compounds are highly toxic to humans and other organisms. Arsenic accumulates in the tissues of fish through the process of bioaccumulation, Chronic exposure to arsenic can lead to various health problems, including skin lesions, cancer, cardiovascular disease, and neurological disorders. Therefore, this study was aimed to observe the impact of arsenic at 0.025 and 0.05ppm levels in two commonly cultured *Cyprinus carpio* and *Cirrhinus mrigala* fishes. The treated fishes exhibited distinct behavioural anomalies, like jerking and whirling movements while swimming, engloping air on the water surface, often going for exodus trials and slime secretion. Fish mortality, change in body colour as well as fin colour, fin erosion, descaling and haemorrhage were observed as the morphological aberrations in both the fish species. Total soluble proteins were reduced in all the tissues viz. liver, body muscles, brain and blood. Arsenic induced synthesis of some new proteins called stress proteins with subsequent deletion of few proteins over the control. Understanding the effects of arsenic contamination on freshwater fish, it is essential for implementing effective management and conservation strategies.

Key Words- Arsenic, *Cyprinus carpio*, *Cirrhinus mrigala,* Protein.

AFTEFS/GCH/2024/235

Management of Water & Soil Resources

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The sustainable management of water and soil resources is imperative for ensuring the well-being of both ecosystems and human societies. This abstract provides an overview of key strategies and approaches employed in the management of these vital resources. Water resource management encompasses various techniques aimed at conserving, protecting, and efficiently utilizing freshwater sources. This includes watershed management, which involves the integrated management of land, water, and vegetation to sustainably meet the needs of both humans and the environment. Additionally, water conservation measures such as rainwater harvesting, drip irrigation, and water recycling play pivotal roles in mitigating water scarcity and promoting resilience in the face of changing climatic conditions. Soil resource management focuses on preserving soil quality and fertility while minimizing erosion, degradation, and contamination. Sustainable agricultural practices such as crop rotation, cover cropping, and no-till farming help maintain soil health and productivity. Moreover, soil conservation methods such as terracing, contour ploughing, and agroforestry aid in preventing soil erosion and promoting sustainable land use. Integrated water and soil management approaches recognize the interconnectedness of these resources and seek to address their management holistically. This involves implementing interdisciplinary strategies that consider the hydrological, ecological, and socioeconomic aspects of water and soil systems. Such approaches often involve stakeholder engagement, participatory decision-making processes, and the integration of traditional knowledge with modern scientific practices. Furthermore, technological innovations such as remote sensing, geographic information systems (GIS), and precision agriculture offer valuable tools for monitoring, analyzing, and managing water and soil resources more effectively. These technologies enable real-time data collection, spatial mapping, and predictive modelling, thereby enhancing decision-making processes and resource allocation.

In conclusion, the management of water and soil resources requires a multifaceted approach that integrates ecological, social, and technological dimensions. By adopting sustainable practices, leveraging innovative technologies, and fostering collaborative partnerships, societies can safeguard these essential resources for future generations while promoting environmental resilience and socio-economic development.

AFTEFS/GCH/2024/236

Shadow of Byrd-Hagel Resolution on Kyoto Protocol: Back step by USA

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United States is not the ratifier of *Kyoto Protocol* because of its previous *Byrd-Hagel resolution* and its economic issues. From very long period USA enjoying its industrial legacy due to big cap on factors of production, particularly putting high stake on environmental resources. Kyoto protocol was stressed document that brought developed nations to take responsibility about environmental loss. Here, we do study about their previous resolution and Kyoto's concerns. Study find that Byrd-Hagel resolution was clear-cut line for US Administration and it was also a point of view of the nations people. US Government follow that line and take back step in the case of Kyoto and even on the issues related to *economic* compromises due to *environmental issues*.

Keywords: Byrd-Hagel Resolution, Kyoto Protocol, Economic Development, Environment.

AFTEFS/GCH/2024/237

हरियाणा में वनों का अवरूपण: एक गंभीर समस्या

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जनसंख्या का तीव्रता के साथ बढ़ना, नगरीकरण और औद्योगिकीकरण की अंधाधुंध दौड़ ने वन संसाधन पर प्रतिकूल प्रभाव डाला हैं। जो वर्तमान समय में एक गंभीर चिंता का विषय हैं। दिन - प्रतिदिन वनों का घटता हुआ स्तर वातावरण में जलवायु का असमान्य होना, पारिस्थितिक असंतुलन, वन जैव विविधता को खतरा, बाढ़ तथा मृदा अपरदन जैसे घटनाओ को निमंत्रण दे रहा हैं । आदिकाल से मानव प्रकृति द्वारा प्रदत इस संसाधन का लाभ उठाता आया है । वन संसाधन शुद्ध वायु का एक मात्र स्त्रोत हैं जो मानव जीवन के लिए सबसे महवपूर्ण है । इसके साथ कार्बन डाई ऑक्साइड का अवशोषण भी करता हैं । फिर भी मानव इस संसाधन पर ध्यान नही दे रहा हैं । हरियाणा में सन् 2019-20 में वन के अधीन क्षेत्र 34 हजार हेक्टेयर हैं जो भौगोलिक तथा पारिस्थितिक रूप से दयनीय स्थिति रखता हैं। हरियाणा वन नीति 2006 में वर्ष 2010 तक 10% भूभाग पर वनावरण के लक्ष्य को प्राप्त करना था। परन्तु यह लक्ष्य सन् 2021 तक भी पूरा नही हो पाया हैं। समय के साथ वन क्षेत्र बढ़ने के स्थान पर कम होते जा रहे हैं। जो भविष्य में मानव के लिए एक चुनौतीपूर्ण विषय है ।

कुंजी: वनक्षेत्र,संसाधन,पारिस्थितिक संतुलन,वनावरण और वानिकी।

AFTEFS/GCH/2024/238

NATURAL RESOURCES AND THEIR MANAGEMENT

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"The Earth provides enough to satisfy every man's needs, but not for any body's greed".

A resource is anything we get from physical environment to meet our needs and wants. Anything which is useful to man or can be transformed into a useful product or can be used to produce a useful thing can be referred to as a resource. A natural resource is the resources obtained from nature. These natural resources form the very basis of entire life on this planet.

Natural resources have been explained by humans since the beginning of civilization or even before. Earlier, the resources were abundant in relation to human population and no significant depletion occurred. But, during last millennium, human population has increased considerably causing serious damage or destruction of natural resources. Humans converted the self-sufficient system of biosphere into a system of natural resources. This modernization has brought about rapid industrialization followed by unplanned cities which have further degraded our environment. The basic urge in man to improve his condition has led to the evolution of scientific means and methods. They try to meet the challenges of life and find solutions to their problems. An integrated approach in their planning, development and management is, therefore, imperative to ameliorate poverty.

Both the affluence of developed countries of the world and the desperate poverty of underdeveloped countries are injurious to the life support system on our planet. Human life in developed countries of the world requires large amount of energy and material inputs while a ceaseless stream of wastes is generated which damages the environment and results in rapid depletion of resources of our planet. Life in under-developed countries strives to survive on a meager, share. craving for the basic necessities and in ignorance or desperation often damages the very resource base on which rests the entire life support system of this planet.

AFTEFS/GCH/2024/239

Study of Various Mathematical Models for Natural Resource Management

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The sustainable use of natural resources is of utmost importance for every community. In particular, it is important for every given generation to plan in such a way that proper provision is made for future generations. The scientific understanding of resources use and appreciation for its life-supporting capacity is therefore essential. Mathematical modeling has proved useful to inform the planning and management of strategies for sustainable use of natural resources. Some specific topics in resource management has been studied intensively through many decades. In particular, mining, fisheries, forestry and water resources are among these. This paper presents a variety of cases of mathematical modeling in resource management. The purpose of this paper is to provide a basic overview of the main mathematical models for the management of the environment and its natural resources.
Keywords: Pareto optimality, Fisher information, Brownian Motion, etc.

AFTEFS/GCH/2024/240

Applications of Remote Sensing and GIS in Natural Resource Management

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Remote sensing is a technology that gathers information about an object or phenomenon without making direct physical touch. Remote sensing provides numerous applications that make a substantial contribution to sustainable resource management. Geographical Information System (GIS) is highly valuable for identifying and analyzing the factors that impact the exploitation of these resources. This paper includes use of remote sensing in the

management of natural resources. Given the growing strain on natural resources caused by the expanding human population, remote sensing and GIS can be employed to effectively and efficiently manage these valuable finite resources.

Key words: Remote Sensing, GIS, Natural Resources, Mapping, Management.

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Application of Mathematical Modeling in the Sustainable Use of Natural Resources

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The sustainable use of natural resources is of supreme importance for an individual in this universe. Particularly, when these resources are reducing alarmingly. Hence, a systematic and scientific understanding of resources along with their uses and conservation is inevitable. Mathematical modeling has proved useful to inform the planning and management of strategies for sustainable use of natural resources. Some specific topics in resource management has been studied intensively through many decades like- mining, fisheries, forestry and water resources etc.

The paper aims at exploring variety of cases pertaining to mathematical modeling in resource management and to improve the general understanding of the relevant problems. Focusing on specific items with further explanations and graphs, or by modifying the models through the introduction of stochastic perturbations, it contributes towards giving more explanation, on the socalled environmental Fisher information or EFI for brevity and by introducing stochasticity into a pest control model and into a savanna vegetation model. It also explores the existing model pertaining to the problem of shifting cultivation, i.e., the use of forest land when used for subsistence level agricultural purposes, until the land is so degraded that the occupants abandon it and move on to a new stand.

The paper explores various models such as deterministic model by developing stochastic differential equation model and the ordinary differential equation model for the competition between trees and grass is also explored. The

competition between them is for soil water, fed by annual rainfall. On the other hand, trees and grass are perturbed by fire, and some other environmental forcings such as herbivores. For this ODE model, we introduce stochastic perturbations. The stochastic perturbations are in the form of three mutually independent Brownian motions. The three-tiered predator-prey model and its stability in terms of Fisher information is also explored. Such Fisher information is defined on the basis of the so-called sustainable measures hypotheses drawing several computations to show the influence of carrying capacity of prey and of mortality rate on EFI. The driven results demonstrate the modeling techniques in the sustainable use of natural resources which paves way for equal opportunities for all generations. The outcomes are equally important in view of a growing world population, and with forcings such as climate change.

Key words: Sustainable, natural resources, mathematical modeling, differential equation model, ODE model.

AFTEFS/GCH/2024/242

Environmental and Cultural Resilience in Chinua Achebe's *Things Fall Apart*

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Achebe's *Things Fall Apart* compels the readers to ponder over a contemporary crisis, one whose devastation, like colonialism, touches some places more than others, but that is universal in scope acknowledged as the environmental crisis. The novel offers a poignant vision and strategy of resilience for coping with the intricate, potentially catastrophic, ecological and cultural changes that confront us today.

The paper aims at analysing *Things Fall Apart* under the scanner of ecocriticism. It examines the literary piece in relation with environment and nature. The urgency of examining literature from an ecological point of view is occasioned by the present environmental crisis that swept the globe. Ecocriticism tries to find possible solution to correct contemporary ecological situation by analyzing the ways nature and environment are represented in literature. The bringing together of ecocriticism and postcolonialism has given

a new impetus to the whole critical thought where the ideas of race, land, environment, wilderness etc. are given new insight.

Things Fall Apart depicts a vibrant community in which human society is not at one with nature, but rather densely entangled with it. Environmental crises—drought, locusts, along with the quotidian challenges of weather and sickness—are part of Igbo life, managed within a system of agricultural, political, social and spiritual practices that have evolved over time. Drawing on practical knowledge infused with an elaborate mythology, in which the concept of *chi* jostles against the authority of ancestors and strictly delimited spheres of masculine and feminine power, the Igbo negotiate—not always successfully or in ways that accord with contemporary ethical understanding—tensions between cosmological and mundane forces, between fate and contingency.

The present paper would make an attempt to examine how nature and environment are being treated in the novel. Such an examination is intended to establish that, while the pre-colonial African society lived in an inviolate state of nature, it was colonialism that opened the door for exploitation of nature, ignoring or denigrating the deep meanings that nature and environment held for the African people in the pre-colonial period.

Key words: Africa; Igbo, agriculture; ecology; Postcolonialism; religion.

AFTEFS/GCH/2024/243

The Impact of Media Framing on Public Perception of Climate Change Adaptation Strategies through GIS and Remote Sensing Data

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This research paper investigates the impact of media framing on public perception of climate change adaptation strategies, specifically focusing on the role of Geographic Information Systems (GIS) and Remote Sensing Data in shaping perceptions. By employing a mixed-methods approach, combining content analysis of media coverage with public opinion surveys, this study

aims to elucidate how different frames employed by media outlets affect the public's comprehension and acceptance of climate change adaptation strategies.

Drawing on theories of framing and agenda-setting, the study analyzes how GIS and remote sensing data are utilized in media narratives to frame climate change adaptation efforts. It examines the prevalence of various frames, including problem-centered, solution-oriented, and human-interest frames, in news articles, broadcasts, and social media content. Additionally, the study investigates the extent to which these frames influence public attitudes, beliefs, and behavioral intentions regarding climate change adaptation.

The research utilizes a combination of quantitative analysis to identify patterns in media framing and qualitative methods such as thematic analysis to delve deeper into the nuances of public perceptions. Furthermore, geospatial analysis techniques are employed to visualize the spatial distribution of media coverage and public sentiment regarding climate change adaptation strategies.

The findings of this research have significant implications for environmental communication strategies, policy formulation, and public engagement efforts. By understanding how media framing shapes public perceptions, stakeholders can tailor communication strategies to effectively convey the importance of climate change adaptation and foster informed decision-making at individual, community, and policy levels. Moreover, the integration of GIS and remote sensing data provides valuable insights into spatial patterns of media coverage and public perception, facilitating targeted interventions to enhance climate change resilience and adaptation efforts.

Keywords: Media framing, climate change adaptation, GIS, remote sensing, public perception, environmental communication.

AFTEFS/GCH/2024/244

The Relationship between Psychological Well-Being and Natural Resources

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Individuals' environmental views and psychological health may be influenced by their perception of nature interaction. The terms emotive, cognitive, and experience dimensions of people's relationships with nature are referred to as

nature relatedness. The stated research focuses on evaluating the connection between wellbeing, self-control and connection to the natural world. The majority of people suffer negative effects from acting in a way that is environmentally relevant, according to conventional techniques in environmental psychology. Feelings associated with participating in pro-environmental activities include inconvenience, guilt, embarrassment, discomfort, and even hypocrisy. However, it appears from recent findings in conservation psychology that people who are pro-environment are more likely to experience good psychological outcomes including joy, increased motivation, good perception, emotionally balanced and contentment. That being said, living sustainably could enhance one's sense of wellbeing. The purpose of this study was to determine whether pro-ecological and helping behavior are two examples of sustainable action that are associated with psychological well-being. A survey evaluating those characteristics was completed by 115 people. After processing the data using a structural equation model, it became evident that people who reported being more engaged in sustainable initiatives also had better psychological health.

Keywords: Natural Resources, Pro-environmental, Nature relatedness, Psychological Wellbeing

AFTEFS/GCH/2024/245

MICROBES AND THEIR ROLE IN SUSTAINABLE USE FOR HUMAN WELFARE

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Microbes are tiny living things that are found all around us and are too small to be seen by the naked eye. They live in water, soil, and in the air. The human body is home to millions of these microbes too, also called microorganisms. The significance of microbes and their sustainable use for human welfare are explained in this abstract Microbes are essential to many facets of human life, such as biotechnology, medicine, food production, and environmental

remediation. Microbial inoculants improve soil fertility, stimulate plant growth, and lessen the need for chemical fertilizers in agriculture, all of which support environmentally friendly farming methods. Bioremediation provides environmentally friendly methods for reducing pollution and regaining the health of ecosystems by utilizing the metabolic processes of microorganisms to break down pollutants and cleanse contaminated areas. Furthermore, microbial enzymes support resource efficiency and the concepts of the circular economy by facilitating industrial processes like the production of biofuel and the valuation of waste. Microbes are used in medicine as sources of probiotics, antibiotics, and vaccines that fight infectious diseases and enhance patient health.

However, ethical issues, biodiversity conservation, and environmental effects must all be taken into account when using microbes sustainably. Monitoring microbial communities, evaluating ecological risks, and putting preventative measures in place to protect ecosystems and public health are all part of responsible microbial management. In order to promote knowledge sharing, ensure inclusive decision-making processes, and advance microbial sustainability agendas, collaboration between scientists, policymakers, industry stakeholders, and communities is imperative. In conclusion, harnessing microbes for sustainable development requires interdisciplinary approaches, ethical considerations, and stakeholder engagement. By leveraging microbial diversity and ecosystem services, humanity can unlock innovative solutions to address global challenges while safeguarding planetary health and promoting human welfare.

Key words: Microorganisms, Environmental remediation and Microbial diversity.

AFTEFS/GCH/2024/246

Chrysanthemum: An Emerging Health drink

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Chrysanthemum or mum is an herbaceous flowering plant in the genus *Chrysanthemum* of the Asteraceae family. It is becoming most popular flower of the world due to its ornamental, medicinal and insecticidal values. Different species of *Chrysanthemum* are cultivated for commercially medicinal purposes.

