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PROCEEDINGS OF

AGRI 2025 VISION

Jan 17-19, 2025, OUAT, Bhubaneswar, Odisha

sarm

(SARM in collaboration with OUAT)

7th International Conference on

Agriculture for Food Security & Nutrition

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CONFERENCE PROCEEDINGS

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AGRI 2025 VISION

7th International Conference on

Agriculture for Food Security & Nutrition

January 17-19, 2025 | Odisha University of Agriculture and Technology (OUAT)
Bhubaneswar, Odisha, India

Organized by

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In collaboration with

ODISHA UNIVERSITY OF AGRICULTURE & TECHNOLOGY ESTD. 1962

Society for Agricultural Research & Management
कृषि अनुसंधान और प्रबंधन संस्थान

Conference Proceedings of

7th International Conference on

Agriculture for Food Security & Nutrition

January 17-19, 2025 | Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha, India

Vol. 03, Issue 01, 2025

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Er. Rajesh Kumar Guru

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ODISHA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
BHUBANESWAR-751 003

ପ୍ରଫେସର ପ୍ରଭାତ କୁମାର ରାଉଳ
କୁଳପତି
Prof. Pravat Kumar Roul
Vice-Chancellor

Dated the 10th January, 2025

MESSAGE

I am happy to know that the Society for Agricultural Research and Management (SARM) is organizing an International Conference on "**Agriculture for Food Security and Nutrition: Vision-2025**" during 17 to 19 January, 2025. It praiseworthy to note that the Conference is reckoning the recent trends in smart and sustainable agriculture practices designed to protect the environment, eradicate & lessen greenhouse gas emission, improve soil fertility & quality to protect crops, and preserve the earth's natural resources for coming generations.

I commend the organizers for their endeavors in bringing together national and international scientists, experts, practitioners, research scholars and students to consider outlining novel pathways benefitting farming community and other stakeholders in general.

I wish the Conference all success.

(P. K. Roul)

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डॉ. मृत्युंजय महापात्र
मौसम विज्ञान विभाग के महानिदेशक,
विश्व मौसम विज्ञान संगठन में भारत के स्थाई प्रतिनिधि
विश्व मौसम विज्ञान संगठन के तीसरे उपाध्यक्ष

Dr. Mrutyunjay Mohapatra
Director General of Meteorology,
Permanent Representative of India to WMO
Third Vice President of WMO

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
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नई दिल्ली–110003
Government of India
Ministry of Earth Sciences
India Meteorological Department
Mausam Bhawan, Lodi Road
New Delhi-110003

MESSAGE

I am happy to know that the Society for Agricultural Research & Management (SARM) is hosting the 7th International Conference on Agriculture for Food Security & Nutrition (Agri Vision-2025) in collaboration with Odisha University of Agriculture & Technology (OUAT), Bhubaneswar Odisha from 17-19, January, 2025.

I feel that it is the apt time to shift from the traditional agriculture to the modern and sustainable way of agriculture to meet the future needs of our country and enhance farmers' income.

Weather and Agriculture are like two sides of the same coin. Accurate weather prediction can help in taking proper farming decisions viz. to decide type of crop to sow in a particular place, when to sow, when to provide irrigation facilities etc. India Meteorological Department has implemented the plan of disseminating weather information directly to the farmers on their mobiles. It may help in safeguarding them against vulnerability of extreme weather events, which in-turn may reduce costs and maximise agricultural yields. I am pleased to learn that the Agri Vision-2025, Odisha is trying to address the challenges being faced by the farmers and deliberating on options to tackle these through sustainable and climate smart agricultural practices. This platform may prove to be useful to farmers in strengthening their economic status.

I express my best wishes to the organizers, delegates, exhibitors and all stakeholders for the success of this event.

03.01.2025

(Dr. Mrutyunjay Mohapatra)

Phone : 91-11-24611842, Fax : 91-11-24611792
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केन्द्रीय आयुर्वेदीय विज्ञान अनुसंधान परिषद्
आयुष मंत्रालय, भारत सरकार
CENTRAL COUNCIL FOR RESEARCH IN AYURVEDIC SCIENCES
Ministry of Ayush, Govt. of India

प्रो (वैद्य) रबिनारायण आचार्य
महानिदेशक
Prof. (Vaidya) Rabinarayan Acharya
Director General

3rd January 2025

MESSAGE

I am delighted to learn that the Society for Agricultural Research & Management (SARM) is hosting the 7th International Conference on Agriculture for Food Security & Nutrition (Agri Vision-2025) in collaboration with Odisha University of Agriculture & Technology (OUAT), Bhubaneswar, Odisha, from January 17-19, 2025. This conference marks a pivotal moment for shifting from traditional agriculture to modern and sustainable practices to meet India's future needs.

The vision of doubling farmers' income within the next five years can be achieved effectively by adopting sustainable agricultural practices that integrate innovation, technology, and local wisdom. Agriculture and weather are inherently interconnected, like two sides of a coin. Accurate weather prediction holds immense value for farming, enabling informed decisions that minimize costs, maximize agricultural yields and profits, and reduce vulnerability to extreme environmental impacts.

India has a rich tradition of forecasting weather for agricultural practices, rooted in indigenous knowledge systems such as observing animal behavior, wind patterns, cloud formations, and astronomical calculations. These time-tested methods have guided farming decisions for centuries. By integrating these traditional approaches with modern meteorological tools, including satellite data, AI-driven weather models, and IoT-based precision agriculture, we can create a comprehensive framework for climate-smart farming. This synergy of rational and scientific forecasting can play a pivotal role in bolstering agricultural productivity and ensuring food security.

It is heartening to see that Agri Vision-2025 is addressing the challenges faced by today's farmers and offering practical solutions through sustainable and climate-resilient agricultural practices. Such platforms are invaluable in empowering farmers to strengthen their economic status and adapt to evolving agricultural demands.

I extend my warm greetings and commend SARM for its unwavering commitment to organizing seminars every year on critical topics of national importance. My best wishes to the organizers, delegates, exhibitors, and all stakeholders for the grand success of this event. May this conference inspire transformative ideas and foster collaborations that shape the future of Indian agriculture.

3/1/25

(Prof. Vaidya Rabinarayana Acharya)

जवाहर लाल नेहरू भारतीय चिकित्सा एवं होम्योपैथी अनुसंधान भवन, 61-65, सांस्थानिक क्षेत्र, सम्मुख 'डी' ब्लाक, जनकपुरी नई दिल्ली-110058
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ज्ञानेन्द्र प्रताप सिंह, पी.एच.डी.
निदेशक
Gyanendra Pratap Singh, Ph.D.
Director

No.: NBPGR/Director/202/
Dated: January 06, 2025

Message

I am happy to know that the Society for Agricultural Research & Management (SARM) is hosting the 7th International Conference on Agriculture for Food Security & Nutrition (Agri Vision-2025) in collaboration with Odisha University of Agriculture & Technology (OUAT), Bhubaneswar Odisha from Jan 17-19, 2025.

