

SCHOLICS

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3rd ABMC 2026

Agriculture and Business Management Congress

NATIONAL CONFERENCE

on “Multidisciplinary Innovations
and Strategic Management
for Sustainable Agriculture,”



18th September 2026

SCHOLICS-SOCIETY OF AGRICULTURE AND BUSINESS MANAGEMENT

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National Conference on “Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture

Organized by-



Scholics–Society of Agriculture and Business Management

Co-Organized by-



School of Agriculture, Smt. Manjira Devi University

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About the Conference

The 3rd ABMC 2026 is a National Conference on "Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture," scheduled to take place in a hybrid mode on September 18, 2026. Organized by Scholics—Society of Agriculture and Business Management in collaboration with the School of Agriculture at Smt. Manjira Devi University, this Agriculture and Business Management Congress aims to bring researchers and professionals together to explore sustainable farming practices and strategic management.



About SMDU

Smt. Manjira Devi University (SMDU) is a state private university located in Uttarkashi, Uttarakhand. Established to provide accessible higher education, the institution offers a diverse range of undergraduate, postgraduate, diploma, and doctoral programs across multiple disciplines—including engineering, agriculture, management, science, law, nursing, and yoga sciences. Focused on holistic development, experiential learning, and modern infrastructure, the university aims to equip students with quality career-oriented skills and research-driven knowledge.



About SCHOLICS

Scholics is a ISO 9001:2001 certified organization registered under the Indian Trust Act 1882 and the Ministry of MSME, Govt of India, is based in Uttarakhand and dedicated to promoting rural development, entrepreneurship, education, and environmental conservation. Through our two wings—Scholics Academy of Rural and Entrepreneurship Development and Scholics- Society of Agriculture and Business Management, we offer short-term training programs, seminars, symposiums, conferences and workshops in agriculture, management, marketing, and data analytics. We also publish an e-magazine, "The AgBiz Today", designed to connect and inspire the agriculture and business management community.



About The AgBiz Today

THE AGBIZ TODAY is a quarterly, open-access digital publication dedicated to advancing the fields of agriculture and business management. It connects professionals, scholars, and enthusiasts with research, insights, and innovations at the intersection of agriculture and business, with a special emphasis on agribusiness and sustainable practices.

Our mission is to bridge academic research and practical application through high-quality, accessible content. Our vision is to become a leading digital resource for professionals and scholars in agriculture and business management.



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Date 15/09/2026

Message

It gives me immense pleasure to extend my warm greetings and best wishes on the occasion of ABMC 2026, the One-Day National Conference on "Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture," organized by SCHOLICS – Society of Agriculture and Business Management, in collaboration with Smt. Manjira Devi University.

The theme of the conference is highly relevant in the present context, where sustainable agriculture, technological innovation, entrepreneurship, and effective management are essential for strengthening rural livelihoods and agricultural development.

As the collaborating institution, Smt. Manjira Devi University is pleased to support this academic initiative, which provides a valuable platform for academicians, researchers, students, and professionals to exchange knowledge, research findings, and innovative ideas.

I congratulate the organizers for this commendable initiative and extend my best wishes to all participants for fruitful deliberations and a successful conference.

With best wishes for the grand success of ABMC 2026.

Vice – Chancellor
Smt. Manjira Devi University



Rajkiya Snatkottar Mahavidyalaya Maldevta (Raipur), Dehradun, Uttarakhand

Affiliated to Sri Dev Suman Uttarakhand University, Badshahithaul, Tehri (Garhwal), Uttarakhand

Prof. (Dr.) Madhu Thapliyal
Head, Dept. of Zoology
Govt Degree College Maldevta, Uttarakhand

Date- 16-9-2026

Message

It gives me immense pleasure to be associated with ABMC 2026, a One-Day National Conference on “Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture,” organized by SCHOLICS – Society of Agriculture and Business Management.

I sincerely appreciate the initiative taken by SCHOLICS to provide a meaningful platform for academicians, researchers, students, and professionals to share their knowledge, research findings, and innovative ideas. Such academic gatherings play a significant role in fostering multidisciplinary collaboration and addressing emerging challenges in agriculture and rural development. Sustainable agriculture, rural entrepreneurship, and women’s empowerment are essential for building an inclusive and prosperous society. I firmly believe that the integration of agricultural innovations with strategic management practices can create new opportunities for farmers, rural entrepreneurs, and young innovators. I am confident that the conference will encourage meaningful discussions, knowledge exchange, and collaborative efforts towards strengthening agricultural sustainability and rural prosperity.

I extend my heartfelt congratulations to the organizing committee for this commendable initiative and convey my best wishes to all the participants for a successful and intellectually enriching conference.

With best wishes for the grand success of ABMC 2026.

(Prof. (Dr.) Madhu Thapliyal)

Dr. D.K Tiwari
Chief Horticulture Officer
Dehradun, Uttarakhand

Date- 16-09-2026

Message

It is a privilege and pleasure to be associated with ABMC 2026, the One-Day National Conference on “Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture,” organized by SCHOLICS – Society of Agriculture and Business Management, in collaboration with Smt. Manjira Devi University.

The conference provides an important platform for academicians, researchers, students, and professionals to share their knowledge, research findings, and innovative ideas in the field of agriculture and business management. In the present era, multidisciplinary approaches, technological innovation, entrepreneurship, and effective management practices are essential for achieving sustainable agricultural and rural development.

I appreciate the efforts of the organizers in bringing together diverse perspectives and creating opportunities for meaningful academic interaction and collaboration. I am confident that the deliberations of the conference will generate valuable insights and contribute towards addressing emerging challenges in agriculture and rural communities.

I extend my sincere congratulations to the organizing committee and my best wishes to all the participants for a successful, enriching, and intellectually stimulating conference.

With best wishes for the success of ABMC 2026.

(Dr. D.K Tiwari)

Prof. (Dr.) Anoop Badoni
(Ph.D., FAPSR, FIBTCA, FSABM)
Director

Message

It gives me immense pleasure to extend my warm greetings and best wishes on the occasion of the **3rd Agriculture and Business Management Congress (ABMC) – 2026**, a One-Day National Conference on “**Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture**,” being organized by **SCHOLICS – Society of Agriculture and Business Management**, in collaboration with **Smt. Manjira Devi University, Uttarkashi**, on **18 September 2026 at PLANTICA-IARD, Dehradun**.

Agriculture today stands at a crucial juncture, confronted with challenges arising from climate change, resource limitations, changing consumer demands, technological transformation, food and nutritional security, and the need for economically viable and environmentally sustainable farming systems. Addressing these complex challenges requires an integrated approach that brings together agricultural sciences, biotechnology, artificial intelligence, entrepreneurship, business management, environmental sciences, social sciences, and emerging technologies.

The theme of this conference, “**Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture**,” is therefore both timely and significant. It provides an important platform for researchers, academicians, students, industry professionals, entrepreneurs, policymakers, and other stakeholders to exchange knowledge, share innovative ideas, deliberate upon emerging opportunities, and explore practical strategies for strengthening the agricultural sector.

I appreciate the efforts of **SCHOLICS – Society of Agriculture and Business Management, Smt. Manjira Devi University**, and all the organizing members for bringing together this important academic platform. I also acknowledge the valuable contributions of the invited experts, keynote speakers, delegates, researchers, students, and participating institutions whose collective efforts will enrich the scientific discourse.

I am confident that the deliberations of the **3rd ABMC 2026** will generate meaningful academic exchange, encourage innovation and entrepreneurship, and contribute towards developing resilient, sustainable, technology-driven, and economically viable agricultural systems.

I extend my sincere best wishes for the grand success of the conference and hope that it will pave the way for new collaborations, research initiatives, and actionable solutions for a sustainable future in agriculture.

With my best wishes for a successful and intellectually enriching conference.



Prof. (Dr.) Anoop Badoni



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Mr. Himanshu Malhotra

President, SCHOLICS (Society of Agriculture
and Business Management)

Dehradun

Date- 16-9-2026

Message

It gives me immense pleasure to extend my warm greetings and best wishes on the occasion of ABMC 2026, the One-Day National Conference on “Multidisciplinary Innovations and Strategic Management for Sustainable Agriculture,” organized by SCHOLICS – Society of Agriculture and Business Management, in collaboration with Smt. Manjira Devi University. The conference provides a valuable platform for academicians, researchers, students, and professionals to exchange innovative ideas, share research findings, and explore multidisciplinary approaches to sustainable agriculture and rural development. I firmly believe that such academic initiatives play a significant role in promoting innovation, entrepreneurship, and collaboration among various stakeholders. I am confident that the conference will encourage meaningful discussions and contribute to the advancement of agricultural knowledge and sustainable practices. I would like to thank Smt. Manjira Devi University for graciously collaborating with us and hosting this important conference. I also extend my sincere appreciation to our venue partner, Plantica–Indian Academy of Rural Development (IARD), Dehradun, for their continued support and partnership in making ABMC 2026 possible.

I sincerely appreciate the efforts of the organizing committee and extend my heartfelt wishes to all the participants for fruitful deliberations and the successful conduct of ABMC 2026.

(Mr. Himanshu Malhotra)



Dehradun, Uttarakhand



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CONTENT	Page. No.
Keynote Address	I to VII
Abstract Index	VIII to XIV
Abstracts	1 to 76

KEYNOTE -1

Driving Agripreneurial Growth in Secondary Agriculture through Strategic Value Chain Management

Dr.Swati Sharma

Professor (Agribusiness Management) and Head
Department of Agribusiness Economics and Finance
ASPEE Agribusiness Management Institute
Navsari Agricultural University, Gujarat

Abstract

Secondary agriculture offers considerable scope for increasing the value of agricultural production by moving beyond the sale of raw commodities towards processing, value addition, product diversification and enterprise development. It includes activities such as post-harvest handling, processing, packaging, branding and utilization of agricultural residues and by-products. These activities not only increase the value of farm produce but also create opportunities for employment, rural entrepreneurship and income diversification. However, much of this potential remains untapped because agricultural value chains are often fragmented and characterized by inadequate storage and processing facilities, post-harvest losses, limited access to suitable technologies, quality-related issues, weak market connections and poor coordination among different stakeholders. A more coordinated approach to value chain management is therefore needed to move from conventional commodity-based production towards market-oriented and value-driven agricultural enterprises. Strategic value chain management can help in identifying market opportunities, improving coordination among stakeholders, reducing inefficiencies and ensuring better returns from agricultural resources. In this context, agripreneurship, value addition, processing technologies, digital tools, market intelligence and innovation have an important role in creating new business opportunities within secondary agriculture. In this regard, greater attention is required to develop differentiated and market-oriented products from agricultural commodities and agro-processing outputs. Appropriate processing, product development, packaging, quality assurance, branding and market positioning can help enterprises move into higher-value market segments. At the same time, agricultural residues, processing by-products and other biomass resources should be viewed not simply as waste but as potential raw materials for new products and enterprises. Such waste-to-value approaches can improve resource efficiency and support circular production systems, with opportunities emerging in areas such as functional foods, nutraceuticals, natural products, bio-based materials and specialty ingredients. The participation of Farmer Producer Organizations (FPOs), start-ups, cooperatives, processors, agripreneurs and other institutional

partners is important for strengthening these value chains. Collective aggregation and marketing can improve economies of scale and bargaining power, while stronger connections with processors, retailers and consumers can improve market access. Digital marketplaces, traceability systems, supply-chain information platforms and data-based decision-making are also creating new possibilities for improving transparency, quality management, logistics and market responsiveness. For secondary agriculture to develop as a viable entrepreneurial sector, attention is also needed towards finance, infrastructure, skills, quality standards, risk management and institutional support. A well-coordinated value chain can help rural entrepreneurs recognize emerging market opportunities, develop suitable business models and manage production and market risks more effectively. Thus, linking agripreneurship with strategic value chain management, innovation and efficient resource utilization can strengthen farm-to-market linkages, improve farmer returns, generate rural employment and promote diversified enterprises. This approach can contribute significantly to the development of a more competitive, inclusive and sustainable secondary agriculture sector in India.

Keywords: *Secondary agriculture, Agripreneurship, Value chain management, FPOs, Market integration*

KEYNOTE -2

Climate Change and Its Impact on Cotton Production

Dr.K. Sankaranarayanan

Principal Scientist,
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Abstract

Cotton is a major raw material for the textile and apparel industry, contributing about 2.3% to India's GDP and 13% to industrial production. Cotton lint productivity has remained around 430 kg/ha, with total production of approximately 290 lakh bales from 11.45 million ha. Productivity has shown a stagnating or declining trend over the past fifteen years, with climate change being one of the contributing factors. Cotton sequesters approximately 2.2 kg of CO₂ in producing one kilogram of fibre but emits about 1.7 kg of CO₂. Increased temperature can shorten crop duration, alter pest populations, accelerate soil mineralization, and increase evapotranspiration. Cotton biomass may decrease substantially under temperature stress compared with the optimum of 30/20°C. In contrast, elevated atmospheric CO₂ enhances photosynthesis, biomass production, input-use efficiency and crop yield. Studies have reported that seed cotton yield may increase by up to 43% at 550 ppm CO₂. However, changing climatic conditions may increase sucking-pest infestation and weed dominance. At the national level, increasing CO₂ may potentially enhance cotton production, whereas higher temperatures, declining and erratic rainfall, particularly in the central and southern zones, may increase wet and dry spells and evapotranspiration demand. Prolonged dry spells during critical crop-growth stages can adversely affect yield. Excessive nitrogen fertilizer use also contributes to nitrous oxide emissions. Climate-change mitigation should therefore emphasize integrated nutrient management, N-fixing microorganisms, legume-based crop rotation, slow-release nitrogen fertilizers, drip fertigation, and incorporation of cotton stalks to reduce fertilizer requirements. Climate resilience can be enhanced through location-specific intercropping and multi-tier cropping systems, along with in-situ soil-moisture conservation practices such as contour bunding, ridges and furrows, opening furrows after every cotton row, black polyethylene mulch, and crop-residue application. Selection of climate-adapted cultivars, including *G. arboreum* for drought-prone areas and *G. herbaceum* for saline environments, is also important for sustaining cotton production under future climates.

Key words: *elevated CO₂, sucking pests, higher temperatures, prolonged dry spells, erratic rainfall, intercropping*

KEYNOTE -3

Documentation and Assessment of Nutraceutical Potential of Climate Resilient Food Grain Crops from Himachal Pradesh

Dr. Nitesh Kumar

Department of Biosciences, Himachal Pradesh University, Shimla-171005

Abstract

Himachal Pradesh has diverse agro-climatic conditions ranging from subtropical valleys to high-altitude temperate and cold desert regions. The state harbours a rich diversity of traditional food grain crops that are well adapted to climatic variability, marginal agricultural conditions, and low-input farming systems. These indigenous crops represent an important component of local food and nutritional security and possess considerable potential as sources of nutraceuticals and health-promoting bioactive compounds. However, their diversity, traditional uses, nutritional properties, and nutraceutical potential remain inadequately documented and underutilized. The proposed study aims to systematically document, characterize, and assess the nutraceutical potential of climate-resilient food grain crops traditionally cultivated and consumed in different agro-climatic zones of Himachal Pradesh. The study will focus on locally important and climate-resilient cereal and pseudo-cereal crops, including finger millet (*Eleusine coracana*) (Mandua/Koda), barnyard millet (*Echinochloa frumentacea*) (Sanwa/Jhangora), foxtail millet (*Setaria italica*) (Kangni), proso millet (*Panicum miliaceum*) (Cheena), little millet (*Panicum sumatrense*) (Kutki), kodo millet (*Paspalum scrobiculatum*) (Kodo), buckwheat (*Fagopyrum esculentum*) (Kuttu/Phaphra), and amaranth (*Amaranthus hypochondriacus* and *Amaranthus cruentus*) (Chaulai/Ramdana). Traditional grain crops such as hulled barley (*Hordeum vulgare*) (Jau) and locally cultivated landraces of wheat (*Triticum aestivum*) (Gehu) may also be documented where they demonstrate adaptation to stress-prone environments and traditional food significance. Crop diversity, distribution, cultivation practices, local names, traditional food preparations, harvesting practices, and ethnobotanical knowledge associated with these crops will be recorded through field surveys, farmer interviews, and interaction with local communities. The nutraceutical potential of these crops is reflected in their diverse nutritional and functional constituents, including carbohydrates, proteins, dietary fibre, lipids, minerals, vitamins, phenolics, flavonoids, tannins, and other phytochemicals. Available studies report several health-promoting properties associated with these grains, including antioxidant, anti-inflammatory, antimicrobial, antidiabetic, antihypertensive, and enzyme-inhibitory activities. Bioactive constituents such as phenolic acids, flavonoids, tannins, and other secondary metabolites further contribute to their functional food and nutraceutical significance. Traditional processing practices, including germination, fermentation, roasting, and cooking, are also known to influence the nutritional quality, bioavailability, and functional properties of these grains.

Documentation of such nutritional attributes, bioactive compounds, biological activities, and traditional processing practices provides an integrated basis for assessing the nutraceutical potential of climate-resilient food grain crops of Himachal Pradesh. The proposed documentation will provide a comprehensive scientific record of underutilized climate-resilient food grains of Himachal Pradesh and their associated traditional knowledge. Identification of nutritionally superior crops and bioactive-rich landraces could support their wider utilization as functional foods and nutraceutical ingredients. The study is expected to contribute towards the conservation of traditional crop diversity, strengthening of climate-resilient agriculture, improvement of dietary diversity and nutritional security, and development of value-added food products based on indigenous Himalayan resources. By integrating traditional knowledge with modern nutritional and phytochemical assessment, the research will establish a scientific basis for promoting neglected and underutilized food grains as sustainable, health-promoting crops under changing climatic conditions.

Keywords: *Climate resilient, Food grain, Functional food, Local crops, Nutraceutical*

KEYNOTE -4

Integrating Agro-Biodiversity, Climate Resilience and Nature-Based Solutions for Sustainable Agriculture: A Himalayan Perspective

Dr. Sarvesh Suyal

Department of Botany, DBS (PG) College Dehradun, Uttarakhand

Abstract

Agriculture is increasingly challenged by climate variability, rising temperatures, erratic precipitation, land degradation, biodiversity loss, water scarcity and growing demand for food and livelihoods. These pressures demonstrate that agricultural sustainability cannot be achieved through production maximization alone. A resilient agricultural system must integrate ecological stability, resource-use efficiency, economic viability and social inclusion. Agro-biodiversity, climate-resilient practices and nature-based solutions provide complementary pathways for achieving this transition. Agro-biodiversity includes the genetic, species and ecosystem diversity associated with cultivated and managed landscapes. It supports essential ecosystem services such as pollination, biological pest regulation, nutrient cycling, soil formation, water regulation and the provision of genetic resources for crop improvement. The conservation and sustainable utilization of traditional crop varieties, wild relatives of cultivated plants, indigenous livestock breeds and beneficial organisms can strengthen adaptive capacity and reduce vulnerability to environmental and market shocks. Diversified farming systems, agroforestry, integrated crop-livestock systems and biodiversity-friendly habitats can further improve productivity, soil health, ecological functioning and livelihood security. The Himalayan region offers an important perspective for understanding these relationships. Forests, agricultural fields, rangelands, wetlands and village ecosystems are interconnected through water flows, nutrient cycling, biodiversity and human dependence on natural resources. In Uttarakhand, the substantial extent of forest and tree cover highlights the importance of forest-farm linkages for watershed protection, soil conservation, climate regulation and rural sustainability. Traditional agroforestry systems and indigenous ecological knowledge provide valuable foundations for locally appropriate strategies, particularly in mountain landscapes exposed to climate-related hazards, soil erosion, water stress and rural outmigration. Nature-based solutions including agroforestry, soil and water conservation, restoration of degraded slopes and riparian zones, biodiversity-friendly farming, ecosystem-based adaptation and landscape restoration can generate multiple benefits. These include carbon sequestration, improved soil structure, enhanced water retention, habitat connectivity, diversified farm products and reduced livelihood risks. Nevertheless, successful implementation requires scientific assessment, participatory planning, institutional coordination, suitable technologies, equitable benefit sharing, market access and long-term monitoring. The central proposition is that resilience is not a single technology or isolated intervention, but a diversified landscape strategy. Integrating agro-biodiversity, climate resilience

and nature-based solutions can help transform agricultural systems into productive, adaptive, ecologically sustainable and socially inclusive landscapes, with particular relevance to the Himalayan region and other climate-sensitive mountain environments.