Chrysanthemum parthenium L. is used as herbal remedy for migraine. *C. coronarium* L. is good medicine for Parkinson disease. *C.* hortorum Bailey is mainly grown for its leaves and flower. The flower are boiled to make a sweet health drink, "Chrysanthemum tea" which is used to cure cold, indigestion and diarrohoea. It is an effective remedy against influenza. Its flower contain chemical content chrysanthemone and chrysanthemin. *Chrysanthemum* flowers are rich in phenolic compounds and show strong antioxidant, anti - inflammatory, antimicrobial, anticancer, antiallergic and nephroprotective properties. *Chrysanthemum* is a short day plant. The flower bud in *Chrysanthemum* have been found to develop above a critical temperature (14.4hr) below which only vegetative growth occur. So to increase the flower yield of *Chrysanthemum*, different growth regulators have been found to increase growth and flowering in *Chrysanthemum.*

Key Words: *Chrysanthemum,* Medicinal and Insecticidal Values

AFTEFS/GCH/2024/247

Effects of Acid Rain on Environment

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Acid rain is not a recent phenomenon. The term was first coined by Robert Angus Smith (1852). Acid rain or more precisely acid precipitation literally means the presence of excessive acids in rainwater. It is formed when oxides of nitrogen and sulphite combine with moisture in the atmosphere to make sulphuric and nitric acids. These acids can be carried away far from its origin. The ratio of sulphuric and nitric acid may vary in acid rain depending upon the relative quantities of oxide of sulphur and nitrogen emitted. Sulphuric acid (H_2SO_4) is the major contributor (60-70%) of acid precipitation, nitric acid (HNO_3) ranks second (30-40%) and HCL third. Acid pollution is a classic example of the consequences of economic and industrial development without regard for the environment. If India adopts pollution control technolosies it is possible to control acid rain factor to a significant extent. However, the only

good news for India is that chances of acid rain occurring are unlikely because tropical climate conditions and alkaline rich soils of the country have a neutralizing effect on the acidic rain. Alkaline dust particles in the country have a neutralizing effect on SO_2 and NO_2 of acid rain. But acid rain can cause some damage in north-eastern and southern parts of India.The TajMahal of Agra is also suffering at present due to SO_2 and H_2SO_4 acid fumes air pollutants released from Mathura refinery. Acid rain causes extensive damage to buildings and structures of marble, limestone, slate etc. This attack on marble is called stone leprosy.

Acid rain can harm aquatic ecosystems by lowering the pH of lakes and rivers, making them uninhabitable for fish and other aquatic life. It can also damage forests, soil, and buildings by eroding and corroding surfaces over time. Human health can be affected by breathing in air pollutants associated with acid rain, leading to respiratory problems. Acid rain is not just a local issue; it can travel long distances, affecting areas far from pollution sources.

AFTEFS/GCH/2024/248

Management of Water Resources

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Water is necessary requirement of life. Water management directly play a great role in development of industries, peaceful environment, reducing poverty, increasing agriculture products etc. Due to limited availabilities of pure water there are many difficulties to provide water to each and every person those are living in villages, urban area and remote areas. To provide water to industries and farming is also a big challenge. Due to continuously change in climate conditions it becomes necessary to manage the water natural resources. Our large population depends on small industries and farming. For efficient functioning of industries and to increase agriculture product there should be a master plan for management of water natural resources. Proper management

of water resources plays an important role for increasing economy of a country. Water management is the combined effort of government and public interest which can be achieved by improving irrigation system, recycling of waste water and by storing rainwater etc.

AFTEFS/GCH/2024/249

Water Resources Management

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Water is a basic need of life and livelihoods and also is a way of sustainable development. A good management of water resources is necessary for human and sustainable development goals. As a result of increasing population, climate change impact, urbanization, pollution and *unplanned management of water resources are leading to water scarcity. Further due to rapidly increase of population in the country the pollution level of various water bodies like rivers, lakes and ponds is increasing day by day also the level of ground water has gone relatively low in the most of the parts of the country as a result of this fresh* water are becoming increasingly stressed. Consequently, not only India but many parts of the world, particularly urban areas are facing water shortages. Water crises not only affects life but also impacts negatively on the economy of a country and with the help of proper water resources management this negative impact can be avoided by eliminating the water crisis. *Water management helps maintain the cycle of nature and existing biodiversity. There is a need to develop waste water management system, rainwater harvesting system, improved irrigation system, water recycling and reuse and proper use of water for sustainable water supply in the future.*

Keywords: *Water resources management, sustainable development, water conservation.*

AFTEFS/GCH/2024/250

Life Cycle Assessment of Whey Protein Utilization in Feed and Biogas Production Systems

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The integration of whey protein into feed supplements and biogas production systems presents a promising approach for enhancing productivity and sustainability in agricultural practices. This review study conducts a comprehensive Life Cycle Assessment (LCA) to evaluate the environmental, economic, and energy impacts of utilizing whey protein in these dual applications. By assessing the entire lifecycle from whey protein extraction to its use in animal feed and biogas generation, this research aims to quantify the benefits and trade-offs associated with these processes. The LCA methodology involves detailed data collection and analysis across multiple stages, including whey protein production, transportation, feed formulation, livestock productivity, biogas yield, and the subsequent environmental impacts. Key metrics such as greenhouse gas emissions, energy consumption, resource use, and economic costs are examined to provide a holistic understanding of the sustainability implications. Preliminary findings indicate that the use of whey protein in feed supplements can significantly enhance livestock growth and health, leading to improved productivity. Simultaneously, incorporating whey protein into biogas production systems boosts biogas yield and energy efficiency, contributing to renewable energy generation and waste reduction. However, the study also highlights potential environmental impacts, such as increased resource use and emissions, underscoring the need for optimized processes and sustainable practices. This LCA provides critical insights into the potential of whey protein to serve as a valuable resource in sustainable agricultural and energy systems, offering a balanced perspective on its benefits and challenges. The findings aim to guide stakeholders in making informed decisions that promote environmental sustainability and economic viability in the agricultural sector.

Keywords: Whey protein, biogas, livestock, LCA.

AFTEFS/GCH/2024/251

Hydrothermally synthesized WO_3 nanoplates as potential gas sensor for the detection of NO_2

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Recently, nanostructured tungsten oxide-based materials have received much attention in the field of gas sensors due to their superior size-dependent gas adsorption properties. In the present study, WO_3 material was synthesized by hydrothermal method at 150° C. The morphology and structure of the obtained WO_3 nanoparticles were characterized by using FESEM, XRD, FTIR, and UV-VIS spectroscopy techniques. Furthermore, the NO_2 sensing properties of WO_3 nanoplates were studied. The NO_2 sensing measurements demonstrated that the WO_3 nanoplates-based gas sensor exhibited excellent response and reversibility. The sensor response increased as NO_2 concentration increased. The highest response value of 37% was achieved to 100 ppm NO_2 at the optimal operating temperature of 150 °C with 113 s response time and 429 s recovery time. The lowest detection limit of the sensor could reach to 15 ppm of NO_2.

Keywords: Gas sensor, Tungsten oxide, Hydrothermal, NO_2

AFTEFS/GCH/2024/252

Fabrication of ZnO nanoparticles-based gas sensor for detection of NO_2 gas at low ppm

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Nitrogen dioxide is an extremely hazardous and detrimental gas that poses a serious threat to human beings and the environment. Even low concentrations of NO_2 can cause detrimental effects on the respiratory system, resulting in severe lung problems that are similar to asthma symptoms. So, it is of utmost importance to develop an economic and selective sensor that can efficiently detect low concentrations of NO_2 gas. In this work, zinc oxide was synthesized using a simple precipitation method. The synthesized material was studied by using XRD, FE-SEM, UV-Vis and FTIR. An effective, economical and simple gas-sensing film was fabricated by drop-casting the synthesized material on a glass substrate. The gas-sensing characteristics of the film were studied at different operating temperatures and different concentrations of nitrogen dioxide gas. Percent response equal to 37.43 % was observed for 10 ppm of NO_2 gas at 100 ^{0}C with response and recovery times of 104 seconds and 119 seconds respectively. To check the repeatability of the sensing film, it was exposed to three successive cycles of 10 ppm of NO_2 gas at the optimized temperature. The film was observed to show almost the same value of % response on repeated exposure and removal of gas. For studying the selectivity, film was tested for NO_2, H_2S and CO gas at the optimized temperature and it indicates high selectivity for NO_2 gas. The synthesized material has excellent sensing characteristics, including a high % response, selectivity, and repeatability. The study concludes that zinc oxide can be used as potential material for detecting low concentrations of NO_2 gas.

Keywords: NO_2, zinc oxide, gas sensor, operating temperature.

AFTEFS/GCH/2024/253

Economic impact of Agro-meteorological Advisories Services (AAS) on Paddy crop under Fatehpur district of UP

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This study aimed to evaluate the effectiveness of Agro-meteorological Advisory Services (AAS) in improving farming practices and economic outcomes for farmers in Fatehpur district, Uttar Pradesh, particularly focusing on Paddy crop during the *Kharif* 2023. The District Agromet Unit at Krishi Vigyan Kendra (KVK) Fatehpur serves as a key provider of AAS to local farmers. A group of farmers who regularly followed AAS advice from DAMU were randomly selected from various villages, while another group who did not follow AAS were also included for comparison. The economic impact of AAS was assessed by analyzing data collected from these farmers. The findings revealed that AAS forecasts generally aligned well with actual weather conditions. Farmers who timely adopted AAS in their farming practices reported higher net incomes, averaging Rs 15,428.57 per hectare, attributed to savings in input costs related to nursery bed preparation, irrigation, pest control, and timely harvesting, compared to non-AAS farmers growing the same crop in their villages. This suggests that AAS effectively minimizes crop losses caused by adverse weather conditions and significantly contributes to increased production and farmer income.

Keyword: Economic impact, AAS, Paddy and Fatehpur

AFTEFS/GCH/2024/254

Temporal Variation in Avian Community Composition and assemblage during Conventional Paddy Cultivation Phases

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Paddy fields are common throughout the agricultural landscape of Southeast Asia and sustain various avian species. These avian species can provide ecosystem services, such as pest control, that improve agricultural yields whilst minimizing the use of agrochemicals. This study quantified avian biodiversity in paddy production agricultural landscapes during three farming stages in selected regions of Haryana. In India, rice fields can be an important habitat for migrating avian species due to India's position on the migratory flyway. We determined avian abundance, species richness, and composition in rice field landscapes and compared these during different stages of rice growing. Wetland and terrestrial birds were counted in paddy fields using ad-libitum approach. Several sampling points were randomly established in different locations, from which 87 bird species belonging to 39 families and 16 orders were recorded. There was a significant difference in total bird abundance and species richness between the three different stages of paddy growing. The pre-harvest stage supported greater bird abundance and species richness compared to the growing and post-harvest stages. Paddy-growing provides temporary habitats to different bird species in this managed aquatic landscape which implies the presence of abundant food resources. The evidence from this study suggests that biodiversity-friendly agricultural practices should be implemented to improve habitat quality for birds in rice production landscapes.

Keywords: Abundance, Bird, Composition, Conservation, Paddy field, Species richness.

AFTEFS/GCH/2024/255

Veterinary Science in Human Welfare: Bridging Health Across Species

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Veterinary science plays a crucial role in advancing human welfare through its multifaceted contributions to health, agriculture, and societal well-being. This abstract delves into the interconnectedness between veterinary science and human welfare, highlighting key areas where veterinary expertise positively impacts human lives. Veterinary science serves as a cornerstone of human welfare, encompassing public health, food security, medical research, and broader societal concerns. By promoting the health and well-being of animals, veterinarians contribute significantly to protecting human health and enhancing the quality of life for both present and future generations.
Keywords: Veterinary science, human welfare, zoonotic diseases, food security, comparative medicine, public health.

AFTEFS/GCH/2024/256

Impact of Organic Farming and Green Practices on Socio-economic Development in Indian Agriculture

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Indian agriculture plays a pivotal role in the country's socio-economic landscape, serving as a primary source of livelihood for a substantial portion of its population. In recent years, the sector has witnessed a transformative shift towards sustainable practices, prominently including organic farming and green agricultural techniques. This review paper synthesizes existing literature

to comprehensively assess the multifaceted impact of organic farming and green practices on the socio-economic development of Indian agriculture.

The introduction of the paper provides a general review of Indian agriculture's current situation, emphasizing its importance and outlining the difficulties it encounters in light of the country's growing population, diminishing natural resources, and changing climate. It then digs into the tenets and methods of organic farming, highlighting how it has the ability to reduce the use of chemical inputs, enhance soil quality, and support biodiversity preservation. Agroforestry, precision agriculture, and integrated pest management are just a few of the green agricultural methods covered in the assessment, which also highlights how they help with resource conservation and sustainability.

The primary focus of this review is the socio-economic dimension, examining how the adoption of organic farming and green practices influences the livelihoods of farmers, income generation, and rural development. It explores the economic viability of organic farming in terms of market access, premium prices, and cost savings. Moreover, the paper analyzes the employment opportunities created by these practices, particularly for marginalized and small-scale farmers.

The assessment also conducts a critical evaluation of India's institutional and policy support for organic farming and green practices, analyzing how these factors influence the uptake and dissemination of sustainable agricultural practices.

This review paper is a combination of empirical data and case studies highlights how organic farming and green practices have the ability to considerably advance the socioeconomic advancement of Indian agriculture. These methods provide promising ways to enhance farmers' livelihoods, guarantee food security, and protect the environment by encouraging sustainable agricultural systems. To reach their full potential in India's agricultural landscape, however, ongoing research and policy interventions are required. These issues relate to awareness, access to resources, and market integration.

Keywords: Indian agriculture, organic farming, green practices, socio-economic development, sustainability, rural livelihoods, environmental conservation, policy framework.

AFTEFS/GCH/2024/257

Harnessing the Potential of Medicinal and Aromatic Plants in Animal Nutrition: Promoting Health and Performance in Livestock

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The utilization of medicinal and aromatic plants (MAPs) in animal nutrition presents a promising avenue for enhancing the health, welfare, and performance of livestock while reducing reliance on synthetic additives. This abstract explores the diverse uses of MAPs in animal diets and their potential contributions to sustainable and holistic animal production systems.

MAPs possess a wide array of bioactive compounds, including phytochemicals, essential oils, and secondary metabolites, known for their therapeutic properties. Incorporating these plants into animal diets can confer various benefits, including improved digestion, enhanced immunity, and reduced incidence of diseases. Furthermore, the aromatic compounds found in MAPs can enhance palatability and stimulate appetite, thereby promoting feed intake and nutrient utilization in livestock.

Keywords: Medicinal and aromatic plants, animal nutrition, bioactive compounds, gut health, growth performance, animal-derived products, and sustainability.

AFTEFS/GCH/2024/258

Histopathological alterations in mid gut of honey bee workers, *Apis mellifera* on exposure to sublethal concentrations of ZnO nanoparticles

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Honey bee, *Apis mellifera* is one of the essential pollinators for agricultural crops worldwide and producer of honey and wax. They are exposed to wide variety of contaminants including nanoparticles during their foraging activities which affects the health of honey bees and leads to decline of honey bee colonies. Increased use of metal and metal oxide nanoparticles for sustainable agricultural practices cause their inevitable release into the environment and causes potential risk to pollinators. In the present study, sublethal effects of exposure of ZnO nanoparticles were assessed. The different concentrations of NPs (0.35mg/ml, 0.70mg/ml and 1.05mg/ml of sucrose solution, w/v) were given to worker bees for 12 days. Control bees were fed with 1.5M sucrose solution only. Effects of nanoparticles were evaluated on their feeding, survival and histological alterations of mid gut. Damage to midgut epithelium, release of cell fragments into mid gut lumen, vacuolization and lysis of cytoplasm, rupture of peritrophic membrane were observed in treatment groups. Results indicate exposure of sub lethal concentration of ZnO nanoparticles causes toxic effects to worker honey bee adversely affects their survival.

Keywords: Zinc oxide, nanoparticles, histological alterations, *Apis mellifera*

AFTEFS/GCH/2024/259

Rodent species diversity and damage in major crops in village *Adampur*, Hisar, Haryana

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Rodents (order: Rodentia) are one of the most successful animals on earth due to their vast breeding potential and adaptability to a variety of living conditions ranging from the snowy heights of 5700 m to the extremes of desert. Rodents are the largest and most successful group of mammal species. It covers nearly 2277 living species and 481 genera placed in about thirty three families all over the world. Rodent can damage ranging from 2% to 15% is ordinary in agricultural crops and sporadically 25% to even 100% damage occurs during conditions of rodent outbreak. At least 15 rodent species are known to be the serious pest of public health hazard. In the present investigation, rodent species and nature of crop (peanut and wheat) damage by rodent species were assessed. The wonder traps/ rat traps were set in arid and semi-arid ecosystems in village Adampur Hisar. The predominant species reported House mouse (*Mus musculus*), Black rat (*Rattus rattus*), Indian gerbil (*Tartera indica*). The most diverse species was *R. rattus* in the study area. Result revealed that rodent species caused damage to peanut and wheat at sowing, seedling, milky and ripened stages.

Keywords: Rodents, Species diversity, Crop damage.

AFTEFS/GCH/2024/260

Inoculation of microbial nitrogen fixers improves productivity and profitability for sweet potato (*Ipomoea batatas*) growers

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Sweet potato (*Ipomoea batatas*) of the family *Convolvulaceae* is one of the primary sources of phytonutrients that can feed this projected ever-growing population. Its tuberous roots are large, starchy and sweet-tasting and are used as a root vegetable. Sweet potatoes contain carotenoids and anthocyanin, which may lower the risk of cancer. It lowers the risk of blood sugar, LDL cholesterol and obesity. During this post-pandemic era, the therapeutic value of sweet potatoes must be considered to replace common medicines. Furthermore, to achieve global food and nutrition security, as well as to address the critical threats of climate change, biodiversity degradation and the health hazards particles in daily diets, our crop production systems must undergo significant transformations. At present, we must increase the productivity of zero-residue vegetables, which can only be achieved by selecting High-Yielding Varieties (HYV), implementing Good Agricultural Practices (GAP), and Integrated Nutrient Management (INM) practices. In this context, the use of biofertilizers such as *Azospirillum*, *Azotobacter*, *Phosphate Solubilizing Bacteria*, and others is extremely beneficial to plant growth, soil health, and production costs. *Azospirillum* is a nitrogen-fixing bacteria that promotes plant growth by changing the forms of plant nutrients like nitrogen and phosphorus to make them more available, as well as competing with pathogens at the root zone and reducing plant disease. With this in mind, we investigated the effect of microbial inoculation on sweet potato yield and economics. In this particular experiment, we evaluated the integration of *Azospirillium* @ 5kg ha^{-1} as a source of nitrogen-fixing bacteria along with the soil test-based fertilizer dose (75:50:75 kg ha-1 of N, P_2O_5, and K_2O). The results of this experiment revealed that microbial inoculation combined with the application of soil test-based synthetic fertilizer produced much more sweet potato (176 q ha^{-1}) with an optimum corm weight of 196g as compared to other nutrient sources. Sweet potatoes produced by this nutrient

combination produced 40% more yield than the sweet potato produced by the farmers' practice and earned a net income of Rs.1,67,500/- ha^{-1} with a maximum benefit-cost ratio of 2.73. Thus, sweet potato growers may benefit from combining this microbial inoculation with the use of synthetic fertilizers in order to maximize yield and economic benefits.