It is the time to shift from the traditional Agriculture to the modern and sustainable way of Agriculture to meet the future needs of lndia. We believe that the vision of doubling farmer's income can be achieved easily in coming five years through the modern ways of Sustainable Agricultural practices. Weather and Agriculture are like two side of a coin. The principal benefit of predicting the weather condition of a place at a given time is proper farming decisions. Prior weather knowledge helps you make choices that minimize costs and maximize agricultural yields and profits. This way, you can, as a farmer, reduce your vulnerability to extreme environmental impact.

It is good to know that the Agri Vision-2025 at Odisha is addressing the challenges the current farmers are facing and how to tackle that through various sustainable and climate smart agricultural practices. This platform will support the farmers in strengthening their economic status.

I express my best wishes to the organizers, delegates, exhibitors. and all stakeholders for a successful program.

GPSingh 6.1.2025

GYANENDRA PRATAP SINGH

भाकृअनुप - राष्ट्रीय चावल अनुसंधान संस्थान
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डॉ. ए.के. नायक
निदेशक
Dr. A.K. Nayak, FNASc, FNAAS
Director

MESSAGE

I am happy to know that the Society for Agricultural Research & Management (SARM) is hosting the 7th International Conference on Agriculture for Food Security & Nutrition (Agri Vision-2025) in collaboration with Odisha University of Agriculture & Technology (OUAT), Bhubaneswar Odisha from Jan 17-19, 2025.

It is the time to shift from the traditional Agriculture to the modern and sustainable way of Agriculture to meet the future needs of India. We believe that the vision of enhancing farmer's income can be achieved easily in coming days through the modern ways of Sustainable Agricultural practices.

It is good to know that the Agri Vision-2025 at Odisha is addressing the challenges the current farmers are facing through various sustainable and climate smart agricultural practices. This seminar will provide platform to researchers and professionals to delibereate on the issues and come out with recommendations that will support the farmers in strengthening their economic status.

I express my best wishes for a successful program.

(A.K. Nayak)

भाकृअनुप-केन्द्रीय अंतर्स्थलीय मात्स्यिकी अनुसंधान संस्थान
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Barrackpore, Kolkata - 700120 West Bengal

डा. बसंत कुमार दास, निदेशक
Dr. Basanta Kumar Das, Director

MESSAGE

I am delighted to learn that the Society for Agricultural Research & Management (SARM) in collaboration with Odisha University of Agriculture & Technology (OUAT), Bhubaneswar, Odisha, is hosting the 7th International Conference on Agriculture for Food Security & Nutrition (Agri Vision-2025) from January 17-19, 2025 at Bhubaneswar, Odisha.

This is a pivotal moment to transition from traditional agricultural practices to modern, sustainable methods to address India's future needs. With the adoption of sustainable agricultural practices, the goal of doubling farmers' income can be realistically achieved within the next five years. Agriculture and weather are inseparable, like two sides of the same coin. Accurate weather forecasting offers significant advantages, enabling informed farming decisions. By leveraging prior weather knowledge, farmers can minimize costs, enhance yields, and boost profitability while reducing their vulnerability to extreme environmental conditions. It is heartening to see that Agri Vision-2025 in Odisha will focus on addressing the pressing challenges faced by farmers today and explore solutions through sustainable and climate-smart agricultural practices. This platform will play a vital role in empowering farmers and strengthening their economic resilience. I extend my heartfelt best wishes to the organizers, delegates, exhibitors, and all stakeholders for the success of this impactful program.

(B. K. Das)

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KEYNOTE

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Low temperature plasma: An emerging green technology for seed priming, improving plant growth and yield, and food safety

Srinivasa Rao Mentreddy*[1], T. Pham[1], Sravan K. Sanathanam[1], Leopold Nyochembeng[1], Manikanta S. S. Kunisetty[1], L. Kassam[a1], Armitra J-Davis[1], and K.G. Xu[2]

[1]Alabama A&M University, USA

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Abstract:

Low-temperature plasma (LTP) is a weakly ionized noble gas or ambient air comprised of free electrons and positively charged ions. It is increasingly used in agriculture for microbial disinfection of foods, enhancing seed germination, and plant growth, among many others. Four experiments were conducted to evaluate low-temperature plasma (LTP) for i) improving plant productivity and ii) ensuring food safety. Experiment 1: The mustard greens seeds were treated with Ar or He LTP for 0, 30, 60, and 90s and assessed for germination in Petri dishes with germination paper. Seeds treated with Ar or He LTP germinated earlier and faster than Control. While Ar gas LTP-treated seeds germinated earlier than those treated with He LTP, the total percentage germination was greater in He gas APP treatment. Experiment 2: Turmeric rhizomes treated with He LTP for 0 seconds (Control), 30, 60, and 90 seconds. The plasma-treated rhizomes sprouted six to ten days earlier and achieved 100% sprouting nearly two weeks earlier than the untreated Control; plants grew faster and were taller (37 – 39 cm) than the Control (26-33cm) at 67 days after planting. The study showed that cold or LTP improves turmeric plant stand establishment and crop performance in open-field production. Experiment 3: Chicken skin treated with He LTP for 15 min reduced microflora and Salmonella by .98 log CFU/ml and 2.29 log CFU/cm2, respectively. Experiment 4: The cold-smoked salmon (CSS) samples were inoculated with L. monocytogenes serovars: NADC 2045 serotype 4b, H7969 serotype 4b, and H7962 serotype and then treated with LTP at 4 kV for 0 (Control), 3, 6, 9, and 12 min. Exposure to LTP for 12 min significantly reduced L. monocytogenes population by 1.13 (± 0.15) CFU/g compared to Control [8.9 (± 0.1) CFU/g] (Fig. 3). The log reduction in pathogen populations increased with exposure time. The study demonstrated that LTP can be used to improve crop productivity and food safety which lead to food security and sustainability of agriculture. This research project was supported by NSF EPSCoR OIA-2148653 and NASA EPSCoR 80NCCS21M0139.