Keywords: *Agro-biodiversity; Climate resilience; Nature-based solutions; Himalayan agriculture; Agroforestry*

Abstract Index

S.N.	Authors	Affiliation	Title	Page No.
001	Abstract ID- 3001 Amitabha Bandyopadhyay	Govind Ballabh Pant University of Agriculture and Technology, Pantnagar	Financial Inclusion and Sustainable Rural Women Entrepreneurship in West Bengal: A Systematic Review of Self-Help Groups	1
002	Abstract ID- 3002 Shouvik kar ^{1*}	¹ Department of Agricultural Economics, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal-736165	Growing Green, Going Global: The Export Potential of India's Cole Crops	2
003	Abstract ID- 3003 Dr. Soniya Singh ¹ , Dr. Deepika Chauhan ¹ Dr. Mohd. Irfan ²	¹ Associate Professor, Phonics University, Roorkee ² Assistant Professor, Chaman Lal Degree College, Landhoura, Roorkee	Integration of Crop Improvement and Precision Agriculture for Climate-Smart Crop Production	3
004	Abstract ID- 3004 Yusuf Tijjani Ali ¹ , Shyam Datta Waghmare ¹ , Surender Singh Siwach ¹ , Yahaya Shanono Tukur ¹ , Abdulrauf Hamisu Mohd ¹ , Mudassir Ubale Saad ¹ , Sani Umar Muhammad ¹ , Sadiq Musa Bello ¹ , and Abdullahi Shehu ¹	^{*1} Sharda School of Smart Agriculture, Sharda University Agra, Agra, Uttar Pradesh 282007, India.	A Bibliometric Analysis of Artificial Intelligence in Agricultural Marketing	4
005	Abstract ID- 3005 Amardev Singh and S. Manthira Moorthy	Scientist-C & Incharge, Silkworm Seed Production Centre, NSSO, Central Silk Board, Udhampur, Ministry of Textiles, GOI, India. Director, CSB-NSSO, Central Silk Board, Bangalore, Ministry of Textiles, GOI, India.	Impact of different rearing house structures on seed cocoon productivity among Adopted Seed Rearers	5
006	Abstract ID- 3006 Siddharth	Department of Agronomy, Maharishi Markandeshwar (Deemed to be) University, Mullana, Ambala Haryana, India	Effect of Planting Geometry on Growth and Yield of Green Gram (<i>Vigna radiata</i> L.): A Review	6
007	Abstract ID- 3007 Abdulrauf Mohd Hamisu ¹ , Shyam Datta Waghmare ¹ , Ado Muhammad ² , Kabiru Hamisu ² , Abduljabbar Muhammad Ahmad ¹ , Shuaibu Yusuf Salihu ¹ , Yusuf Tijjani Ali ¹ , Aminu Said Rufai ¹	^{*1} Sharda School of Smart Agriculture, Sharda University, Agra, Uttar Pradesh (282 007), India ² Department of Crop Science, Kano University of Science and Technology, Wudil, Kano State (700001), Nigeria	The Green Gram (<i>Vigna radiata</i> L.) for Sustainable Agriculture and Conservation Contributions to Soil Health, Nutrient Management and Resource Use Efficiency: A Review	7
008	Abstract ID- 3008 Garima ^{1*} , Sanjeev Kumar ¹ , Ayush Vashist ²	¹ Department of Basic Sciences, COF, Dr. YSP University of Horticulture and Forestry Nauni Solan, Himachal Pradesh, India ² Department Soil Science and Water Management, COH & F, Neri, Dr. YSP University of Horticulture and Forestry Nauni Solan, Himachal Pradesh, India	Biochemical Profiling and Hormonal Dynamics Driving Stress Resilience in Mid-Hill Apple Cultivars of Himachal Pradesh, India	8

009	Abstract ID- 3009 <i>Simran^{1*}, Sanjeev Kumar¹</i>	¹ Department of Basic Sciences, COF, Dr. YSP University of Horticulture and Forestry Naini Solan, Himachal Pradesh, India	Integrated assessment of Physiological, Biochemical and Soil health responses of <i>Capsicum annuum</i> L. grown under natural farming practices	9
010	Abstract ID- 3010 <i>Dr. Sugunthakunthalambigai^{1*}, P. Vinodhini¹</i>	¹ Assistant Professor of Mathematics, Agricultural Engineering College and Research Institute, Tamil Nadu Agricultural University, Kumulur	Integrating AI-Assisted Data Preprocessing and the Paired t-Test for Statistical Assessment of Grain Distribution in Paddy Panicles	10
011	Abstract ID- 3011 <i>Mahima</i>	B.Sc. (Hons.) Agriculture, 7th Semester Uttaranchal College of Science and Technology (UCST), Dehradun	Role of organic matter in maintaining soil health	11
012	Abstract ID- 3012 <i>Dr. Sarita Bansal</i>	Assistant Prof. Deptt. of Public Administration, Dr. Y.S. Parmar Govt. PG. College, Nahan, Sirmour, H.P	Strengthening Capacity Building and Education for Sustainable Agriculture in India	12
013	Abstract ID- 3013 <i>Aditi Suman¹ and Neelam Kaushik^{1*}</i>	¹ Department of Biotechnology, Himachal Pradesh University, Summerhill, Shimla	From Roots to Resilience: Exploring Plant-Microbe Interactions for Sustainable Agriculture	13
014	Abstract ID- 3014 ¹ Vasudev Dhakad	B.Sc. (Hons.) Agriculture, 7th Semester Uttaranchal College of Science and Technology (UCST), Dehradun	Role of Artificial Intelligence in Precision Agriculture	14
015	Abstract ID- 3015 <i>* Musa Muhammad Yusuf¹, Nitesh Samadhiya¹, Surrender Singh Siwach¹, Mudassir Ubale Saad¹, Sani Umar Muhammad¹, Shuaibu Yusuf Salihu¹, Abdussamad Saleh Saad¹</i>	[*] Sharda School of Smart Agriculture, Sharda University Agra, Agra, Uttar Pradesh, India.	Integrating Precision Nutrient Management and Biostimulants for Crop Improvement and Soil Health: A Review	15
016	Abstract ID- 3016 <i>Sumaiya</i>	M.Sc. Geography, 3rd Semester College of Science, Technology & Agriculture, University of Calcutta, Kolkata	Soil Health and Nutrient Management for Sustainable Agriculture	16
017	Abstract ID- 3017 <i>Shivansh Tiwari</i>	Uttaranchal College of Science and Technology	Integrated Nutrient Management (INM)	17
018	Abstract ID- 3018 <i>Rajveer Pandey</i>	Noida International University	Food Science, Nutrition and Food Security	18
019	Abstract ID- 3019 <i>Anshika Aggarwal</i>	Noida International University	Transforming Rural Economies: Leveraging Farmer Producer Organizations (FPOs) for Youth and Female Entrepreneurship	19
020	Abstract ID- 3020 ¹ Kunal Shakya, ² Anoop Badoni and ³ Vandana Petwal	^{1, 3} PLANTICA- Indian Academy Rural Development, Dehradun Uttarakhand	Plant Molecular Biology and Genomics in Crop Improvement	20
021	Abstract ID- 3021 <i>Imra Mumtaz*, Ashhad Parvez, Altaf Ahmad</i>	Department of Botany, Aligarh Muslim University, Aligarh, UP, India	Development and characterization of FRET-based genetically encoded nanosensor for real-time monitoring of Pyrroloquinoline Quinone (PQQ) in living cells	21

022	Abstract ID- 3022 Princy Raj	Noida International University, Greater Noida	Extraction and Stabilization of Lutein Pigments from Waste Marigold Flowers for Industrial Food Colorants.	22
023	Abstract ID- 3023 Divyansh	NIFTEM, Kundali	Biochar Potential of invasive weed Lantana Camara L.	23
024	Abstract ID- 3024 S. Reddy Veera Nagaveni ¹ , P. Syam Sundar Reddy ² , Syed Sadarunnisa ³ , Y. Deepthi Kiran ⁴ , Karakambadi Vaishnavi ⁵	¹ Ph.D. Scholar, Department of Vegetable Science, JNKVV, Jabalpur, Madhya Pradesh ² Principal Scientist and Head, Citrus Research Station, Petlur, Andhra Pradesh ³ Professor and Head, Department of Vegetable Science, Dr. Y.S.R. Horticultural University, College of Horticulture, Anantharajupeta, Andhra Pradesh ⁴ Assistant Professor, Department of Agronomy, Dr. Y.S.R. Horticultural University, College of Horticulture, Anantharajupeta, Andhra Pradesh ⁵ Ph.D. Scholar, Department of Vegetable Science, Dr. Y.S.R. Horticultural University, College of Horticulture, Anantharajupeta, Andhra Pradesh	Effect of NaCl-Induced Salinity Stress on Yield Performance of Okra (<i>Abelmoschus esculentus</i> L. Moench) Cultivars	24
025	Abstract ID- 3025 Rakesh Kumar, Pooja Bartwal and Swatantra Pratap Singh	Assistant Professor School of Agricultural Studies, Quantum University Roorkee, Uttarakhand	Optimization of Yellow Sticky Trap Height for Monitoring of Okra Insect Pests under Field Conditions in Mandawar region Haridwar, Uttarakhand	25
026	Abstract ID- 3026 Ashhad Parvez* Imra Mumtaz, Altaf Ahmad	Department of Botany, Aligarh Muslim University, Aligarh, U.P., India	Atrazine Monitoring Using Nanosensors for Intelligent Herbicide Management in Agriculture	26
027	Abstract ID- 3027 Priyanshu Gupta ¹ and Sarvesh Suyal ²	Department of Botany, DBS (PG) College, Dehradun Uttarakhand	Bioclimatic Suitability, Spatial Occurrence Profiling and Multi-Variable Ecological Modeling of Ashwagandha (<i>Withania somnifera</i>) Across Indian Agro-Ecological Zones	27
028	Abstract ID- 3028 Rohit Sehrawat	B.Sc. Agriculture (Final Year), Geeta University, Panipat	Role of Artificial Intelligence in Agriculture	28
029	Abstract ID- 3029 Aryan	B.Sc.(H) Agriculture Geeta University, Panipat	Protected Cultivation: Opportunities for High-Value Vegetable Production	29
030	Abstract ID- 3030 Anil	Geeta University, Panipat	Organic farming for sustainable agriculture	30
031	Abstract ID- 3031 Kapil	Geeta University, Panipat	Biofertilizers and their Role in Agriculture	31
032	Abstract ID- 3032 Naseema Begum M	Stella Maris College, University of Madras	Financial Effectiveness and Future Expansion Potential of Paramparagat Krishi Vikas Yojana (PKVY) for Organic Farming: A National- Level Assessment	32
033	Abstract ID- 3033 Zeba Parveen* and Shamsul Hayat	Department of botany, Aligarh Muslim University, Aligarh	Quercetin-Mediated Modulation of Growth and Redox Homeostasis in <i>Solanum lycopersicum</i> L.	33
034	Abstract ID- 3034 Medha Deb	PLANTICA - Indian Academy of Rural Development(IARD)	Upcycling Food By-Products into Nutrient-Dense Foods: A Sustainable Strategy for Improving Nutrition and Food Security	34

035	Abstract ID- 3035 Mustapha Ibrahim Muhammad ^{1*} , Nitesh Samadhiya ¹ , Surender Singh Siwach ¹ , Mudassir Ubale Saad ¹ , Saifullahi Yahaya Adamu ¹ , Khalifa Adam ¹ , Abdulrauf Mohd Hamisu ¹ , Yusuf Tijjani Ali ¹	¹ Sharda School of Smart Agriculture, Sharda University, Agra, Agra, Uttar Pradesh	Nano Fertilizers as a Potential Alternative for Conventional Fertilizers in Modern Agriculture: Evidence, Opportunities, Challenges and Future Perspectives	35
036	Abstract ID- 3036 A. MALAISAMY, Ph.D.,	Professor and Head, Department of Agricultural Economics, Tamil Nadu Agricultural University, Agricultural College and Research Institute, Madurai	Impact of Farmer Producer Organizations (FPOs) on Livelihood of Farmers in Tamil Nadu	36
037	Abstract ID- 3037 Tarun Dhouchak	Geeta University, Panipat	Agroforestry and Its Benefits	37
038	Abstract ID- 3038 Minal Kalyan	School of Agriculture Studies, Geeta University, Haryana	Climate change and agriculture	38
039	Abstract ID- 3039 Anuj	Geeta University, Panipat	AgricultureApp for Smart Farming	39
040	Abstract ID- 3040 Garima Bora*, Mrinal Kumar Das	Ph.D. Scholar, Botany, Assam down Town University, Guwahati, Assam Professor, Botany, Assam down Town University, Guwahati, Assam	Roots of Resilience: Biodiversity Conservation and Sustainable Agroecosystems among Tribal Communities of Dimoria, Assam	40
041	Abstract ID- 3041 Naveen Chandra and Gaurav Aggarwal	Quantum School of Agricultural Studies, Quantum University Roorkee Uttarakhand.	The Role of Horticulture Therapy in Stress Management	41
042	Abstract ID- 3042 Suhani Tyagi	DIMR, Shyampur, Rishikesh	Environment and Sustainability in Agriculture: A Study on Ecological Balance and Modern Farming	42
043	Abstract ID- 3043 Abhijeet	Uttaranchal College of Science and Technology	Gender & Inclusivity in Agriculture	43
044	Abstract ID- 3044 Dr Sunita Saklani*	* Department of Zoology, Sidharth Govt. Utkrisht College, Nadaun, District Hamirpur, Himachal Pradesh, India	Honey Bees and Managed Pollination: Their role in Sustainable Agriculture	44
045	Abstract ID- 3045 Harjeet	Geeta University, Panipat	Nanotechnology in Agriculture	45
046	Abstract ID- 3046 Arti Sharma ^{1*}	¹ Assistant Professor, Department of Botany, Freedom Fighter Pandit Susheel Rattan Government Degree College Jawalamukhi, Himachal Pradesh, India	Sacred Groves as Living Models for Biodiversity Conservation: A Case Study of Kangra District, Himachal Pradesh	46
047	Abstract ID- 3047 Roshini Jaiswal	Symbiosis Institute of Operational Management, Nashik, Maharashtra	Greenwashing In Agri-Business Marketing: A Content Analysis of Sustainability Claims by Indian Agri-Startups	47

048	Abstract ID- 3048 Bhagwati Prashad Sharma	Department of Botany, Sidharth Government College Nadaun, Himachal Pradesh, India	Biodiversity Conservation: Significance of Biodiversity Act 2002	48
049	Abstract ID- 3049 Sana* and M. Naeem	Department of Botany, Aligarh Muslim University, Aligarh, UP, India	Dose Optimization of Foliar-Applied Methyl Jasmonate for Improving Growth, Photosynthetic Efficiency, and Secondary Metabolite Production in Fenugreek (<i>Trigonella foenum-graecum</i> L.)	49
050	Abstract ID- 3050 Minakshi Sharma	Associate Professor in Zoology, Govt Degree College Kandaghat Dist Solan (HP)	Pollinators, Predators and Soil Fauna: Conserving Animal Biodiversity for Resilient Agroecosystems	50
051	Abstract ID- 3051 Meenakshi Mangain ¹ and Neelam Kaushik ^{1*}	¹ Department of Biotechnology, Himachal Pradesh University, Summerhill, Shimla, India	MICROPROPAGATION: A BIOTECHNOLOGICAL TOOL FOR CONSERVATION OF MEDICINAL PLANTS FOR SUSTAINABLE AGRICULTURE	51
052	Abstract ID- 3052 Vineet Kumar	Assistant Professor & Head, Department of Zoology, Dr. Y.S. Parmar Govt. P.G. College Nahan, Distt. Sirmour (H.P.), India.	Zoonotic Malaria: The Role of Wildlife Hosts and Animal Reservoirs in Emerging Disease Transmission	52
053	Abstract ID- 3053 Farha Aijaz ¹ , Nazish Akhtar ¹ , Mo Shadab ¹ , Abdul Wahid ¹ , Mohammad Badruzzaman Siddiqui ¹	¹ Allelopathy and Plant Taxonomy Laboratory, Department of Botany, Aligarh Muslim University, Aligarh, U.P., India	Green-Synthesized Silver Nanoparticles from <i>Erigeron bonariensis</i> Exhibit Enhanced Bioherbicidal Activity Against <i>Amaranthus viridis</i> Retz. Compared with Leaf Aqueous Extract	53
054	Abstract ID- 3054 Dr. R. Jeya Chandra	Biology Trainer, Jaihind Bharat Academy (NEET Coaching), Tiruchendur, Tamil Nadu, India	Paddy Leaf Disease Detection and Classification Using Machine Learning and Deep Learning Techniques	54
055	Abstract ID- 3055 Suraj joshi and Anoop Badoni	PLANTICA-Indian Academy of Rural Development (IARD), Dehradun.	Integrated Pest and Disease Management under Changing Climate: A Multidisciplinary Strategy for Climate-Resilient and Sustainable Agriculture	55
056	Abstract ID- 3056 Swati Kaushal and Dr. Nitesh Kumar	Department of Biosciences, Himachal Pradesh University	Ethanomedicinal and Traditional Uses of Some Grasses Of Shivalik Range Of Himachal Pradesh	56
057	Abstract ID- 3057 Vishakha Rathour, Dr. Arti Sharma and Dr. Nitesh Kumar	Department of Biosciences Himachal Pradesh University	Morphological and Ethnobotanical Assessment of Some Foliose Lichens from Himachal Pradesh	57
058	Abstract ID- 3058 Ashish Negi	PhD scholar - School Of Agricultural Sciences And Technology RIMT University, Mandi Gobindgarh, Punjab.	Technological Innovations Driving the Transition from Conventional to Smart Agriculture	58
059	Abstract ID- 3059 Anil Kumar ¹ and A. K. Pant ²	¹ Ph.D. Scholar, Department of Soil Science, College of Agriculture, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India ² Professor, Department of Soil Science, College of Agriculture, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India	Comparative Assessment of Different Nutrient Management Practices on Crop Growth and Microbial Biomass in a Rice–Wheat Cropping System	59

060	Abstract ID- 3060 <i>Anjali Sharma and Anoop Badoni</i>	<i>Plantica – Indian Academy Of Rural Development (IARD), Dehradun</i>	Food Security and Hunger Alleviation Strategies: A Multidisciplinary Pathway towards Sustainable Agriculture	60
061	Abstract ID- 3061 <i>Payal Badola</i>	<i>Himalayan Institute of Technology</i>	Agriculture Advancement and Sustainable Production	61
062	Abstract ID- 3062 <i>Sakshi</i>	<i>Government Degree College, Rudraprayag Sri Dev Suman University</i>	Food Science ,Nutrition & Security	62
063	Abstract ID- 3063 <i>Venish Madhu</i>	<i>Quantum University, Roorkee</i>	Organic Farming And Their Roles In Sustainable Agriculture	63
064	Abstract ID- 3064 <i>Marshal Saren</i>	<i>Quantum University, Roorkee</i>	Food Security and Hunger Alleviation Strategies	64
065	Abstract ID- 3065 <i>Sarah Amongi</i>	<i>Graphic Era Hill University, Dehradun, India</i>	Development of a Biodegradable Nursery Pot Using Locally Available Organic Materials for Sustainable Agriculture	65
066	Abstract ID- 3066 <i>Ruchi Sangal ,Anjna Kumari,</i>	<i>Research Scholar (Ph.D.) Zoology Division,Career Point University ,Hamirpur(H.P) Assistant Professor,NSCBM Govt.PG College,Hamirpur(H.P)</i>	Eco-Engineers of the soils: Earthworms in Environmental pollution mitigation	66
067	Abstract ID- 3067 <i>Vishnu</i>	<i>Noida International University</i>	Digital Agriculture and Smart Farming: Advancing Sustainable Agricultural Production	67
068	Abstract ID- 3068 <i>Vandana Petwal</i>	<i>School of Agricultural Studies, RIMT University, Punjab</i>	Guryal (Bauhinia variegata L.): An Underutilized Himalayan Vegetable with Nutritional and Income Generation Potential in Tehri Garhwal, Uttarakhand	68
069	Abstract ID- 3069 <i>Sweta</i>	<i>Noida international university</i>	Food Science, Nutrition & Security	69
070	Abstract ID- 3070 <i>Aditya Prasad Kanswal</i>	<i>Himalayan Institute of Technology, Dehradun</i>	Environment And Sustainability In Agriculture	70
071	Abstract ID- 3071 ¹ Ashish Singh Negi , ² Anoop Badoni , and ³ Vandana Petwal	<i>PLANTICA – Indian Academy of Rural Development, Dehradun, Uttarakhand</i>	Artificial Intelligence in Indian Agriculture: A Strategic Pathway for Sustainable and Profitable Agribusiness	71
072	Abstract ID- 3072 <i>Rakshita Krishali</i>	<i>Himalaya Institute of Technology ,Dehradun</i>	Integrated Approaches to Food Safety, Nutrition and Sustainable Food Security	72
073	Abstract ID- 3073 <i>Gina Naiding, Vishal Ghorela</i>	<i>Ph.D. Research Scholars, Institute of Agri-Business Management, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India</i>	Assortment, Price and Availability in the Plant-Based Milk Category on Indian Quick-Commerce Platforms: Evidence from a Digital Shelf Audit and Implications for Domestic Crop-Based Product Development	73
074	Abstract ID- 3074 <i>Adarsh Dangwal¹, Rajeew Kumar¹, Priyanka Pandey²</i>	¹ Department of Agronomy, College of Agriculture, GBPUAT, Pantnagar ² Department of Molecular Biology and Genetic Engineering, CBSH, GBPUAT, Pantnagar	Nano-DAP application for improving root growth and biochemical parameters in Cereal crops	74

075	Abstract ID- 3075 Vishal Ghorela and Gina Naiding	<i>Ph.D. Research Scholars, Institute of Agri-Business Management, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India</i>	Carbon Credits and Carbon Farming Research: A Comparative Bibliometric Synthesis of India's Position in the Global Knowledge Base	75
076	Abstract ID- 3076 Gowri Shankar Raman ^{1*} , Malaisamy A ² , Yazhini Arivazhagan ³	¹ Assistant Professor, Vels Institute of Science, Technology and Advanced Studies, Chennai, Tamil Nadu, India ² Professor and Head, Department of Agricultural Economics, Agricultural College and Research Institute, Madurai, Tamil Nadu, India ³ Assistant Professor, Vinayaka Mission School of Legal Studies, Chennai, Tamil Nadu, India	Reverse Migration and Agricultural Labour Supply in Tamil Nadu: A Before–After Analysis of the COVID-19 Shock	76

Abstract ID ABMC 3001

Financial Inclusion and Sustainable Rural Women Entrepreneurship in West Bengal: A Systematic Review of Self-Help Groups

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Abstract

Self-Help Groups (SHGs) have emerged as a significant institutional mechanism in India, contributing to the strengthening of financial inclusion, women's empowerment, entrepreneurialism, and rural development. In the last three decades, they have expanded beyond saving and credit for enterprises by diversifying their activities and promoting economic growth through enterprise development. Financial inclusion, women's empowerment, entrepreneurship, and institutional support are among the many research topics that have been explored separately. Consequently, there has been limited attention to understanding how socio-economic factors such as financial inclusion led to sustainable rural women's entrepreneurship. This review is systematic and draws on existing scholarly literature regarding SHGs, financial inclusion, rural livelihoods (including girls), institutional development and sustainable enterprise development in West Bengal. The review is a thematic analysis of repeated themes, conceptual connections and research gaps. The outcomes demonstrate that sustainable entrepreneurial outcomes are dependent on entrepreneurship, institutional support, skill development, leadership, market linkages, and continuous capacity building, not just financial inclusion. This is consistent with the findings of the study. According to the review, SHGs have a positive impact on women's economic involvement in creating businesses and organizations, as well as their leadership development, and livelihood security, but also highlight ongoing issues related to institutional coordination, entrepreneurial capability. Based on these insights the study suggests an Integrated SHG Success Framework that describes sustainable rural women's entrepreneurship as being born from the dynamic interaction between financial inclusion, institutional support, entrepreneur development, enterprise sustainability, and women's socio-economic empowerment. By providing a conceptual foundation for future empirical research, the proposed framework also offers practical guidance for strengthening SHG-based entrepreneurship initiatives in West Bengal.