AFTEFS/GCH/2024/261

Free Radical Scavenging Potential of Phenolic Compounds from Bark of Some Indian Tree Species to Manage Oxidative Stress

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Potent pharmacological activities, economic viability and low toxicity make the bio- active compounds from medicinal plants as the most attractive source of alternate drugs. The possible benefits of plant derived medications constitutes a rewarding area of research particularly in India which have a rich plant biodiversity. Depletion of endogenous antioxidants and oxidation of bio-molecules result in oxidative stress. Role of free radicals in pathogenesis of many diseases is well established.Tree bark is a multipurpose renewable natural resource of secondary metabolites of phenolic nature. They have capacity to quench free radicals via. different mechanisms. Phenolic compounds derived from tree bark have been recognized as a valuable source of natural antioxidants to manage cellular oxidative stress and related disorders. On the same lineage the present work was designed to evaluate comparative antioxidant potential of aqueous and methanolic extracts of bark of some Indian tree species using *in vitro* methods. The total phenol content was measured using the Folin- Ciocalteu reagent. Hydroxyl ion, superoxide anion, hydrogen peroxide and nitric oxide scavenging assays were employed to estimate antioxidant potential. Study reveals comparatively highest absorbing activity by *Tamarindus indica* followed by *Holoptelea integrifolia, Ailanthus excelsa* and *Gmelina arborea*. Correlation between total phenolic content and antioxidant activity was reported.The significant presence of phenolic content

revealed that they can be used as a rich sources of natural antioxidants. Such pharmacological investigations are important to separate the novel active compounds from the bark to formulate new drugs in order to treat oxidative stress related disorders. Further research is needed to understand detailed mechanisms through which these effects are exerted for finding new sources of natural antioxidants, functional foods and nutraceuticals.

Keywords: Antioxidants, *in vitro* assays, phenolic compounds, tree bark.

AFTEFS/GCH/2024/262

"Petal to Palate": Production Technology of Exquisite Rose Petal Wine

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Rose petal wine is a type of wine made from the petals of roses. It's a floral and fragrant wine with a delicate flavor profile that captures the essence of the roses. Like other types of wine, rose wine contains antioxidants, such as flavonoids and polyphenols, which may help reduce oxidative stress and lower the risk of certain chronic diseases when consumed in moderation. For the preparation of rose petals wine, we have taken fresh and fragrant rose petals from unsprayed, organically grown roses. Then rose petals were placed in clean container and covered with water for few hours to infuse the water with their flavor and aroma. Then sugar is added to the must for the adjustment of ^{o}brix, it was inoculated with wine yeast. Then inoculated must was incubated at controlled temperature (25°C) for a specified period (for one week) until fermentation is complete. After primary fermentation, wine was siphoned into a clean vessel and then allowed the wine to undergo secondary fermentation for additional clarification and flavour development.

Keywords: Fermentation, Petals, Rose, Wine, Yeast.

AFTEFS/GCH/2024/263

Physiological responses of okra to different sowing time

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Okra [*Abelmoschus esculentus* (L.) Moench] belongs to the *Malvaceae* or mallow family. Okra or okra, is known in many English speaking countries as 'Ladies' finger or ochro. Okra is a short-day plant, and for its better adaptation, the selection is to be made for photoperiod insensitivity. It is a semi-woody, fibrous, herbaceous annual with an indeterminate growth habit; it grows to a height of 3 to 6ft. This vegetable is very beneficial in improving the digestive health, manage diabetes, reduce fatigue and increase the endurance levels. It also helps in reducing the stress and decrease the cholesterol as well as triglyceride levels in the body. Okra are generally sensitive to environmental extremes, and thus high temperatures and limited soil moisture are the major causes of low yields as they greatly affect several physiological and biochemical processes like reduced photosynthetic activity, thermal injury to the tissues etc., which will be further magnified by climate variability and change. In the experiment Okra variety (Hisar Naveen) was sowed at four dates (2, 12 and 22 March and 2 April) at Research Farm of Department of Vegetable Science, CCS Haryana Agricultural University, Hisar (latitude 29.10 ^{0}N, longitude 75.46 ^{0}E).The results showed that Hisar Naveen resulted into significantly higher growth parameters like plant height (122.20 cm at 90 DAS), LAI (2.22 at 90 DAS) and leaf dry matter (25.97 g/plant at 90 DAS), were found better in okra crop sown on third week of March (22 March).

Keywords: Okra, environmental extremes, photosynthetic activity, thermal injury.

AFTEFS/GCH/2024/264

Understanding the Magnitude of Post-Harvest Losses in Tomato: Implications for Ensuring Food Security

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Post-harvest losses play a crucial and significant role in jeopardizing food security. The paper utilizes a comprehensive assessment framework, including data collection, analysis and stakeholder consultation from Yamuna Nagar district of Haryana to quantify the extent of post-harvest losses in tomato production. The findings of the research highlight that post-harvest losses in tomato are not only substantial but also have implication on farmers' income and the food security. The result shows that nearly 15 percent of tomato was lost from farmer to reach ultimate consumer. The considerable factors attributable to post-harvest losses are inadequate post-harvest handling practices, lack of proper storage facilities, transportation challenges and market inefficiencies which not only affects farmers' income but also lead to increased food prices and reduced availability of food for people. To address this issue, the study proposes a range of strategies to improve post-harvest management and to enhance food security like promotion of proper harvesting techniques, improving proper storage and transportation infrastructure, implementing proper packaging and effective market linkages. By implementing these strategies and addressing the issue of post-harvest losses will help in ensuring reliable food supply for people, strengthens the overall agricultural value chain and ultimately contribute to broader goal of sustainable food production and food security.

Keywords: Tomato, Post-Harvest Losses, Food Security, Food Safety, Crop Management.

AFTEFS/GCH/2024/265

Heena (Lawsonia inermis) and *Babool (Acacia nilotica)* bark: Utilizing there potential for antimicrobial activity

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In the context of sustainability, natural dyes are gaining commercial importance due to their eco-friendly and biodegradable nature, offering alternatives to hazardous synthetic dyes. Biomordants and enzyme pretreatments further enhance the green and environmentally friendly aspects of natural dyeing, while the diverse sources of natural dyes provide beautiful shades on various natural fabrics, addressing concerns about environmental pollution and emphasizing the importance of ecological and environmental considerations. The development of a functional finish for cotton fabric that is antibacterial properties through the utilization of medicinal plant *heena* as a biomordant in conjunction with *babool* bark dye. Cotton fabric, widely used for its comfort and breathability, often lacks inherent antimicrobial characteristics, making it susceptible to degradation due to bacterial growth. In this study, we present a sustainable and eco-friendly approach to address these issues. *Heena*, derived from the *Lawsonia inermis* plant, is used as a biomordant to enhance the dyeing and functional properties of cotton fabric. The addition of *babool (Acacia nilotica)* bark dye, known for its antimicrobial attributes, not only imparts colour to the fabric but also endows it with natural antibacterial capabilities. Furthermore, the incorporation of *babool* bark dye imbues the fabric with inherent antibacterial properties, inhibiting the growth of microorganisms that cause odours and fabric deterioration. It is a sustainable and environmentally friendly approach to enhance the functionality of cotton fabric by utilizing medicinal and aromatic plants like *heena* and *babool* bark dye. This novel finish not only provides antibacterial properties but also contributes to the sustainability of textile processing through the use of biomordants and natural dyes. The findings of this study have promising implications for the textile industry, offering a path towards the development of functional and eco-conscious cotton textiles.

Keywords: Heena, antibacterial, Aromatic, medicinal plant and sustainability.

AFTEFS/GCH/2024/266

AI-Driven Sustainable Resource Management: Nurturing Nature for Future Generations

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This paper explores the transformative potential of artificial intelligence (AI) in fostering sustainable resource management practices for the benefit of future generations. By leveraging AI algorithms and machine learning techniques, stakeholders can analyze intricate ecosystem dynamic, predict environmental trends and optimize resource allocation strategies. Through the integration of biomimicry principles, AI-driven solutions mimic nature's resilience, promoting regenerative approaches to resource utilization and environmental preservation. Key considerations include ethical AI deployment, stakeholder engagement and equitable access to technology. This interdisciplinary approach aims to mitigate biodiversity loss, climate change impacts and resource depletion while fostering resilience and ensuring intergenerational equity. By synergizing technology with nature, we can cultivate a sustainable future where human well-being coexists harmoniously with the planet's ecological integrity.

Keywords: Artificial intelligence (AI), Sustainable Resource Management, Machine Learning, biomimicry, Intergenerational Equity

AFTEFS/GCH/2024/267

Mathematical Approaches to Assessing Climate Change Impacts on Natural Resource Availability and Sustainability

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This research paper delves into the critical issue of assessing the impacts of climate change on natural resource availability and sustainability through mathematical approaches. Climate change poses significant challenges to ecosystems, altering the distribution and availability of essential resources such as water, land, and biodiversity. Traditional methods for assessing these impacts often lack the precision and scalability needed to capture the complex dynamics of climate-driven changes.

In this study, we propose the integration of mathematical modeling techniques to provide a comprehensive framework for assessing climate change impacts on natural resources. We explore various mathematical approaches, including statistical modeling, dynamic systems analysis, and optimization techniques, to quantify the effects of climate change on resource availability and sustainability.

Furthermore, we examine the application of mathematical models in predicting future scenarios, identifying vulnerable regions, and informing adaptive management strategies. Through a synthesis of existing literature and case studies, we highlight the potential of mathematical approaches to enhance our understanding of climate change impacts and support evidence-based decision-making for sustainable resource management.

Keywords: *Climate change, natural resources, sustainability, mathematical modeling, impact assessment, adaptation strategies.*

AFTEFS/GCH/2024/268

Role of Mathematics in Sustainable Natural Resource Management

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ABSTRACT

In the face of escalating environmental challenges, the necessity to conserve natural resources has gained paramount importance. Mathematics, often overlooked in discussions on environmental conservation, plays a pivotal role in understanding, managing and preserving these finite resources. This abstract delves into the multifaceted ways in which mathematics contributes to the management of natural resources.

Firstly, mathematics provides the analytical framework for modeling complex ecological systems, allowing scientists and policymakers to simulate various scenarios and predict the impacts of human activities on natural resources. Through mathematical models, researchers can assess the dynamics of ecosystems, predict the consequences of climate change and formulate strategies for sustainable resource management.

Secondly, mathematics facilitates optimization techniques that help in resource allocation and decision-making processes. From determining optimal harvesting rates in fisheries to optimizing land use for agriculture, mathematical optimization enables efficient utilization of resources while minimizing waste and environmental degradation.

Moreover, mathematics underpins the development of innovative technologies for resource conservation. From remote sensing techniques to monitor deforestation to algorithms for optimizing energy consumption, mathematical tools drive advancements in environmental monitoring, resource management, and sustainable technology.

Furthermore, mathematics plays a crucial role in quantifying the economic value of natural resources and ecosystem services, informing policymakers and stakeholders about the benefits of conservation efforts. Through cost-benefit analysis and valuation techniques, mathematics provides insights into the trade-offs involved in resource utilization and conservation, guiding decision-makers towards more sustainable practices.

In conclusion, the role of mathematics in conserving natural resources cannot be overstated. By providing the analytical foundation, optimization tools, technological innovations, and economic insights, mathematics empowers us to address the complex challenges of resource management and environmental conservation in an increasingly interconnected world. Embracing mathematics

as a fundamental tool in conservation efforts is essential for safeguarding the planet's biodiversity and ensuring the well-being of future generations.

***Key words**: Mathematics, natural resources, sustainable management, decision making*

AFTEFS/GCH/2024/269

संस्कृत में पर्यावरण चेतना

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भारतीय संस्कृति के आदि ग्रंथ वेदों से लेकर लौकिक संस्कृत साहित्य में पर्यावरण चेतना का विस्तृत स्वरूप दिखाई देता है। प्रकृति के अनुकूल रहन-सहन एवं प्रकृति के प्रति संवेदनशीलता का पर्याप्त वर्णन मिलता है। आज के युग में जब पर्यावरण प्रदूषण के प्रत्यक्ष दुष्प्रभाव चतुर्दिक् दिखाई दे रहे हैं, ऐसे में हमारे मनीषियों का इस विषय में क्या चिंतन था, इस पर ध्यान देना आवश्यक है। हमारी परंपरा में सुखमय जीवन के लिए प्रकृति के सान्निध्य के महत्व को समझा गया है। वैज्ञानिक जिस ओजोन परत के विषय में चिंता प्रकट कर रहे हैं, वेदों में इस संबंध में सचेत किया गया था कि पृथ्वी का हृदय व्योम अर्थात् आकाश में स्थित है - यस्या हृदयं परमे व्योमन्(अथर्ववेद 12.1.8)।

ऋग्वेद में भूमि को माता और द्यौ को पिता कहा गया है। भारतीय संस्कृति में वट, पीपल और तुलसी आदि वृक्षों की पूजा का यही अभिप्राय है कि यह सबसे अधिक आक्सीजन प्रदान करके मानव जीवन को सुरक्षित करते हैं।

वेदों में अग्निहोत्र का विशेष महत्व है। यजुर्वेद तो पूर्णतया यज्ञमय है। अग्निहोत्र वायु में फैले हुए कीटाणुओं एवं विषाणुओं को नष्ट करके वातावरण को स्वच्छ एवं सुगंधित बनाता है।यजुर्वेद कहता है कि यज्ञ का फल चारों दिशाओं में फैलता है -यज्ञस्य दोहो विततः पुरुत्रा (यजुर्वेद 8.62)। शपथ ब्राह्मण में उल्लेख है कि यजमान अग्निहोत्र में दी गई आहुतियां से प्राकृतिक देवों (पृथ्वी, जल, अग्नि, वायु, आकाश आदि) को प्रसन्न करता है तथा मनुष्य देवों अर्थात तपस्वी विद्वानों को दक्षिण द्वारा संतुष्ट करता है- **आहुतिभरेव देवान् प्रीणाति दक्षिणाभिर्मनुष्यदेवान्**
शुश्रुवुषः अनूचानान्(श.ब्रा. 2.2.2.6) ।

चेचक के टीके के आविष्कारक डॉ. हैफकिन का कथन है 'घी जलाने से रोग के कीटाणु मर जाते हैं।' फ्रांस के वैज्ञानिक प्रो. ट्रिलबिर्ट कहते हैं, "जली हुई शक्कर में वायु शुद्ध करने की बड़ी शक्ति हैं। इससे टी. बी., चेचक, हैजा आदि बीमारियां तुरंत नष्ट हो जाती हैं।" अंग्रेजी शासनकाल में मद्रास के सेनिटरी कमिश्नर डॉ. कर्नल किंग आई.एम.एस. ने कहा, "घी और चावल में केसर मिलाकर अग्नि में जलाने से प्लेग से बचा जा सकता है।"

यज्ञ पर्यावरण संरक्षण के लिए अत्यंत महत्वपूर्ण कारक सिद्ध हो सकता है।

संस्कृत साहित्य सर्वत्र पुरुष से प्रकृति का तादात्म्य प्रदर्शित करता है। हमारे आरंभिक साहित्य का एक बड़ा हिस्सा आरण्यक है। पेड़, पौधे, पशु, पक्षी सभी परिवार के अंग जैसे दिखाई पड़ते हैं। संस्कृत काव्य में स्त्रियों के पदाघात से वृक्षों के पुष्पित होने की बहुत चर्चा है। मेघदूत में स्त्री के विभिन्न अंगों और क्रियाओं के संस्पर्श से प्रियंगु, बकुल, अशोक, तिलक, कुरबक, मंदार, चम्पक, आम, नमेरु तथा कर्णिकार आदि वृक्षों के पुष्पित होने की बात है।संस्कृत में स्त्री को अंगना भी कहा जाता है और अंगनाप्रिय का मतलब है 'अशोक का पेड़'। प्राचीन परंपरा का मदनोत्सव या वसंतोत्सव हमारी प्रकृति प्रेम को प्रदर्शित करता था। अतः वेदानुकूल यज्ञमय जीवन बनाने से तथा प्रकृति के प्रति प्रेम रखने से ही हमारा पर्यावरण सुरक्षित हो सकता है।

AFTEFS/GCH/2024/270

Rainwater harvesting as an adaptation to climate change

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Due to population growth, increased urbanization, industrialization, and irrigated agriculture, there is a constant need for water supplies. It is anticipated that extreme weather phenomena like cyclones, floods, droughts, and severe downpour will have an effect on human society. In addition, a broad response is anticipated in order to adapt and lessen the pain brought on by these extremes. Extended periods of drought can cause population displacement, cultural distancing, home abandonment, and even society collapse. Human migration to safer and more productive places is a common response to local aridity. Climate and culture, however, can interact in a variety of ways. Embracing the ideas of sustainability and water resource conservation can aid in addressing the world's water deficit. One idea that can be used to address the issue of water scarcity is the rainwater harvesting system.