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AGRI 2025 VISION

7th International Conference on
Agriculture for Food Security & Nutrition
January 17-19, 2025 | OUAT, Bhubaneswar, Odisha, India

Keynote

The critical role of the subtropical horticulture research station in USDA-ARS National Plant Germplasm System

Madhugiri Nageswara-Rao and Sukhwinder Singh
USDA-ARS, Subtropical Horticulture Research Station, Miami, FL USA

Abstract:

Global food security faces significant challenges due to a growing population and rising demand for high-quality food. Climate change, pests, diseases, and monoculture farming threaten sustainable agriculture. Gene banks, or germplasm repositories, are crucial in addressing these issues by conserving species and ensuring food security. These repositories provide important materials for research, contributing to climate studies and food crop improvement. The USDA-ARS National Plant Germplasm System (NPGS) is a major source of plant germplasm, with over 600,000 accessions from more than 10,000 species in the Germplasm Resources Information Network (GRIN) database. The NPGS aims to support agricultural production by acquiring, conserving, and distributing crop germplasm. The Subtropical Horticulture Research Station (SHRS) in Miami, Florida, is key within the NPGS, maintaining over 3,000 ornamental plant accessions, all linked to the NPGS-GRIN network. In the last five years, SHRS has processed over 2,300 germplasm requests. Research at SHRS, including whole transcriptome studies on Amaryllidaceae plants, has revealed important metabolites in fragrance. Analysis revealed an 88% concentration of the (Z)-ß-ocimene metabolite in fragrant white Amaryllidaceae flowers, significantly higher than the 48% found in their non-fragrant purple counterparts. These findings highlight the role of ornamental plant germplasm repositories in crop maintenance and improvement, which aligns with USDA-NPGS goals. This presentation will discuss the efforts, challenges, and research opportunities at the USDA-ARS-SHRS in Miami, Florida.

Keywords: plant germplasm, propagation and horticulture techniques, population genetics, conservation biology, ecological assessment, regulatory science, medicinal plants, phenomics, and genomics

Biography:

Dr. Madhurgiri Nageswara-Rao works as an Ornamental Project Lead Scientist at the USDA Agricultural Research Service's Subtropical Horticulture Research Station in Miami, Florida. His research focuses on Subtropical/Tropical Ornamental and medicinal Genetic Resource Management. Before joining USDA ARS, Dr. Rao worked with USDA APHIS on national and international regulatory sciences at Linden, NJ. He has worked in the Pharmaceutical and Biotechnology Industries and with various Universities. Dr. Rao has diverse expertise in working with population genetics, conservation biology, ecological assessment, regulatory science, and genomics of various ornamental plants (e.g., coreopsis, bamboo, palms, daylily, woody landscapes, and sandal), fruit crops (e.g., citrus, grapes, pineapple, mango, guava, avocado, and papaya), other agricultural plants as well as medicinal and forest wild species. Dr. Rao's research contributions have been published in several reputed and peer-reviewed international journal articles. He has also contributed various book chapters, co-edited international books, served on several scientific committees, led grant proposals, and made >150 scientific presentations at various national and international scientific meetings. Dr. Rao's outreach activities include conducting trainings, and workshops, interacting with farmers, and responding to stakeholder needs.

Research Interest: plant germplasm, propagation and horticulture techniques, population genetics, conservation biology, ecological assessment, regulatory science, bioprospecting, phenomics, and genomics

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New opportunities to diversify agriculture by de novo domestication

Robert J Henry
University of Queensland, Brisbane, Australia

Abstract:

The challenges of food security and climate change require the development of improved crop varieties. The production of a diverse range of crop varieties improves food security by reducing the risks associated with biotic and abiotic stresses and may contribute to better human diets. Only a small proportion of plant species have been domesticated for food production and in many cases the domesticated gene pool has captured only a small part of the variation in the wild populations. New species can be found by searching for crop wild relatives or novel species in environments that are similar to the proposed agricultural production area. Genomic analysis has allowed the analysis of many crop wild relatives and other potential food species. This information allows the identification of candidates for de novo domestication using conventional approaches or gene editing to rapidly domesticate new crop species. The genes that have been modified or selected for in domestication are known in many cases and can be efficiently modified using gene editing. Examples of candidates and progress in domestication will be detailed.

Biography:

Robert Henry is Professor of Innovation in Agriculture at the University of Queensland. He was foundation director of the Queensland Alliance for Agriculture and Food Innovation and is currently a Chief Investigator in the ARC Centre of Excellence for Plant Succes in Nature and Agriculture and Director of the ARC Research Hub for Engineering Plants to Replace Fossil Carbon. His research applies genomics to support the conservation and use of biodiversity to ensure food and energy security.

Research Interest: plant genomics, food quality, climate change

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Extreme climate events and agricultural commodity markets

Raghav Goyal *
Louisiana State University, LA, USA

Abstract:

The increasing frequency and intensity of extreme climate events—such as storms, floods, extreme temperatures, and droughts—pose significant challenges to agricultural commodity markets. This study aims to investigate the impact of these events on the futures market returns of two major U.S. agricultural commodities, corn and soybeans, from 1995 to 2023. By quantifying abnormal returns (ARs) and cumulative abnormal returns (CARs) resulting from extreme climate events, we seek to identify the specific event types most disruptive to market performance and provide insights into market vulnerabilities and adaptive strategies.

Utilizing futures market data from Bloomberg and climate event records from the EM-DAT database, we analyze 254 extreme events for corn and 250 for soybeans. Events are categorized into storms, floods, and extreme temperatures. We calculate ARs as the deviation of actual returns from counterfactual returns derived from the S&P GSCI Agricultural Index, using a market model for expected return estimation. CARs are computed to assess the cumulative impact across an event window of up to 10 days post-event.

Regression models are employed to identify factors influencing peak CARs, incorporating economic (GDP, production-consumption gap, import dependency), speculative (T-Index, VIX), and climatic (event duration, damage) variables. Statistical robustness is ensured through t-tests and multi-model comparisons using AIC and BIC metrics.

Our preliminary results reveal that 22.05% of extreme events significantly impact corn returns, while 21.20% affect soybean returns. Storms and extreme temperatures emerge as key drivers for corn and soybeans, respectively, with prolonged events having a pronounced influence on CARs.

This research will provide a comprehensive understanding of how extreme climate events disrupt agricultural commodity markets, offering practical insights for policymakers, traders, and producers. By identifying key factors influencing market response, the findings will guide strategies for enhancing market resilience and inform adaptive policy frameworks.