Keywords- *Self-Help Groups (SHGs), Financial Inclusion, Women's Entrepreneurship, Rural Development, Institutional Support.*

Abstract ID ABMC 3002

Growing Green, Going Global: The Export Potential of India's Cole Crops

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Abstract

Vegetables have a significant contribution in the horticulture sector to agricultural development and food security in India due to their substantial contribution to production and farm income. Of these, cabbage and cauliflower are important Cole crops which have a high domestic and international value. India both produces and produces large quantities of both crops, but they have a limited presence in the world export markets. In this background the present study has been aimed to evaluate the dynamics of production, growth, stability and export potential of the cabbage and cauliflower in India. The production performance and its stability were analysed using descriptive statistics, Compound Annual Growth Rate (CAGR), regression and Coefficient of Variation (CV) and Cuddy–Della Valle Instability Index (CDVI). For the past ten years, the average production of cabbage in India was 4.92% and cauliflower was 4.71%. India produced 8.29% of the world's cabbage production and ranked second in the world with production increasing by 1.65% per year. Likewise, in the case of cauliflower production, the growth rate was 1.93% on average per year with low instability (2.63) and India maintained the second position in world production. Nevertheless, export performance was still abysmal with cabbage contributing 0.10% of global exports and cauliflower not being able to make its way to the top ten exporters list in the world. The results show that there is a significant disparity between production efficiency and export efficiency. The export growth is hampered by limited productivity growth, high domestic consumption, poor post-harvest infrastructure and poor market linkages. Therefore, enhancing productivity by using technologies that are resilient to climate change, leveraging the cold-chain, upgrading processing facilities, and strengthening diversified export markets and efficient value chains are key to achieving sustainable global competitiveness from the production advantage.

Keywords: *Cabbage, Cauliflower, Production Dynamics, Export Potential, Growth and Stability.*

Abstract ID ABMC 3003

Integration of Crop Improvement and Precision Agriculture for Climate-Smart Crop Production

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Abstract

Climate change poses a serious threat to global food security, necessitating the adoption of new and innovative methods for sustainable agriculture. Climate change is posing serious challenges to agricultural yields worldwide due to factors such as drought, heat stress, unseasonal rainfall, soil degradation, pest and disease outbreaks, and other environmental pressures. One innovative approach to developing cropping systems that can withstand adverse conditions, deliver high yields, and ensure efficient resource use is to integrate precision agriculture with crop improvement techniques. Modern crop improvement methods such as conventional breeding, marker-assisted selection, genomic selection, molecular breeding, and genome editing can help develop crop varieties with enhanced nutritional value, higher yield potential, and improved resilience against biotic and abiotic stresses. At the same time, precision agriculture employs technologies such as remote sensing, Geographic Information Systems (GIS), Internet of Things (IoT), drones, soil and crop sensors, artificial intelligence (AI), machine learning, and satellite imagery to monitor crop and soil conditions and enable site-specific management. Precision phenotyping can accelerate crop breeding by providing high-resolution information on plant growth, water status, nutrient requirements, disease incidence, and yield-related traits. Similarly, data-driven precision management can optimize irrigation, fertilization, pest management, and other agricultural inputs, thereby reducing production costs and minimizing environmental impacts. The combined application of crop improvement and precision agriculture can enhance resource-use efficiency, productivity, resilience, sustainability, and farm profitability. This integrated framework represents an important pathway toward climate-smart agriculture and sustainable food security under changing climatic conditions. Future advancements in AI, digital phenotyping, genomics, and sensor-based technologies are expected to further strengthen the connection between crop breeding and precision farm management.

Keywords: *Crop Improvement, Precision Agriculture, Climate-Smart Agriculture, Climate-Resilient Crops, Precision Phenotyping.*

Abstract ID ABMC 3004

A Bibliometric Analysis of Artificial Intelligence in Agricultural Marketing

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Abstract

The emergence and advancements in artificial intelligence (AI) technologies and the digitalization of agriculture are evident in the sustainable growth of scholarly knowledge and research; however, the specific focus of agricultural marketing is not well mapped and tends to lack systematization. This study aims to review the development and evolution of this research field, identify the most prominent authors, countries, institutions, journals, and publications, key themes, keyword relationships, and the structure of the literature, and identify emerging trends and future research directions. The data were sourced from the Dimensions database, with a sample size of 1,361 from 2008 to 2025. A bibliometric analysis was used in the R software. The findings uncover that the field was dormant until 2016, then grew exponentially, followed by a sudden rise from 2021 onwards. Leading contributors were China, India, and the United States. Highly productive journals such as Sustainability and Frontiers in Sustainable Food Systems came from climate and sustainability as well as agricultural science fields. Thematic and keyword-network mapping revealed that the intellectual organization of the field groups centers on agri-environmental production, food security, and the use of AI technological methods. Commerce and marketing components are considered peripheral. Blockchain, the Internet of Things, and machine-learning-based forecasting were identified as some of the emerging themes. It concludes that agricultural marketing is a still underdeveloped section in the vast body of literature on AI in agriculture, and a great opportunity for future research exists to connect AI capabilities and agricultural marketing theoretically and in practice.

Keywords: *Artificial Intelligence; Agricultural Marketing; Machine Learning; Bibliometric Analysis; Research Trends.*

Abstract ID ABMC 3005

Impact of different rearing house structures on seed cocoon productivity among Adopted Seed Rearers

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Abstract

A field study was undertaken to assess the impact of different types of silkworm rearing house structures constructed and utilized by Adopted Seed Rearers (ASRs) across three distinct P1 seed zones. The field data revealed considerable variation in seed cocoon productivity among ASRs rearing silkworms under different types of rearing houses, including tin-sheet, concrete and mud houses. The observations also showed variation in several important economic such as cocoon yield per 100 DFLs, larval duration, single cocoon weight, single shell weight, shell percentage, pupation percentage and other associated rearing performance parameters. These variations indicate that the type and structure of the rearing house may have a significant influence on the rearing environment and, consequently, on silkworm growth, cocoon quality and seed cocoon productivity.

Key Words: *Seed cocoon, crop, rearing houses, ASRs.*

Abstract ID ABMC 3006

Effect of Planting Geometry on Growth and Yield of Green Gram (*Vigna radiata* L.): A Review

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Abstract

Green gram (*Vigna radiata* L.) is an important short-duration pulse crop of the tropics and subtropics, valued for its nutritional quality and nitrogen-fixing ability, yet its productivity under field conditions often remains suboptimal. Improper spacing has been reported to reduce green gram yield by 20–40 percent due to competition among plants for light, space, water, and nutrients, underscoring the agronomic importance of planting geometry in crop management. This review was undertaken to compile and evaluate published research on the influence of row spacing and plant density on the growth, yield attributes, and productivity of green gram. Findings from multiple field experiments consistently indicate that moderately closer spacing, particularly around 30 cm × 10 cm, favours superior growth performance. Studies conducted under rainfed conditions recorded significantly higher plant height, leaf number, and shoot dry weight at this spacing, while leaf area index was also found highest at 30 × 10 cm spacing compared with both closer and wider arrangements. Seed yield responses followed a similar pattern, with 30 cm × 10 cm spacing producing significantly higher seed and stover yield than wider spacing, with gains of about 18–19 percent. However, wider spacing has been shown to enhance individual plant vigour: reduced plant density allowed greater canopy expansion, resulting in a higher number of branches, pods, and seeds per pod per plant, reflecting the trade-off between population density and per-plant productivity. Overall, the reviewed literature suggests that an optimum planting geometry, balancing plant population with individual plant growth, is essential to maximize resource-use efficiency and seed yield. Since responses vary with soil fertility, cultivar, and agro-climatic conditions, location-specific spacing trials remain necessary for precise field-level recommendations in green gram cultivation.

Keywords: *Green gram, Planting geometry, Spacing, Growth, Yield*

Abstract ID ABMC 3007

The Green Gram (*Vigna radiata* L.) for Sustainable Agriculture and Conservation Contributions to Soil Health, Nutrient Management and Resource Use Efficiency: A Review

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Abstract

Sustainable and conservation agricultural practices are needed because of climate change, reduced soil fertility, water scarcity, and soil degradation. Green gram (*Vigna radiata* L.) has good productive potential, is resource-efficient, supports resilient agricultural systems and serves as a short-duration pulse crop. It is a legume that forms a symbiotic relationship with Rhizobium, thus enabling biological nitrogen fixation, soil nitrogen availability and fertility. This review highlights the potential of green gram as a short-duration pulse crop for improving soil health and productivity. For this review, we examined 40 research papers covering themes in biological nitrogen fixation, soil health and fertility, residue management, nutrient cycling, resource-use efficiency, weed management, and climate resilience. The findings reveal that green gram residue adds to organic matter, increases microbial activity, soil structure, penetration, and conservation of soil moisture, and decreases soil erosion, runoff and nutrient leaching. It has also been found to be suitable for crop diversification, intensification and conservation agriculture as a result of its dense growth period and adaptability, including in water- and resource-constrained areas. Improved nutrient availability, efficiency of nutrient use, soil quality and productivity will be further enhanced by integrated nutrient management and effective residue management. Thus, the integration of green gram into conservation and sustainable agricultural practices can offer agronomic, environmental, and economic advantages, as well as boost soil health, nutrient turnover, and climate resilience. Therefore, green gram is considered a promising option for diversified and sustainable cropping patterns.

Keywords: Green gram (*Vigna radiata* L.); Sustainable Nutrient management; Conservation agriculture; Biological nitrogen fixation; Climate resilience.

Abstract ID ABMC 3008

Biochemical Profiling and Hormonal Dynamics Driving Stress Resilience in Mid-Hill Apple Cultivars of Himachal Pradesh, India

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Abstract

Dormancy release and the resumption of vegetative growth in apple (*Malus domestica* Borkh.) are regulated by complex biochemical and hormonal crosstalk triggered by environmental stimuli. This study evaluated physiological mechanisms across three cultivars ('Gale Gala', 'Red Velox', and 'Jeromine') at three developmental stages (Dormant Tip, Silver Tip, and Green Tip) in two distinct agroclimatic conditions in Himachal Pradesh (Nauni and Mashobra). Biochemical profiling showed total phenolics, total flavonoids, and radical scavenging antioxidant capacity peaked during the Dormant Tip stage and declined significantly toward the Green Tip stage ($p < 0.001$). Genotype- and location-dependent variations were highly significant ($p < 0.001$). 'Jeromine' recorded the highest total phenolics ($251.54 \text{ mg GAE g}^{-1} \text{ DW}$ at Nauni; $239.54 \text{ mg GAE g}^{-1} \text{ DW}$ at Mashobra), while 'Gale Gala' exhibited the highest antioxidant capacity (60.39% at Mashobra). Endogenous hormone profiling demonstrated an antagonistic relationship between growth-promoting and stress-related pathways ($p < 0.001$). Gibberellin (GA) levels rose sharply during dormancy release, reaching peak concentrations in 'Jeromine' at the Green Tip stage ($788.44 \text{ ng g}^{-1} \text{ DW}$ at Nauni; $805.06 \text{ ng g}^{-1} \text{ DW}$ at Mashobra). Conversely, abscisic acid (ABA) dropped precipitously from $1512.68 \text{ ng g}^{-1} \text{ DW}$ at Dormant Tip to $92.16 \text{ ng g}^{-1} \text{ DW}$ at Green Tip. Trees at Mashobra maintained higher hormone levels overall, illustrating the strong impact of lower temperatures on metabolic synthesis. The consistent biochemical resilience and superior hormonal plasticity of 'Jeromine' highlight its potential for sustainable mid-hill cultivation under changing climatic conditions.

Keywords: Bud dormancy, Phytohormone dynamics, Phenolic compounds, Climate resilience, Genotype & Environment interaction.

Abstract ID ABMC 3009

Integrated assessment of Physiological, Biochemical and Soil health responses of *Capsicum annuum* L. grown under natural farming practices

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Abstract

Natural Farming is a sustainable, chemical-free system that reduces dependence on external inputs by utilizing locally available resources to improve soil fertility, microbial activity and crop productivity. The study was conducted to evaluate the effects of varying concentration of Jeevamrit application on the physiological, biochemical, nutritional and soil attributes of *Capsicum annuum* L. Six treatments, comprising T₁ (control) to T₆ (50% Jeevamrit), were evaluated. Jeevamrit application significantly influenced the parameters studied, with T₄ (30%) and T₅ (40%) showing superior performance. T₅ recorded the highest leaf area (90.54 cm²), leaf area index (2.77), fruit number, biomass accumulation, and chlorophyll and carotenoid content (3.07 mg g⁻¹ FW), whereas T₄ recorded the highest photosynthetic rate (14.64 μmol m⁻² s⁻¹), earliest flowering (37 days), maximum fruit weight (48.95 g) and β-carotene content. T₄ and T₅ also enhanced ascorbic acid, total phenols (22.40 mg g⁻¹), flavonoids (12.96 mg g⁻¹) and DPPH radical scavenging activity (53.05%), indicating improved fruit quality. Jeevamrit application further enhanced macro- and micronutrient availability and beneficial microbial populations in soil. GC–MS analysis revealed greater metabolite diversity in fruits from T₅ (78 metabolites) than the control (56 metabolites). Overall, 30–40% Jeevamrit emerged as the optimum range for improving plant performance, fruit quality and soil attributes of *Capsicum annuum* L. under Natural Farming.

Keywords: *Natural Farming, Jeevamrit, Physiological Parameters, Biochemical parameters, Sustainable agriculture.*

Abstract ID ABMC 3010

Integrating AI-Assisted Data Preprocessing and the Paired t -Test for Statistical Assessment of Grain Distribution in Paddy Panicles

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Abstract

The integration of artificial intelligence (AI)-assisted data preprocessing with conventional statistical methods provides an effective approach for improving the quality, consistency, and reliability of agricultural data analysis. This study assessed the variation in grain distribution between the top and bottom portions of paddy panicles using an AI-assisted data preprocessing framework combined with a paired t -test. Grain count data were collected from twenty paddy panicles, with paired observations recorded from the top and bottom portions of each panicle. AI-assisted preprocessing was employed for consistency verification, anomaly detection, noise reduction, and data normalization prior to statistical analysis. The paired t -test was subsequently applied to determine whether a significant difference existed between the grain counts of the two portions. The analysis yielded a calculated t -value of **9.7987 with 19** degrees of freedom, which exceeded the critical t -value of **2.093 at the 5%** significance level. The null hypothesis was therefore rejected, confirming a statistically significant difference in grain distribution between the top and bottom portions of the paddy panicles. The top portion recorded a higher grain count, with a mean difference of **25.8** grains, demonstrating significant intra-panicle variability. The findings highlight the value of integrating AI-assisted data preprocessing with classical statistical inference while retaining the interpretability and statistical rigor of the paired t -test. This hybrid framework offers a transparent and reproducible approach for agricultural data analysis, with potential applications in precision agriculture, yield assessment, and data-driven crop management.

Keywords: *Artificial intelligence, AI-assisted data preprocessing, paired t -test, paddy panicles, grain distribution, intra-panicle variability, precision Agriculture, Agricultural data analysis.*

Abstract ID ABMC 3011

Role of organic matter in maintaining soil health

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Abstract

Soil organic matter (SOM) is one of the most important components of healthy and productive soils. It plays a vital role in improving soil physical, chemical, and biological properties and supports sustainable agricultural production. Organic matter improves soil structure, aggregation, porosity, water-holding capacity, and aeration, thereby creating a favorable environment for root growth. It also acts as an important reservoir of essential nutrients such as nitrogen, phosphorus, and sulfur and contributes to nutrient cycling and gradual nutrient availability to plants. Furthermore, organic matter provides energy and habitat for beneficial soil microorganisms, which are involved in decomposition, nutrient mineralization, and the formation of stable soil aggregates. Increased organic matter can improve soil organic carbon, enhance microbial activity, reduce erosion, and increase the soil's ability to retain water and nutrients. Practices such as application of farmyard manure, compost, crop residues, green manures, biofertilizers, and other organic amendments can help maintain and increase soil organic matter. Therefore, effective management of soil organic matter is essential for restoring soil fertility, improving crop productivity, enhancing climate resilience, and maintaining long-term soil health. Integrating organic matter management with sustainable farming practices can contribute significantly to environmentally friendly and resilient agricultural production.

Keywords: *Soil organic matter, soil health, soil fertility, organic amendments, nutrient cycling, microbial activity, sustainable agriculture.*

Abstract ID ABMC 3012

Strengthening Capacity Building and Education for Sustainable Agriculture in India

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Abstract

Sustainable agriculture in India faces complex challenges arising from climate variability, resource degradation, socio-economic disparities, and limited adoption of innovative practices. Addressing these requires multidisciplinary approaches that integrate technological innovations with strategic management of human and institutional capacities. This paper examines the critical role of capacity building and Education for Sustainable Development (ESD) in advancing sustainable agriculture, while drawing linkages with agricultural extension and advisory services, rural sociology and community development, and gender and inclusivity. Drawing on secondary research, including policy reviews, thematic analyses, and existing literature on National Education Policy (NEP) 2020 and Sustainable Development Goal (SDG) 4.7, the study synthesises evidence on how targeted capacity-building interventions can enhance the effectiveness of extension systems, foster community-led development, and promote gender-responsive agricultural practices. Findings highlight persistent gaps in teacher and extension personnel training, limited contextualisation of sustainability knowledge, and inadequate integration of social and gender dimensions into agricultural education and advisory frameworks. At the same time, emerging opportunities under NEP 2020, digital platforms, and participatory extension models offer pathways for transformative learning, skill development, and inclusive innovation. The paper argues that strategic investments in continuous professional development of extension agents, educators, and rural stakeholders—combined with interdisciplinary pedagogies and community engagement—can significantly strengthen the adoption of sustainable agricultural practices. By positioning capacity building and ESD as central pillars of multidisciplinary innovation and strategic management, the study contributes actionable insights for policymakers, practitioners, and researchers seeking to build resilient, equitable, and environmentally sound agricultural systems in India.

Keywords: *Capacity building, Education for Sustainable Development, Sustainable agriculture, Agricultural extension, Gender inclusivity, Rural community development, NEP 2020, India.*

Abstract ID ABMC 3013

From Roots to Resilience: Exploring Plant–Microbe Interactions for Sustainable Agriculture

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Abstract

Plants exist in close association with diverse microorganisms that collectively influence their growth, health, and adaptation to changing environmental conditions. The rhizosphere represents a particularly important interface where plant roots interact with microbial communities and exchange nutrients and chemical signals. In agricultural systems, beneficial plant–microbe interactions have emerged as promising biotechnological approaches for improving crop productivity while supporting environmental sustainability. Beneficial microorganisms such as plant growth-promoting rhizobacteria (PGPR), arbuscular mycorrhizal fungi and endophytes, act through various direct and indirect mechanisms to support plant growth. This article aims to explore the mechanisms through which beneficial microorganisms contribute to plant growth, nutrient acquisition, stress tolerance, and protection against pathogens for their potential role in sustainable agriculture. These microorganisms can promote plant growth through phytohormone production, nutrient solubilization, and improved nutrient availability, while siderophores help in chelating iron, antimicrobial compounds together with induced systemic resistance contribute to pathogen suppression and stress tolerance. These interactions can also support soil fertility, nutrient cycling, soil structure, and resilience under environmental stresses. The reviewed evidence indicates that harnessing beneficial plant–microbe interactions may reduce dependence on synthetic fertilizers and pesticides while promoting healthier soils and more resilient crops. Nevertheless, the complexity of microbial communities and variation in plant, soil, and environmental conditions remain important challenges for consistent field application. Recent advancements in microbiome research, omics technologies, synthetic biology and microbial consortia development have provided new insights into understand the complexity and potential contribution of plant-associated microbial communities. Understanding the functional roles of rhizosphere microbiomes and translating this understanding into reliable microbial-based agricultural strategies offers a promising route toward more sustainable, resilient, and resource-efficient crop production systems.