Keywords: Rainwater harvesting, quality living, rainwater potential, water supplies, Climate

AFTEFS/GCH/2024/271

वैदिकविद्या में प्राणिविज्ञान

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वैदिकसाहित्य सहित सम्पूर्ण संस्कृत–वाङभ्य प्राणि–विज्ञान के सन्दर्भ में अत्यन्त महत्त्वपूर्ण अध्ययन–सामग्री का आकार है। इनमें दो प्रकार के ग्रन्थों का समावेश है–प्रथम श्रेणी में वे ग्रन्थ आते हैं जो सीधे इसी विषय से सम्बद्ध हैं, जैसे आयुर्वेद की विभिन्न शाखाओं के ग्रन्थ। 'शालिहोत्र' भी इसी प्रकार का ग्रन्थ है, जिसमें अश्व–चिकित्सा से सम्बद्ध सामग्री संचित है। दूसरी श्रेणी में वे ग्रन्थ सम्मिलित हैं, जिनका प्रणयन केवल प्राणि–विज्ञान की जानकारी देने के लिए नहीं हुआ। मूलतः वे ललित साहित्य की श्रेणी में आते हैं, लेकिन उनमें भी इस शास्त्र से सम्बद्ध पुष्कल जानकारी उपलब्ध होती है। संस्कृत–साहित्य के बहुसख्ङयक एवं महत्त्वपूर्ण ग्रन्थों की रचना का ताना–बाना पशु–पक्षियों और उनके कार्य–कालापों एवं मनोविज्ञान को ध्यान में रखकर बुना गया है। उदाहरण के लिए आदिकाव्य रामायण को ही लें–इसकी रचना का उपक्रम ही क्रौ×ाच पक्षी की निर्मम हत्या से जुड़ा है। महाभारत के लेखक श्रीगणेशजी का स्वरूप गजाननयुक्त है। उसके प्रणेता महर्षि व्यास के पुत्र शुकदेव की शारीरिक यष्टि भी अनेक प्राचीन चित्रों में तोते के सदृश ही अङ्कित है। महाकवि कालिदास के 'रघुवंश' के आरम्भिक सर्गों में ही कामधेनु तथा उसकी पुत्री नन्दिनी गौ की सेवा का विवरण है। मायिक सिंह से राजा दिलीप का वार्तालाप इस महाकाव्य को रोचकता ही नहीं प्रदान करता अपितु विचार की गम्भीर सामग्री भी पाठकों को देता है। 'कादम्बरी' का शुक, 'प×ातन्त्र' और हितोपदेश के करटक, दमनक, हिरण्यक और चित्रग्रीव, 'बृहत्कथा' अथवा 'बड्ढकहा' के श्रोता वन्य जीव–जन्तु एवं बाद में विलापरत सन्देशवाहक हंस तथा 'शकुन्तला' के मृग और सिंहशावक संस्कृतसाहित्य के विशिष्ट पात्र हैं। 'शुकसप्तति' का कथावाचक शुक प्रवास पर गये पुरुष की विरहविदग्ध पत्नी को पति के लौटने तक प्रतिदिन एक कथा सुनाकर उसके पतिव्रत की रक्षा कर लेता है। ये सभी संस्कृत–रचनाकार के पशु–पक्षियों के साथ आत्यन्तिक जुड़ाव के द्योतक हैं। शारदीय एवं वासन्तिक नवरात्रों की पवित्र तिथियों में, जब घर–घर में 'श्रीदुर्गासप्तशती' का पाठ चल रहा होता है, प्रथम अध्याय के वे पद्य बरबस हमारा ध्यान आकृष्ट कर लेते हैं, जिसमें पशु–पक्षियों के मानववत् ज्ञान, समझदारी, प्रेम और ममतामय व्यवहार का उल्लेख किया गया है। इनमें कहा गया है कि मनुष्य समझदार होते हैं–यह ठीक है, लेकिन केवल वे ही ऐसे नहीं होते। पशु, पक्षी और मृग आदि सभी प्राणी समझदार होते हैं। मनुष्यों की समझ भी वैसी ही होती है, जैसी उन पशुओं और पक्षियों की होती है–यही पशुओं के भी विषय में सत्य है। अन्य बातें भी दोनों में प्रायः समान ही हैं। समझ होने पर भी इन पक्षियों को देखो, जो स्वयं भूख से पीड़ित होते हुए भी मोहवश बच्चों की चोंच में कितने चाव से अन्न के दाने डाल रहे हैं। भगवती का स्वरूप भी तो 'सर्वभूतेषु चेतनामय' ही है। आज की पश्चिमी–सभ्यता और उसके प्रभाववश हमारी सभ्यता भी यद्यपि मानव–केन्द्रित सी होती जा रही है, लेकिन मूलतः भारतीय–मानस इससे हटकर सर्वभूतों का ही विचार करने के लिए प्रतिबद्ध–सा दिखाई देता है। भगवान् विष्णु के मत्स्य, कूर्म, वराह, नृसिंह प्रभृति अनेक अवतार स्पष्टरूप से पशुयोनियों में ही हुए। परम्परा ने चारों वेदों को भी मर्कटानन, रासभानन, हयानन–रूप में चित्रित करने में सङ्कोच नहीं किया। वैदिकसाहित्य में इससे भी एक कदम आगे बढ़कर, पशु–पक्षी सम्पूर्ण मानव–व्यापारों में निरन्तर सम्मिलित दिखाई देते हैं। शुक्लयजुर्वेदसंहिता का 24वाँ अध्याय पशु–जगत् का सर्वाधिक समृद्ध विवरण हमारे सामने उपस्थित करता है। इसी प्रकार, शतपथब्राह्मण का 13वाँ अध्याय भी है। वैदिक–यज्ञस्थल वास्तव में उन उन्मुक्त प्रयोगशालाओं के सदृश हैं, जिनमें बहुसङ्खयक यज्ञीप यूपों में निबद्धकर एक अस्थायी जन्तुशाला ही तैयार कर दी जाती थी। इसका प्रयोजन था कि समाज के प्रबुद्धजनों के साथ, यज्ञ–स्थलों पर आये

जन–सामान्य भी पशु–पक्षियों का अवलोकन कर, उनके विषय में अपनी जानकारी बढ़ा सकें। यज्ञस्थल पर लाये गये ये पशु–वृन्द केवल पालतू ही नहीं होते थे, आरण्यक और हिंसक पशु भी वहाँ लाये जाते थे। इनकी सङ्ख्या विभिन्न यागों में 15 से प्रारम्भ कर 609 तक पहुँच जाती है। यज्ञ–समाप्ति के अनन्तर इन पशुओं को पुनः यथास्थान पहुँचा दिया जाता था। सर्वाधिक पशुओं को अश्वमेध के अवसर पर लाया जाता था। इनमें थे अश्व, तूपर, गोमृग, कृष्णग्रीव, मेषी, रोहित (लालअज), घूम्ररोहित, कर्कन्धुरोहित, पृश्नि, मर्कट, हंस इत्यादि, जिन्हें विभिन्न देवों और देवियों के साथ ब्राह्मणग्रन्थों में जोड़ दिया गया है। इनके साथ शार्दूल, वृक, पृदाकु, नक्र, मकर इत्यादि हिंसक जीव–जन्तु भी बन्द पिंजड़े में लाये जाते थे। यजुर्वेद और शतपथब्राह्मण दोनों में इनका विशद विवरण दिया गया है। अन्य ब्राह्मणों और श्रौतसूत्रों में भी इन यागीय प्रयोगशालाओं के विषय में अच्छी जानकारी मिलती है।

मत्स्य–संरक्षण के विषय में शतपथ का वह प्रसङ्ग बहुचर्चित है, जिसमें प्रातःकाल मुख–प्रक्षालन के सयम मनु को जल–पात्र में एक छोटी से मछली मिलती है, जो उनसे आत्मरक्षण के लिए निवेदन करती हुई कहती है कि सक्ङट–काल में वह भी मनु के काम आयेगी। मनु अन्ततः उसके संरक्षण के लिए तैयार हो जाते हैं, जो छोटे आकार से बढते–बढते, छोटे जलस्थानों से समुद्र में पहुँच जाती है और जल–प्लावन के समय मनु की सुरक्षा करती है।

मेढकों के विषय में, यदि विशुद्ध जन्तुवैज्ञानिक साहित्य को छोड़ दिया जाए, तो विश्व भर में सर्जनात्मक साहित्य में ऋग्वेद का मण्डूकसूत्क अकेले ही मण्डूकों पर लिखी गई प्रथम कविता है, जिसमें वर्षाकाल के आते ही, वर्ष भर शान्त रहने वाले मण्डूकों का रोचक और वैज्ञानिक विवरण सँजोया गया है।

अभिप्राय यह है कि वैदिकवाङभय में प्राणि–विज्ञान की विभिन्न शाखाओं से सम्बद्ध सामग्री अत्यन्त पुष्कल परिणाम में उपलब्ध होती है। इस पर यज्ञ–प्रक्रिया और देवशास्त्र का एक सूक्ष्म आवरण अवश्य चढ़ा है, लेकिन यदि गम्भीरता से इसकी आधुनिक प्राणि–विज्ञान के साथ तुलनात्मक समीक्षा की जाये, तो निश्चित ही बहुत सी सामग्री आज भी उपादेय सिद्ध होगी।

इन सभी ऊपर उद्धृत अंशों से यह स्पष्ट है कि प्राणि–विज्ञान के विषय में वैदिक और वैदिकोत्तरकाल में बहुत उत्कृष्ट श्रेणी की वैज्ञानिक जानकारी विद्यमान थी। यद्यपि यह सम्पूर्ण जानकारी यज्ञ–विज्ञान के सन्दर्भ में ही प्रायः प्रस्तुत की गई है, लेकिन इससे इसकी उपादेयता पर कोई आँच नहीं आती। इन परिमित पृष्ठों में वैदिक प्राणि–विज्ञान की विस्तृत विवेचना करना सम्भव नहीं है, लेकिन यह संक्षिप्त झलक समाज में अधिकाधिक उत्सुकता को जगा ही सकती है।

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वेदों में कृषि विज्ञान : एक विवेचन

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मनुष्य ने जब से धरती पर आँखें खोली तब से अपने को कृषि और वनस्पतियों के बीच में पाया। यह कहना अतिष्योक्ति नहीं है कि मनुष्य का समग्र जीवन–व्यक्त–अव्यक्त रूप से कृषि और वनस्पति जगत् से सम्बन्ध बनाये हुए है। केवल मनुष्य ही नहीं अपितु सम्पूर्ण प्राणि जगत् वनस्पति जगत् का आश्रय पाकर प्राण प्रतिष्ठा कर रहा है। जन्म–मरण के चक्र में मनुष्य जितने दिन तक परमात्मा की सृष्टि में अबाध विचरण करता है उसके पीछे महत्त्वपूर्ण योगदान भोजन–वस्त्र–औषधि–आवासादि का रहता है। इनकी सम्प्राप्ति का श्रेय कृषि और वनस्पति जगत् को चला जाता है। अतः इनकी उपेक्षा करके कोई भी मनुष्य अपना कल्याण साध नहीं सकता।

जब हम जीवन और जगत् की व्याख्या में चले जाते हैं तो हमको अन्तःप्रज्ञा से मानना पड़ता है कि असीम परमात्मा ने अपनी विलक्षण अनन्त सृष्टि में अपने महान् गुण–कर्म–स्वभाव का व्याख्यान किया है जिसके समझाने के लिए वेद रूपी निर्भ्रान्त विधि–निषेधात्मक ज्ञान विज्ञान का संविधान मानवीय सृष्टि के साथ–साथ सनातन जीवन के लिए प्रदान किया है। इसलिए मनुष्य को कोई भी कार्य करने से पूर्व ईष्वर निःष्वसित वेद की आज्ञा ध्यान में रखनी चाहिए। क्योंकि 'सर्वषक्तिमान जगदीष्वर ने इस सृष्टि में जो जो पदार्थ बनाये हैं वे–वे निष्प्रयोजन नहीं किन्तु एक–एक वस्तु अनेक–अनेक प्रयोजन के लिए रचे हैं। इसलिए उनसे वे ही प्रयोजन लेना न्याय है अथवा अन्याय।

अथर्ववेदीय पृथिवी सूक्त में भूमि को विष्व का भरण पोषण करने वाली कहा गया है। इतना ही नहीं अथर्ववेद में आगे और भी कहा है कि : हे भूमे! मैं कृषि के लिए जहाँ भी खनन करूँ, खोदूँ, वहाँ जो भी रोपण करूँ, उगाऊँ, वह शीघ्र उग आये। इस प्रकार वेदों में तथा ब्राह्मण ग्रन्थों, पुराणों, महाभारत आदि संस्कृत वाड्.मय में कृषि विद्या, कृषि विज्ञान सम्बन्धित विस्तृत विवेचना उपलब्ध होती है। महर्षि दयानन्द सरस्वती जी ने 'वेद सब सत्य विद्याओं का पुस्तक है' कहा है। अतः वेद में जीवनोपयोगी मानवों के लिए समस्त ज्ञान–विज्ञान के लिए सूत्र सूत्रित हैं। वैज्ञानिकों ने इन सूत्रों को आधुनिकीकरण द्वारा विविध प्रकार के यन्त्रादि का आविष्कार करके कृषि विद्या को विकसित रूप दिया है, दे रहे हैं। वास्तव में कृषि कर्म को मानवीय अन्न समस्या का समाधान कहा जाये तो कोई अतिषयोक्ति नहीं है।

अथर्ववेद में एवं यजुर्वेद में खाद्यानों में सर्वोत्कृट गुणों का आधान करने के लिए उत्तमोत्तम द्रव्यों द्वारा भूमि को सींचने की बात कही है। जब जुती हुई भूमि दूध–घी–मधु से सींची जाती है और जब जलवायु आदि देव अनुकूल होते हैं तब वह भूमि रसयुक्त उत्तम अन्न देती है। इस प्रकार उत्कृष्ट अन्न उत्पादन में वेद का उच्चस्तरीय चिन्तन है। आज का समाज उसकी कल्पना भी नहीं कर सकता। मानव विज्ञान के नाम पर पृथिवी की उत्पादन शक्ति को बढ़ाने के लिए मल–मूत्र एवं गन्दे पानी का प्रयोग खेतों में कर रहा है इतना ही नहीं अधिक उत्पादन के नाम पर कल कारखानों में नाइट्रोजनी, फॉस्फेटी और पोटेषियम नामक रासायनिक ऊर्वरकों का उत्पादन किया जा रहा है।

कीटनाषक औषधियों का भी भारी मात्रा में फसलों में प्रयोग किया जा रहा है। निःसंदेह इन प्रयोग से खाद्यान्नों में कई गुणा परिणात्मक अभिवृद्धि भी हुई है। हम खाद्यान्न के क्षेत्र में आत्मनिर्भर भी हो गये हैं। वैज्ञानिकों की नवीन–नवीन खोजों ने अत्याधुनिक उन्नतमान कृषि यन्त्रों या उपकरणों की सहायता से वैज्ञानिकों ने संसार भर में हरित क्रान्ति को लाकर खड़ा कर दिया है।

वैदिक कृषि उद्योग नैसर्गिक है – प्राकृतिक है सर्वथा सात्विक है अतः मल–मूत्र, दूषित जल, रासायनिक उर्वरकों जहरीले कीटनाषक औषधियों का प्रयोग सर्वथा वर्जित है। प्राकृतिक उर्वरकों गोबर, गोमूत्र आदि द्वारा कृषि कर्म करके सर्वोत्तम सुख को भोगना है। अथर्ववेद में 9 मन्त्रों का एक पूरा सूक्त कृषिकर्म से सम्बन्धित है। इनमें अधिकांष मन्त्र ऋग्वेद और यजुर्वेद में भी आए हैं। इन प्रकरणों से यह विदित होता है कि कृषि कर्म के साथ पशुपालन का विषेष सम्बन्ध है।

आधुनिक कृषि विज्ञान में भी इन मौलिक घटकों का वर्णन मिलता है। भेद इतना ही है कि वैदिक कृषि विज्ञान में नैसर्गिक घटकों का अवलम्बन करके कृषि कर्म को सम्पादित करने के लिए कृषि विज्ञ विद्वानों की आवष्यकता होती है। यजुर्वेद में मन्त्र आया है कि हे मनुष्य! जिसे ध्यानषील–बुद्धिमान लोग हलों और जुआ आदि को युक्त करते हैं और सुख के साथ विद्वानों में अलग विस्तारयुक्त करते हैं वैसे सब लोग इस खेती कर्म का सेवन करें। इससे स्पष्ट है कि कृषि जैसे महत्त्वपूर्ण कार्य को करने के लिए उच्च कोटि का विद्वान होना आवष्यक है। आज का उच्चषिक्षित समाज कृषि जैसे पवित्र कर्म को करना निकृष्ट कर्म समझता है। इससे पता चलता है कि लॉर्ड मैकाले की दूषित षिक्षा ने मनुष्य समाज को कहाँ पर लाकर खड़ा कर दिया है। इस प्रकार वेद में कृषि विज्ञान के सम्बन्ध में विस्तृत चर्चाएँ हैं। इस विज्ञान को गम्भीरतापूर्वक जानकर क्रियात्मक रूप देकर भौतिक उन्नति के साथ–साथ आध्यात्मिक उन्नति करनी चाहिए।

AFTEFS/GCH/2024/273

पर्यावरणसंरक्षणे यज्ञप्रभावः

डॉ. मुकेश कुमारः
सहायकाचार्यः
राजकीयमहाविद्यालयहिसारम्

अखिलं चराचरं जगत् पर्यावरणजन्यभयावहदुष्परिणामेभ्योऽनुभवति घोरतरां भीतिम्। साम्प्रतं विज्ञानिनः पर्यावरणस्य परिष्काराय सर्वतोभावेन प्रयतमानाः दरीदृश्यन्ते। वैदिकवाङ्मयं प्रकृतिसंरक्षणाय पञ्चमहायज्ञमाश्रित्य चिरन्तनाल्लोकं सन्दिशति। पृथिवीजलानलवायुनभसामिति पञ्चप्रकृतितत्त्वानां सन्तुलिता स्थितिरेव शान्तिकरी भवति।