Keywords: Weather, Corn, Soybeans, Abnormal Returns

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Keynote

Farmer prosperity through corn in Odisha

Sain Dass and Chikkappa Gangadhar Karjagi
ICAR-Indian Institute of Maize Research, Ludhiana, India

Abstract:

Maize is the second most important agricultural crop in Odisha, after paddy. In recent years, maize has started occupying a prominent place in Odisha due to its increased demand for diverse uses as food for humans, feed for poultry, livestock animals, fish and swine, and industrial raw material to produce various processed food, starch and biofuel. As a result, the maize area, production, and yield in Odisha have continuously increased during the last three decades. The maize area of the state has increased by 52.9% from 67000 ha to 1,02,440 ha during 1992 to 2021. Similarly, the production and productivity of maize have also increased by 352 and 196 per cent, respectively; the production has increased from 63000 MT to 284770 MT and productivity from 940 kg/ha to 2780 kg/ha. In Odisha, >96% of the total maize area is under the Kharif/autumn season and the average maize yield in this season is 2783 kg/ha, which almost matches that of the national Kharif season average maize yield (2914 kg/ha). However, the average maize yield of the state in 1992 was 943 kg/ha which was around half (58%) of that of the national average maize yield (1623 kg/ha). The credit for the increased maize productivity of Odisha in recent years is attributed to the introduction of hybrid maize in the state and the expansion of maize areas under single cross hybrids. Nonetheless, there is tremendous scope for further enhancement of the maize yield of the state during the kharif season. The substantial proportion of upland rice area in the state is either left fallow due to uncertainty in rainfall or used for paddy cultivation with low yield due to deficit rains. However, the upland area can be efficiently used for maize cultivation as the rainfall received in the upland area is sufficient to undertake maize cultivation with better profitability as compared to paddy. Therefore, bringing an upland area under maize cultivation not only increases the farmers' profitability but also enhances cropping intensity, and uses natural resources efficiently. Further, the rice-rice cropping system of the state suffers due to water scarcity during the peak summer season leading to lower paddy yields. However, replacing the rice-rice cropping system with rice-maize would bring more profit to farmers. Because the rice-maize cropping system not only addresses water scarcity but also uses available natural resources efficiently and economically. In addition, the Odisha state has tremendous scope for hybrid maize seed production, which not only increases farmers' income and profitability but also facilitates local hybrid seed production and supply at low cost. The hybrid seed production would further help to strengthen the seed industry, promote the cultivation of new and improved hybrids by local farmers and further enhance the maize productivity of the state. The surplus maize production by the state can further be diverted either for biofuel production or for export to neighbouring states or countries. Thus, a maize-based cropping system has the potential to alleviate the adverse effects of shrinking natural resources under changing climate during winter or rabi season through the adoption of rice-maize and/or hybrid maize seed production during the winter season. Odisha being a coastal state, possesses ample opportunities to integrate maize cultivation especially quality protein maize (QPM) with poultry, fish and swine farming. Because the biological value of QPM is almost double that of field corn. Due to the higher nutritional value of QPM, the feed intake of poultry, fish and swine reduces substantially without compromising the rate of gain in the total body weight. Therefore, supplementation of QPM feed not only reduces the total cost of meat/egg production but also increases the profit margin of farmers involved in animal husbandry. Odisha being a tourist state provides opportunities to promote specialty corn (sweet corn, popcorn and baby corn) cultivation and their value chain development. Due to the higher profit margin, specialty corn cultivation is ideal for enhancing the farmers' income, especially small and marginal farmers. Thus the promotion of maize cultivation and its value chain development by integrating allied sectors in Odisha would bring overall prosperity to the Odisha farmers by enhancing their income level, ensuring livelihood security all through the year and also supporting the allied sectors like poultry, swine, fish and various processing industries including seed industry sustainably in long-run.

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Efforts of ICAR-NBPGR in managing pulses genetic resources in India

Gyanendra Pratap Singh
ICAR-National Bureau of Plant Genetic Resources , New Delhi , India

Abstract:

ICAR-NBPGR serves as the national focal point for managing plant genetic resources (PGR) in India, functioning under the umbrella of ICAR. The National Genebank conserves 66,283 accessions from 15 genera across 98 species of grain legumes, which includes *55,757* indigenous collections and 10,526 exotic ones. Among the 15 genera, *Vigna* has the highest number of accessions (15,113), encompassing 32 species. Of these, 13,199 are indigenous, and 1,914 are exotic. Following *Vigna*, *Cicer* has the second-largest number of accessions (15,053) across 10 species, with *Cajanus* coming next with 11,940 accessions from seven species. All genebank collections have been characterized, and core sets have been developed for crops like chick-pea, mungbean, cowpea, horsegram, urdbean, ricebean, lentil, pea, and grasspea, which provide a solid foundation for creating trait-specific reference sets to support targeted breeding.The trait-specific germplasm were also identified for crop improvement. In lentil, 1,500 accessions were screened for resistance to Fusarium wilt, collar rot, dry root rot, and rust, with stable resistant lines such as IC241447 and IC317520 identified over three years. Molecular tools have validated the phylogenetic relationships of pathogens, and reference sets for resistance traits have been established. Similarly, in chickpea, over 2,250 accessions were evaluated, resulting in the identification of resistant lines for Ascochyta blight and Fusarium wilt, including IC117744 and IC275447. For blackgram, IC424616 was selected for resistance to yellow mosaic disease, while IC241532 was chosen for early maturity in lentil. Mapping populations and pre-breeding materials, utilizing wild *Cicer* species, have been developed to enhance the genetic base and improve stress resistance traits. Pre-breeding efforts also focus on wild relatives of chickpea, lentil, and *Lathyrus* for traits such as low ODAP and Fusarium wilt resistance. Collaborative research on orphan legumes like horsegram and tepary bean aims to enhance drought tolerance and agronomic resilience. Genomic advancements, including SNP discovery and genome resequencing, support marker-assisted breeding, while international germplasm exchanges—such as biofortified French bean lines and stress-tolerant wild *Lathyrus*—help increase genetic diversity. These initiatives position ICAR-NBPGR as a pivotal institution in improving pulse productivity, climate resilience, and food security.

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Impact of climate change on food security

G. Byju
ICAR-CTCRI, Thiruvananthapuram, India

Abstract:

TBA

Biography:

G. Byju, a noted tuber crop soil scientist, has been appointed Director, ICAR-Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram. Dr. Byju has been working as scientist at CTCRI for the past 30 years and is known for his site-specific nutrient management and climate change studies on tuber crops.

Research Interest: Microbial genomics, host plant resistance, sustainable agriculture

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Internal immunity in plants for biotic stress tolerance

Ajit Kumar Shasany
CSIR- National Botanical Research Institute, Lucknow , India

Abstract:

TBA

Biography:

Dr. Ajit Kumar Shasany is currently serving as Director, CSIR- National Botanical Research Institute, Lucknow. Before joining CSIR-NBRI he served as the Director, ICAR-National Institute for Plant Biotechnology, New Delhi, and Chief Scientist, Biotechnology Division, CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow.

Dr. Ajit Kumar Shasany started his carrier at OUAT, Bhubaneswar (BSc Ag), and graduated from Indian Agricultural Research Institute (PhD. Molecular Biology and Biotechnology) with a merit medal and an OGPA 4.0 out of 4.0. Also secured the highest OGPA (8.81/10.00) in MSc with two awards and studied Agricultural Biotechnology at AAU, Jorhat. Having a bachelor's degree in Agriculture, he blends rural development with recent approaches to Plant Molecular Biology. The research interest includes plant diversity, metabolic engineering in Medicinal and Aromatic Plants and bioprospection for human health. After joining ICAR NIPB, focusing on the innate immunity of crop plants through gene editing. Spends 20% of the time for the farmers through promotion and training on Medicinal and Aromatic Plants aimed at improving their livelihood.