Keywords: *Plant–microbe interactions, plant growth-promoting rhizobacteria, sustainable agriculture, biofertilizers, soil health.*

Abstract ID ABMC 3014

Role of Artificial Intelligence in Precision Agriculture

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Abstract

Precision agriculture is a modern farming approach that uses technology to observe, measure, and respond to variability within fields. With the growing global demand for food and the rising pressure on natural resources, Artificial Intelligence (AI) has become an important tool in making farming more accurate and efficient. AI is now applied in crop monitoring, disease and pest detection, soil and crop analysis, weather and yield prediction, smart irrigation, and the efficient use of fertilizers and pesticides, supporting data-based agricultural decision-making. Using AI in precision agriculture aims to improve crop productivity, reduce the unnecessary use of water, fertilizers, and pesticides, enable early detection of crop diseases and pests, support faster and better farming decisions, and promote sustainable agriculture. A review and analysis of existing research studies, reports, and AI applications in precision agriculture forms the basis of this work. Technologies such as machine learning, deep learning, computer vision, predictive analytics, and AI-based sensors that collect and interpret agricultural data are examined. AI can improve crop monitoring and yield prediction, detect diseases and pests at an early stage, optimize irrigation and fertilizer use, and reduce overall resource wastage, thereby supporting better productivity and sustainability. However, several challenges remain, including high implementation costs, limited access to technology, the need for quality data, and a lack of technical knowledge among some farmers. AI has strong potential to make agriculture more efficient, productive, sustainable, and data-driven. For successful implementation, affordable technology, reliable data, and proper farmer training are essential. With continued research and support, AI can play a meaningful role in shaping the future of farming and helping meet global food demands responsibly.

Keywords: *Precision Agriculture, Artificial Intelligence, Crop Monitoring, Sustainable Agriculture, Disease Detection, Smart Irrigation, Precision Fertilization.*

Abstract ID ABMC 3015

Integrating Precision Nutrient Management and Biostimulants for Crop Improvement and Soil Health: A Review

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Abstract

Precision nutrient management (PNM) uses advanced technologies to manage spatial and temporal variability in soil nutrient supply, boosting productivity and environmental sustainability. It improves crop yield and quality while reducing resource use. Biostimulants like humic acids, seaweed extract, and plant growth-promoting rhizobacteria enhance the crop-microbiome system by increasing nutrient transport efficiency and optimizing root structure. This review aims to provide a comprehensive summary of the synergistic integration of precision nutrient management technologies and biostimulants for crop improvement and soil health. Agricultural practices heavily depend on chemical inputs that may increase yield in the short term but negatively affect soil health and nutrient-use efficiency (NUE) over time and produce significant nonpoint source pollution. Site-Specific Nutrient Management (SSNM) overcomes these challenges through the use of real-time proximal crop sensors, satellite sensors, in-situ electrochemical soil diagnostics, and decision support systems (DSS) to supply nutrients in sync with crop metabolic demand. The interactive effects of precision nutrient management and biostimulants on crop improvement and soil health were critically reviewed based on evidence from 42 selected studies, with emphasis on existing challenges, research gaps, and future perspectives. We review existing evidence that the use of 25% synthetic inputs can be successfully replaced by the integration of precision nutrient management and biostimulants to ensure yield stability under environmental stress, improve nutrient use efficiency (NUE), enhance soil biological health, raise crop quality, reduce environmental losses, and present significant research contradictions, such as the negative effects of mineral fertilizer co-application on soil microbial biomass carbon (C_{mic}) and the feedback inhibition of microbial activity by high doses of mineral fertilizers. Finally, we discuss the challenges in adoption, the standardization gaps, and future perspectives such as engineered synthetic microbial consortia (SynComs) and smart nano-sensors, offering a transformative path towards the development of self-optimizing, climate-resilient biotechnology. As a circular bio-economic solution, this review suggests an integrative Microbe-Sensor Closed Loop (MSCL) framework.

Keywords: *Integrating Precision Nutrient Management, Biostimulants, Soil Health, Nutrient-use efficiency, Sustainability.*

Abstract ID ABMC 3016

Soil Health and Nutrient Management for Sustainable Agriculture

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Abstract

Soil health is an important foundation of sustainable agriculture because healthy soil supports plant growth, nutrient supply, water retention, and biological activity. However, continuous cultivation, removal of nutrients through repeated cropping, and improper or imbalanced use of fertilizers can gradually reduce soil fertility and affect long-term agricultural productivity. Nutrient management is therefore important not only for increasing crop yield but also for maintaining the quality and productivity of soil. Research from long-term agricultural experiments in India shows that balanced application of nutrients along with organic sources can improve several soil properties. The use of farmyard manure, crop residues, green manure, compost, and other organic materials can increase soil organic carbon, improve nutrient availability, support microbial activity, and improve soil structure. At the same time, the proper use of chemical fertilizers is necessary to meet the nutrient requirements of high-yielding crops. Long-term studies from the Indo-Gangetic Plains have shown that combining organic and inorganic nutrient sources can support both soil health and crop productivity over time. However, nutrient requirements and soil conditions vary from one place to another, making site-specific nutrient management important. Soil testing can help identify nutrient deficiencies and guide the appropriate use of fertilizers and organic inputs. Therefore, integrated nutrient management, based on soil condition and crop requirements, can help maintain soil fertility, improve nutrient-use efficiency, and support sustainable agricultural production. Maintaining soil health should be considered a long-term goal along with achieving higher crop yields.

Keywords: *Soil health, nutrient management, soil fertility, integrated nutrient management, soil organic carbon, nutrient-use efficiency, sustainable agriculture.*

Abstract ID ABMC 3017

Integrated Nutrient Management (INM)

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Abstract

Integrated Nutrient Management (INM) is a sustainable approach to maintaining soil fertility and optimizing plant nutrient supply for achieving and sustaining desired crop productivity. It involves the judicious and integrated use of nutrients from different sources such as chemical fertilizers, organic manures, crop residues, compost, green manures and biofertilizers. The main concept of INM is to optimize the benefits of all available nutrient sources while reducing nutrient losses, preventing soil nutrient depletion and maintaining long-term soil health. It promotes the efficient utilization and recycling of locally available organic resources, thereby reducing dependence on chemical fertilizers and lowering the cost of crop production. The major objectives of INM are to sustain crop productivity without degrading soil health, reduce the gap between nutrients applied and nutrients harvested by crops, conserve and efficiently utilize locally available resources, improve soil quality, and increase the economic returns of farmers.

Keywords : *Organic manure, crop residues, compost, green manures.*

Abstract ID ABMC 3018

Food Science, Nutrition and Food Security

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Abstract

Food science, nutrition, and food security are closely interconnected fields that are essential for maintaining human health and supporting sustainable development. Food science involves the study of the physical, chemical, biological, and nutritional properties of food, as well as methods of food processing, preservation, and quality control. Nutrition focuses on the role of nutrients in growth, development, immunity, and overall well-being, while food security ensures that all people have reliable access to sufficient, safe, nutritious, and affordable food. Rapid population growth, climate change, food loss, changing dietary patterns, and socioeconomic inequalities pose significant challenges to global food security. Advances in food science can help address these challenges through improved preservation technologies, development of nutritious food products, reduction of post-harvest losses, and enhancement of food quality and safety. Modern approaches such as food fortification, functional foods, fermentation technology, and alternative protein sources can contribute to better nutrition and diversified diets. Adequate nutrition is particularly important for vulnerable groups, including children, pregnant women, older adults, and economically disadvantaged populations. Micronutrient deficiencies and malnutrition remain major public health concerns, while increasing consumption of highly processed foods contributes to diet-related disorders. Therefore, promoting balanced diets, nutrition education, and access to safe and nutritious foods is essential. Integration of food science and nutrition with sustainable agricultural practices, efficient food distribution, and supportive policies can strengthen food systems. Overall, interdisciplinary research and innovation are crucial for improving food quality, nutritional health, and equitable food access while ensuring long-term food security for present and future generations.

Keywords: *Food science , Nutrition , Food safety , Malnutrition , Sustainable food systems.*

Abstract ID ABMC 3019

Transforming Rural Economies: Leveraging Farmer Producer Organizations (FPOs) for Youth and Female Entrepreneurship

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Abstract

The transition of rural economies from subsistence farming to commercial agri-business requires innovative institutional frameworks that empower marginalized populations. Farmer Producer Organizations (FPOs) have emerged as pivotal engines of rural transformation by aggregating smallholder farmers, enhancing bargaining power, and driving localized economic growth. This paper examines the role of FPOs in driving rural development by fostering entrepreneurship among youth and female farmers. Historically relegated to informal labor, women are finding structured avenues for leadership, financial autonomy, and equity ownership through women-centric FPOs. By engaging in high-value, niche enterprises such as seed production, post-harvest processing, and value addition, female entrepreneurs effectively bypass traditional middlemen and access institutional credit. Membership in FPOs elevates their status from informal farm labor to decision-making shareholders and business operators, expanding their access to micro-capital, direct market links, and capacity-building programs. Furthermore, youth engagement in digital logistics, precision tools, and post-harvest management within FPOs creates high-value non-farm employment opportunities, directly curbing distress rural-to-urban migration. The findings indicate that active participation in FPOs increases farm-gate price realization by up to 20% and significantly reduces transaction costs through economies of scale. The study concludes that FPOs act as essential catalysts for long-term rural revitalization, effectively bridging the structural gap between small-scale production and competitive commercial markets. To fully maximize this economic potential, policymakers, financial institutions, and agricultural extension services must prioritize targeted technical training, digital literacy programs, specialized infrastructure grants, and streamlined micro-credit mechanisms tailored specifically for youth and female-led FPO collectives.

Keywords: *Farmer Producer Organization, Rural Economics , Women Entrepreneurship , Youth , Agribusiness.*

Abstract ID ABMC 3020

Plant Molecular Biology and Genomics in Crop Improvement

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Abstract

Plant molecular biology and genomics are rapidly developing fields that provide a deeper understanding of the genetic and molecular mechanisms controlling plant growth, development, stress responses, and crop productivity. Molecular biology focuses on important cellular components such as DNA, RNA, genes, proteins, and gene expression, while genomics enables the study of the complete genetic information of an organism. Together, these approaches have become powerful tools for modern crop improvement. DNA sequencing is one of the fundamental techniques used in molecular biology and genomics to determine the precise order of nucleotides in DNA. Advances in next-generation sequencing and high-throughput technologies have made it possible to study plant genomes more rapidly and efficiently. Genomic approaches such as molecular markers, genome-wide association studies (GWAS), transcriptomics, and comparative genomics help identify genes and genomic regions associated with important traits. These technologies are increasingly being applied to improve crop yield, quality, disease resistance, drought and heat tolerance, and nutritional value. Molecular markers - can accelerate the selection of desirable traits through marker-assisted selection, while genomic selection can improve the efficiency of breeding programmes by predicting the genetic potential of plants. Gene expression analysis and functional genomics further help in understanding how plants respond to environmental stresses at the molecular level. The integration of molecular biology, genomics, bioinformatics, and conventional breeding offers new opportunities for developing climate-resilient and high-performing crop varieties. Therefore, plant molecular biology and genomics play a crucial role in modern agriculture and sustainable crop improvement, contributing to global food security and the development of future-ready agricultural systems.

Keywords: *Plant Molecular Biology, Genomics, DNA Sequencing, Gene Expression, Crop Improvement, Bioinformatics.*

Abstract ID ABMC 3021

Development and characterization of FRET-based genetically encoded nanosensor for real-time monitoring of Pyrroloquinoline Quinone (PQQ) in living cells

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Abstract

With increasing significance to precision agriculture, plant stress diagnostics, and sustainable crop management, metabolites are essential markers of cellular health, metabolic activity, and environmental adaptability in living systems. Among these, pyrroloquinoline quinone (PQQ), a redox cofactor generated by bacteria that promote plant growth, is important for improving soil microbial health, plant metabolism, and stress tolerance. With potential uses in tracking plant-microbe interactions and soil biochemical dynamics pertinent to sustainable agriculture, this research intends to design and develop a genetically encoded nanosensor using Fluorescence Resonance Energy Transfer (FRET) technology for real-time, sub-cellular detection of PQQ. Based on its known ligand-induced conformational shift, the PQQ-specific periplasmic binding protein was found by structural analysis utilising the Protein Data Bank (PDB). In order to amplify the PQQ-binding protein, cyan fluorescent protein (CFP), and yellow fluorescent protein (YFP), primers with appropriate restriction sites were created using the corresponding gene sequence that was obtained from the NCBI database. *Pseudomonas aeruginosa* PAO1 genomic DNA was extracted, and the target gene was amplified using PCR before being cloned into the pGEM-T vector. CFP and YFP genes were amplified using pDH18 plasmid as a template and cloned similarly into pGEM-T vectors. Using restriction digestion analysis and agarose gel electrophoresis, the successful amplification of all three gene fragments was verified. It is anticipated that the final construct, which integrates the PQQ-binding domain with CFP and YFP through ligation, would provide a functional FRET-based nanosensor capable of real-time PQQ measurement, providing a novel molecular tool for promoting biosensor-driven innovations in sustainable agricultural research.

Keywords: *FRET, nanosensor, pyrroloquinoline quinone (PQQ), periplasmic binding protein, plasmid, metabolite.*

Abstract ID ABMC 3022

Extraction and Stabilization of Lutein Pigments from Waste Marigold Flowers for Industrial Food Colorants.

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Abstract

Marigold (*Tagetes erecta* L.) is one of the most widely cultivated loose flowers in India, extensively used for garlands, religious offerings and decorations. After use, tonnes of waste flowers are discarded daily in temples and markets, creating environmental pollution and loss of valuable bioresources. These waste petals are a rich source of lutein, a natural xanthophyll carotenoid pigment with high demand as a food colorant, antioxidant and nutraceutical (nutrition+pharmaceutical). The present study was undertaken to valorize waste marigold flowers into a stable, industrial-grade natural food colorant. The work involved collection of discarded flowers, shade drying and solvent extraction of lutein using food-grade ethanol. The crude extract was subjected to saponification to obtain free lutein, followed by purification and quantification using spectrophotometry and HPLC(High-performance liquid chromatography). To overcome the major limitation of lutein degradation due to light, heat and oxidation, stabilization was achieved through microencapsulation using wall materials such as maltodextrin and gum Arabic

COLLECTION -> SHADE DRYING & POWDERING -> SOLVENT EXTRACTION -> SAPONIFICATION -> PURIFICATION & QUANTIFICATION -> MICROENCAPSULATION [Maltodextrin + GumArabic(Spray Drying)]-> FINAL PRODUCT

Results indicated good recovery of free lutein from waste petals with significant improvement in colour stability and shelf-life after encapsulation. The developed powder form was water-dispersible, heat-stable and suitable for application in bakery, beverages, dairy and confectionery products. This approach offers a sustainable solution for floral waste management while replacing harmful synthetic colours with a safe, natural alternative. It promotes circular economy, adds value to farmer's produce and has strong potential for entrepreneurship and industrial scale-up

Keywords: *Tagetes erecta*, Lutein, Waste Valorization, Natural Food Colorant, Encapsulation.

Abstract ID ABMC 3023

Biochar Potential Of Invasive Weed *Lantana Camara* L.

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Abstract

Lantana camara L. is one the most aggressive invasive alien plant species, causing significant ecological and economic impacts through biodiversity loss, suppression of native vegetation and alteration of ecosystem processes. Simultaneously, its abundant biomass offers an opportunity for conversion into biochar, a stable carbon-rich material. The aim of study is to explore the potential of this noxious weed for biochar production, providing an environmentally sustainable strategy for biomass utilization and management of invasive species. The Biochar potential of *Lantana* wood was assessed by pyrolyzing it at 300, 450 and 600°C temperature at varying residence time ranging from 15 to 60 minutes. It was observed that maximum biochar yield (41.70%) was at 300°C for 15 minutes and the minimum (13.37%) at 600°C for 60 minutes which shows that the higher temperature with longer charring time decreases the yield. Moreover, the biochar pH, electrical conductivity and carbon content increased with increasing pyrolysis temperature and longer residence time. The highest pH (10.22), EC (3.81 mS cm⁻¹) and carbon content (78.20%) were observed at 600°C for 60 minutes. Thus, utilization of *Lantana camara* L. biomass for biochar production may provide a useful approach for converting an invasive plant into a value added and carbon-rich material which could be utilized as a soil carbon enhancer to promote additional soil carbon sequestration.

Keywords: *Biochar, sustainable strategy, invasive alien, pyrolysis, sequestration.*

Abstract ID ABMC 3024

Effect of NaCl-Induced Salinity Stress on Yield Performance of Okra (*Abelmoschus esculentus* L. Moench) Cultivars

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Abstract

Okra (*Abelmoschus esculentus* L. Moench) is an economically important vegetable crop, but its productivity is adversely affected by salinity stress, which is increasingly becoming a constraint to sustainable vegetable production. The present study was conducted to evaluate the effect of different levels of NaCl-induced salinity on yield performance and identify comparatively better-performing okra cultivars under saline conditions. The experiment was conducted during *Spring-Summer* 2022 at College of Horticulture, Anantharajupeta, Dr. Y.S.R. Horticultural University, Andhra Pradesh. Four okra cultivars, namely Arka Anamika, Pusa Sawani, Pusa Bhindi-5 and Local variety were evaluated under five NaCl salinity levels (control, 2, 4, 6 and 8 dS m⁻¹) in a factorial completely randomized design with three replications. Yield attributes including number of pods plant⁻¹, pod length, pod girth, single pod weight and pod yield plant⁻¹ were recorded and statistically analysed. Significant differences were observed among cultivars, salinity levels and their interaction for all the yield attributes. Among the cultivars, Pusa Bhindi-5 recorded the highest pod yield (285.05 g plant⁻¹), followed by Arka Anamika (261.55 g plant⁻¹), while the Local variety recorded the lowest yield (199.38 g plant⁻¹). Increasing salinity progressively reduced yield and its associated components, with the highest pod yield under control (339.28 g plant⁻¹) and the lowest at 8 dS m⁻¹ (135.50 g plant⁻¹). The cultivar × salinity interaction revealed that Pusa Bhindi-5 under control recorded the maximum pod yield (388.74 g plant⁻¹), whereas the Local variety at 8 dS m⁻¹ recorded the minimum (115.56 g plant⁻¹). The study highlights considerable cultivar variability in yield response to salinity, with Pusa Bhindi-5 showing comparatively superior yield performance under saline conditions.

Keywords: Okra, Cultivars, Salinity stress, NaCl, Pod yield.

Abstract ID ABMC 3025

Optimization of Yellow Sticky Trap Height for Monitoring of Okra Insect Pests under Field Conditions in Mandawar region Haridwar, Uttarakhand

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Abstract

Effective monitoring of insect pest populations is a critical component of integrated pest management (IPM), enabling timely and need-based interventions while reducing unnecessary pesticide applications. The present study was conducted during 2025 in the Quantum University, Mandawar region of Haridwar, Uttarakhand, to evaluate the efficacy of yellow-coloured sticky traps installed at different heights for monitoring major insect pests of okra, particularly hoppers and thrips. Sticky traps were positioned at three heights, viz., 0.5, 1.0 and 1.5 m, and insect populations were recorded at different meteorological standard weeks (MSW). The results demonstrated a clear influence of trap height and crop growth stage on pest attraction. During the 14th MSW, hopper population was relatively low, with 1.00 hopper per trap at 0.5 m and 1.67 hoppers at both 1.0 and 1.5 m heights. A progressive increase was observed thereafter, reaching a pronounced peak during the 23rd MSW. The highest hopper population of 212.67 hoppers per trap was recorded at 1.5 m, followed by 207.33 at 1.0 m and 128.33 at 0.5 m. The greater attraction at 1.5 m was associated with increasing crop canopy height, suggesting that trap positioning in relation to crop architecture plays a significant role in pest surveillance. Similarly, *Thrips tabaci* (Thysanoptera: Thripidae), an economically important pest of okra, was detected from the 14th MSW onwards. Thrips attraction increased progressively, with the highest population recorded during the 22nd MSW. Although 0.5 m traps recorded comparatively lower attraction, the population reached 46.33 thrips per trap, compared with 58.00 at 1.0 m and 63.33 at 1.5 m. Overall, the study establishes that 1.5 m trap height was most effective for monitoring hopper and thrips populations, particularly during advanced crop growth stages. Yellow sticky traps can therefore serve as a simple, economical and environmentally compatible surveillance tool for early pest detection, population forecasting and timely decision-making in okra IPM programmes.