एतच्छोधपत्रं विश्वजनीनसमक्षं यज्ञद्वारा पर्यावरणगतदोषराशिं विविच्य तान् समाधातुं प्रकल्पितमस्ति।

भारतीयसंस्कृतौ वैदिकवाङ्मये च यज्ञानामतिशयितं महत्त्वं निरूपितमस्ति। यज्ञोऽयं दैवीसंस्कृतेः शाश्वतः प्रतीकोऽस्ति । वस्तुतः भारतीयसंस्कृतिः यज्ञपरकैव। वेदाः, ये परमात्मनो निःश्वासभूताः सन्ति, तेषां मुख्यप्रवृत्तयः यज्ञानामनुष्ठानविधाने सन्ति। इत्थं परमात्मा यज्ञमाध्यमेन विश्वसंरक्षणं करोति । समेषां वैश्विकक्रियाकलापानामक्षे यज्ञस्यैव स्थितिः अस्ति। तमेवाश्रित्य विश्वब्रह्माण्डस्य गतिचक्रं घूर्णनं करोति। अतएव वैदिकऋषिभिः यज्ञोऽयं भुवनस्य किं वा समग्रसृष्टेराधारबिन्दुः उक्तोऽस्ति - 'अयं यज्ञो भुवनस्य नाभिः। विश्वस्य सर्जनमथ च पालनं यज्ञप्रक्रिया एव फलमस्ति। ऋग्वेदस्य नासदीयसूक्ते पुरुषसूक्ते च सृष्टिविज्ञानस्य विशदं विवेचनं विद्यते। तत्र पुरुषसूक्ते निगदितमस्ति यत् सर्वेषां वेदानां, पशुपक्षिमनुष्यादि- जीवानां, सूर्यचन्द्रादिदेवानां च सृष्टिः यज्ञपुरुषादेव जाता। यज्ञेनैव सर्वेषां देवानां, प्रजानां पृथिव्याः सर्वप्राणिनां च स्थितिः अस्ति। सृष्टेः समस्तं कार्यं यज्ञमयं विद्यते तथा च यज्ञेनैव सञ्चालितमस्ति। इदं सम्पूर्णं जगदपि यज्ञमयमस्ति- 'सर्वयज्ञमयं जगत् – (का०पु०)। प्रकृतिः स्वयमेव अध्वर्युरूपेण यजनं करोति। ब्रह्माण्डेऽस्मिन् यत्किञ्चिदपि भवति, तदेव प्रतीकरूपेण यज्ञे क्रियते। यज्ञः सृष्टिनियमानां क्रियान्वयने सहाय्यमपि करोति। यज्ञेन पृथिव्याः अन्तरिक्षस्य च सर्वे पदार्थाः सूर्यस्य रश्मयः पर्यावरणं च पवित्राणि भवन्ति। यज्ञः वेदशास्त्रेषु सर्वत्र सकलकल्याणकारकः सकलसृष्टिसंरक्षकश्च कथितोऽस्ति ।

'यज् - देवपूजासंगतिकरणदानेषु च' इति धातोः नङ् प्रत्ययेन निष्पन्नस्य यज्ञशब्दस्य त्रयः अर्थाः भवन्ति - देवशक्तीनां पूजा, संगतिकरणं दानञ्च । ईश्वरीयदिव्यशक्तीनाम् आराधनमुपासनं वा, तासां संगतिः (सामीप्यं), स्वीयवस्तूनां देवानां कृते त्यागः समर्पणं च - एतदेव यज्ञस्य आध्यात्मिकी प्रक्रियास्ति। कात्यायनश्रौतसूत्रे देवविशेषाय द्रव्यस्य अग्नौ प्रक्षेपः यज्ञः कथितोऽस्ति - 'द्रव्यं देवतात्यागः' । यज्ञेषु देवेभ्यः समर्पणमेतदर्थमप्यभीष्टमस्ति, यतो हि देवैः न कस्यापि वस्तुनः सञ्चयः क्रियते, अपि तु समर्पितस्य वस्तुनः अगणितं विस्तारं कृत्वा पुनः तद् मानवकल्याणाय प्रत्यर्प्यते - एतदेव यज्ञस्य तत्त्वदर्शनमस्ति ।

AFTEFS/GCH/2024/274

Consumerism and Waste: Unveiling the Environmental Costs of Mass Production

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Consumerism has become a cornerstone of modern economies, driving mass production and shaping societal norms around consumption. However, this paper delves into the hidden environmental costs associated with this paradigm, particularly focusing on the proliferation of waste in the wake of mass production. Through a critical examination of the lifecycle of consumer goods, from extraction of raw materials to disposal, it exposes the extensive resource depletion, pollution, and carbon emissions inherent in the current model of mass consumption. Moreover, it investigates the socio-economic impacts of waste, including disproportionate burdens on marginalized communities and ecosystems. By unraveling the complex relationship between consumerism and waste, this paper aims to provoke reflection and stimulate dialogue on the imperative of transitioning towards more sustainable consumption patterns and circular economy practices.

Keywords*: consumerism, waste, environmental costs, mass production, resource depletion, pollution, carbon emissions, socio-economic impacts, circular economy.*

AFTEFS/GCH/2024/275

Climate Change Adaptation: Using AI for Resilience Planning and Risk management

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This paper explores the intersection of climate change adaptation strategies and artificial intelligence (AI) technologies, focusing on their synergistic potential for resilience planning and risk assessment. As the impacts of climate change continue to manifest in increasingly severe weather events and environmental disruptions, there is a pressing need for proactive measures to enhance societal resilience and mitigate risks. Leveraging AI tools such as machine learning, predictive modeling, and data analytics, this paper demonstrates how decision-makers can harness large datasets and complex systems dynamics to anticipate climate-related hazards, identify vulnerable regions and populations, and prioritize adaptation interventions. Through case studies and examples from diverse contexts, it elucidates the practical applications of AI in supporting adaptive management approaches, including early warning systems, infrastructure planning, and natural resource management. Furthermore, it examines the ethical, technical, and governance challenges inherent in deploying AI for climate resilience, emphasizing the importance of transparency, equity, and community engagement in the design and implementation of AI-driven adaptation strategies. By showcasing the transformative potential of AI for resilience planning and risk assessment, this paper aims to catalyze interdisciplinary collaboration and empower stakeholders to navigate the complexities of a changing climate.

Keywords*: climate change adaptation, artificial intelligence, resilience planning, risk assessment, machine learning, predictive modeling, data analytics, adaptive management, early warning systems, infrastructure planning.*

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Conservation agriculture for enhancing resource use efficiency and sustainability

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Conservation Agriculture (CA) encompasses three interconnected principles: minimizing soil disturbance, maintaining permanent soil cover with crop residual mulch, and implementing diverse crop rotations. This approach provides numerous advantages. The possibility exists to increase crop yields while simultaneously improving and restoring soil health and environmental quality. This has led to the swift adoption and expansion of CA in several nations worldwide, including the USA, Brazil, Argentina, Australia, Canada, and China. Surprisingly, the worldwide land area dedicated to Conservation Agriculture (CA) has been expanding by 10 million hectares each year since 2009. As of 2015-16, a total of 79 countries have implemented CA. India has been actively working on developing, improving, and spreading conservation-based agricultural technologies for about twenty years. Despite facing several limitations that hinder the implementation of these technologies, significant progress has been accomplished during this time. CA technologies offer prospects for cost reduction in production, water and nutrient conservation, yield enhancement, crop variety, effective resource utilization, and environmental benefits. These systems offer a diverse array of services that contribute to the efficient use of natural resources and the achievement of environmental and food security goals outlined by the UNDP Sustainable Development Goals. These services include food production, water efficiency, soil moisture conservation, groundwater regulation, energy use, waste decomposition and detoxification, soil erosion prevention, carbon sequestration, climate regulation, nutrient accumulation and cycling, biodiversity conservation, and primary production.

Keywords: *Conservation Agriculture, Sustainable Development Goals and carbon sequestration,*

AFTEFS/GCH/2024/277

Agroforestry for Climate Change Mitigation

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Agroforestry is a land use strategy that combines food crops (annuals) with tree crops (perennials) and/or animals on the same unit of land to maintain and improve overall production in an environmentally sustainable manner. A vast expanse of land is accessible with defined boundaries, embankments, and uncultivated areas where this system can be implemented. Farmers cultivate several tree species such as *Acacia nilotica, Acacia catechu, Dalbergia sissoo, Mangifera indica, Zizyphus mauritiana,* and *Gmelina arborea* on their farmland. The tree component of climate change mitigation plays a vital part in its overall effectiveness. Trees store carbon dioxide (CO2), the most prevalent greenhouse gas (GHG), in their biomass. Agroforestry contributes to both climate change mitigation and climate change adaptation. It is well recognized that, despite our current attempts to reduce greenhouse gas emissions and mitigate climate change, there is a more urgent requirement to address and adapt to the consequences of climate change. It is important for individuals to have knowledge about the extent and advantages of Agroforestry, and actively engage in the implementation and advancement of Agroforestry in India. Agroforestry systems are economically and ecologically beneficial practices that improve overall farm productivity. They achieve this by enriching the soil through the accumulation of organic matter from fallen leaves. Additionally, agroforestry systems provide important environmental services such as mitigating climate change through carbon sequestration, cleaning up pollutants through phytoremediation, protecting watersheds, and conserving biodiversity.

Keywords: *Agroforestry, biodiversity, climate change and phytoremediation.*

AFTEFS/GCH/2024/278

Building a Greener Tomorrow: Climate Tech Innovations

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In the face of the urgent need for mitigating climate change and achieving sustainable development goals, advancements in climate technologies play a pivotal role in shaping strategies for climate management. In this study we explored the multifaceted landscape of climate technologies, encompassing renewable energy sources, Carbon Capture and Storage (CCS) systems, sustainable agriculture practices, and innovative approaches to climate adaptation and resilience. Key areas of focus include the integration of Artificial Intelligence and Big Data Analytics to optimize energy efficiency, the development of scalable renewable energy solutions such as solar and wind power, and the implementation of nature-based solutions to enhance carbon sequestration and biodiversity conservation. Additionally, emerging technologies such as BioEnergy with Carbon Capture and Storage (BECCS) and Direct Air Capture (DAC) offer promising avenues for achieving negative emissions and addressing carbon dioxide removal targets. Furthermore, interdisciplinary collaborations and international partnerships are essential for fostering innovation, facilitating technology transfer, and scaling up deployment of climate technologies across diverse socio-economic contexts. By harnessing the potential of climate technologies in a holistic and inclusive manner, societies can transition towards a more resilient, low-carbon future while ensuring equitable access to sustainable development opportunities for all.

Keywords: Climate technologies, renewable energy sources, carbon capture and storage (CCS), sustainable agriculture practices, climate adaptation, solar power, wind power

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Role of Artificial Intelligence in Natural Resource Management: A Comprehensive Review

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Artificial Intelligence (AI) plays a crucial and vital role in addressing natural resource management challenges in the present era. Began with the development of expert systems for problem-solving and decision-making. The use of expert systems [1] led to the development of other AI procedures admissible to natural resource management. AI technology revolutionizes natural resource management, addressing challenges from energy optimization to forest conservation. Recent data science advancements and satellite technology enhance AI's potential in the forestry and wildlife sectors. In this paper, we tried to elaborate on the importance of Artificial intelligence in managing natural resources worldwide.

Keywords: *AI, Expert System*

AFTEFS/GCH/2024/280

Sustainable Application of Nanotechnology in Aquaculture

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When it comes to food security and economic impact, aquaculture is regarded as one of the most significant food production systems. As such, the industry's continued growth is essential to the plan for ensuring the nutritional safety of the world's food supply. It is stated that minerals used as feed additives in nanoparticle form have a particle size of less than 100 nanometers, which allows them to enter body cells and pass through the stomach wall more

quickly than regular minerals with a greater particle size. Various nanotechnology-based technologies are being used today to boost sustainability, efficiency, and output. There have been recent initiatives in the areas of water treatment, seafood processing and preservation, fish and shellfish growth enhancement through nutritional supplementation with nutraceuticals, and health management. As a result, nanotechnology is crucial to improving this industry's efficiency and environmental impact.

Keywords: Nanotechnology, Aquaculture.

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Study on the effect of seed coating and foliar spray of nanofertilizers on seed yield and quality parameters of maize (*Zea mays* L.)

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In the present study, an experiment entitled "Study on the effect of seed coating and foliar spray of nanofertilizers on seed yield and quality parameters of maize (*Zea mays L.*)" was conducted at research farm of Tirhut College of Agriculture, Dholi during Kharif season 2021. The experiment was laid out in RBD with ten treatments viz., T1 (control-No fertilizers applied), T2 (recommended dose of fertilizer), T3 [100% RDF + Seed coating of nano P (Phosphorus) @ 125 ml ha^{-1} (100% seed coating)], T4 [100% RDF + seed coating of nano Zn + Fe (Zinc + Iron) @ 125 ml ha^{-1} (100% seed coating)], T5 [75% RDF (100% N/K with 75% P) + Seed coating of nano P (Phosphorus) @ 125 ml ha^{-1} (100% seed coating)], T6 [75% RDF (100% NPK with 75% Zn/Fe) + Seed coating of nano Zn +Fe (Zinc + Iron) @ 125 ml ha^{-1} (100% seed coating)], T7 [100% RDF + seed coating of nano P (Phosphorus) @ 62.5 ml ha^{-1} + Foliar spray of nano P (Phosphorus) @ 250 ml ha^{-1} (50% seed coating + 50% Foliar)], T8 [100% RDF + Seed coating of nano Zn + Fe (Zinc + Iron) @ 62.5 ml ha^{-1} + Foliar spray of nano Zn + Fe (Zinc + Iron) @ 250 ml ha^{-1} (50% seed coating + 50% Foliar)], T9 [75% RDF (100% N/K with 75% P) + Seed coating of nano P (Phosphorus) @ 62.5 ml ha^{-1} + Foliar spray of nano P (Phosphorus) @ 250 ml ha^{-1} (50% seed coating + 50% Foliar)], T10 [75% RDF (100% NPK with 75% Zn/Fe) + Seed coating of nano Zn + Fe (Zinc + Iron) @ 62.5 ml ha^{-1} +

Foliar spray of nano Zn + Fe (Zinc + Iron) @ 250 ml ha^{-1} (50% seed coating + 50% Foliar)] in four replications. Various yield-attributing characteristics were significantly improved by the use of nano fertilizers. Maximum field emergence and plant stand establishment was observed in treatment T8 and T9 respectively, seed yield per plot, number of cobs per plant, thousand seed weight, ear girth, number of seeds per ear & harvest index was found in T3. Maximum height of plant at 30 DAS as well as at harvest was observed in treatment T7 and T5 respectively. Earlier flowering was observed in treatment T5 for first flowering and T3 for 50% flowering. Among seed quality parameters, germination % was maximum in T8, seedling length was found to be highest in T4, similarly dry weight along with fresh weight of seedlings & both the vigor indices was observed maximum in T2, T9, T4 and T3 respectively along with minimum incidence of seed borne pathogens in the treatment T7. Treatment T8 showed the highest activity of enzymes related to antioxidant activities and seed germination viz., peroxidase activity, polyphenol oxidase activity, amylase activity and dehydrogenase activity.

Keywords: Maize, Nanofertilizers, Foliar spray, Seed coating

AFTEFS/GCH/2024/282

Enhancing the disease resistance in fishes by using the medicinal herb *Salvia rosmarinus*

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The medicinal herb *Salvia rosmarinus* (rosemary) has potential applications in aquaculture. This conference delves into the significance of rosemary and its expanding role in contemporary aquaculture methodologies. Rosemary is rich in bioactive compounds such as rosmarinic acid, carnosic acid and essential oils, demonstrating potent antioxidant and antimicrobial activities. These bioactive compounds enhance fish health by bolstering immune responses, reducing stress, promoting growth and combating pathogens and disease

outbreaks in aquaculture systems. Rosemary extracts have shown potential as natural sustainable alternatives to synthetic antibiotics and chemical treatments, addressing the growing concerns of antibiotic resistance and environmental pollution in aquaculture. Rosemary emerges as a promising natural solution to bolster fish health and welfare. Moreover, rosemary's aromatic properties offer dual benefits in aquaculture. Its pleasant scent can mask undesirable odours associated with fish farms, enhancing the aesthetic appeal of aquaculture facilities. Beyond its medicinal attributes, rosemary's natural repellent properties against certain aquatic pests and parasites present opportunities for integrated pest management in fish farms. Incorporating rosemary into aquafeed formulations can potentially improve fish growth rates and feed conversion efficiencies, contributing to sustainable aquaculture production. This conference aims to elucidate the mechanisms underlying rosemary's beneficial effects on aquaculture and explore innovative strategies for its integration into aquaculture practices. By harnessing the multifaceted benefits of rosemary, aquaculture stakeholders can foster sustainable production systems that prioritize fish health, environmental stewardship and economic viability.

Keywords: Rosemary, medicinal plant, disease resistance, sustainable aquaculture

AFTEFS/GCH/2024/283

Natural Resource Management: Concept, Models and Approaches

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Natural resource management (NRM) is a multidisciplinary field that encompasses the sustainable utilization, conservation, and restoration of Earth's natural resources. These resources include land, water, air, minerals, forests, wildlife, and biodiversity. Effective management of natural resources is crucial for maintaining ecosystem health, supporting human livelihoods, and preserving the planet for future generations. The materials and substances present in the natural environment that people may exploit for economic advantage or other reasons are referred to as natural resources. There are two types of resources: non-renewable and renewable. Natural resources that are renewable are ones that can be regenerated over either by human activity or by natural processes throughout time. Renewable resources include things like fisheries, solar, wind, hydropower, and wood. Conversely, once they are depleted, non-renewable natural resources cannot be replaced since they are limited in quantity. Minerals like iron, copper, and gold, as well as fossil fuels like coal, oil, and natural gas, are examples of non-renewable resources. Groundwater is another. The review includes Concept, Models and Approaches to Natural Resources Management, it provides an overview of the various concepts, models, and approaches used in natural resource management (NRM) and describe different NRM models, including the systems approach, the sustainable development approach, and the resilience approach. Overall, the article focuses on comprehensive note of concept, models and approaches of natural resource management.