His significant research contributions are, complete genome and transcriptome sequencing of "Tulasi" Ocimum sanctum (first medicinal plant genome from India); transcriptome of several aromatic plants; cloning of about 32 terpene synthase genes; .analyzing more than 900 accessions of medicinal belonging to 40 different plant species for genetic diversity estimation, evolutionary relationships and marker identification. Also contributed in the release of 45 commercially important varieties with 23 US plant patents, using genomics as well as breeding tools. The contribution in research related to Mentha, Artemisia and Ocimum is significant as CIMAP bagged Technology award in 1999, 2012 and 2018 (certificate of Merit) respectively. In plants, isolated several novel genes in Withania somnifera, Mentha arvensis, Ocimum sanctum, Artemisia annuua and engaged in proving the functionality and metabolite channeling as evident from his publications, genbank accessions and PhD thesis.

Being an Agriculturist, he is also engaged in dissemination of technology to farmers. These are Mint technology (Uttar Pradesh), Geranium technology in (Uttarakhand), Artemisia technology (Uttar Pradesh), aromatic plant technology (Odisha) for rural economic upliftment and livelihood enhancement. He also led the development of 39 clusters of Aromatic Plants in 21 districts of Odisha under "Aroma Mission" of CSIR-CIMAP developing about 10 start-up Entrepreneurs, in addition to helping a number of farmers for income enhancement.

He has 101 granted patents and 150 publications to his credit. Granted Patents: Total 101; US Patents: 51 (DNA sequences 3, Plants 23, 10 processes, 15 compositions). Indian: 16; Other countries: 34; Filed: 2 , Variety Development: 46, PhD Students Guided: 17 awarded; 4 Continuing; M.Sc. students guided: 62, Involved in 30 Projects from which led 16 projects as Principal Investigator/Co-PI. Complete genome and transcriptome sequencing of "Holy basil" Ocimum sanctum: (First medicinal plant Genome and first genome solely from India).

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Overexpression of Sirohydrochlorin Ferrochelatase (*AtSirB*) Boosts Nitrogen Sulfur and Carbon assimilation and productivity in *Arabidopsis thaliana*

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Abstract:

Nitrogen deficiency in the soil is a significant agronomic problem, and the application of nitrogenous fertilizers to the soil has environmental concerns, such as sodic soil and the emission of greenhouse gases. To increase the nutrient use efficiency, the cDNA of *AtSirB* coding for sirohydrochlorin ferrochelatase, responsible for Fe insertion to the tetrapyrrole moiety of sirohydrochlorin, was overexpressed in *Arabidopsis thaliana* under the control of 35S promoter for increased synthesis of siroheme. The siroheme is a cofactor for the plastidic enzymes nitrite reductase (NiR) and sulfite reductase (SiR), which reduces nitrite and sulfite to ammonium and sulfide, respectively. A three-step process including methylation, oxidation, and ferro-chelation produces siroheme from uroporphyrinogen III, an intermediate of chlorophyll (Chl) biosynthesis. The *NiR* and *SiR* gene expression and protein abundance increased in the over-expressers due to the increased *AtSirB* protein level. It resulted in an increase in N and S assimilation and enhanced protein content of over-expressers. Conversely, the total protein content decreased in antisense plants due to reduced NR and NiR activities. *AtSirB* over-expressers had higher protein and Chl contents and increased photosynthetic rate and biomass. Under N and S limitation, the protein, Chl, and photosynthetic electron transport rates in AtSirB over-expressers were higher than in WT. Results demonstrate that the SirB that hijacks uroporphyrinogen from the chlorophyll biosynthesis pathway is a crucial player in N and S assimilation. The siroheme is limiting for efficient nitrate and sulfate reduction and utilization. SirB could be genetically manipulated to increase crop productivity for sustainable agriculture.

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Value Chain development of high value Agriculture towards food cum nutritional security– A case of groundnut in Odisha

Samarendra Mahapatra
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Abstract:

Agriculture forms the backbone of India's economy, employing a significant portion of the population and contributing substantially to the nation's GDP. Within this sector, high-value agriculture (HVA) — encompassing horticulture, floriculture, sericulture, aquaculture, and livestock products — has emerged as a vital driver of economic growth and rural development. High-value agriculture (HVA), encompassing crops such as fruits, vegetables, nuts, spices, dairy, and aquaculture, has the potential to significantly contribute to food and nutritional security. As the global population rises and dietary preferences shift toward healthier and nutrient-dense foods, HVA plays a critical role in addressing malnutrition, ensuring diversified diets, and fostering sustainable agricultural development. Value chain development in HVA emphasizes an integrated approach that strengthens linkages from production to consumption, ensuring the availability of high-quality, nutrient-rich produce. This involves modern farming practices, efficient post-harvest management, value addition, and robust marketing systems that minimize losses and enhance affordability and accessibility for consumers. By bridging gaps in production efficiency and market delivery, value chain integration ensures equitable benefits for all stakeholders, including smallholder farmers.In the context of food and nutritional security, HVA value chain development addresses key challenges such as nutrient deficiencies, seasonal food shortages, and rising food prices. Targeted interventions, such as promoting biofortified crops, establishing farm-to-market linkages, and leveraging technology for precision agriculture, can significantly improve the availability of diverse and nutrient-rich foods. India, with its varied agro-climatic conditions and rich biodiversity, holds immense potential to harness HVA for achieving food and nutritional security. Policies that align agricultural production with nutrition goals, supported by innovations in value chains, can ensure sustainable and inclusive growth, benefiting both producers and consumers. This approach not only enhances agricultural productivity but also paves the way for healthier and more resilient communities.

Groundnut, a vital cash crop in Odisha, holds significant potential for driving rural income and enhancing agricultural value addition. The state's diverse agro-climatic conditions and increasing demand for edible oils and processed products position groundnut cultivation as a high-value agricultural activity. However, the traditional supply chain faces challenges such as low productivity, inefficient post-harvest practices, inadequate market linkages, and limited access to quality inputs and technology.Value chain development offers a transformative approach to addressing these challenges by creating an integrated system from production to market delivery. In Odisha, initiatives to strengthen the groundnut value chain involve introducing high-yielding seed varieties, modernizing processing facilities, and fostering collaboration among farmers, cooperatives, and agribusinesses. Government programs and private sector investments further play a crucial role in enabling smallholder farmers to transition from subsistence farming to market-oriented production.