Keywords: *Okra, plant hoppers, thrips, yellow sticky traps, monitoring, height.*

Abstract ID ABMC 3026

Atrazine Monitoring Using Nanosensors for Intelligent Herbicide Management in Agriculture

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Abstract

Innovative, technologically advanced methods that strike a balance between environmental stewardship and productivity are necessary for sustainable agriculture. One such interdisciplinary invention is nanosensors, which combine biotechnology, analytical chemistry, and precision agriculture to allow for the real-time monitoring of agrochemicals in soils, water bodies, and living systems. Due to its propensity to build up in soil and aquatic ecosystems, contaminate groundwater, and cause long-term ecological harm, atrazine—a popular and reasonably priced broadleaf herbicide—poses an increasing environmental challenge. This highlights the necessity of strong monitoring strategies within a strategic agricultural management framework. Using a pair of cyan fluorescent proteins (CFP) and yellow fluorescent proteins (YFP), FRET (Förster Resonance Energy Transfer)-based nanosensors provide a sensitive and non-destructive platform for atrazine detection. A detectable shift in the fluorescence ratio results from a conformational change in the sensor that modifies the spatial connection between donor and acceptor fluorophores upon herbicide attachment. Compared to traditional methods like HPLC or GC-MS, this ratiometric signal allows continuous, high-resolution tracking of atrazine dynamics throughout living cells, including plants and microorganisms, without sample destruction. By supporting precision application, minimising overspraying, and lowering chemical runoff, integrating this technology into agricultural strategy directly helps resource-efficient management techniques and ecologically conscious farming. Furthermore, these sensors offer mechanistic understanding of herbicide uptake, metabolism, and resistance development in microbes and plants, supporting evidence-based policy and farm-level decision-making. FRET-based nanosensors demonstrate how multidisciplinary technology advancement can propel sustainable, data-driven agriculture systems for the future by fusing biosensing innovation with strategic environmental oversight.

Keywords: *Atrazine, herbicide, FRET-based nanosensors, weed management, sustainable agriculture.*

Abstract ID ABMC 3027

Bioclimatic Suitability, Spatial Occurrence Profiling and Multi-Variable Ecological Modeling of Ashwagandha (*Withania somnifera*) Across Indian Agro-Ecological Zones

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Abstract

Climate variability, habitat fragmentation, and unsystematic wild harvesting pose severe threats to native medicinal germplasm in India. *Withania somnifera* (L.) Dunal (Ashwagandha) is a premier medicinal plant widely used in traditional pharmaceutical applications. Moving beyond qualitative species descriptions and single-marker linear assumptions, this study establishes a quantitative, reproducible macro-ecological framework to define the geographical bounds and climatic envelope of *W. somnifera* across India. Georeferenced occurrence records (N = 237) were compiled from the Global Biodiversity Information Facility (GBIF) and coupled with global bioclimatic rasters from the WorldClim dataset using spatial processing, point-coordinate filtering, and raster manipulation packages in R. Overlay analyses and spatial extraction revealed a distinct geographical concentration across semi-arid, arid and dry subtropical belts, bounded predominantly within latitudes 15°N–32°N and longitudes 70°E–78°E, while showing a marked absence in the high-rainfall regions of Eastern and North-Eastern India. Extraction of environmental variables at point occurrences identified temperature seasonality (BIO4) and precipitation during the driest quarter (BIO17) as critical physiological constraints governing the wild distribution of the species. Thermal variation and prolonged moisture deficits during dry periods directly dictate survival boundaries and metabolic adaptation in natural habitats. These findings offer actionable spatial data to delineate high-suitability zones for sustainable commercial cultivation, reduce exploitation pressure on wild populations of valuable medicinal plant *Withania somnifera* and support climate-resilient crop conservation strategies across diverse agricultural landscapes.

Keywords : *Bioclimatic Suitability, GBIF, R.*

Abstract ID ABMC 3028

Role of Artificial Intelligence in Agriculture

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Abstract

Agriculture plays a vital role in food security, employment, and economic development, but it faces challenges such as climate change, unpredictable weather, pest and disease outbreaks, increasing input costs, and declining natural resources. Artificial Intelligence (AI) has emerged as a promising technology to address these challenges and transform conventional farming into smart and precision agriculture. AI enables the analysis of large amounts of agricultural data to support timely and accurate decision-making. It is being used in crop and soil monitoring, pest and disease detection, yield prediction, weather forecasting, precision farming, irrigation management, weed detection, agricultural robotics, and market analysis. The integration of AI with technologies such as the Internet of Things (IoT), remote sensing, drones, and Geographic Information Systems (GIS) can improve the efficient use of water, fertilizers, pesticides, and other agricultural inputs. AI-based technologies can help farmers reduce crop losses, improve productivity, lower production costs, and promote sustainable farming practices. However, challenges such as high initial investment, limited digital literacy, inadequate rural infrastructure, data availability, and lack of technical knowledge can restrict the adoption of AI. Therefore, farmer training, affordable technologies, improved digital connectivity, and government support are essential for its wider adoption. In conclusion, Artificial Intelligence has significant potential to make agriculture more productive, efficient, profitable, climate-resilient, and sustainable while contributing to improved food security and better livelihoods for farmers.

Keywords: *Artificial Intelligence (AI), Precision Agriculture, Smart Farming, Machine Learning, Internet of Things (IoT), Remote Sensing, Drones, Crop Monitoring, Yield Prediction, Pest and Disease Detection, Sustainable Agriculture.*

Abstract ID ABMC 3029

Protected Cultivation: Opportunities for High-Value Vegetable Production.

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Abstract

Protected cultivation is becoming an important approach for increasing the productivity and profitability of vegetable farming in India. It involves growing crops under structures such as polyhouse, net houses, shade houses and tunnels, where environmental conditions can be managed according to crop requirements. This method provides better control over temperature, humidity, irrigation, nutrition and pest pressure, allowing farmers to produce good-quality vegetables even during unfavourable seasons. High-value crops such as capsicum, tomato, cucumber, cherry tomato, coloured bell pepper and leafy vegetables have considerable potential under protected conditions. It also creates opportunities for off-season production, when market prices may be more attractive. Efficient drip irrigation and fertigation can improve the use of water and nutrients, while suitable crop management can help maintain uniform quality and reduce production losses. Protected cultivation can therefore support crop diversification, increase returns from limited land and generate employment opportunities, particularly for small and medium farmers. However, high initial investment, technical requirements, market price fluctuations and the need for skilled management remain important challenges. With proper training, improved technologies, financial support and better market linkages, protected cultivation can become a promising enterprise for sustainable and high-value vegetable production.

Keyword: *Protected cultivation; Polyhouse; High-value vegetables; Off-season production; Vegetable productivity; Fertigation; Resource-use efficiency; Farm income.*

Abstract ID ABMC 3030

Organic farming for sustainable agriculture

Anil

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Abstract

Organic farming is an eco-friendly approach to agriculture that focuses on producing healthy food while protecting natural resources and maintaining soil fertility. It reduces the dependence on synthetic fertilizers and chemical pesticides by using practices such as composting, crop rotation, green manuring, biological pest control, and the use of organic inputs. These methods help improve soil health, conserve biodiversity, and reduce environmental pollution. Organic farming also supports sustainable use of water and other farm resources, making it important for long-term agricultural development. However, farmers may face challenges such as higher labour requirements, limited availability of organic inputs, pest management difficulties, and lower yields during the initial transition period. With proper knowledge, improved organic technologies, better market support, and suitable government policies, these challenges can be reduced. Overall, organic farming provides a promising pathway toward sustainable agriculture by balancing crop production with environmental protection, economic viability, and the well-being of farming .

Keywords: *Organic farming, Sustainable agriculture, Soil health, Biodiversity, Organic inputs, Crop rotation, Composting, Biological pest management, Environmental conservation, Sustainable food production.*

Abstract ID ABMC 3031

Biofertilizers and their Role in Agriculture

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Abstract

Biofertilizers are formulations containing beneficial living microorganisms that improve plant nutrition, soil fertility, and crop performance through natural biological processes. They provide an eco-friendly approach to reducing excessive dependence on synthetic fertilizers while supporting sustainable agricultural production. Important biofertilizer microorganisms include nitrogen-fixing bacteria such as *Rhizobium*, *Azotobacter*, and *Azospirillum*; phosphate-solubilizing microorganisms; potassium-mobilizing microbes; cyanobacteria; and beneficial mycorrhizal fungi. These microorganisms contribute to agriculture by fixing atmospheric nitrogen, solubilizing or mobilizing nutrients, producing plant-growth-promoting substances, improving root development, and enhancing nutrient-use efficiency. They can also support plants under biotic and abiotic stresses and contribute to healthier soil microbial activity. Research indicates that biofertilizers can improve nutrient availability and crop productivity while helping to reduce environmental problems associated with indiscriminate use of chemical fertilizers. However, their effectiveness can vary with crop species, soil properties, climate, microbial strain, formulation quality, storage, and method of application. Therefore, appropriate strain selection, quality control, efficient formulation, farmer awareness, and integration with organic and mineral nutrient sources are important for consistent field performance. The integration of biofertilizers into integrated nutrient management can contribute to improved soil health, sustainable crop production, environmental protection, and long-term agricultural resilience. Continued research and field-level validation are needed to develop reliable microbial consortia and formulations suited to diverse farming conditions.

Keywords: *Biofertilizers; beneficial microorganisms; nitrogen fixation; nutrient solubilization; plant growth-promoting rhizobacteria; soil fertility; sustainable agriculture; crop productivity.*

Abstract ID ABMC 3032

Financial Effectiveness and Future Expansion Potential of Paramparagat Krishi Vikas Yojana (PKVY) for Organic Farming: A National-Level Assessment

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Abstract

The Indian agricultural policy landscape has increasingly focused on sustainable farming, with the Paramparagat Krishi Vikas Yojana (PKVY) - launched in 2015 under the National Mission on Sustainable Agriculture - emerging as an important centrally sponsored policy instrument for promoting cluster-based organic farming. While PKVY has played an important role in expanding organic farming, little empirical evidence exists on how efficiently its financial inputs translate into physical outputs, particularly organic area expansion and on the scheme's potential for further non-disruptive expansion through mobilising idle land (current fallow and fallow other than current fallow). This study addresses these gaps using secondary data from Government reports, Parliamentary questions, and Agricultural Statistics at a Glance (2024) covering 2015–16 to 2024–25. A double-log regression model examines the elasticity of organic area expansion with respect to funds released, estimated separately for the pre-disruption period (2015–16 to 2020–21) and the full implementation period (2015–16 to 2024–25). A log-linear growth model projects organic area coverage up to 2029–30, assuming gradual mobilisation of 1%, 3% and 5% of the national idle land under PKVY, with corresponding additional funding requirements estimated using the derived elasticity. The results show a strong and statistically significant relationship between funds released and organic area expansion under PKVY in the pre-disruption period (elasticity = 11.55, $p < 0.10$) which weakens substantially in the full period (elasticity = 3.35, statistically insignificant) amid COVID-19 disruptions and institutional changes in fund flow. Baseline projections indicate substantial future growth, while idle land mobilisation scenarios show that even modest inclusion of idle land under PKVY can expand organic coverage significantly with only 0.72 to 3.60% additional funding, offering a financially feasible, non-disruptive pathway for expanding organic farming through idle land mobilisation while aligning with SDGs 12 and 15.

Keywords: *Paramparagat Krishi Vikas Yojana (PKVY), Sustainable Agriculture, Agricultural Policy, Financial Effectiveness, Idle Land Mobilisation.*

Abstract ID ABMC 3033

Quercetin-Mediated Modulation of Growth and Redox Homeostasis in *Solanum lycopersicum* L.

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Abstract

Sustainable approaches to crop production are important for meeting the growing demand for food while maintaining plant productivity under changing environmental conditions. Quercetin is a naturally occurring flavonol and is recognized for its strong antioxidant and free-radical-scavenging properties. The present investigation was undertaken to assess the influence of exogenously applied quercetin on the morphological, physiological and biochemical performance of *Solanum lycopersicum* L. plants. Foliar application of quercetin was carried out at concentrations of 0, 0.3, 0.6, 0.9 or 1.2 mM, beginning at 25 days after transplantation (DAT), and treatments were continued for five consecutive days (25–29 DAT). Sampling was performed at 40 and 70 DAT to assess various parameters. Furthermore, stomatal morphology was examined using scanning electron microscopy (SEM) to evaluate structural changes induced by the treatment. Quercetin treatments positively influenced plant growth and improved photosynthetic parameters, such as net photosynthetic rate, stomatal conductance, internal CO₂ concentration and transpiration rate, in comparison with untreated plants. Among the tested concentrations, 0.6 mM quercetin produced the most significant improvement across the measured parameters. The enhanced physiological performance following quercetin application indicates its potential role in supporting plant growth and maintaining metabolic activity. SEM analysis revealed treatment-induced changes in stomatal structure, supporting the observed physiological responses. Overall, the findings demonstrate that exogenous quercetin can act as a promising plant biostimulant for improving the performance of tomato plants. Its application may provide an environmentally compatible strategy for strengthening crop productivity and resilience, thereby contributing to sustainable agricultural production.

Keywords: *Antioxidants, β carotene, Flavonoids, Lycopene, Stomata.*

Abstract ID ABMC 3034

Upcycling Food By-Products into Nutrient-Dense Foods: A Sustainable Strategy for Improving Nutrition and Food Security

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Abstract

The growing global population, climate variability, and increasing food waste have created an urgent need for sustainable approaches to ensure food and nutritional security. Food processing generates substantial quantities of by-products such as fruit peels, cereal bran, seed cakes, and vegetable residues, which are often discarded despite containing valuable nutrients and bioactive compounds. This study proposes the development of nutrient-dense food products through the scientific valorisation of selected food-processing by-products. The approach focuses on evaluating their nutritional composition, functional properties, antioxidant potential, and technological suitability for incorporation into commonly consumed foods. Appropriate processing techniques, including drying, fermentation, milling, and controlled extraction, can improve nutrient bioavailability while reducing undesirable components and extending shelf life. In this context, an emerging opportunity lies in converting overlooked edible resources such as fruit and vegetable fractions, cereal processing residues, seed coats, pulses, by-products, and locally neglected plant materials into nutrition-smart food ingredients. Rather than treating these materials as waste, this concept explores their potential as reservoirs of dietary fibre, proteins, minerals, antioxidants, and other health-promoting compounds. Food science, nutrition, and food security are interconnected areas that play a vital role in promoting human health and sustainable development. Food science focuses on the processing, preservation, quality, and safety of food, while Food security ensures that all individuals have continuous access to sufficient, safe, nutritious, and affordable food. Advances in food science, including improved preservation techniques, food fortification, development of nutritious foods, and sustainable processing methods, can help address these challenges. The concept therefore proposes a shift from a “waste-to-food” model toward an “underutilized-resource-to-nutrition” paradigm, positioning food science as a bridge between sustainable resource utilization and equitable nutrition.

Keywords: - *Food upcycling, Nutrient bioaccessibility, Nutrient-Smart foods, Circular food systems, Food Security.*

Abstract ID ABMC 3035

Nano Fertilizers as a Potential Alternative for Conventional Fertilizers in Modern Agriculture: Evidence, Opportunities, Challenges and Future Perspectives

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Abstract

Intensive farming relies on synthetic chemical fertilizers as a critical tool in satisfying the food, feed and fiber needs of the world's fast-growing population. Conventional fertilizers, however, have relatively low nutrient-use efficiency (NUE) of 30-35% for nitrogen, 18-20% for phosphorus and 35-40% for potassium. This significant unabsorbed percentage is lost through leaching, volatilization, runoff, and soil fixation, leading to groundwater contamination, eutrophication and greenhouse gas emissions. The potential application of nanotechnology in precision agriculture is the development of "smart" nano fertilizers (NFs) with nanoscale particle size, high specific surface area and controlled-release kinetic. This review will try to highlight the current scientific evidence regarding effectiveness, uptake mechanism, substitution potential, and ecological and economic effects of nano fertilizers in comparison to conventional fertilizers. The review indicates that, based on the evidence collected from various crops, the application of nano fertilizers, especially in combination with lower conventional fertilizer application rates, can result in better plant growth, dry matter accumulation and yield alongside the improvement in NUE in major crops such as rice, wheat, maize, potato and tobacco. Some of the problems are apparent during field-level assessments, however. Correcting nutrient deficiencies through foliar application with nano formulations alone after conventional macronutrient fertilizer has been completely replaced can lead to yield reductions and/or deficiencies because of the limited absolute amounts of nutrients supplied by commercial liquid nano products. Partial substitution (reduction of traditional soil application by 25-50% and supplementation with targeted application of foliar nano sprays) is thus defined as a scientifically sound and practically feasible approach to maintain productivity, reduce production costs and minimize environmental footprint. The review concludes nano fertilizers are promising as a complementary option to traditional nutrient management strategies for sustainable nutrient management, but to date no evidence supports their complete replacement of conventional fertilizers. More studies are required to clarify conflicting results, to determine the optimum dosage, to evaluate long term soil microbial ecotoxicity, and to develop uniform regulatory guidelines to enable safe and sustainable commercialization of nano fertilizers.

Keywords: *Nano fertilizers, Nutrient-use efficiency, Nano-urea, Nano-DAP, Sustainable agriculture.*

Abstract ID ABMC 3036

Impact of Farmer Producer Organizations (FPOs) on Livelihood of Farmers in Tamil Nadu

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Abstract

This study analyzes the economic impact of Farmer Producer Organizations (FPOs) in Tamil Nadu, with a focus on how these organizations affect farmers' livelihoods, market access, and income generation. FPOs are crucial for addressing the challenges faced by small and marginal farmers, such as limited market access, inadequate resources, and financial constraints. These organizations aim to improve the socio-economic status of farmers by pooling resources, reducing input costs, enhancing market linkages, and promoting technology adoption. The study used the Heckman two-stage selection model to analyze factors affecting farmers' income. Key factors such as farm size (0.23), high-yielding varieties (HYVs) (0.84), and input provision by FPOs (0.17) significantly impacted income. Education (coefficient = -0.05) and FPO training (0.19) also played a role, with FPO training increasing income by 33.2%. However, the dependency ratio (-0.45), KCC credit (coefficient = -0.09), age, farm size, and hired labor (-0.13) had limited or negative effects. The analysis confirmed selection bias ($\lambda = 0.11$), emphasizing the need for policies promoting farm consolidation, better access to HYVs, and effective input distribution to boost farmers' income. Household Livelihood Security (HLS) was assessed using an index across four components: education, health, food, and economic security, categorizing households into low, medium, and high security. For FPO members, the composite food security index is 0.693 (medium security), with educational security at 0.628, health security at 0.706, and economic security at 0.738, all falling within medium security. For FPO non-members, the composite livelihood security index is 0.659, with economic security (0.675) being the highest, followed by health (0.649), education (0.634), and food security (0.629). Economic factors contribute most to livelihood security. A SWOT analysis of Farmer Producer Organizations (FPOs) shows strengths in collective bargaining, market access, and women's empowerment. Weaknesses include limited managerial skills and reliance on external funding. Opportunities involve credit access and digital marketing, while threats come from market fluctuations and competition. FPOs face organizational, economic, technical, and marketing challenges. Policy suggestions to address challenges include strengthening institutional linkages for training and technical support, improving access to affordable credit, enhancing skill development, ensuring timely access to quality inputs, and creating market linkages. FPOs should focus on post-harvest infrastructure, value addition, and price stabilization. Supporting FPO formation, encouraging women and youth participation, promoting modern agricultural practices, addressing labor costs, offering financial literacy programs, and incentivizing impactful FPOs are key strategies.

Keywords: *FPO, Livelihood, Income, Employment, Value Chain.*

Abstract ID ABMC 3037

Agroforestry and Its Benefits

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Abstract

Agroforestry is a sustainable land-use system that combines trees, crops, and sometimes livestock on the same piece of land. It is an important agricultural practice that helps farmers improve productivity while conserving natural resources and protecting the environment. Agroforestry systems provide multiple benefits, including increased farm income, improved soil fertility, reduced soil erosion, better water conservation, and enhanced biodiversity. The integration of trees with agricultural crops improves the physical, chemical, and biological properties of the soil through organic matter addition and nutrient recycling. Trees also play an important role in carbon sequestration and help reduce the effects of climate change. Agroforestry provides farmers with additional products such as timber, fuelwood, fodder, fruits, medicines, and other valuable resources, which can increase economic security and reduce dependence on a single crop. Furthermore, agroforestry contributes to environmental sustainability by improving ecosystem services, conserving biodiversity, and protecting land from degradation. It can also improve the resilience of farming systems against drought, floods, and other climatic stresses. Therefore, agroforestry is considered an effective approach for achieving sustainable agriculture, environmental conservation, and improved rural livelihoods. The adoption of suitable agroforestry practices can play a significant role in ensuring food security and sustainable development in the future.

Keywords: *Agroforestry, Sustainable Agriculture, Soil Conservation, Biodiversity, Carbon Sequestration, Climate Change, Farm Income, Environmental Sustainability.*

Abstract ID ABMC 3038

Climate change and agriculture

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Abstract

Climate change poses significant challenges to agriculture, impacting global food security and livelihoods. This abstract explores the complex interactions between climate change and agriculture, emphasizing the need for adaptive strategies. Rising temperatures, altered precipitation patterns, and extreme weather events are disrupting traditional farming practices, leading to decreased crop yields and shifts in agricultural zones. The changing climate also influences pest and disease dynamics, posing additional threats to crops. Smallholder farmers, particularly in developing countries, face heightened vulnerabilities due to limited resources and adaptive capacity. Additionally, fluctuating weather patterns contribute to market uncertainties, affecting the economic viability of farming enterprises. Mitigating the impact of climate change on agriculture requires a multifaceted approach. Implementing sustainable agricultural practices, such as agroecology and precision farming, can enhance resilience and reduce environmental impacts. Furthermore, investment in research and development for climate-resilient crop varieties and livestock breeds is essential. Global collaboration is crucial to address the transboundary nature of climate change impacts on agriculture. Policymakers need to prioritize the integration of climate-smart agriculture policies, incorporating both mitigation and adaptation measures. Empowering farmers with knowledge and resources, fostering technological innovations, and creating supportive policies are integral components of a comprehensive strategy to ensure food security in the face of a changing climate.