AFTEFS/GCH/2024/284

Effect of foliar application of calcium, zinc and boron on biochemical properties of aonla

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An experiment entitled "Effect of foliar application of calcium, zinc and boron on biochemical properties of aonla" was carried out during 2021-22 at Experimental Farm, Department of Fruit Science, 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., T_1 - (Calcium chloride 1 %), T_2 - (Calcium chloride 1.5 %), T_3 - (Zinc sulphate 0.4 %), T_4 - (Zinc sulphate 0.6 %), T_5 - (Borax 0.4 %), T_6 - (Borax 0.6 %) T_7 - (Calcium chloride 1.0 % + Zinc sulphate 0.4 % + Borax 0.4 %), T_8 - (Calcium chloride 1.5 % + Zinc sulphate 0.6 % + Borax 0.6 %), T_9 - (Control), were used in research programme. Two sprays of each treatment were given at the pea stage and at thirty days intervals after the first spray. The results of the present investigation revealed that, treatment T_8 (Calcium chloride 1.5 % + Zinc sulphate 0.6 % + Borax 0.6 %) was found to be the best among all as it gives the maximum TSS (11.24 ^{0}B), total sugar (5.76 %), reducing sugars (3.40 %), non-reducing sugars (2.36 %) and vitamin C (590 mg/100 g) with minimum titratable acidity (1.42 %), while minimum TSS (9.03 ^{0}B), total sugar (4.72 %), reducing sugars (2.63 %), non-reducing sugars (2.09 %) and vitamin C (524.33 mg/100g) with maximum titratable acidity (1.84 %) were recorded with control.

Keywords: *Aonla, Foliar application, Calcium, Zinc, Boron.*

AFTEFS/GCH/2024/285

Effect of Zinc oxide nanoparticles on the viability of fruit fly, *Drosophila melanogaster*

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Nanotechnology has led to the incorporation of nanomaterials in many consumer products and industrial applications, including agriculture and food. Nanotechnology applications for use in agriculture have become increasingly popular over the past decade, with a particular interest in developing novel nano agrochemicals i.e. "nanopesticides" & "nanofertilizers." Nanofertilizers and nanopesticides offer promising solutions for enhancing agricultural productivity and reducing environmental impact. But we need to be careful about how these products affect non-target insects. The wide use of zinc oxide nanoparticles in nanofertilizers increases the potential risk to the environment. In this study effect of zinc oxide nanoparticles on *Drosophila melanogaster* was assessed. *Drosophila melanogaster* proves to be the most suitable organism to study nanoparticle toxicity. The advantages include low maintenance cost, ease of handling, short life span and small number of chromosomes with a fully sequenced genome. The exposure of zinc oxide nanoparticles induces a decrease in the viability of *Drosophila melanogaster.* The flies were utilized for the viability assay and administered by feeding ZnO NPs at various concentrations, ranging from 0.2 mg/ml to 0.6mg/mL. A decrease in egg-to-adult viability of F1 progenies was observed in a dose-dependent manner.

Keywords: Nanotechnology, nanofertilizers, nanopesticides, *Drosophila melanogaster,* viability.

AFTEFS/GCH/2024/286

Effect of varieties and nitrogen sources on growth parameters of wheat under alternate furrow irrigation method

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A field experiment was conducted at Agronomy Research Farm, CCS HAU, Hisar during *rabi* season of 2021-22 with the objective to study the effect of alternate furrow irrigation method and nitrogen application on productivity of FIRB planted wheat. The research was carried out in split plot design with sixteen treatment combinations replicated thrice. The four varieties (WH 1105, HD 3086, HD 2967 and WH 1184) were assisted in main plot and nitrogen sources viz. control, 100% RDN through urea, 50% RDN through urea + 50% RDN through VC and 50% RDN through urea + 25% RDN through VC + 25% RDN through FYM in sub plots. Slightly higher plant population per meter row length was observed with variety HD 3086 among the varieties and under nitrogen application of 50 per cent recommended dose of nitrogen through urea + 25 per cent RDN through vermicompost + 25 per cent RDN through FYM among nitrogen sources. The tallest plants at 60 and 90 days after sowing were found in variety HD 3086, however, it did not differ significantly from variety WH 1184 at 60 days after sowing. Among the nitrogen sources, application of 50% RDN through urea + 25% RDN through VC + 25% RDN through FYM produced tallest plants over control and 100% RDN through urea. Plant height recorded with the application of 50% RDN through urea + 50% RDN through VC was at par with the application of 100% RDN through urea. Shortest plants were observed under control.

Key words: FYM, yield, FIRB, straw and alternate furrow irrigation

AFTEFS/GCH/2024/287

Comprehensive study on nutritionally enriched live feed on rearing of fry of Amur Carp (*Cyprinus carpio haematopterus*)

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The fish food organisms in the aquatic environment are planktons, nekton and benthos which play vital role in larval rearing of fish particularly for the exogenous feeding. During the present study, fry of Amur carp, *Cyprinus carpio haematopterus* were fed with diet containing T1 (live feed), T2 (live+ formulated feed), T3 (formulated feed) and commercial feed as a control treatment (T_o). The fry stages were reared for three months and initial length and weight of 2.08 cm and 0.25 gm were recorded respectively. 180 number of fry stages of Amur carp were divided into twelve groups with 15 numbers in triplicate tanks of each treatment. Live food for the fish larvae is an important aspect because they not only supply sufficient nutrient to fish larvae but also provide exogenous enzymes to fish larvae which is important for the digestion of other feeds. The Feed conversion ratio of (1.30±0.05) was found best in treatment T2 containing mixed diet of live and formulated feed. During the study period all the water quality parameters DO, pH, temperature, electrical conductivity, total alkalinity, total hardness and ammonia concentration were found within the tolerance level. After rearing for a period of three months maximum weight and length were observed in T2 treatment i.e. (5.31±0.01) gm and (5.25 ±0.02) cm respectively. The result of the experiment depicted that incorporation of a mixed diet of live feed and locally available formulated feed completes the nutrient requirement of *Cyprinus carpio haematopterus* fry.
Keyword: Feed, fry, live feed, growth. Amur Carp, *Cyprinus carpio haematopterus*

AFTEFS/GCH/2024/288

Cultural and Ecological Aspects of Plant Use in Ladakh

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Traditional knowledge (TK) in Ladakh encapsulates a repository of experimental wisdom cultivated over millennia. Despite this cultural wealth, dwindling interest among the younger generations in the region's age-old practices underscores the urgency to document TK. The current study investigates the diverse usage of plants in Surru, Wakha and Lower Indus valleys of Western Ladakh exploring the influence of socioeconomic and ecological factors. Disparities in plant use understanding are evident among different groups, prompting further investigation through intercultural comparisons. Plants such *as Arnebia euchroma, Juniperus semiglobosa,* and *Artemisia* species emerge with cultural importance. Gender, valley affiliation, religious background and the remoteness of a village all influence local plant knowledge. These variations are linked to socioeconomic disparities among communities.

Key Words: Plant, Ladakh, Culture, Ecology.

AFTEFS/GCH/2024/289

A Comprehensive Overview of Organic Farming Practices

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Organic farming has emerged as a cornerstone of *sustainable agriculture,* offering a holistic approach to food production that prioritizes environmental stewardship, *biodiversity conservation*, and human health. This paper provides a comprehensive examination of organic farming practices, elucidating their principles, benefits, and challenges in the context of modern agricultural systems. Organic farming emphasizes the use of natural inputs and ecological processes to enhance soil fertility, promote plant health, and minimize environmental impacts.Key components of organic farming include crop rotation, composting, biological pest control, and the avoidance of synthetic pesticides and fertilizers. By fostering soil biodiversity and enhancing soil

structure, organic farming practices contribute to long-term *soil health* and resilience, mitigating erosion and nutrient runoff while sequestering carbon from the atmosphere. Furthermore, organic farming systems prioritize the conservation of biodiversity by providing habitat for native flora and fauna and minimizing the negative impacts of agricultural practices on ecosystems.In addition to environmental benefits, organic farming plays a crucial role in ensuring *food security* and promoting human health. By prioritizing agroecological principles and minimizing reliance on chemical inputs, organic farming practices produce nutritious, flavorful, and safe food while reducing the risk of pesticide residues in the food chain. However, organic farming faces challenges related to scalability, market access, and knowledge dissemination. In conclusion, organic farming represents a promising pathway towards building resilient and sustainable food systems that prioritize the health of people and planet alike. Embracing the principles of organic agriculture can foster agricultural resilience, enhance ecosystem services, and contribute to the transition towards a more sustainable and equitable food future.

Keywords: organic farming, sustainable agriculture, biodiversity conservation, soil health, food security.

AFTEFS/GCH/2024/290

Manifestation of Nature in Romantic Poetry

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The relationship between nature and literature is a central theme in romantic poetry, where nature is viewed as the visible world that exists independently. Human beings, as part of nature, recreate it to create works of art. Romantic poets such as Coleridge, Wordsworth, and Keats have glorified nature with their beautiful words and ideas, offering a new perspective on nature and its images. They believed that experiencing nature was essential for the development of a complete soul and personhood. Through their vivid descriptions of natural elements like grasslands, trees, flowers, and wildlife, the romantic poets expressed deep spiritual and sensory delight. This paper aims to delve into the manifestation of nature in romantic poetry and explore the intimate connection between nature and literature.

Keywords: Nature, literature, romantic poetry, grasslands, trees, flowers, and wildlife.

AFTEFS/GCH/2024/291

The Ecological Consequences of Nuclear Conflict

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The possibility of a nuclear war in the future may be uncertain, but there is no doubt that the world's arsenals must be rid of nuclear weapons. Even the slightest nuclear action by one belligerent could potentially lead to a counterattack, which would in turn escalate the conflict. The USA's limited attacks during World War II had a profound impact on people and their physical belongings with long-lasting medical and social consequences for survivors and their descendants. Nevertheless, this paper does not focus on the effects of nuclear weapons on humans, but rather on the impact on the natural environment. The foreseeable environmental damage caused by a nuclear attack is summarised quantitatively in terms of the blast wave, thermal pulse, and nuclear radiation. A nuclear attack could devastate wildlife, cause destruction to vegetation over a wide area through the combination of blast, heat, and nuclear radiation. Wildfires could expand the zone of immediate destruction. The loss of vegetation through surface disruption would also lead to increased wind and water erosion and a loss of nutrients.

Keywords: Nuclear warfare, radiation, environmental impact, wildlife, and vegetation.

AFTEFS/GCH/2024/292

एक गैर सरकारी संगठन (NGO) की पर्यावरण में भूमिका

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एक गैर-सरकारी संगठन (एनजीओ) कोई भी गैर-लाभकारी, स्वैच्छिक नागरिक समूह है जो स्थानीय, राष्ट्रीय और अंतर्राष्ट्रीय स्तर पर संगठित होता है। गैर सरकारी संगठन अब पर्यावरण नीति तैयार करने, पर्यावरण संरक्षण के लिए सार्वजनिक समर्थन जुटाने और जंगलों और जानवरों की लुप्तप्राय प्रजातियों की रक्षा करने में महत्वपूर्ण भूमिका निभा रहे हैं। ऐसा अनुमान है कि, भारत में लगभग 1.5 मिलियन गैर सरकारी संगठन विभिन्न उद्देश्यों के लिए काम कर रहे हैं। भारत में कई गैर सरकारी संगठन हैं जो असम में पर्यावरण संरक्षण और पारिस्थितिकी के क्षेत्र में काम करते हैं। ये हैं साइंस सोसाइटी, बॉम्बे नेचुरल हिस्ट्री सोसाइटी, सीईई, सीएसई, सीपीआर पर्यावरण शिक्षा केंद्र, केरल शास्त्र साहित्य परिषद, कल्पवृक्ष, नर्मदा बचाओ आंदोलन, एफआरएलएचटी, टीईआरआई, डेवलपमेंट अल्टरनेटिव ग्रुप्स, मद्रास क्रोकोडाइल बैंक ट्रस्ट आदि। कुछ अंतरराष्ट्रीय एनजीओ हैं - ग्रीन पीस, डब्ल्यूडब्ल्यूडब्ल्यू फंड फॉर नेचर (डब्ल्यूडब्ल्यूएफ) और अर्थ फर्स्ट आदि पर्यावरण जागरूकता को बढ़ावा दे रहे हैं। स्थानीय स्तर पर प्रयागराज में CURE और SBSRD आदि प्रकृति और पर्यावरण के संरक्षण की आवश्यकता को संबोधित कर रहे हैं।

एनजीओ एक अखंड इकाई नहीं हैं, बल्कि समूह और संगठन हैं जो जमीनी स्तर और अखिल भारतीय जनसांख्यिकी दोनों में सक्रियता, विकास, राहत, सूचना और अनुसंधान तक पहुंच में लगे हुए हैं। वे जनता की भलाई और स्थिरता के लिए अपने लक्ष्य में एकजुट हैं।

इन गैर सरकारी संगठनों का मूल उद्देश्य जीवन की गुणवत्ता में समग्र सुधार के लिए स्थानीय, राष्ट्रीय और अंतरराष्ट्रीय पहल और सामुदायिक भागीदारी लाने में उत्प्रेरक के रूप में कार्य करना है। वे सरकार को प्रमुख पर्यावरण कार्यक्रमों के कार्यान्वयन को बढ़ावा देने और सुविधाजनक बनाने के लिए प्रासंगिक जानकारी प्राप्त करने में मदद करते हैं।

AFTEFS/GCH/2024/293

Renewable Energy Sources in India: A Review

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The world is becoming a more global village due to the growing daily energy needs of everyone on it, but the earth is unable to change its shape. The need for drive and related qualities is growing in order to meet the needs of human community as well as economic development, health, and education. One of the best ways to meet potential energy demand is to return to sustainability in the fight against temperature change. The study examined the potential benefits of renewable energy, including energy security, energy access, social and economic development, reduction of environmental and health issues, and mitigation of climate change. Given these advantages, barriers to mitigating climate change impede the expansion of clean energy sources. This includes inefficiencies in the market, ignorance, availability of raw materials for the production of future clean energy, and our everyday carbon footprint. In order to help achieve the goals of reducing carbon emissions, mitigating the effects of climate change, and preserving a healthy atmosphere and reasonably priced resources for future generations, the report has suggested a number of policies and actions.

Keywords: Sustainability Issues, Clean Energy, Carbon Footprint, and Climate Change Mitigation

AFTEFS/GCH/2024/294

Effect of bee attractants on the attraction of *Apis dorsata* and their impact on seed yield of niger, *Guizotia abyssinica* (L.f.) Cass, crop

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An experiment was conducted at experimental farm of PC Unit Sesame and Niger, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, during *Kharif* 2021. To determine the impact of bee attractants on the attraction of *Apis dorsata* and their impact on seed yield in niger crop, the experiment was set up using a RBD with nine treatments and three replications. Research found that the both at 10% and 50% flowering stage *Apis dorsata* visit was numerically highest with treatment, flower extract of *Madhuca longifolia* 10% with 20.42 and 19.25 *Apis dorsata*/m^2/5min, respectively followed by rose water spray with 19.25 and 15.33 *Apis dorsata*/m^2/5min, respectively. The population of *Apis dorsata* was received from the controlled condition (4.08 and 6.08 *Apis dorsata*/m^2/5min at 10% and 50% flowering stage, respectively) followed by water spray (5.75 and 8.58 *Apis dorsata*/m^2/5min at 10% and 50% flowering stage, respectively). The foliar spray of mahua flower extract and rose water 10% were found significantly superior over others in respect to record higher seed yield and recorded 6.90 q and 6.70 q/ha seed yield, respectively.

Keywords: Flower extract of *Madhuca longifolia* 10%, dates extract 10% and significantly superior.

AFTEFS/GCH/2024/295

Microbial Sustainability: Harnessing Microbes for Human Welfare

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Microbes have played a pivotal role in sustaining life on Earth for billions of years, and their impact on human welfare is immense. Harnessing the power of these microscopic organisms holds the key to addressing some of the most pressing challenges faced by humanity, including food security, environmental protection, and healthcare. In the realm of agriculture, microbes are essential for maintaining soil fertility and promoting plant growth. Beneficial microbes, such as rhizobacteria and mycorrhizal fungi, can be employed as bio fertilizers and biocontrol agents, reducing the reliance on chemical fertilizers and pesticides, thereby promoting sustainable farming practices. Microbes also play a crucial role in environmental remediation and waste management. Certain bacteria and fungi possess remarkable capabilities for breaking down pollutants and transforming them into harmless compounds, offering eco-friendly solutions for cleaning up contaminated sites and reducing the environmental impact of industrial activities. The application of microbes in the healthcare sector is equally significant. Probiotics, which are live beneficial bacteria and yeasts, can improve gut health and boost the immune system. Additionally, microbes are invaluable in the production of various life-saving drugs, such as antibiotics and vaccines, as well as in the development of novel therapies for treating diseases. Furthermore, microbes have the potential to contribute to the development of renewable energy sources through their ability to convert biomass into biofuels, paving the way for a more sustainable energy future. By harnessing the remarkable capabilities of microbes, we can unlock innovative solutions that promote human welfare while preserving the delicate balance of our planet's ecosystems, ensuring a sustainable future for generations to come.

Keywords: Mycorrhizal fungi, capabilities of microbes, planet's ecosystems and biocontrol agents.