Biography:

Dr. Mahapatra graduated in Agricultural Engineering from Odisha University of Agriculture and Technology and holds a Postgraduation in Management from Xavier Institute of Management,Bhubaneswar as well as a Doctorate in Business Management from Utkal University.After around two decades of corporate work experience in Agri-input industry,he has switched over to academics.To his credit he has authored five books and six book chapters in areas on Agribusiness and Marketing Management .He was nominated by ICAR as a member to develop syllabus for Agribusiness Management.He has been nominated by various agricultural universities as a member for faculty selection and also by Government of Odisha,Agriculture Department as a committee member for various assignments.He has published technical papers in various journals and was invited as a key note speaker in various conferences. He has also received best teacher award in Agribusiness Management.

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Crop diversity: A journey from Vedic texts to Genomics

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Abstract:

Ancient Indian literature, synonymous to the Vedic texts, gives a clear overview and is full of evidences showing systematic agricultural practices. Whether it is in context to agronomical practices, plant protection or germplasm, old Indian literature is full of concepts and practices which have been, in the recent decades, proven empirically, based on modern principles of scientific evaluation. One aspect of these texts is discussion on germplasm which introduces us to the rich agro-diversity of the period. We lost a considerable part of our crop germplasm in the last century. On one hand Green Revolution lead to food security which was much needed but it also created genetic erosion. Ancient Indian literature is full of references to germplasm especially agricultural crops. For instance, rice in India has been classified based on their nutritional values and also based on the sowing time. Two ayurvedic treatises (samhitas), one by Charaka (c. 700 BC) and the other by Susruta (c. 600–400 BC mention rice varieties in the context of their effects on human health. Rice, in Ayurveda, is considered to be acrid, oleaginous, tonic, aphrodisiac, flattening, diuretic and useful in biliousness. Another classification of rice which is seasonal classifies rice into three types, first called Bhadai rice harvested in August / September, the second Aghani which is harvested in November / December and the third category is the Jethi or Boro harvested in summers. Diversity studies using molecular markers have revealed patterns of clustering which are similar to the classifications done in ancient texts. A good case study of validation of these ancient texts is a common bhadai rice, Sathi (shastika in sanskrit). Sathi derives its name from the fact that it matures in sixty days. Sathi has been reported to be mentioned in literature from the Vedic period to the modern times. It is commonly grown in the Terai of the Himalayas in Nepal and India, more so because of its nutritional and cultural aspect. Sathi is associated to the festival of sun god called Chatth in Nepal and Bihar (India) and in regions it is grown for the sole purpose of being used for religious rituals. Indigenous knowhow suggests Sathi to be eaten as a porridge after sickness. It is also favoured for making rice flakes which is a commonly eaten in north Bihar (India). Indigenous knowledge and studies also show that Sathi has allelopathic effects whereby it naturally supresses weeds. This is important considering the non-chemical based farming systems where a need to have less herbicides is required. Validation and exploration of indigenous technical knowhow related to agricultural practices can be of great help in assimilating them for utilization in modern agricultural system. Decoding the Sanskrit texts using the language of the DNA, nucleotide sequences, can help us to understand the importance of these in terms of gene mining. Exploration and utilization of plant genetic resources will not only be useful to fulfill our goals of achieving sustainability in agriculture but also provide resources for nutritional security.

Biography:

By profession he is a scientist having done my PhD in Japan followed by postdoctoral fellowship first at Gyeongsang National University, South Korea and secondly at Charles University, Prague . I then worked as a scientist at the Karlsruhe Institute of Technology, Germany. My ultimate goal starting from my days as masters student was to unravel the mysteries of the Plant Kingdom. Presently I am a Professor and the Head of Department of Genetics and Plant Breeding at Sam Higginbottom University of Agriculture Technology and Sciences Prayagraj. I am working conserve landraces and wild relative of crops for their future utilization in breeding for various stress resilience or for nutritional enhancement. He has edited two books for Plant Cell Monograph series of Springer and have published more than 20 international articles in peer reviewed journals. From my days in Germany till now, he has guided more than 50 Master students and 5 PhD students. I have served as an ambassador for the Society of Experimental Biology UK as a young scientist. Presently i serve on the editorial board of 1 international journal and 1 national journal apart from being a regular reviewer for 4 international journals. Recently i have been accepted as life member of two reputed scientific societies of India, the Indian Society for Plant Genetic Resources and Society for Advancement of Wheat and Barley Research. He serves as member of academic councils of a number of colleges and University.

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Multifaceted eco-physiological behaviors towards salt management in Mangrove plants

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Abstract:

Mangroves are physiologically interesting as prospective models for salt stress tolerance and as sources of substitute ideas about physiological tactics applicable at the ecosystem level. Variation in habitat has great impact on the physiological behavior and biochemical expression level of a particular plant species. A comparative assessment were conducted on five mangrove species (*Bruguiera gymnorrhiza, Excoecaria agallocha, Heritiera fomes, Phoenix paludosa and Xylocarpus granatum*) grown *in-situ* (Sundarbans mangrove swamps, saline) and *ex-situ* (non-saline) environment. Parameters investigated with respect to their photosynthesis rate, chlorophyll content, mesophyll conductance, specific leaf area, stomatal conductance and photosynthetic nitrogen use efficiency under saline (15–27 PPT) and non-saline (1.8–2 PPT) conditions. Total foliar free amino acids (which are considered as "compatible solutes" in the cell cytoplasm leading to provide excess water potential in saline environment) and differential expression of some antioxidant isoenzymes in leaf were estimated between the saline and non-saline plants.

Preeminent assimilation rate coupled with augmented chlorophyll content, more mesophyll and stomatal conductance and higher specific leaf area in non-saline condition indicates that these mangroves can grow well even with minimal salinity in soil. In *B. gymnorrhiza, E. agallocha and P. paludosa* the optimum PAR acquisition for photosynthesis was higher under salt stress, while the maximal rate of assimilation was lower even with minimal salinity. *H. fomes and X. granatum* followed the opposite trend, where the highest photosynthesis rate was lower under non-saline conditions even at a higher irradiance than in the saline forest. This indicates less affinity of *H. fomes and X. granatum* to high substrate salinity. Photosynthetic nitrogen use efficiency increased in non-saline soil that can be attributed to higher photosynthetic peak in most of the species and/or lower nitrogen accumulation in plant samples. The major free amino acids are aspartic acid, alanine, proline, tryptophan, tyrosine and phenylalanine. Five mangrove taxa from in situ condition and as well as their counterpart from mesophytic substratum were estimated. The isoform patterns of peroxidase, acid phosphatase and esterase indicated considerable difference in regulation of these enzymes due to salt stress and /or reverse adaptation