Keywords: *Climate change, agriculture, empowering farmers.*

Abstract ID ABMC 3039

AgricultureApp For Smart Farming

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Abstract

Agriculture is one of the most important sectors of the Indian economy, and farmers require timely and accurate information for better decision-making. The Agriculture App is designed as a digital platform to provide farmers with useful agricultural information and services in a simple and accessible manner. The application can provide information related to crop selection, seed varieties, fertilizers, pesticides, irrigation, weather conditions, pest and disease management, and market prices. It can also help farmers identify common crop problems and follow suitable management practices. The main objective of the Agriculture App is to reduce the information gap between farmers, agricultural experts, and available agricultural resources. By providing information through a mobile application, farmers can access important recommendations at their convenience, potentially reducing unnecessary input costs and improving crop productivity. The app can also support sustainable farming practices by promoting balanced fertilizer use, integrated pest management, and efficient water management. Thus, the Agriculture App can serve as a useful digital tool for modern agriculture by improving access to agricultural knowledge, supporting informed decision-making, and contributing to efficient and sustainable farming.

Keywords: *Agriculture App, Smart Farming, Farmers, Crop Management, Pest and Disease Management, Weather Information, Market Prices, Digital Agriculture, Sustainable Agriculture, Agricultural Technology.*

Abstract ID ABMC 3040

Roots of Resilience: Biodiversity Conservation and Sustainable Agroecosystems among Tribal Communities of Dimoria, Assam

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Abstract

Tribal communities have traditionally maintained a close relationship with nature, developing agricultural practices that support both livelihood security and biodiversity conservation. Dimoria, Assam, represents a culturally and biologically diverse landscape where traditional farming systems, indigenous crops, livestock, forest resources, and local ecological knowledge contribute significantly to the sustainability of agroecosystems. However, changing land-use patterns, agricultural intensification, loss of traditional crop varieties, declining soil fertility, and changing climatic conditions are increasingly affecting this ecological balance. This paper explores the role of tribal communities in conserving biodiversity through traditional and sustainable agroecosystem practices in Dimoria. Practices such as mixed cropping, crop rotation, agroforestry, home gardens, use of indigenous crop varieties, organic nutrient management, traditional pest-control methods, and conservation of useful wild plants provide important ecological and economic benefits. These systems support pollinators, soil microorganisms, natural pest predators, and other components of agricultural biodiversity while enhancing soil health and climate resilience. Traditional ecological knowledge, particularly the selection and preservation of locally adapted plant species, represents an important but often under-recognized resource for biodiversity conservation. Strengthening community participation and documenting indigenous knowledge can help safeguard both biological and cultural diversity. Integrating traditional practices with appropriate scientific approaches, along with institutional support and awareness programmes, can further improve sustainable agricultural production. Conservation of biodiversity in Dimoria's agroecosystems is therefore not only an environmental priority but also an important pathway towards strengthening tribal livelihoods, food security, cultural heritage, and resilience to future environmental changes.

Keywords: *Tribal Communities; Biodiversity Conservation; Dimoria; Traditional Ecological Knowledge; Sustainable Agroecosystems*

Abstract ID ABMC 3041

The Role of Horticulture Therapy in Stress Management

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Abstract

Chronic stress is a growing public health concern linked to cardiovascular disease, anxiety, depression, and impaired immune function. Among the range of non-pharmacological interventions developed to address this problem, horticulture therapy (HT) the structured use of gardening and plant-based activities under professional guidance has emerged as a low-cost, accessible, and evidence-supported approach to stress reduction. This article examines the theoretical foundations of horticulture therapy, including the Stress Reduction Theory and Attention Restoration Theory, and reviews the physiological, psychological, and social mechanisms through which garden-based activity lowers stress. It further explores practical applications across clinical, workplace, educational, and community settings, and considers the limitations and future directions of the field. The evidence suggests that horticulture therapy offers a holistic, multisensory pathway to stress relief that complements conventional mental health treatment and can be integrated into a wide range of care and wellness programs.

Keywords: *Horticulture therapy, stress management, green care, nature-based intervention, mental health, wellbeing.*

Abstract ID ABMC 3042

Environment and Sustainability in Agriculture: A Study on Ecological Balance and Modern Farming

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Abstract

Agriculture is the foundation of human civilization, providing food, fiber, and livelihoods to billions worldwide. However, the intensification of agricultural practices has put pressure on the natural resources that support farming and human life. Sustainable agriculture seeks to balance the need for food production with the protection of natural resources and ecological systems. It encourages farming methods that can support present needs while also protecting resources for future generations. **The Objectives:** To understand the meaning and importance of environment and sustainability in agriculture, To promote farming practices that conserve soil, water, and other natural resources, To understand the role of modern technology in making agriculture more efficient and sustainable., To encourage farming methods that support biodiversity and maintain ecological balance, To promote economically viable and socially responsible agricultural practices for future generations.

Sustainable farming systems should be ecologically sound, economically viable, and socially responsible. Some important approaches are: **Regenerative Agriculture:** Focuses on restoring soil health through minimal soil disturbance, continuous soil cover, and integrating livestock. **Precision Farming:** Uses technology such as GPS, IoT sensors, and drones to apply water, fertilizers, and pesticides only where needed, reducing waste. **Agroforestry:** Integrates trees and shrubs into crop and livestock systems to support biodiversity, improve microclimates, and capture carbon. **Integrated Pest Management (IPM):** Combines biological control, mechanical practices, and resistant crop varieties to manage pests with less dependence on chemicals.

The transition to sustainable agriculture requires cooperation among farmers, policymakers, and consumers. Government support can encourage better farming practices, while investment in agricultural research can help farmers use resources more efficiently. Small farmers should also be supported with knowledge, technology, and suitable financial assistance. Reducing food waste and improving supply chains can further help create a resilient and sustainable food system. By adopting responsible farming practices, agriculture can continue to provide food and livelihoods while protecting natural resources for future generations.

Keywords: *Impact of sustainable agriculture, Environmental benefits, Maintained sustainability, Promoting good environment, Reduces environmental negative impacts.*

Abstract ID ABMC 3043

Gender & Inclusivity in Agriculture

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Abstract

Agriculture is one of the most important sectors of India, which plays a major role in food security, employment, livelihoods, and rural development. Women are an important part of the agricultural sector. They contribute to many activities such as crop production, livestock management, sowing, weeding, harvesting, post-harvest processing, packaging, and marketing. However, they often have limited access to land, credit, modern technology, training, extension services, and markets. Differences in wages, heavy physical workload, discrimination, and limited participation in decision-making also affect their social and economic empowerment. Gender inclusivity in agriculture means providing women with equal opportunities and access to resources. Providing better access to financial support, technology, knowledge, training, and markets can help women improve their productivity and take a greater role in agricultural activities and decision-making. Various government programmes such as the Agriculture Infrastructure Fund (AIF), PM-KISAN, Mission for Integrated Development of Horticulture (MIDH), National Beekeeping and Honey Mission (NBHM), Namo Drone Didi Programme, and DAY-NRLM are supporting women through financial assistance, skill development, technology, infrastructure, and livelihood opportunities. The recognition of 2026 as the International Year of the Woman Farmer (IYWF 2026) highlights the important contribution of women in agriculture. It promotes women-led Farmer Producer Organizations, entrepreneurship, skill development, and gender-responsive agricultural systems that can provide women with better economic opportunities. Empowering women in agriculture can improve productivity, sustainable rural development, and women's empowerment. Therefore, ensuring gender equality and inclusivity is important for building a more productive, sustainable, and equitable agricultural system.

Keywords: *Gender Equality, Women Farmers, Agriculture, Inclusivity, Empowerment, Rural Development.*

Abstract ID ABMC 3044

Honey Bees and Managed Pollination: Their role in Sustainable Agriculture.

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Abstract

Scientifically managed honeybees provide essential pollination services to a wide range of crops and play an important role in promoting sustainable agriculture. Honey bee species, particularly *Apis mellifera* and *Apis cerana*, pollinate and improve fruit set and seed production and therefore increase the quality and quantity of crops. Besides their direct contribution to crop productivity, managed honeybee colonies facilitate the reproduction of flowering plants and hence sustain biodiversity and strengthen agroecosystem stability. Beekeeping can also provide farmers with extra income through honey, beeswax, propolis, royal jelly, and other hive products, thereby supporting rural livelihoods. Integrating beekeeping with crop production can reduce dependence on artificial pollination and promote more efficient use of natural resources. However, managed colonies are facing threats due to pesticide exposure, habitat loss, diseases, parasites, climate change, and inadequate colony management. Therefore, sustainable agricultural systems require bee-friendly farming practices, which include responsible pesticide use, maintenance of floral resources, conservation of natural habitats, and appropriate colony management. Altogether, managed honeybees act as an important biological resource for securing productive, biodiversity-friendly, and economically sustainable agricultural systems.

Keywords: *Managed honeybees, Sustainable Agriculture, Honeybees' Importance, Conservation.*

Abstract ID ABMC 3045

Nanotechnology in Agriculture

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Abstract

Nanotechnology is an emerging field with considerable potential to transform modern agriculture by improving input-use efficiency, crop productivity, and environmental sustainability. It involves the application of materials and technologies at the nanoscale to develop advanced solutions for plant nutrition, crop protection, soil management, water use, and post-harvest handling. Nano-fertilizers can improve the targeted and controlled delivery of essential nutrients, potentially reducing nutrient losses and increasing nutrient-use efficiency. Similarly, nano-pesticides and nano-enabled delivery systems can support more precise management of pests and diseases while reducing unnecessary chemical application. Nanomaterials are also being explored for soil and water remediation, stress detection, seed treatment, and smart sensing of crop and environmental conditions. These applications may help farmers respond to challenges such as declining soil fertility, water scarcity, climate variability, and the need for sustainable intensification. However, responsible adoption requires careful assessment of the environmental fate, toxicity, food safety, cost, regulatory requirements, and long-term effects of nanomaterials on soil, plants, beneficial organisms, and human health. Therefore, nanotechnology should be integrated with conventional and sustainable agricultural practices through evidence-based research, appropriate regulation, and farmer-oriented technologies. Overall, nanotechnology offers a promising pathway toward more efficient, precise, and sustainable agriculture when its benefits are balanced with potential risks.

Keywords: *Nanotechnology; Nano-fertilizers; Nano-pesticides; Precision agriculture; Nutrient-use efficiency; Sustainable agriculture; Smart farming.*

Abstract ID ABMC 3046

Sacred Groves as Living Models for Biodiversity Conservation: A Case Study of Kangra District, Himachal Pradesh

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Abstract

Sacred groves represent one of the oldest forms of community-based conservation in India, where traditional beliefs, cultural practices, and ecological values have collectively contributed to the protection of natural habitats. These culturally protected forest patches play an important role in conserving biodiversity while also supporting essential ecosystem functions and services. Sacred groves provide habitats for rare, endemic, threatened, and medicinally important plant species and support diverse communities of wildlife, pollinators, and microorganisms. Their multilayered vegetation, continuous litter deposition, and relatively undisturbed soils contribute to nutrient cycling, soil formation, carbon storage, and other important ecological processes. Dense vegetation and canopy cover also help regulate local temperature and humidity, creating favorable microclimatic conditions and improving ecosystem resilience during environmental fluctuations. In addition, extensive root systems and vegetation cover support water retention, groundwater recharge, soil conservation, and erosion control. The ecological significance of sacred groves extends beyond biodiversity, as these landscapes contribute to carbon sequestration, climate regulation, habitat connectivity, and the sustainable use of natural resources. However, increasing urbanization, developmental activities, invasive species, changing land-use patterns, climate variability, and the gradual erosion of traditional beliefs and indigenous knowledge are placing these valuable ecosystems under growing pressure. The transformation of traditional nature-based practices and weakening community participation further increase the vulnerability of sacred groves. Strengthening community involvement and encouraging the transfer of traditional ecological knowledge between generations are therefore essential for their long-term protection. Integrating sacred groves into conservation planning, restoration programmes, climate adaptation strategies, and sustainable landscape management can enhance both ecological resilience and cultural continuity. Protecting these living landscapes offers an important nature-based pathway for conserving biodiversity, maintaining ecosystem services, mitigating climate change, and strengthening the enduring relationship between communities and nature.

Keywords: *Sacred Groves, Indigenous Knowledge, Biodiversity Conservation, Ecosystem Services, Carbon Sequestration.*

Abstract ID ABMC 3047

Greenwashing In Agri-Business Marketing: A Content Analysis Of Sustainability Claims by Indian Agri-Startups

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Abstract

The burgeoning agri-tech and agri-business startup ecosystem in India has witnessed a prolific use of green-eco marketing lingo, ranging from 'eco-friendly', 'organic', 'carbon-neutral', to "farm-to-fork sustainable" across their digital and physical material. Yet, the actual implementation of such claims, if any, remains unclear. This study seeks to (1) identify the frequency and nature of such claims made by Indian agri-startups in their marketing communication, (2) evaluate whether such claims bear any credible proof, certification or evidence, and (3) classify the types of greenwashing, if any, through an application of vagueness and verifiability framework. The study will adopt a qualitative content analysis approach, whereby a sample size of 25-30 Agri-based start-ups (across agri-inputs, D2C organic produce, and agri-fintech segments) will be selected on the basis of their online marketing visibility. The content on their websites, packaging, and social media content will be catalogued applying a greenwashing indicator checklist (developed on the basis of Seven Sins of Greenwashing framework, by TerraChoice). Initial observations indicate that the majority of the shortlisted start-ups display vague unsubstantiated claims on their website or packaging, rendering them susceptible to high risk of greenwashing accusations. The study anticipates to find a differential distribution of greenwashing indicators across funding stages and company sizes; with early-stage start-ups found to demonstrate higher vagueness. The study will contribute to a growing body of literature on greenwashing in the start-up ecosystem, while also providing actionable insights to ESG due diligence practitioners and ESG investors.

Keywords: *Greenwashing, Agri-startups, Sustainability Marketing, Content Analysis, ESG.*

Abstract ID ABMC 3048

Biodiversity Conservation: Significance of Biodiversity Act 2002

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Abstract

The Biological Diversity Act, 2002 has been framed to provide a legal framework to promote sustainable and fair use of biological resources. The act has been enacted to meet the objectives of the Convention on Biological Diversity (CBD) and it emphasizes on the significance of biological resources and the rights of dependent communities. It provides National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), and Biodiversity Management Committees (BMCs) for biodiversity governance and community participation. This framework is particularly significant for the Indian Himalaya which holds high plant diversity, including numerous medicinal, aromatic, endemic, and economically valuable plant species. The region possesses around 1,700 plant species of medicinal value which also fulfil the needs of native people. The Act regulates access to biological resources and associated knowledge and provides mechanisms for Access and Benefit Sharing for local communities. The preparation of People's Biodiversity Registers (PBRs) by BMCs is important as it documents local biological resources and traditional knowledge of their use, resulting in their conservation. In Himachal Pradesh, biodiversity institutions have established BMCs and undertaken PBR preparation demonstrating the potential of decentralized governance for strengthening local participation in biodiversity conservation. Effective implementation of the Act can therefore contribute to promote sustainable harvesting of medicinal plants protecting threatened and endemic species, conserving traditional knowledge, and supporting community-based resource management. Scientific monitoring of harvesting levels, improved documentation of traditional knowledge, and transparent mechanism of benefit sharing can transform the legislative provisions into effective conservation results.

Keywords: *Access and benefit sharing, Biodiversity conservation, Medicinal plants, Sustainable development, Traditional knowledge.*

Abstract ID ABMC 3049

Dose Optimization of Foliar-Applied Methyl Jasmonate for Improving Growth, Photosynthetic Efficiency, and Secondary Metabolite Production in Fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

Trigonella foenum-graecum L. (fenugreek) is an aromatic plant with considerable economic value due to its therapeutic, cosmeceutical, and pharmacological properties. This plant is characterized by the presence of active agents, such as trigonelline, which demonstrate qualities that are antidiabetic, hypercholesterolemic, and anticarcinogenic. The present study focuses on the putative roles of methyl jasmonate (MeJA), a signalling molecule, in plant growth and development. Foliar application of MeJA at different concentrations (0, 25, 50, 100, and 200 μ M) in fenugreek improved plant productivity. The maximum growth, photosynthetic efficiency, physiological responses, and secondary metabolite production were observed at the optimal concentration of MeJA (50 μ M) compared to the controls. The optimum concentration markedly augmented plant biomass, seed production, and numerous characteristics, including total chlorophyll, carotenoids, chlorophyll fluorescence, carbonic anhydrase and nitrate reductase activities, osmolytes, and secondary metabolites. The findings suggest that MeJA enhances overall fenugreek growth and stimulates secondary metabolite production by activating various metabolic pathways. The results demonstrate that the response of fenugreek to MeJA is concentration-dependent and that an appropriately optimized foliar dose (50 μ M) can simultaneously enhance vegetative growth, photosynthetic efficiency, and phytochemical production. Overall, the study highlights foliar MeJA application as a promising elicitation strategy for improving the physiological performance and medicinal quality of fenugreek and provides a basis for selecting an effective concentration for future stress-mitigation and phytochemical-enhancement studies.

Keywords: Fenugreek, signaling molecule, photosynthetic pigments, antioxidant activity, secondary metabolites.

Abstract ID ABMC 3050

Pollinators, Predators and Soil Fauna: Conserving Animal Biodiversity for Resilient Agroecosystems

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Abstract

Agroecosystems are dynamic ecological systems in which biodiversity plays a fundamental role in maintaining productivity, stability and resilience. Among the diverse animal communities associated with agricultural landscapes, pollinators, predatory organisms and soil fauna perform critical ecological functions that directly and indirectly support sustainable crop production. But agricultural intensification, excessive pesticide use, habitat fragmentation, monoculture, climate change and degradation of soil quality are increasingly threatening this functional biodiversity. Pollinators, particularly bees, butterflies, moths, hoverflies and other flower-visiting insects, are essential for the reproduction of numerous crops and contribute substantially to fruit and seed production. Predatory insects and spiders provide natural pest regulation by suppressing herbivorous insect populations and thereby reducing dependence on chemical pesticides. Equally important, soil fauna such as earthworms, nematodes, mites, springtails and other soil-dwelling invertebrates contribute to decomposition, nutrient cycling, soil aggregation, aeration and maintenance of soil health. This paper highlights the importance of conserving these functional faunal groups as an integral component of sustainable agroecosystem management. Conservation strategies include maintenance of natural and semi-natural habitats, flowering strips, reduced and selective pesticide application, ecological intensification, crop diversification, conservation agriculture and creation of suitable refugia for beneficial organisms. The integration of traditional ecological knowledge with modern approaches such as GIS-based biodiversity mapping, remote sensing, ecological monitoring and digital identification of insects can further strengthen conservation planning. The paper emphasizes that agricultural biodiversity should not be viewed merely as a conservation concern but as a biological asset providing essential ecosystem services. Integrating zoological knowledge into agricultural planning can enhance pollination, biological pest control, soil fertility and ecosystem resilience, ultimately contributing to sustainable food production and improved livelihoods.

Keywords: *Agroecosystems, animal biodiversity, pollinators, predators, soil fauna, ecosystem services, biological control, conservation, sustainable agriculture.*

Abstract ID ABMC 3051

MICROPROPAGATION: A BIOTECHNOLOGICAL TOOL FOR CONSERVATION OF MEDICINAL PLANTS FOR SUSTAINABLE AGRICULTURE

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Abstract

Medicinal plants have been used for prevention and treatment of various diseases since antiquity worldwide. Many of these are important resources for drug formulation in Ayurvedic and Unani medicines, which were developed long ago and serve a large part of the population in the country. At present, most pharmaceutical industries are highly dependent on wild medicinal plants for the supply of raw materials for extraction of bioactive compounds. Due to the high demand and overexploitation of medicinal plants, lack of proper cultivation practices, and destruction of plant habitats by natural calamities or deforestation, many medicinal species are at risk of extinction. There is an urgent need to explore the possibilities of conserving high-value medicinal plants. This article focuses on the capability of micropropagation, a tissue culture technique, as a tool in sustainable agriculture for rapid multiplication, conservation and large-scale production of medicinal plants. Micropropagation facilitates the mass production of disease-free and genetically identical clonal plants of a plant species from plant tissue or organs in defined media under aseptic conditions and in a controlled environment, in a short period and throughout the year. Micropropagation allows large-scale production of medicinal plants without exploiting wild medicinal plants and provides a regular supply of healthy plants for medicinal production. These in vitro-grown plants can be planted on farms so that farmers can grow them sustainably. Moreover, micropropagation helps protect endangered and economically significant medicinal plants. Thus, micropropagation is becoming beneficial for medicinal plant conservation and sustainable agriculture by increasing the number of plants for present and future use.