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Response of organic farming and opportunities for agricultural sustainability in changing climate scenarios on Indian agriculture

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Organic farming is acknowledged as crop production system which can sustain health of soils, ecosystems and people by combining tradition, innovation and improved farm technology. Major components generally adopted by farmers include untreated seed, biomanures and biofertilizers, biopesticides, manurecompost vermicompost and crop diversification. Increasing population and related food demand always remain the most imperative challenges for the developing world. It could be attained by an increased agricultural production based on external inputs like mineral fertilizers and pesticides during the 20th century. The green revolution based modern agricultural practices has resulted in the substantial increase in grain yield at the cost of natural resource degradation decline in soil fertility and environmental resilience. It is a different approach which should inculcate the farmers to utilize their traditional knowledge to produce more grains by using less external inputs. This approach is known as sustainable agriculture which is the need of the hour, at present. The sustainable agriculture practices are derived from the amalgamation of traditionally-adapted healthy practices with a modern development of agricultural systems. Thus, sustainable agricultural practices are supposed to be resource-conservative and resilient. How the integration of traditional knowledge and modern agriculture practices will improve the agricultural productivity, soil quality and health as well as socio-economic balance, has also been discussed in terms of research opportunities.

Key words: Bio-fertilizers, biopesticides, manurecompost and environmental resilience.

AFTEFS/GCH/2024/297

रक्त प्रवाह संस्थान और नियमित रूप से व्यायाम करने से रक्त प्रवाह संस्थान में होने वाले स्थायी परिवर्तन

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रक्त प्रवाह संस्थान (Circulatory System)

रक्त प्रवाह संस्थान मनुष्य का शरीर एक मशीन की भांति काम करता है इसलिए शरीर के सभी संस्थानों का सबसे कम करना अति आवश्यक है।अच्छे स्वास्थ्य को बनाए रखने के लिए शरीर की कोशिकाओं व अंगों को ऑक्सीजन व अन्य आहार की अति आवश्यकता होती है इसके अतिरिक्त मल पदार्थों तथा कार्बन डाइऑक्साइड को बाहर निकालने का कार्य भी निरंतर चलना चाहिए ए मनुष्य के शरीर में ऐसा संस्थान रूम्स इन कोशिकाओं तक ऑक्सीजन वालों को पहुंचाता है तथा कार्बन डाइऑक्साइड व्यर्थ के पदार्थों को शरीर से बाहर निकालता है रक्त प्रवाह संस्थान कहलाता है। दूसरे शब्दों में हम कह सकते हैं कि हृदय से शरीर के विभिन्न अंगों तक रक्त पहुंचाने तथा शरीर के विभिन्न अंगों से हृदय तक रक्त पहुंचाने के कार्य में शरीर के जो अंग भाग लेते हैं उनके समूह को रक्त प्रवाह संस्थान कहते हैं। रक्त प्रवाह संस्थान में शरीर के निम्नलिखित अंग शामिल होते हैं।1 हृदय 2 धमनिया 3. शिराएं 4. लघु रक्त वाहिनियां 5. कशेरुकाए 6. रक्तकण

AFTEFS/GCH/2024/298

Therapeutic Management of Canine Ehrlichiosis – A Case Report

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Ehrlichiosis is an important protozoan disease in canine caused by an intracellular gram - negative bacteria of the genus Ehrlichia, under the family Anaplasmataceae. Three different Ehrlichia species can cause canine ehrlichiosis namely *E. canis, E. chaffeensis and E. ewingii.* In acute cases, fever reticuloendothelial hyperplasia, generalized lymphoadenopathy, splenomegaly and thrombocytopenia are noticed. The disease can be diagnosed on the basis of clinical signs and can be confirmed by demonstration of the organisms (as clusters or colonies) within the cytoplasm of the mononuclear cells. A male German shepherd dog of 6 months of age was presented at Veterinary Clinical Complex, CVAS, Bikaner with history of anorexia, weakness, high fever (104.5 F), heavy tick infestation and progressive weight loss. Preliminary examination was done and blood sample was sent to laboratory for confirmatory diagnosis. The blood test determined range of packed cell volume (PCV), hemoglobin below normal and thrombocytopenia. On the basis of blood report and clinical signs, case was diagnosed as canine ehrlichiosis. Treatment was started with antibiotic, antipyretics and supportive therapy along with multivitamin and liver tonics. Oxytetracycline at the dose rate 10 mg/kg body weight was administered intravenously with normal saline slowly. Doxycycline capsule was recommended at the dose rate 10 mg/kg body weight orally for 14 days twice a day. Ranitidine was given at dose 2 mg/kg body weight subcutaneously once. After 14 days the dog was recovered and looked healthier. Hemoglobin came to its normal position and PCV was normal in range.

Keywords: canine, ehrlichiosis, doxycycline

AFTEFS/GCH/2024/299

Phytohormone Jasmonic Acid Mediated Plant Responses to Abiotic Stresses

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It was projected that the world population will become around 8.5 billion by 2030 and 9.7 billion by 2050. To provide food security to the growing population, farmers have to increase crop productivity to a sustainable level. Climatic changes, limited and unfertilized croplands and many more factors prevent the plants to produce crops to their potential. Various biotic (fungi, bacteria and herbivores) and abiotic stresses (drought, cold, light, temperature, salinity) faced by plants during their growth and development account for a considerable economical loss to the farmers. Plant growth regulators are naturally occurring, non-toxic compounds, that play a key role in dealing with the abiotic and biotic stresses in plants. Jasmonic acid and its derivatives are known as Jasmonates, are derivatives of fatty acid, synthesis in the chloroplast, peroxisome and mitochondria. Jasmonates regulate various physiological and biological processes in plants including various types of abiotic stresses such as heat, cold, drought, salinity and heavy metals etc through different regulatory and signalling pathways. Thus, Jasmonic acids and its derivatives considered to be a significant player in fight against abiotic stresses in plants.

Keywords: Jasmonic acid, abiotic stress, Drought, Plant resistance, Signalling pathways.

AFTEFS/GCH/2024/300

Therapeutic Management of Canine Ehrlichiosis: Lesson Learned from Bareilly, India

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The study was conducted on 5 dogs presented at Teaching Veterinary Clinical Complex, Indian Veterinary Research Institute with history of anorexia, lethargy, weakness, high fever, vomiting, severe panting and heavy tick infestation. Physical examination of dogs revealed increased respiratory rate, pale mucus membrane and conjunctiva, dehydration and enlarged lymph nodes. Hematological finding showed marked anaemia and thrombocytopenia. Sonographic and radiographic investigation of the abdomen revealed splenomegaly and partial hepatomegaly. Parasitological examination found it positive for *Ehrlichia canis* and confirmed the ticks *Rhipicephalus sanguineus*. Dog was treated with doxycycline @ 10 mg/kg for 28 days in divided dose with supportive therapy. Dog showed marked recovery after 2 doses of doxycycline and re-examination of blood after 20 days gave negative results in rapid test kit.

Keywords: *Ehrlichia canis*; anaemia; splenomegaly; *Rhipicephalus sanguineus*; thrombocytopenia; doxycycline.

AFTEFS/GCH/2024/301

In-silico analysis of genes involved in β-glucan biosynthesis: The critical attributes of monitoring *Hordeum vulgare* malt quality

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Hordeum vulgare is a diploid self-pollinating monocotyledonous coarse cereal crop with a genome size of ~5.3 Gb sequenced. The *in-silico* analysis of genes involved in β-glucan biosynthesis is effectively employed to investigate the intricate regulatory networks of genes regulating the malt quality of barley genotypes. The current study uses Phyre2 software to advance remote homology detection methods to build 3D models, predict ligand binding sites and analyze the effect of amino acid variants for the protein sequences of candidate genes. The modelled structures were further refined using Deep Refiner and the PyMol platform. The obtained protein structure is validated by SAVES v 6.0. The PROCHECK, PROVE and VERIFY 3D approach was used for model validation. The PROCHECK results showed that 92.7% and 87.8% residues lie in the most favoured region of the *UDP-glucose-cellulose glucosyl transferase* (*CslF6)* and *callose synthase* (*CS3ase)* transcript, respectively. The binding sites of receptors and the corresponding binding poses of ligands were predicted using cbdock2. It is a protein-ligand blind docking server that employs a protein-surface-curvature-based cavity detection approach to guide molecular docking with AutoDock Vina. The *CslF6* gene and *CS3ase* transcripts showed a Vina score of -8.8 and -6.4, respectively. The *in-silico* analysis allows us to select candidate transcripts for further analysis. This study will accelerate the genetic improvement program of barley grown under subtropical climates with an insight leading to breeding efficient indigenous malt genotypes.

Keywords: Hordeum Vulgare, Malt quality, β-glucan, UDP-glucose-cellulose glucosyl transferase, callose synthase.

AFTEFS/GCH/2024/302

In-vitro evaluation of different fungicides against *Rhizoctonia solani* causing sheath blight of Rice

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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 cucumeries* (frank) Donk belong to phylum Basidiomycota. Among fungicides tested cent per cent mycelial growth inhibition with tebuconazole (25.9 EC) and trifloxystrobin + tebuconazole 75% WG (each @ 0.075, 0.1, and 0.15 %), difenoconazole 11.4 % SC (each @ 0.1 and 0.15 %) over untreated control. These were followed by Flusilazole 40 % + Carbendazim 37.5 % EC (91.48%), Azoxystrobin 23.0 % SC (88.52%) Kresoxim methyl 44.3% WP (88.14 %) and (each @ 0.15 % conc.) over untreated control. Average radial per cent mycelial growth inhibition recorded with fungicides tested was ranged from 41.60 to 100.00 %. However, it was significantly highest and cent per cent mycelial growth inhibition with fungicides Tebuconazole 25.9 % EC and Trifloxystrobin + Tebuconazole 75% WG. Followed by Difenconazole 11.4 % SC (94.32%), Kresoxim methyl 44.3% WP (83.45%) and Carbendazim 12% + Mancozeb 63% WP (75.18%), respectively.

Keywords: Sheath blight, R. solani, fungicides, mycelial growth

AFTEFS/GCH/2024/303

The Impacts of Climate Change on Livestock: Strategies for Mitigation and Adaptation to Climate Change

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The world community has become unduly alarmed by greenhouse gas (GHG) emissions and climate change in recent years due to the potential threat to food security. According to recent projections, the demand for livestock is expected to increase by 70% by 2050, and it is crucial for achieving food security. In terms of the source of emissions, the world's livestock industry contributes 7.1 gigatonnes of CO2 equivalent to greenhouse gas emissions. Regarding climate change, livestock does matter. It is impossible to ignore the fact that ruminant methane (CH4) emissions cause 10–11% productivity loss in addition to posing a threat to the environment. For this reason, in order to combat GHG emissions and climate change in general, we must put appropriate mitigation and adaptation measures in place.

AFTEFS/GCH/2024/304

Assessment of bacterial biodiversity in fish cultured in Biofloc tank at Hisar, Haryana

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The fisheries sector is continuously expanding in the state of Haryana with more and more farmers and entrepreneurs are experimenting with high value fishes in different culture systems. Fish farming under Biofloc tank is witnessing disease incidence in different fish species. The aim of the study was to record bacterial biodiversity in fish cultured in Biofloc tank at Hisar. During monthly survey, diseased fish were collected from the fish farms under aseptic conditions during 2023 to isolate bacterial isolates. Hemorrhage on ventral side of mouth region recorded in fish, *Pangasius pangasius* cultured in Biofloc tank . The bacteria from affected portion were inoculated on culture media. Bacterial colonies were selected on the basis of different morphological characteristics. These were picked from the Nutrient Agar, Mannitol salt agar medium and were streaked on pre prepared respective plates to obtain purified culture of isolates. Total 2 bacteria were isolated from mouth region, and intestine region of *P.pangasius.* Among these, Gram negative s*pecies was found* in all the collected samples, however, the bacterial species was present in water samples collected from the same tank. The result of this study strongly suggested the urgent need to improve the quality control systems in Biofloc tank.

Keywords: *Pangasius pangasius,* Bacterial biodiversity, Gram negative bacteria sp., Biofloc tank.

AFTEFS/GCH/2024/305

Impact of lactobacillus microbial consortia on digestive enzyme activity of *Cyprinus carpio* L.

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As aquaculture continues to expand to meet the growing global demand for seafood, optimization of fish health and growth has become vital at national as well as international level. This research focuses on the use of probiotics, particularly Lactobacillus species, to enhance digestive health in common carp fish (*Cyprinus carpio L.*). This explores the effects of *Lactobacillus* supplementation on fish digestive physiology, including alterations in gut microbiota composition, improvements in nutrient digestion and absorption. In experiment in which microbial consortia was given in water at 0.1 v/v% concentration rate. After 90 days the samples of intestines were separated and then homogenized in phosphate buffer (pH 7.5; PBS) (1 g per 10 ml) using a hand-held glass homogenizer at 4 °C. The homogenate was then centrifuged at 4 °C at 15000 × g for 15 min. The supernatant was used for all enzymatic assays. Protease activity was evaluated using Folin-phenol reagent and amylase activity was measured using iodine solution to reveal non-hydrolysed starch. Lipase activity was determined based on measurement of fatty acids release due to enzymatic hydrolysis of triglicerides in stabilized emulsion of olive oil. The potential mechanisms underlying these effects, highlights the intricate interplay between *Lactobacillus* and the host digestive system. Thus, by understanding the role of Lactobacillus in fish digestion not only contributes to the development of sustainable aquaculture practices but also offers insights into probiotic applications for enhancing animal health across diverse ecosystems.

Keywords: Lactobacillus, Folin-phenol reagent, sustainable aquaculture, microbial consortia

AFTEFS/GCH/2024/306

वेदों में पर्यावरण संरक्षण के स्वर

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पर्यावरण का अभिप्राय है परित: आवरणम् अर्थात हमारे आसपास का आवरण रूप में जो हमें दिखाई पड़ता है उसमें जो वृक्ष आदि आते हैं वे पर्यावरण के अंतर्गत परिगणित होते हैं ।

वेद शब्द का शाब्दिक अर्थ है ज्ञान । विद् ज्ञाने धातु से घञ् प्रत्यय लगकर वेद शब्द बना है । वेद ही हमारी संस्कृति के मूल अर्थात आदि स्रोत हैं । लिखित रूप में कोई भी साहित्य उपलब्ध है तो वह वेद है । वेदों से तत्कालीन सामाजिक, राजनीतिक, धार्मिक आदि स्थितियों का पता किया जा सकता है । वेद रूपी ज्ञान की ज्योति अगर न होती तो यह संसार अंधकारमय होता । जैसा कि महाकवि ने कहा है –

इदमन्धतम:कृत्स्नं जायेत भुवनत्रयम् ।
यदि शब्दाह्व्यं ज्योतिरासंसारं न दीप्यते ।

संस्कृत साहित्य में पर्यावरण के विशेष में बहुश: वर्णन मिलता है । संस्कृत साहित्य के शेक्सपियर कहे जाने वाले महाकवि कालिदास ने भी प्रकृति संरक्षण व प्रकृति के प्रति सजगता को दर्शाया है । इसमें शकुंतला का इतना प्रकृति प्रेम प्रदर्शित किया है कि वह पहले पौधों को पानी देकर ही भोजन आदि का ग्रहण करती है ।

इसी प्रकार शकुंतला के वियोग में प्रकृति भी दुखी दिखाई पड़ती है इस प्रकार के उदाहरण महाकवि कालिदास में अपने काव्य में प्रस्तुत किए हैं । संस्कृत साहित्य के आदेश स्त्रोत वेद भी पर्यावरण के बारे में अतीव सजग हैं । वेदों में की गई प्रार्थना न केवल मनुष्य सम्बद्ध अपितु प्रकृति के भी कल्याण की कामना करती है । अथर्ववेद में स्थित पृथिवी सूक्त में भूमि के स्वरूप व फसल आदि का विवरण प्राप्त होता है। पौराणिक ग्रन्थों में तुलसी, वटवृक्ष आदि पौधों को पूजनीय बताया है ।

अग्नि, वरुण, पृथिवी आदि प्राकृतिक तत्त्वों को देव संज्ञा भी दी है । उनके लिए अलग सूक्त भी लिखे गए हैं । इस प्रकार प्रस्तुत शोध पत्र का विषय वेदों में पर्यावरण व उसके संरक्षण के उपायों को किस प्रकार प्रदर्शित किया है, इस विषय में विचार करने का प्रयास किया जाएगा।

AFTEFS/GCH/2024/307

Zinc-activated *Azadirachta indica*-based Biochar: An activated Green Solution for Water Pollution

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Biochar, a plant-based material, has also been found as a potential agent for phytoremediation of a wide range of contaminants, including both inorganic and organic pollutants in wastewater. Biochar production is inexpensive, environmentally friendly, and successful in reusing waste resources. In general, bulk biochar (B-BCs, 0.04-20 mm) is utilised to improve agricultural and environmental sustainability. Reducing particle size to the micro range (10-600 µm) enhanced adsorption sites, leading to better capacity. Transforming crop residue from farms into biochar can provide an alternative way to reutilize these waste materials, reducing carbon emissions and contributing significantly to climate change mitigation (Woolf et al., 2010). The Neem tree (*Azadirachta indica*) is revered and regarded as a golden tree in semitropical and subtropical climates due to its numerous applications. It is also utilized in energy generation, cosmetics, pest management, medicinal syrup, and other applications. The work entails exposing neem plant leaves to controlled pyrolysis conditions to make biochar. To increase its efficacy, the resultant compound was then activated by bonding zinc metal. Both iterations of the synthesised product were characterised using FTIR, XRD, SEM, and zeta potential methods. Overall, the integration of biochar, nanotechnology, and other innovative materials offers a promising approach to addressing water pollution challenges, providing sustainable solutions for environmental remediation and ensuring the safety and well-being of communities worldwide.

Keywords: Biochar, Zinc Activation, Water Pollution, Green Technology.