Keywords: Isozymes, compatible solutes, Mangroves, Photosynthetic efficiency, Specific leaf area

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Prediction of phytochemicals against plant pathogens: A computational analysis

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Abstract:

The impact of plant pathogens significantly affects global agriculture, and gradually develops losses in crop yield leading to food insecurity. Traditional synthetic compounds (pesticides/ fungicides/herbicides) although effective in their action, however, cause harm to human health and the environment. Hence there is an urgent need for alternative eco-friendly compounds to play a similar role. Phytochemicals, from the plants, can be used as a promising candidate for their application in sustainable plant protection due to their wide range of bioactive properties. This study employs a bioinformatics-based approach to predict and analyze the potential of phytochemicals against key plant pathogens in Rice, the staple food. A comprehensive comparative search for the proteome dataset of the plant and the pathogen generated unique essential proteins of the pathogen and further screened as the target. Three-dimensional structure prediction of the selected was performed followed by structure validation. Further screening of phytochemicals against the target resulted in 100 compounds and additional screening of compounds based on binding pose, and toxicity AD-MET property. Subsequent molecular dynamics simulation also supported the fact regarding the favorable binding of the compound to the enzyme. This study contributes to the development of natural phytochemicals, that offer insights into the integration of bioinformatics tools for plant pathology research. Future experimental validations are recommended to confirm the efficacy and practicability of the predicted phytochemicals in real-world agricultural systems.

Keywords: Phytochemicals, Plant pathogens, Bioinformatics, Molecular docking, ADMET analysis, Molecular dynamics simulation, Computational analysis, Natural product

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Crop Health Management for Sustainable Rice Farming

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Abstract:

Rice is staple food crop for over half of the world's population, making its sustainable production vital for global food security. However, rice farming faces significant challenges, including pest infestations, diseases, and climate-induced stresses, which threaten productivity and environmental sustainability. Effective crop health management tailored to rice farming is essential to address these challenges.

Sustainable rice farming integrates practices such as Integrated Pest Management (IPM), where biological pest control, direct seeding and the use of resistant rice cultivars plays major role to help minimize reliance on chemical pesticides and fertilizers, reducing environmental degradation. These strategies promote soil health, conserve water, and reduce greenhouse gas emissions, ensuring long-term productivity and environmental resilience. By prioritizing crop health management, rice farming can align with global sustainability goals while securing livelihoods and food systems for future generations.

Keywords: breeding, virulence, genomics, pathogen

Biography:

Dr. Deo Mishra is 'Bayer Science Fellow' and currently leading Asia Plant Health Risk Assessment activities at CropScience, R & D Division, Hyderabad, India. He obtained Ph.D. in Plant Pathology in 2002 from GB Pant University of Agriculture and Technology, India. During last >20 years, research focus of Dr Mishra has been to tackle major biotic stress challenges primarily in rice-bacterial blight (Xanthomonas oryzae pv. oryzae) patho-system, by investigating pathogen virulence shifts and new race evolution with respect to the deployment of resistance genetics. His studies integrated physiological, molecular, and genomic approaches along with laboratory and field experimentation to identify sources of long-lasting, broad-spectrum disease/insect resistance in rice, allowing for the development of customer-designed sustainable solutions for small-holder farmers in Asia. This resulted into development of rice hybrids resistant to Bacterial Leaf Blight (BLB) and Brown plant hopper (BPH), those are currently being grown in >4-million-acre area across Asia. Dr Mishra also collaborated on multiple projects on rice crop health improvement with National and International Institutes/Universities, like Centre for Cellular and Molecular Biology (CCMB), Indian Institute of Rice research (IIRR), Institute of Microbial technology (IMTECH), International Rice Research Institute (IRRI), Colorado State University and California University.

Research Interest: Microbial genomics, host plant resistance, sustainable agriculture

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Root and tuber crops for food and nutrition

M. Nedunchezhiyan*, Kalidas Pati, V.B.S. Chauhan, K. Hanume Gowda and Arutselvan
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Abstract:

Root and tuber crops are third most important food crop after cereals and grain legumes. The root and tuber crops, including cassava (*Manihot esculenta* Crantz), sweet potato (*Ipomoea batatas*), yams (*Dioscorea sp.*), taro (*Colocasia esculenta*), elephant foot yam (*Amorphophallus paeoniifolius*) and other minor tuber crops play a crucial role in providing food security for about 2.2 billion people in the World besides contributing to animal feeds and industry. Among total World production, about 45% of root and tuber crop production are consumed as food, with the rest converted as animal feed or industrial products. Root and tuber crops are important sources of starch after cereals. Cassava and sweet potato are the most important among the root and tuber crops. Cassava starch finds application in array of industrial products, textiles, corrugation box, paper conversion, liquid gum for domestic sector, paper industry etc. Besides food, sago industry is the major one. A number of stable and marketable food products as well as less stable snack food can be made from tuber crops. Cassava rawa, semolina and fried cassava chips are successful stable products that can be made from cassava tubers. Besides, cassava flour fortified with cereals and legumes flours can be used for making extruded fried foods which also have good post product shelf life. Cassava starch is a valuable stock for bioethanol and biodegradable plastic production. Sweet potato is used as raw materials in the manufacture of products such as deep processing starch, alcohol, liquid glucose, high fructose syrup, maltose and for food processing fresh roots dry flour or starch can be used for noodles, fried chips and canned flakes production. In feed processing the main product is sweet flour used by the compound feed industry. The industrial utilization of sweet potato is rudimentary in India. Starch of colocasia and arrowroot is very fine and it is used in cosmetic and pharmaceutical industries.

Biography:

Dr. Maniyam Nedunchezhiyan, Principal Scientist & i/c TIC, Regional Centre of ICAR-Central Tuber Crops Research Institute, Bhubaneswar – 751 019, Odisha, India is a renowned agronomist in root and tuber crops. He has 32 years experience in tropical root and tuber crops. He is specialized in root and tuber crops-based farming and cropping systems, weed and drip fertigation management. He is also looking after production and distribution of quality planting materials of root and tuber crops. He has more than 210 research papers in International and National peer reviewed journals and more than 96 popular articles. He has authored 14 books, 32 book chapters, 8 technical bulletins and 12 training manuals. Last twenty years he is working in hilly areas for food and nutritional security of tribal farmers of Eastern and North-Eastern India through tuber crop technologies. He has guided 4 Ph.D. students and 3 M.Sc. students. He is a life member of 7 scientific societies. He is a reviewer and referee of 7 scientific research journals including international journals.