Keywords: *Micropropagation, sustainable agriculture, rapid multiplication, clonal plants, conservation.*

Abstract ID ABMC 3052

Zoonotic Malaria: The Role of Wildlife Hosts and Animal Reservoirs in Emerging Disease Transmission

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Abstract

Zoonotic malaria is an emerging public health concern that highlights the complex relationships among wildlife, parasites, mosquito vectors, humans and the environment. While human malaria has traditionally been associated with *Plasmodium falciparum* and *Plasmodium vivax*, several *Plasmodium* species naturally maintained in non-human primates have demonstrated the capacity to infect humans. Among these, *Plasmodium knowlesi* has emerged as an important example of zoonotic malaria, particularly in Southeast Asia, where macaques serve as natural reservoir hosts and *Anopheles* mosquitoes act as vectors. The increasing recognition of zoonotic malaria emphasizes the importance of understanding wildlife reservoirs and animal–human interfaces in the emergence and transmission of infectious diseases. Wildlife hosts play a crucial role in maintaining parasite populations within natural ecosystems. Environmental disturbances, including deforestation, habitat fragmentation, agricultural expansion and climate change, can alter the distribution and behaviour of wildlife and mosquito vectors, thereby increasing opportunities for contact between humans, reservoir hosts and vectors. Such ecological changes may facilitate cross-species transmission and contribute to the emergence of new disease patterns. Animal science and zoological research are therefore essential for investigating host ecology, parasite diversity, vector behaviour and the mechanisms underlying host switching and pathogen spillover. Animal surveillance and molecular identification of *Plasmodium* species in wildlife populations can provide valuable information regarding parasite reservoirs and potential transmission pathways. Integrating wildlife ecology, parasitology, entomology, veterinary science and public health through a One Health approach is essential for effective surveillance and prevention. This abstract highlights the critical role of wildlife hosts and animal reservoirs in zoonotic malaria transmission. Improved understanding of animal–parasite–vector interactions, coupled with ecological monitoring and interdisciplinary research, will strengthen early detection, disease surveillance and the development of sustainable strategies to reduce the risk of zoonotic malaria and other emerging vector-borne diseases.

Keywords: *Zoonotic malaria, Plasmodium knowlesi, Wildlife reservoirs, Non-human primates, Anopheles, Emerging diseases, One Health.*

Abstract ID ABMC 3053

Green-Synthesized Silver Nanoparticles from *Erigeron bonariensis* Exhibit Enhanced Bioherbicidal Activity Against *Amaranthus viridis* Retz. Compared with Leaf Aqueous Extract

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Abstract

The increasing problem of herbicide resistant weeds has necessitated the search for sustainable and environmentally compatible alternatives for weed management. The current study is designed to evaluate the comparative bioherbicidal activity of leaf extract of *Erigeron bonariensis* and its biosynthesized silver nanoparticles (AgNPs) against *Amaranthus viridis*. *E. bonariensis* aqueous leaf extract having strong allelopathic potential was used as a reducing and stabilizing agent for green synthesis of AgNPs. The synthesized nanoparticles were characterized by UV-Vis spectroscopy, SEM, TEM, FTIR, XRD and EDX analyses, which confirmed their spherical morphology and uniform distribution. The average particle size of AgNPs was 19.1 nm, with a zeta potential of -23.6 mV, indicating good stability and dispersion. The results of bioassay indicated that both leaf extract and AgNPs inhibited the germination percentage, seedling vigor, morphological growth and biochemical parameters of *A. viridis* in a concentration-dependent manner and AgNPs showed more phytotoxicity than the crude extract. Moreover, the increased oxidative stress markers and reduced chlorophyll contents indicated the induction of physiological stress mediated by allelochemical-nanoparticle interactions. Overall, the findings indicate that integrating allelopathy with green nanotechnology provides a promising eco-friendly strategy for sustainable weed control, reducing reliance on synthetic herbicides.

Keywords: *Erigeron bonariensis*, Bioherbicidal activity, Green synthesis, Silver nanoparticles, Allelopathy, *Amaranthus viridis*.

Abstract ID ABMC 3054

Paddy Leaf Disease Detection and Classification Using Machine Learning and Deep Learning Techniques

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Abstract

Paddy (*Oryza sativa* L.) is one of the most important staple food crops and plays a central role in global food security. However, paddy production is considerably affected by fungal, bacterial and viral diseases, which can reduce crop yield and quality when appropriate management measures are not implemented at an early stage. Conventional disease identification generally relies on visual examination by farmers or agricultural experts and may be subjective, labour-intensive and time-consuming. Consequently, image processing, machine learning (ML), computer vision and deep learning (DL) have increasingly been investigated for automated paddy disease detection and classification. This review critically examines the development of image-based approaches for paddy leaf disease identification, with particular emphasis on image acquisition, preprocessing, segmentation, feature extraction, traditional ML algorithms, convolutional neural networks (CNNs), transfer learning, hybrid architectures and emerging field-deployment technologies. Existing datasets and their influence on model generalization are also examined. Traditional ML methods generally depend on manually engineered colour, texture and morphological features, whereas DL approaches can learn discriminative representations directly from images. Recent studies demonstrate the potential of CNN and transfer-learning models; however, reported performance is strongly influenced by dataset size, image quality, disease diversity, experimental conditions and validation strategy. Recent systematic reviews also highlight persistent challenges involving dataset diversity, domain adaptation, interpretability, computational requirements and real-world deployment. This review therefore identifies key research gaps and proposes future directions involving diverse field datasets, explainable artificial intelligence, lightweight models, UAV-assisted monitoring, multimodal sensing and integrated decision-support systems for precision paddy disease management.

Keywords: *Paddy; rice; leaf disease; machine learning; deep learning; image processing.*

Abstract ID ABMC 3055

Integrated Pest and Disease Management under Changing Climate: A Multidisciplinary Strategy for Climate-Resilient and Sustainable Agriculture

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Abstract

Climate change is increasingly threatening agricultural productivity and food security by altering temperature, rainfall, humidity, cropping seasons, and agroecosystem dynamics. These changes can influence the distribution, population dynamics, and severity of insect pests and plant diseases, increasing the frequency and unpredictability of outbreaks. Excessive dependence on synthetic pesticides may provide immediate control but can lead to pesticide resistance, pest resurgence, environmental contamination, and loss of beneficial organisms. Hence, climate-responsive and sustainable Integrated Pest and Disease Management (IPDM) is essential for resilient crop production. IPDM integrates multiple compatible strategies, including resistant cultivars, crop rotation, intercropping, field sanitation, balanced nutrient management, biological control, botanical pesticides, microbial antagonists, pheromone traps, conservation of natural enemies, and need-based pesticide application. The integration of agronomy, entomology, plant pathology, microbiology, climatology, biotechnology, remote sensing, artificial intelligence, and agricultural extension can enhance early detection, forecasting, and timely management of emerging pest and disease threats. Weather-based forecasting, digital surveillance, remote sensing, and decision-support systems can reduce unnecessary pesticide applications while improving crop protection efficiency. Strategic approaches such as ecological engineering, climate-smart farming, farmer participation, and location-specific IPDM can improve agroecosystem resilience while reducing production risks and environmental impacts. Strengthening farmer awareness, extension services, institutional coordination, and access to affordable technologies is crucial for successful adoption. Thus, multidisciplinary and preventive IPDM can reduce crop losses, minimize pesticide dependence, conserve biodiversity, and contribute significantly to climate-resilient and sustainable agriculture.

Keywords: *Climate change, IPDM, biological control, pest forecasting, precision agriculture, sustainable crop protection.*

Abstract ID ABMC 3056

Ethanomedicinal and Traditional Uses of Some Grasses Of Shivalik Range Of Himachal Pradesh

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Abstract

The Shivalik range of Himachal Pradesh, representing the outermost foothills of the Himalayas, harbors a rich diversity of grasses that are deeply interwoven with the traditional healthcare and livelihood practices of local communities. The present study documents the ethnomedicinal and traditional uses of selected grasses from this region. Field surveys were conducted during 2023-2025 in districts falling under the Shivalik tract i.e., Kangra, Hamirpur, Bilaspur, Solan and Sirmour. Ethnobotanical information was collected through semi-structured interviews, questionnaires and group discussions with local vaidyas, pastoral Gujjar communities and elderly villagers. A total of 22 grass species belonging to 18 genera of family Poaceae were documented. Prominent species include *Cynodon dactylon*, *Desmostachya bipinnata*, *Imperata cylindrica*, *Themeda triandra*, *Dichanthium annulatum*, *Chrysopogon zizanioides* (syn. *Vetiveria zizanioides*) and *Saccharum spontaneum*. These are considered for documentation of their traditional applications. *C. dactylon* was found to be most versatile, used for wound healing, nose bleeding, and as an antidiabetic. *D. bipinnata* and *S. spontaneum* are used in religious rituals and for diuretic and urinary disorders. Root decoction of *C. zizanioides* is used for cooling and fever, while *I. cylindrica* is used for cattle ailments and thatching. The study reveals that grasses, often neglected in ethnobotanical studies in comparison to medicinal herbs and trees, play a crucial role in primary healthcare and cultural practices. Documentation of this indigenous knowledge is essential for conservation and for further phytochemical and pharmacological validation.

Keywords: *Ethanomedicinal Uses, Grasses, Poaceae, Traditional Uses, Shivalik, Himachal Pradesh.*

Abstract ID ABMC 3057

Morphological and Ethnobotanical Assessment of Some Foliose Lichens from Himachal Pradesh

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Abstract

Foliose lichens of Himachal Pradesh represent a significant reservoir of bioactive secondary metabolites and traditional knowledge. The present study deals with morphological and ethnobotanical aspects of seven dominant foliose species: *Parmotrema tinctorum*, *Parmotrema austrosinense*, *Parmotrema nilgherrense*, *Flavoparmelia caperata*, *Punctelia borrieri*, *Dermatocarpon vellereum* and *Xanthoparmelia tinctina* collected from Sikandra Dhar (Mandi), Potter Hill (Shimla), Sanjauli, Kangra regions on bark and siliceous rocks. Morphologically, *Parmotrema* spp. are characterized by large, loosely adnate thalli (8-20 cm), broad rotund lobes with marginal cilia, and presence of isidia/soredia. *P. tinctorum* is isidiate with lecanoric acid and atranorin. *P. nilgherrense* is an eciliate-sorediate rich in alectoronic acid. *P. austrosinense* is sorediate with hymecromone and phenolics. *Flavoparmelia caperata* shows yellow-green upper cortex due to usnic acid with protocetraric and caperatic acids, lower surface black with brown margins. *Punctelia borrieri* is distinguished by white punctiform pseudocyphellae on the upper surface and lecanoric acid. *Dermatocarpon vellereum* is umbilicate, monophyllous, leathery, dark brown, umbilicate attachment on rocks. *Xanthoparmelia tinctina* is a yellow-green saxicolous foliose with salazinic and usnic acid, narrow sublinear lobes. Ethnobotanically, *P. nilgherrense* represents Grade-I commercial lichen for export, resinoid extraction and high-grade perfumery. *P. tinctorum* and *P. austrosinense* are used as spice in Garam Masala, meat flavouring. *F. caperata* is traditionally applied as wound-healing powder and as natural dye yielding brown (boiling water) to light-purple (ammonia fermentation) on cotton. *P. borrieri* is documented in Himachal folk medicine as decoction for chronic dermatitis, uterine bleeding, blurred vision, sores and swelling, and as an α -amylase inhibitor. *X. tinctina* is recorded as raw material for antibiotics and shows strong reducing power and neuroprotective activity, besides accumulating heavy metals for phytoremediation and biomonitoring of air pollution.

Keywords: *Antimicrobial, bioactive metabolites, lecanoric acid, Himachal Pradesh.*

Abstract ID ABMC 3058

Technological Innovations Driving the Transition from Conventional to Smart Agriculture

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Abstract

Agriculture has historically relied on traditional knowledge, human effort, natural resources and conventional practices. However, rising population, changing climate, depleting water resources, deteriorating soil health and growing food requirements have necessitated a shift towards more efficient and sustainable systems. Smart farming, driven by technological advancement, is revolutionizing conventional agriculture through the integration of digital tools, automation, data analytics and precision farming approaches. Advanced technologies including Artificial Intelligence, Internet of Things, unmanned aerial vehicles, GPS, sensors, remote sensing, robotics and mobile-based applications enable farmers to make precise and timely decisions. Precision agriculture facilitates real-time assessment of soil moisture, crop condition, meteorological parameters and nutrient status. This helps in judicious use of water, fertilizers and plant protection chemicals, thereby lowering input costs and minimizing environmental pollution. Drones and satellite-based monitoring allow early detection of diseases, pest attacks and crop stress, ensuring prompt management. Smart irrigation improves water productivity by supplying water as per crop need and soil-weather conditions. AI-based and data-driven tools further assist in yield forecasting, weather prediction, market intelligence and risk mitigation. These technologies collectively enhance productivity, profitability, resource-use efficiency and climate resilience. Nevertheless, adoption remains limited due to high initial investment, poor digital awareness, weak internet connectivity in rural areas and lack of technical skills, especially among small and marginal farmers. Hence, low-cost solutions, capacity building of farmers, financial assistance and enabling policy support are crucial for wider adoption.

Keywords: *Smart farming, precision agriculture, artificial intelligence, sustainable agriculture, IoT and Automation.*

Abstract ID ABMC 3059

Comparative Assessment of Different Nutrient Management Practices on Crop Growth and Microbial Biomass in a Rice–Wheat Cropping System

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Abstract: Sustainable nutrient management is essential for maintaining crop productivity and improving soil biological properties in intensive cropping systems. The present study was conducted to comparatively assess the effect of different nutrient management practices on crop growth and soil microbial biomass in a rice–wheat cropping system during 2024-25 at the Norman E. Borlaug Crop Research Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. The experiment was laid out in a randomized block design with four replications. The treatments comprised absolute control, Natural Farming based on Beejamrit + Ghanjeevamrit + Jeevamrit with crop-residue mulching, AI-NPOF organic nutrient management package, integrated nutrient management, integrated crop management and recommended dose of fertilizers. Crop growth was assessed through plant height and number of tillers m⁻² at different growth stages of rice and wheat. Soil biological response was evaluated through microbial biomass carbon (MBC) and microbial biomass nitrogen (MBN). The results revealed that different nutrient management practices had a marked influence on crop growth and soil microbial biomass. Natural Farming and the AI-NPOF organic nutrient management package showed favourable performance in terms of plant height and tiller production compared with the absolute control. Both treatments also resulted in improved MBC and MBN, indicating enhanced microbial biomass and greater biological activity in the soil. The response of crop growth and microbial biomass varied among the nutrient management practices, demonstrating the importance of nutrient source and management strategy in influencing crop–soil interactions. The study demonstrated that nutrient management practices incorporating organic and biological inputs can improve crop growth and soil microbial biomass in a rice–wheat cropping system. Natural Farming based on Beejamrit, Jeevamrit, Ghanjeevamrit and crop-residue mulching, along with the AI-NPOF organic nutrient management package, showed promising potential for enhancing soil biological properties while supporting crop growth. These practices may therefore contribute to the development of sustainable nutrient management strategies for rice–wheat production.

Keywords: *Nutrient management, Natural Farming, rice–wheat, crop growth, microbial biomass carbon.*

Abstract ID ABMC 3060

Food Security and Hunger Alleviation Strategies: A Multidisciplinary Pathway towards Sustainable Agriculture

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Abstract

Food security is one of the major challenges facing the world today, especially in developing regions where poverty, population growth, climate change, and limited access to nutritious food continue to affect vulnerable communities. Food security is not only about producing enough food, it also depends on whether people can access safe, affordable, and nutritious food throughout the year. Changing climatic conditions, water scarcity, declining soil fertility, loss of biodiversity, and rising input costs are making farming increasingly difficult for small and marginal farmers. Addressing hunger requires a balanced approach that combines sustainable farming practices with better resource management and improved livelihoods. Crop diversification through the inclusion of millets, pulses, oilseeds, vegetables, and fruits can improve nutritional security while reducing production risks. Practices such as integrated farming systems, agroforestry, efficient water management, soil health improvement, and climate-resilient crop varieties can help farmers maintain production under changing environmental conditions. At the same time, technologies such as precision farming, digital advisory services, remote sensing, and improved storage and processing facilities can help reduce resource wastage and post-harvest losses. However, increasing production alone cannot eliminate hunger. Strong agricultural extension services, better market linkages, farmer organizations, value addition, and greater participation of women and rural youth are equally important. Local food systems, traditional knowledge, and community-based initiatives can also play a valuable role in improving access to nutritious food. Therefore, food security and hunger alleviation require coordinated efforts from farmers, researchers, policymakers, industries, and local communities. Combining agricultural productivity with nutrition, income security, environmental protection, and equitable access to resources can help build resilient and sustainable food systems capable of meeting the needs of present and future generations.

Keywords: *Food security, hunger alleviation, sustainable agriculture, climate resilience, crop diversification, nutrition security, food systems, rural development.*

Abstract ID ABMC 3061

Agriculture Advancement and Sustainable Production

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Abstract

Agriculture is essential for food security, rural livelihoods, and economic development; however, increasing population, climate variability, declining soil fertility, water scarcity, and excessive dependence on external inputs are challenging the sustainability of agricultural production. Agriculture advancement must therefore integrate modern scientific approaches with resource-conserving and ecologically responsible practices. Sustainable production aims to increase productivity and profitability while maintaining soil health, conserving natural resources, protecting biodiversity, and ensuring food security for future generations. To promote crop improvement and precision agriculture for higher productivity, resource-use efficiency, and climate resilience. To improve soil health through balanced nutrient management and efficient use of organic and inorganic inputs. To encourage sustainable farming practices that conserve soil, water, biodiversity, and other natural resources. To strengthen integrated pest and disease management for safer and environmentally responsible crop protection. Improved and climate-resilient crop varieties, supported by GPS, IoT sensors, drones, and site-specific management, can optimize the use of seed, water, fertilizers, and pesticides while reducing input losses. Soil testing, balanced fertilization, organic amendments, biofertilizers, crop residues, and integrated nutrient management can maintain soil fertility, improve nutrient-use efficiency, and sustain long-term productivity. Crop rotation, conservation agriculture, mulching, agroforestry, integrated farming systems, and efficient water management can conserve resources, enhance biodiversity, and strengthen farm resilience. Integrated Pest and Disease Management: Combining resistant varieties, biological control, cultural and mechanical methods, monitoring, and need-based chemical application can reduce pest pressure and minimize environmental risks. The future of agriculture depends on integrating innovation with sustainability. Wider adoption of precision technologies, improved varieties, soil-health-based nutrient management, and integrated crop protection can create productive, climate-resilient, and economically viable farming systems. Collaboration among farmers, researchers, policymakers, and industries, along with farmer education and accessible technologies, will be essential to achieve sustainable agricultural advancement and ensure food and livelihood security for future generations.

Keywords: *Crop Improvement; Precision Agriculture; Soil Health; Sustainable Farming; Integrated Pest and disease Management (IPDM).*

Abstract ID ABMC 3062

Food Science ,Nutrition & Security

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Abstract

Food science, nutrition and food security are closely connected to human health, well-being and sustainable development. Food science focuses on the study of food composition, processing, preservation and safety, while nutrition explains how nutrients support growth, development and overall health. Food security ensures that all people have regular access to sufficient, safe and nutritious food. A balanced diet containing carbohydrates, proteins, fats, vitamins, minerals, fibre and adequate water is essential for maintaining good health and preventing nutrition-related problems. Modern food processing and preservation technologies can improve food quality, safety and availability, but they should be used responsibly to retain nutritional value. Sustainable agriculture, reduction of food waste, awareness about healthy diets and improved access to nutritious foods are important for strengthening food security. Therefore, an integrated approach involving food science, nutrition education and sustainable food systems is essential for building a healthier and more food-secure society. Food safety is also a major concern, as contamination and poor handling can lead to food-borne illnesses. Ensuring safe food from farm to fork requires proper hygiene, quality control and adherence to food safety standards. In addition, promoting local and seasonal foods, along with balanced diet education, helps in good nutrition and prevents malnutrition in all age groups. In conclusion, food science, nutrition and food security work together to ensure access to safe, nutritious and sustainable food for present and future generations. This not only improves individual health but also supports the economic growth and overall development of the nation.

Keywords: *Food Science, Nutrition, Food Security, Food Safety, Balanced Diet, Sustainable Food Systems.*

Abstract ID ABMC 3063

Organic Farming and Their Roles in Sustainable Agriculture

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Abstract

Organic farming is a method of agriculture that mainly depends on natural resources and processes rather than synthetic fertilizers and pesticides. It focuses on maintaining healthy soil, protecting the environment, and producing safe and nutritious food. Practices such as the use of farmyard manure, compost, green manure, biofertilizers, crop rotation, mixed cropping, and biological pest control are commonly used in organic farming. These practices help farmers maintain soil fertility and reduce the harmful effects of excessive chemical use. Organic farming has an important role in sustainable agriculture because it helps maintain the natural balance of the farming ecosystem. Adding organic matter to the soil improves its structure, water-holding capacity, and microbial activity. It also supports useful organisms such as earthworms and beneficial insects. Reduced use of chemical pesticides and fertilizers helps protect soil, water, and biodiversity from pollution. Crop rotation and other diversified farming practices can also reduce pest problems and improve the long-term productivity of farmland. Another important benefit of organic farming is its contribution to climate-friendly agriculture. Healthy soils can store more organic carbon, while the use of locally available organic inputs can reduce dependence on energy-intensive chemical fertilizers. Organic farming also encourages farmers to recycle crop residues and animal waste, making better use of farm resources. However, organic farming also has some challenges, including higher labour requirements, limited availability of organic inputs, certification difficulties, and possible lower yields during the initial conversion period. With proper training, scientific support, better markets, and suitable government policies, these challenges can be reduced. Overall, organic farming can play a significant role in making agriculture more environmentally friendly, resource-efficient, and sustainable. It provides a way to produce food while protecting the soil and natural resources needed by future generations.