AFTEFS/GCH/2024/308

Basic study on the properties of bioplastic film prepared using PLA and wheat gluten

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Bioplastics, derived from agricultural resources, could offer eco-friendly, low-impact alternatives to plastics. However, their development is still in its early stages, contributing only 5,000 tonnes to the EU's plastic market. Bioplastics are primarily used in food packaging, transport packaging, service packaging, biowaste bags, and compostable articles in agriculture and horticulture. Edible protein-based films, obtained through thermoplastic processes, can fulfill consumer demand for convenient and environmentally friendly food packaging systems. Wheat gluten, a vegetable protein obtained from food industry by-products. Wheat gluten, a by-product of the food industry, is a promising material due to its abundance, low cost, and suitable properties. . It shows high degradation rates and can be manufactured with additives like plasticizers through casting or thermomechanical methods like compression molding, extrusion, and injection-moulding, producing various shapes in various products. It can be processed using thermoplastic methods and plasticizers to create various shapes, potentially replacing petroleum-based plastics for specific applications. . The flexible and biodegradable PLA bioplastic can be obtained from various fermented plant sugars. In this work PLA was produced by direct condensation polymerization of lactic acid. Lactic acid production was first optimized at different concentrations of the substrate. PLA was characterized for its properties. Wheat gluten was extracted from the wheat flour. Bioplastic film was prepared using different ratios of the PLA/Wheat gluten along with glycerol as plasticizer. Prepared films were then characterized. Utilizing bio-based precursors improves the biodegradability of the finished products while also reducing the carbon impact.

Keywords: Bioplastic, PLA, Wheatgluten, Biodegradability, Plasticizers

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Natural Resources Management for Climate-Resilient Agri food System

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Almost 10 decades back in Jharkhand the livelihood was traditional subsistent farming based and highly relying on natural resources and commons. Farmer's were very happy to grow some paddy, millets and small quantity of vegetables while mixing a lot of food from forests and other natural resources making a great combination for their happy life. With passing of time there has been stress on natural resources due to different modern technological development and unconventional practices and these practices ultimately resulted into climate change and for now its outcome and impact is visible in terms of longer dry spells, increase in drought years (in last decade it was 4 drought years), shift in crop calendar (almost for 1 months), topography gets disturbed (resulting in high surface runoff and loss of top surface soil with massive loss of vegetation) also the drastic change in climate has negatively impacted the food production system and sustainability equilibrium. For the time being the farmers of Jharkhand started to following the modern agriculture practices where they failed to use standard recommendation of ICAR only because the lack of resources (either due to monetary value or the natural resources are not much more conditioning to the situations) , so we (Abhivyakti Foundation) have decided to go on field with aim of connecting farmers with Sustainable agricultural practices and an approach where we are trying to improve the local food system using 3 methods which are as follows; 1.Conservation a. Ex-situ, b. In- situ (local drought tolerant crop varieties of short duration, regeneration of forests, preservation of commons, revival of water bodies), 2.Integration (A.Vertical Integration- multi layer integration model which is based on principle of a. Root lengths and depth i.e. shallow to deep rooted plants, b. Plant height, c. Canopy of trees and B. lateral Integration- interrelation of six subsystems i.e. a. Crop, b. Trees, c. Animals, d. Birds, e. Aqua, f. Bio-waste,) and 3.Diversification (Agri-silviculture, Horticulture, Animal Husbandry, Aviary, Poultry, Goatry, Lac Cultivation, Sericulture). As an Outcome we have identified 114 local seed varieties, aware local people to regenerate these varieties and make it possible to conserve 24 local seed varieties through local people involvement and also we have reduced input cost ratio of farmers by 20% in addition with crop diversity, diet diversity, improved water harvesting structures. Today, when our bio-diversity, soil health, and water resources are getting lost then Natural Resources Management is the need of the hour to balance all these.

Keywords: Natural Resource Management, Sustainable Food System, Sustainable Integrated Farming system, Food system, Climate Change.

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Streptomyces: An effective plant growth promotor and biocontrol agent under natural farming conditions

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The largest genus of Actinobacteria is *Streptomyces* and they are gram positive in nature. Due to its antimicrobial properties against phytopathogens and plant growth promoting properties for a variety of plant species, *Streptomyces* has attracted special interest as a promising PGPM in recent years. In our study, a total number of 56 *Streptomyces* isolates were obtained from wheat (*Triticum* sp.) rhizospheric soil samples collected from distinct sites of Haryana (29.0588° N latitude 76.0856° E longitude), India. The bacterial isolates were screened on the basis of their antifungal activity against *Fusarium oxysporum* & *Rhizoctonia solani*, and motility test. The PGP activities such as zinc, phosphorus and potassium solubilization, ammonia excretion, ACC deaminase, IAA and siderophore production were also tested. Eighteen Streptomyces isolates showed inhibitory zones against both *Fusarium oxysporum* and *Rhizoctonia solani*. Ten isolates were found non-motile and they exhibited many PGP attributes. The effect of chosen *Streptomyces* isolates was tested on germination of wheat seedlings. Various antifungal and plant growth promoting activities confirmed the beneficial role of *Streptomyces* in crop development directly or indirectly.

Keywords: *Streptomyces*, PGP activities, biocontrol agent, sustainability, seedlings

AFTEFS/GCH/2024/311

Conservation and Management of Fish Diversity in International Important Wetlands in Central India: Challenges and Solutions

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Wetlands, commonly known as the breeding grounds of biodiversity and integral components of our natural surroundings, distinguish themselves as highly productive ecosystems supporting a diverse array of plant and animal life. These crucial wetland environments act as essential sanctuaries, providing refuge not just for various aquatic species like fish, birds, turtles, and crocodiles but also for numerous rare and endangered species. As defined by Article 1.1 of the Ramsar Convention of 1971, wetlands encompass areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including marine areas with a depth at low tide not exceeding six meters. As of January 2024, India proudly hosts 75 Ramsar Sites, collectively covering a vast expanse of 1,326,677 hectares, acknowledged internationally as Wetlands of Importance. Despite this recognition, wetlands globally confront serious threats such as habitat destruction, pollution, over-exploitation, and the impacts of climate change. Failing to unite in concerted efforts to preserve and restore these invaluable ecosystems jeopardizes not only the essential services they offer but also the survival of the diverse species dependent on them. The effective conservation and management of wetlands demand a multifaceted approach that includes scientific research, robust policy development, active community engagement, and the adoption of sustainable practices. Only through the implementation of such comprehensive measures can we aspire to protect these precious habitats and the myriad of life forms they sustain.

Keywords: Wetlands, Climate change, Ramsar convention, conservation, solutions.

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Influence of Teacher Qualification on Social and Emotional Development of Preschool Children

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The study was examined in Dharwad taluk of Karnataka state during the year 2018-20 to study the effect of teacher qualification on social and emotional development of preschool children**.** A sample consists of 208 children, age between 3-6 years of children attending different ECCE centers in rural and urban areas of Dharwad taluk were selected. The study aimed to know the influence of teacher-qualification on social and emotional development of children. Transdisciplinary Play Based Assessment-2 tool was used to assess the social and emotional development of preschool children. General information questionnaire was used to collect the general information of the children, school and teacher. The qualitative approach involved naturalistic observation method to document, analyze and study the impact of play-based activities on social and emotional development. Naturalistic observation was made during children involved in free play through video recording which was complemented with participant observation which included by taking field notes. Results revealed that that the comparison of social and emotional development of children by teacher qualification in rural and urban areas. The difference value explained that children with teacher qualification B.Ed. had significantly higher scores than teacher qualification with D.Ed. and SSLC on social and emotional development in both rural and urban areas.

Key words: *social and emotional development, teacher qualification, preschool children*

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Phytohormone Jasmonic Acid Mediated Plant Responses to Abiotic Stresses

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It was projected that the world population will become around 8.5 billion by 2030 and 9.7 billion by 2050. To provide food security to the growing population, farmers have to increase crop productivity to a sustainable level. Climatic changes, limited and unfertilized croplands and many more factors prevent the plants to produce crops to their potential. Various biotic (fungi, bacteria and herbivores) and abiotic stresses (drought, cold, light, temperature, salinity) faced by plants during their growth and development account for a considerable economical loss to the farmers. Plant growth regulators are naturally occurring, non-toxic compounds, that play a key role in dealing with the abiotic and biotic stresses in plants. Jasmonic acid and its derivatives are known as Jasmonates, are derivatives of fatty acid, synthesis in the chloroplast, peroxisome and mitochondria. Jasmonates regulate various physiological and biological processes in plants including various types of abiotic stresses such as heat, cold, drought, salinity and heavy metals etc through different regulatory and signalling pathways. Thus, Jasmonic acids and its derivatives considered to be a significant player in fight against abiotic stresses in plants.

Key words: *Jasmonic acid, abiotic stress, Drought, Plant resistance, Signalling pathways.*

AFTEFS/GCH/2024/314

Drone and Remote Sensing Technologies for Disease Detection in Fruit Orchards

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Recent advances in drone-based remote sensing have transformed disease monitoring in fruit orchards by enabling early, non-destructive, and large-scale detection of plant stress. Unmanned aerial vehicles (UAVs) equipped with multispectral, hyperspectral, and thermal sensors can identify disease-induced physiological changes 10–20 days before visible symptoms appear, substantially reducing crop losses. Multispectral indices such as NDVI, GNDVI, and NDRE have shown 70–88% accuracy in detecting early-stage infections of citrus greening, powdery mildew, anthracnose, and leaf spot in mango, grape, and apple orchards. Hyperspectral imaging offers even greater precision. Controlled trials reported in Precision Agriculture demonstrate that hyperspectral bands between 680–750 nm and 1,450–1,750 nm can distinguish healthy and diseased citrus leaves with 92–96% classification accuracy, even under variable light conditions. Thermal cameras mounted on drones have been used to detect canopy temperature abnormalities, with disease-stressed trees showing 1.8–3.2°C higher canopy temperatures, enabling rapid mapping of infection hotspots across orchards ranging from 1 to 25 hectares. Machine-learning algorithms further enhance disease identification. Random Forest, SVM, and deep-learning CNN models reported 85–94% model accuracy for grapevine downy mildew and apple scab detection. Integration of UAV-derived data with ground-based spectrometers has improved detection reliability by 12–18%, particularly in heterogeneous orchards. Drone surveillance also reduces scouting labour by 60–75%, while enabling weekly or even daily disease monitoring at relatively low cost. Despite its promise, adoption remains limited due to operational costs, battery limitations, data-processing complexity, and the need for skilled operators. Weather conditions, especially wind and cloud cover, can affect data quality. AI-driven flight planning, automated image stitching, low-cost sensor integration, and cloud-based disease dashboards—are rapidly improving accessibility for small and medium orchard growers. UAV-based remote sensing is emerging as a powerful tool for early disease detection, timely intervention, and improved fruit orchard health, ultimately contributing to reduced chemical usage and enhanced yield stability.

AFTEFS/GCH/2024/315

Microbiome-Assisted Breeding: A Sustainable Strategy for Climate-Resilient Vegetable Crop Improvement

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Microbiome-assisted breeding (MAB) is emerging as a promising and sustainable approach to enhance productivity, resilience, and nutritional quality in vegetable crops by harnessing beneficial plant-microbe interactions. Vegetable production systems are highly sensitive to abiotic stresses such as drought, salinity, heat, and nutrient limitations, as well as biotic pressures from soil-borne pathogens and pests. The plant microbiome, comprising diverse microbial communities associated with the rhizosphere, phyllosphere, and endosphere, plays a crucial role in enhancing nutrient uptake, modulating plant hormones, improving stress tolerance, and suppressing diseases. Recent advances in high-throughput sequencing, metagenomics, and microbiome phenotyping have enabled deeper insights into microbiome structure, function, and host specificity in vegetable crops. Microbiome-assisted breeding integrates these insights with host genetic selection to identify vegetable genotypes capable of recruiting and sustaining beneficial microbial consortia under diverse environments. This approach complements conventional and molecular reading strategies by improving resource-use efficiency, reducing dependence on chemical inputs, and enhancing yield stability. However, challenges such as environmental variability, genotype x microbiome interactions, and consistency of microbial performance under field conditions remain key research priorities. Addressing these constraints through integrated breeding, microbiology, and systems-level approaches will facilitate the practical deployment of MAB in vegetable breeding programs. Overall, microbiome-assisted breeding offers a holistic pathway toward developing climate-resilient, sustainable, and high-performing vegetable cultivars.

Keywords: *Microbiome-assisted breeding, vegetable crops, plant-microbe interactions, rhizosphere, microbiome, stress tolerance.*

AFTEFS/GCH/2024/316

Synthetic Biology Approaches for Next-Generation Cereal Crop Improvement

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Synthetic biology is rapidly emerging as a powerful tool in cereal crop improvement by enabling precise and efficient manipulation of genetic and metabolic pathways. Unlike conventional breeding approaches that rely on natural variation and long selection cycles, synthetic biology integrates genome engineering, systems biology, and computational design to develop targeted and predictable trait modifications. In major cereals such as rice, wheat, maize, and barley, these approaches offer new opportunities to enhance yield, nutritional quality, and resilience to biotic and abiotic stresses. Recent advances in genome editing technologies, particularly CRISPR-based systems, have facilitated accurate modification of genes controlling plant architecture, grain quality, stress tolerance, and disease resistance in cereals. Synthetic promoters, regulatory elements, and engineering gene circuits further enable fine-tuned gene expression and improved trait stability across environments. These innovations significantly shorten breeding cycles while reducing unwanted genetic linkage effects. Synthetic biology also supports the development of climate-resilient cereal varieties capable of withstanding drought, heat, salinity, and nutrient stress challenges that are intensifying under changing climatic conditions. However, the successful deployment of synthetic biology in cereal breeding requires addressing key challenges related to regulatory policies, biosafety evaluation, and public acceptance. The integration of synthetic biology with conventional and molecular breeding strategies represents a promising pathway for developing high-yielding, stress-tolerant, and sustainable cereal crops to meet future global food security demands.

Keywords: *Synthetic biology, cereal crops, genome editing, CRISPR-Cas, stress tolerance, sustainable breeding*

AFTEFS/GCH/2024/317

Effect of Postharvest Treatments and Storage Conditions on Shelf Life and Quality of Ber (*Ziziphus mauritiana* L.) cv. Gola

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A study was conducted to evaluate the effects of selected postharvest treatments and storage conditions on the shelf life and quality of ber (*Ziziphus mauritiana* L.) cv. Gola. Freshly harvested fruits were treated with lemongrass oil (0.1%), sesame oil (2%), Aloe vera gel (100%), salicylic acid (1 mM), calcium chloride (2%), citric acid (0.5%), sodium nitroprusside (1 mM), along with an untreated control. Treated fruits were stored under ambient conditions (25 ± 2 °C) and refrigerated conditions (5 ± 2 °C; 80–85% relative humidity).

Physiological and biochemical parameters, including physiological loss in weight (PLW), decay incidence, firmness, colour, sensory acceptability, and selected biochemical attributes, were assessed at regular intervals during storage. All postharvest treatments significantly reduced deterioration compared to the control. Among the treatments, calcium chloride and salicylic acid were most effective in minimizing weight loss and decay incidence, whereas Aloe vera gel was superior in maintaining colour retention and overall sensory quality. Refrigerated storage further delayed physiological and biochemical changes, thereby enhancing fruit storability.

The findings demonstrate that the combined application of appropriate postharvest treatments and low-temperature storage effectively extends shelf life and preserves the marketable quality of ber fruits.

Keywords *Ber; postharvest treatments; Aloe vera gel; calcium chloride; fruit quality*

AFTEFS/GCH/2024/318

Effect of grafting time on graft success and growth in low chill peach cv Shan-i-Punjab in Haryana

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This investigation was carried out with the objectives to standardize the grafting time in low chill peach cv. Shan- e-Punjab under semi-arid irrigated ecosystem of Haryana at CCSHAU, Hisar during 2018-19. Experiment consists of two grafting time i.e. 2nd week of January (9th January) and 4th week of January (25th January). Results revealed that plants grafted on 9th January had significantly higher sprouting (60.95%) and graft success (68.02%) over those plants which were grafted on 25th January. However, all other growth parameters viz., plant height (149.51 cm), number of leaves (172.59), leaf area (35.56 cm^2), percent increase in scion (4.08%) and rootstock diameter (4.3%), fresh (259.89 g) and dry (175.04 g) weight of shoot, fresh (79.93 g) and dry (49.46 g) weight of root, relative water content (68.24%), leaf nitrogen (2.92%), leaf potassium content (2.08%) and total chlorophyll content (1.27 mg/g of fresh weight) were significantly increased when grafting was performed on 25th January over 9th January. 25th January also took significantly lower number of days for first (26.86) and complete (47.85) sprouting.

Keywords*: Graft success, Shan-i-punjab, rootstock, grafting time*

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Innovations in probiotics and microbial management in aquaculture

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Aquaculture, a key component in meeting the global seafood demand, faces critical challenges such as disease management, water quality control, and sustainability. Traditional methods often involve antibiotics and chemical treatments, leading to resistance, ecological imbalances, and health concerns. Recent innovations in probiotics and microbial management offer promising, sustainable alternatives. Probiotics provide health benefits; enhances aquatic health by improving growth rates, disease resistance, and water quality. These benefits are achieved through mechanisms such as competitive exclusion of pathogens, production of antimicrobial compounds, and modulation of gut microbiota. Microbial management strategies, including Biofloc Technology and Integrated Multi-Trophic Aquaculture (IMTA), focus on optimizing microbial communities to improve water quality and resource use. Despite their potential, challenges such as strain selection, environmental variability, and regulatory issues hinder widespread adoption. Addressing these challenges through continued research and development is crucial for advancing sustainable aquaculture practices. This chapter examines the latest advancements in probiotics and microbial management, highlighting their impact on industry practices and environmental sustainability while identifying the ongoing challenges and future research directions.

Keywords: *Probiotics, Biofloc Technology, IMTA*



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