Keywords: *Organic farming, sustainable agriculture, soil fertility, biodiversity, environmental conservation, natural resources, climate-resilient agriculture.*

Abstract ID ABMC 3064

Food Security and Hunger Alleviation Strategies

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Abstract

Food security is an important global concern because every person should have regular access to sufficient, safe, and nutritious food for a healthy life. Despite improvements in agricultural production, hunger and malnutrition continue to affect many people due to poverty, unemployment, climate change, conflicts, food wastage, and unequal access to resources. Ensuring food security therefore requires more than simply increasing food production; it also involves improving people's access to food and making food systems more sustainable and resilient. Agriculture plays a major role in reducing hunger by increasing the availability of food and providing income and employment to rural communities. Strategies such as sustainable farming, improved irrigation, climate-resilient crops, better storage facilities, and efficient use of natural resources can help increase agricultural productivity. Supporting small and marginal farmers through affordable inputs, access to credit, modern technologies, better markets, and agricultural extension services is also important. Hunger alleviation also depends on strong social and economic support systems. School meal programmes, food distribution schemes, nutrition programmes, and employment opportunities can help vulnerable families meet their basic food needs. Reducing post-harvest losses and food wastage can further improve the availability of food without putting additional pressure on agricultural resources. At the same time, promoting nutritional awareness and encouraging diverse diets can help address hidden hunger and malnutrition. Climate change is becoming an additional challenge to food security by affecting crop yields, water availability, and farming conditions. Therefore, climate-smart agriculture, crop diversification, efficient water management, and improved disaster preparedness are increasingly important. Overall, eliminating hunger requires coordinated efforts from farmers, governments, communities, researchers, and the private sector. A combination of productive and sustainable agriculture, poverty reduction, improved food distribution, nutrition support, and better access to resources can help create a food system that is more secure, inclusive, and capable of meeting the needs of present and future generations..

Keywords: *Food security, hunger alleviation, sustainable agriculture, food systems, climate change, malnutrition, nutrition security.*

Abstract ID ABMC 3065

Development of a Biodegradable Nursery Pot Using Locally Available Organic Materials for Sustainable Agriculture

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Abstract

The extensive use of plastic nursery pots in crop and horticultural production contributes to plastic waste and creates environmental concerns associated with disposal. Therefore, there is a need for affordable, biodegradable and environmentally friendly alternatives that can be produced using locally available materials. The present study focuses on the development of a biodegradable nursery pot using a mixture of flour, cow dung, straw, soil and water. Flour was used as a natural binding material, while cow dung, straw and soil provided structure and organic matter to the pot. The materials were mixed in appropriate proportions, moulded into pot shapes and dried to obtain a firm biodegradable container suitable for raising plants. The developed pot is intended to provide an alternative to conventional plastic nursery containers while utilizing locally available agricultural materials and organic waste. The proposed technology has potential to reduce dependence on plastic nursery pots, promote the productive utilization of agricultural and livestock waste, and support low-cost and environmentally sustainable nursery production and it allows root extension into the soil without damage to the roots and also provides nutrients to the plants. Such locally adaptable innovations can contribute to sustainable agricultural practices and circular resource management, particularly among small-scale farmers and nursery growers.

Keywords: *Biodegradable pot, sustainable agriculture, cow dung, agricultural waste, nursery production, organic materials.*

Abstract ID ABMC 3066

Eco-Engineers of the soils: Earthworms in Environmental pollution mitigation

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Abstract

The growing problem of soil contamination necessitates creative solutions to lessen its harmful impacts on ecosystems and human health .Earthworms, who are frequently referred to as nature's engineers, are essential to the fertility and health of soil.The various ways that earthworms can help fight soil pollution as soil engineers are examined in this research.Through bioaccumulation and biochemical changes, it explores their potential for bioremediation of polluted soils.It also talks about how earthworms can improve microbial activity, soil structure, and nutrient cycling, which can help polluted soils recover and become sustainable.This study emphasizes the effectiveness of earthworm-based remediation techniques as economical and environmentally beneficial approaches.- to tackle soil pollution, a worldwide issue.

Keywords: *Bioremediation ,bioaccumulation,Restoration*

Abstract ID ABMC 3067

Digital Agriculture and Smart Farming: Advancing Sustainable Agricultural Production

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Abstract

Digital agriculture and smart farming are emerging as important approaches for improving agricultural productivity, resource-use efficiency and sustainability. The integration of digital technologies such as remote sensing, sensors, mobile applications, artificial intelligence, data analytics and precision farming tools can support farmers in making timely and informed decisions. The present abstract aims to highlight the role of digital agriculture and smart farming in addressing major challenges such as increasing production costs, inefficient use of inputs, climate variability and the need for sustainable management of natural resources. The study is based on a review of available concepts and applications of digital technologies in agriculture, with emphasis on precision input management, crop monitoring, weather-based decision making and data-driven farm management. The potential benefits and limitations of adopting smart farming technologies are considered from the perspective of sustainable agricultural development. Digital technologies can improve the accuracy and efficiency of farm operations by enabling better monitoring of crops and soil, optimizing the application of water and fertilizers, and supporting early identification of crop stress and production risks. Smart farming can also contribute to reduced input wastage, improved farm productivity and better resource conservation. However, high initial investment, limited digital literacy, poor connectivity and lack of technical support may restrict adoption, particularly among small and marginal farmers. Strengthening farmer training, digital infrastructure, affordable technology and extension services is therefore essential. Overall, digital agriculture and smart farming have significant potential to promote more productive, efficient and environmentally sustainable agricultural systems.

Keywords: *Digital Agriculture, Smart Farming, Precision Agriculture, Artificial Intelligence, Sustainability*

Abstract ID ABMC 3068

Guryal (*Bauhinia variegata* L.): An Underutilized Himalayan Vegetable with Nutritional and Income Generation Potential in Tehri Garhwal, Uttarakhand

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Abstract

Guryal (*Bauhinia variegata* L.), often referred to locally as Kachnar or Guryal, is a wild vegetable that is traditionally eaten in Uttarakhand's Himalayan area. During the flowering season, immature Guryal flower buds are harvested and frequently used to make pickles, vegetables, and other traditional foods. The plant is still mostly underutilised and has had relatively little attention as a viable horticultural and commercial crop, while being linked for generations to the traditional food system of mountain tribes. Guryal can add to the diversity of diets in rural communities and has significant nutritional value. The vegetable is useful as a traditional cuisine as well as a possible functional food resource since the edible flower buds are a source of nutrients and contain advantageous compounds. Its unique flavour and seasonal availability make it even more valuable to local customers. However, its widespread use is limited by its reliance on wild harvest, restricted scientific cultivation methods, insufficient processing facilities, and weak market connections. Guryal is a significant underutilised vegetable in the area that Tehri Garhwal has a lot of potential to promote. Maintaining the availability of high-quality planting material and lessening the strain on naturally existing plants can be achieved by scientific cultivation and multiplication, as well as appropriate harvesting and post-harvest care. Products like pickles, dried flower buds, and other processed foods can add value, increase shelf life, and open up new markets. For rural women and small farmers in particular, local selling and small-scale processing can offer new sources of income. Therefore, promoting Guryal can help enhance livelihoods in Tehri Garhwal's hill areas, preserve traditional food supplies, use biodiversity, and ensure nutritional security. To bring this neglected Himalayan vegetable into mainstream cultivation and commercialisation, systematic research, farmer awareness, value addition, and the creation of appropriate market links are required.

Keywords: *Guryal; Underutilized vegetable; Wild edible plant; Nutritional security; Value addition; Livelihood generation; Traditional food resource.*

Abstract ID ABMC 3069

Food Science, Nutrition & Security

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Abstract

Food science, nutrition, and food security are important areas that contribute significantly to human health, sustainable development, and the well-being of society. The availability of safe, nutritious, and affordable food is essential for maintaining a healthy population. Food science involves the study of food composition, processing, preservation, safety, quality, and its effects on human health. This abstract focuses on four major aspects: food processing and preservation, food safety and quality assurance, nutrition and health, and food security and hunger alleviation strategies. Food processing and preservation techniques such as drying, refrigeration, freezing, canning, fermentation, pasteurization, and modern packaging help extend the shelf life of food, reduce food spoilage, minimize food losses, and maintain nutritional and sensory qualities. Food safety and quality assurance are equally important to ensure that food is free from harmful microorganisms, chemicals, and physical contaminants. Proper hygiene, sanitation, storage, quality testing, and food safety management systems help prevent foodborne diseases and ensure consumer safety. Nutrition plays a vital role in growth, development, immunity, energy production, and overall health. A balanced diet containing carbohydrates, proteins, fats, vitamins, minerals, fibre, and adequate water is necessary for healthy living. Poor nutrition can lead to malnutrition, obesity, micronutrient deficiencies, and various health problems. Therefore, nutrition education and access to healthy foods are essential. Food security ensures that all people have physical and economic access to sufficient, safe, nutritious, and culturally appropriate food. Hunger can be reduced through sustainable agriculture, improved food production and distribution, reduction of food loss and waste, support for small farmers, nutrition programmes, and effective government policies. An integrated approach to food science, nutrition, food safety, and food security can help create a healthier, safer, and more sustainable food system for present and future generations.

Keywords: *Food processing, preservation, nutrition, food security, food science*

Abstract ID ABMC 3070

ENVIRONMENT AND SUSTAINABILITY IN AGRICULTURE

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Abstract

Agriculture is essential for food security, livelihoods, and economic development. However, climate change, soil degradation, water scarcity, pollution, and excessive use of chemical inputs are creating environmental challenges. Sustainable agriculture aims to maintain productivity while protecting resources and ecological balance. It promotes responsible use of soil, water, energy, and biodiversity to ensure long-term agricultural development. To promote sustainable farming practices that conserve soil, water, and natural resources. To reduce environmental pollution and greenhouse gas emissions from agricultural activities. To improve the resilience of agriculture to climate change and environmental stresses. To conserve biodiversity and maintain agroecosystems. Climate Change and Resilient Agriculture: Climate-smart practices, crop diversification, improved varieties, efficient irrigation, and conservation agriculture can help farmers adapt to climatic conditions. Natural Resource Management: Soil conservation, rainwater harvesting, organic amendments, balanced nutrient management, and efficient irrigation help maintain soil fertility and conserve water resources. Sustainable Energy in Agriculture: Solar energy, biogas, and other renewable energy sources can reduce dependence on fossil fuels, lower emissions, and support sustainable agricultural production. Biodiversity Conservation and Agroecosystems: Crop diversification, agroforestry, integrated farming systems, and conservation of beneficial organisms help maintain ecological balance and improve ecosystem services. The future of agriculture depends on balancing productivity with environmental protection. Adoption of sustainable technologies, renewable energy, efficient resource management, biodiversity conservation, and climate-resilient practices will be essential. Cooperation among farmers, researchers, government institutions and policymakers can promote sustainable agricultural development and ensure food security for future generations.

Keywords: *Sustainable Agriculture; Climate-Resilient Farming; Natural Resource Management; Renewable Energy; Biodiversity Conservation*

Abstract ID ABMC 3071

Artificial Intelligence in Indian Agriculture: A Strategic Pathway for Sustainable and Profitable Agribusiness

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Abstract

Indian agriculture is undergoing a significant transformation driven by digital technologies, climate variability, changing consumer demand and the growing need for efficient resource utilization. Among emerging innovations, Artificial Intelligence (AI) has considerable potential to improve agricultural decision-making, productivity, profitability and sustainability. AI-enabled applications such as crop and disease identification, yield prediction, precision irrigation, weather-based decision support, market forecasting and intelligent supply-chain management can contribute to more efficient and resilient agrifood systems. However, the adoption of these technologies among farmers and agribusiness stakeholders remains constrained by factors including limited digital literacy, inadequate infrastructure, fragmented farm holdings, data accessibility issues and the high initial cost of technology. The present study examines the strategic role of AI in transforming Indian agriculture into a more sustainable and market-oriented agribusiness system. The study adopts a conceptual and exploratory approach based on secondary information from research publications, government reports and relevant literature. It evaluates the potential of AI across major stages of the agricultural value chain, including production, post-harvest management, marketing and supply-chain operations. The study further identifies major opportunities and challenges associated with AI adoption and proposes a strategic framework involving farmers, Farmer Producer Organizations (FPOs), agribusiness enterprises, financial institutions, research organizations and policymakers. The study highlights that effective integration of AI with farmer-centric extension services, digital infrastructure and market linkages can simultaneously enhance resource-use efficiency, farm income and environmental sustainability. The findings provide strategic insights for developing an inclusive and technology-driven agricultural ecosystem in India.

Keywords: *Artificial Intelligence, Agribusiness, Sustainable Agriculture, Precision Agriculture, Digital Agriculture, Farmer Producer Organizations, Agricultural Value Chain*

Abstract ID ABMC 3072

Integrated Approaches to Food Safety, Nutrition and Sustainable Food Security

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Abstract

Food and nutrition security are important for maintaining good health and improving the quality of life. It is not only about having enough food, but also about ensuring that food is safe, nutritious, affordable, and available when needed. In today's situation, challenges such as food losses, poor storage, food contamination, malnutrition, and limited access to nutritious food make food security an important concern. This abstract discusses the role of food processing and preservation, food safety and quality assurance, nutrition and health, and hunger alleviation in improving food security. Proper food processing and preservation can increase the shelf life of food, reduce post-harvest losses, and help minimize food wastage. At the same time, effective food safety practices are necessary to prevent contamination and protect consumers from food-borne diseases. Maintaining food quality from production to consumption is also important for ensuring safe and reliable food. Good nutrition plays an important role in maintaining health, supporting growth, and preventing nutritional deficiencies. A balanced and diverse diet provides the nutrients required for proper body functioning. Practices such as food fortification, dietary diversification, and nutrition education can improve the nutritional quality of diets and help reduce malnutrition. Better awareness about healthy food choices can also encourage people to adopt healthier eating habits. Sustainable agricultural practices can further contribute to food security by improving food production while making efficient use of natural resources. Proper storage facilities, better transportation and distribution systems, and efficient use of food resources can improve the availability and accessibility of food. Reducing food waste is also important because it helps make better use of the food already produced and reduces unnecessary loss of resources. Overall, bringing together food science, nutrition, food safety, and sustainable agricultural practices can help address major challenges related to hunger and food insecurity. These combined efforts can contribute to better public health, improved nutrition, reduced food losses, and a more sustainable food system. Such an approach can help ensure that people have access to safe and nutritious food and can support a healthier and more food-secure future.

Keywords: *Food Security, Food Science, Nutrition, Food Safety, Food Processing, Food Preservation, Food Fortification, Sustainable Agriculture, Food Wastage, Hunger Alleviation*

Abstract ID ABMC 3073

Assortment, Price and Availability in the Plant-Based Milk Category on Indian Quick-Commerce Platforms: Evidence from a Digital Shelf Audit and Implications for Domestic Crop-Based Product Development

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Abstract

Quick commerce has become the principal urban shelf for emerging packaged-food categories in India, and for plant-based milk it is now the main site of competition. This study audits that shelf and argues that its three observable properties, assortment, price and availability, form a single causal chain rather than three separate descriptors. A census of listings was taken from Blinkit and BigBasket, yielding twenty-three one-litre stock-keeping units from eight brands, each standardised to rupees per litre and benchmarked against toned dairy milk on the same platform. Almond and oat together accounted for 69.6 per cent of the assortment and soy for 30.4 per cent, while coconut, cashew, peanut and millet formulations were entirely absent. Mean effective price was Rs. 217.8 per litre, or 2.83 times toned milk, but the category proved not to be a single price point: soy averaged Rs. 143.2 per litre against oat at Rs. 262.9, and dispersion within each base remained modest at 8 to 14 per cent while overall dispersion reached 26.4 per cent. Because variation is between bases rather than within them, the price the consumer meets is determined largely by which bases the platform has chosen to stock, making assortment a pricing decision in disguise. Availability completes the chain: listings observed out of stock push buyers towards two-hundred-millilitre formats costing Rs. 316.7 per litre, forty-five per cent more than the litre pack and 4.1 times dairy. Brand concentration was moderate, with a Herfindahl-Hirschman index of 1,645. The findings identify assortment restructuring, rather than discounting, as the lever most likely to move the category towards dairy-comparable pricing.

Keywords: *plant-based milk; quick commerce; digital shelf audit; assortment; price dispersion; availability; agribusiness marketing*

Abstract ID ABMC 3074

Nano-DAP application for improving root growth and biochemical parameters in Cereal crops

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Abstract

Nano-diammonium phosphate (Nano-DAP) is an emerging nanofertilizer with considerable potential for improving nutrient-use efficiency, plant growth and physiological performance in cereal crops. Owing to its nanoscale particle size and greater surface area, Nano-DAP can enhance the availability and utilization of nitrogen and phosphorus and influence root development and biochemical metabolism. Studies conducted in cereals such as wheat, rice and maize have reported improvements in growth, nutrient uptake, photosynthetic activity and phosphorus-use efficiency following Nano-DAP application. In wheat, Nano-DAP particles were reported to be approximately 5,000 times smaller than conventional DAP, with about 14,000 times greater specific surface area. Nano-DAP application influenced root–shoot development, with reported increases in shoot surface area of up to 21.68%. Field studies have also demonstrated grain yields of 4.25-6.04 t ha⁻¹ under reduced phosphorus fertilization combined with foliar Nano-DAP application. In rice, Nano-DAP treatments increased photosynthetic rate by 3.4-7.7%, stomatal conductance by 18-23%, and SPAD values by 12.9-16.6% compared with conventional DAP-based treatments. Changes in nitrogen-assimilatory enzymes, including nitrate reductase, glutamine synthetase and glutamate synthase, have also been reported. Overall, available evidence indicates that Nano-DAP can influence root growth, nutrient acquisition and biochemical processes in cereal crops, supporting its potential as a component of efficient and sustainable nutrient management.

Keywords: *Nano-DAP; Cereal crops; Root growth; Biochemical parameters; Nutrient-use efficiency.*

Abstract ID ABMC 3075

Carbon Credits and Carbon Farming Research: A Comparative Bibliometric Synthesis of India's Position in the Global Knowledge Base

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Abstract

India notified its Carbon Credit Trading Scheme in 2023 and has signalled that agriculture may participate through an offset mechanism, yet the readiness of the national knowledge base to support farm-level crediting has not been assessed. This study conducts a comparative bibliometric synthesis, treating published bibliometric and systematic reviews as the unit of analysis, and maps fourteen such studies covering more than fifteen thousand indexed documents on carbon farming, soil carbon, carbon markets, carbon finance and agricultural carbon credits. The evidence is classified into three streams. Stream A, the biophysical literature on carbon farming and soil organic carbon, is large and mature, with six studies mapping 10,685 documents; India is reported among the leading contributors in one of them. Stream B, covering carbon markets, finance and emissions trading, spans 4,275 documents across the studies stating a corpus size, and India appears among the leading contributors in none, the recurring leaders being China, the United States, Australia and Germany. Stream C, the intersection where agricultural carbon credits are actually studied, consists of a single corpus of seventy-nine articles accumulated over twenty years. Within India's own carbon farming literature, coverage is concentrated on biochar, at 4.3 times the global share, and on soil health, 13.7 percentage points above the global share, while crop-livestock integration, biodiversity and long-term sustainability themes fall below global levels and explicit system classification is absent. India therefore publishes the soil science of carbon sequestration but not the institutional economics of carbon markets. The study maps this asymmetry against the operational requirements of the Carbon Credit Trading Scheme and identifies aggregation, contract design, willingness to accept and benefit sharing as the binding evidence gaps for Indian agribusiness research.

Keywords: *carbon credits; carbon farming; bibliometric analysis; Carbon Credit Trading Scheme; research gaps; agribusiness management*

Abstract ID ABMC 3076

Reverse Migration and Agricultural Labour Supply in Tamil Nadu: A Before–After Analysis of the COVID-19 Shock

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Abstract

The COVID-19 lockdown of 2020 triggered one of the largest reverse migration episodes in India's recent history, with an estimated 86 lakh migrant workers returning to their native states within months of the nationwide shutdown. For Tamil Nadu, a state historically characterized by sustained agricultural labour out-migration, this shock offered a rare opportunity to examine whether disrupted urban and interstate labour markets translated into a meaningful increase in the supply of agricultural labour, and whether any such increase proved lasting or temporary. This paper traces agricultural labour force participation and real rural wage trends in Tamil Nadu across the pre-shock (2018–19 to 2019–20), shock (2020–21), and recovery (2021–22 to 2022–23) periods, using data from the Periodic Labour Force Survey (PLFS) and the Labour Bureau's rural wage statistics. A simple before-after comparison is employed to identify shifts in labour market indicators coinciding with the lockdown-induced reverse migration wave, and to assess whether the observed changes reverted toward pre-pandemic trends as urban employment opportunities recovered. Preliminary evidence suggests a short-term rise in agricultural labour absorption accompanied by wage moderation during the shock period, followed by a gradual reversion in subsequent years, indicating a largely transient rather than structural effect. The findings carry implications for rural labour market policy, the design of employment guarantee schemes, and the long-term sustainability of agricultural labour supply in Tamil Nadu's evolving agrarian economy.

Keywords: : *Reverse Migration, Agricultural Labour Supply, COVID-19 Shock, Rural Wages, Tamil Nadu*

ABOUT THE BOOK

This abstract and souvenir book contains the selected abstracts, innovative ideas and best practices presented at the 3rd ABMC 2026, organized by SCHOLICS – Society of Agriculture and Business Management. It highlights recent advancements in agriculture and business management, with a focus on sustainable solutions, climate resilience, value addition, and rural development.

The proceedings aim to inspire researchers, practitioners, policymakers and students to work together for a more sustainable and prosperous agricultural future.

KEY THEMES



Sustainable Agriculture and Food Security;



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