Research Interest: Nutrient, water and weed management in tuber crops based cropping systems

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Utilization of Wild *Vigna* genetic resources in crop improvement

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Abstract:

The genus *Vigna* plays a vital role in food security by serving as a source of vegetable protein. To bolster its resilience against pests, diseases, and environmental stresses, an in-depth study was conducted on its wild relatives. This research focused on the complete collection of wild Vigna accessions preserved in the ICAR-NBPGR genebank. Field characterization of 601 accessions representing 35 taxa identified promising donors for yield-related traits. Morphological evaluation, using 28 qualitative and 21 quantitative traits in an Augmented Block Design, highlighted accessions with superior attributes, such as early flowering and high protein content. Field screening and artificial validation pinpointed five accessions from V. stipulacea and V. dalzelliana as resistant to Yellow Mosaic Disease, confirmed using viruliferous whitefly. Further, real-time PCR analysis will assess viral loads in these accessions to validate their resistance. Additionally, a study on the response of 21 wild Vigna accessions to pulse beetle (Callosobruchus chinensis) infestation revealed significant variability in growth parameters, including oviposition, development period, and adult emergence. Based on the Growth Index, accessions were classified from highly resistant to highly susceptible. Remarkably, *V. stipul*acea (IC553547) demonstrated high resistance, with GI values ranging from 0.149 to 1.249. Correlation, regression, PCA, and clustering analyses identified accessions with potential for breeding programs targeting enhanced bruchid resistance. Biochemical analyses highlighted the nutritional value of species such as *V. oblongifolia* and *V. vexillata*, which showed high protein and mineral content, addressing issues of malnutrition. This comprehensive evaluation underscores the genetic potential of wild Vigna species for breeding programs aimed at improving disease resistance, pest tolerance, and nutritional profiles, thereby contributing to global food security and sustainable agriculture

Keywords: *Vigna*, wild relatives, genebank, characterization, evaluation

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Validation of botanical decoctions, concoctions and microbial consortia for pest management in crops under Natural Farming and Organic farming

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Abstract:

The current food production system which includes heavy dose of chemicals leads to loss of biodiversity in and above the soil. Our daily food that we eat is a cocktail of chemicals. Consumers eat chemically loaded food particularly vegetables are highly detrimental to our health. The vegetables are very much vulnerable to insect-pests and diseases as they are generally short duration and the possibility of residual toxicity of pesticide is more. Moreover we consume it in raw form also. The farmers are exposed to the plant protection chemicals during application which causes their health hazards. The one and only solution to all these problems is to make our crop production system free from chemicals. The non chemical ways of pest management maintaining crop yield and quality is the need of the hour. The replacement of chemical pesticides with locally made natural concoctions/ inoculants and decoctions prepared from cow-based products like cow urine, cow dung added with leaves from locally available trees is needed to be scientifically evaluated and validated. The products are to be characterized to find the exact functional group responsible for pesticidal action, to establish the exact mode of action, mechanism of induced host plant resistance and evaluation of their bio-efficacy against pests. Chemical free food grain and vegetable production technology using the natural farming components for vegetable pest management supported with scientific background is novel approaches which will reduce the chemical pesticides consequently develop a low-cost crop production system which will be an environment friendly approach. The farmers of Odisha will be able to produce healthy agricultural products and vegetables which will support their economy as well as the economy of the State.

For scientific validation of the pest management components of Natural Farming has been done at OUAT. The paddy variety 'Pratikshya' was grown during two consecutive Kharif seasons; 2021 and 2022 at research farm of Regional Research and Technology Transfer Station (RRTTS), Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha to assess the biorational management practices against major insect pests in rice. The field experiment included eight treatments including untreated control. The treatments included, Seed treatment with Beejamrit, soil application of Jivamrit @250l/ha, foliar spray of Neem oil @1500ml/ha, cow urine(5%) @500l/ha, cow urine (5%) mixed with neem oil, Neemastra @250l/ha, Brahmastra @250l/ha compared with standard chemical, chlorpyriphos 20EC and untreated control. Results from the field experiment revealed that, the organic pest management module constituting 'Seed treatment with Beejamrit + Soil application of Jivamrit @250l/ha at 30, 45, 60 and 75DAT + foliar spray of Bramhastra @250l/ha at 30, 45, 60 and 75DAT' was found to be most effective against major insect pests in paddy resulting 58%, 64.9% and 70.8% reduction in stem borer, leaf folder and BPH infestation along with 23.4% yield improvement over untreated control resulting incremental cost benefit ratio (ICBR) (4.71). All the botanical treatments were very much friendly to the natural enemies. Pot experiment was conducted to confirm the efficacy of the botanical decoction and concoctions against rice leaffolder.

The botanical decoction (Brahmastra), Concoction (Neemastra) and microbial enrichers (Jivamrit) can be the suitable substitute of chemical insecticide which is very much competent to manage the insect pest population in rice managing to obtain considerable yield and economic output under natural farming or organic farming situation. The current study highlights the effectiveness of the botanicals in rice leaffolder mortality. These results provide valuable insights into pest management strategies, offering cow based botanical formulations as eco-friendly options for sustainable agricultural practices.

Outcomes of the research findings will facilitate the

- Establishment of supportive scientific database of the plant protection products/components under Natural farming
- Creation of ecofriendly and sustainable crop production system.
- Production of healthy agricultural products and vegetables free from chemicals.
- Reduction in production cost, which will push the economy of the farmers.
- Creation of enthusiastic farmers through lateral spread of the technology.
- Enhancing of agricultural export potentiality from Odisha.

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Exploring arsenic tolerant and exclusion donors for use in rice breeding

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Abstract:

Growing rice under arsenic (As) stress inevitably invites a huge risk of As exposure to human and livestock in Asian countries. Identification of As tolerant rice genotype(s) with accumulation of As in straw and grains below threshold limit can be a way forward to mitigate such life threatening problem. We systematically evaluated 131 diverse rice genotypes for As tolerance based on germination and seedling growth p rameters and selected a few elite As tolerant genotypes at appropriate lethal (LD50). The rice genotypes responded differentially with marked difference in tolerance under As stress. Exposure to As adversely affected germination and seedling growth. Significantly higher estimates of RSVI and both STI and RTI coherently associated with tolerant rice genotypes with no symptoms of damage on leaves. Major proportion of As uptake was shown to be retained in roots in tolerant genotypes with progressive decrease in the order of leaf sheath> leaf blade> husk> kernel under As stress although extent of partitioning was genotype-specific signifying As exclusion in shoot and grains. First Principal component alone explained 78.16% of the total phenotypic variation. Seedling tolerance indices, vigour indices and germination percentage were shown to be important criteria for As- tolerance based on PCA and correlation analysis. PCA biplot revealed highly As tolerant genotypes e.g., Ashutosh, BRRI Dhan-72, CST Sel. 4, Mahanadi, MI 156, OR(CZ) 78-1, PB-1, Pusa Sugandha 3 and Pusa Sugandha 3-1 with higher positive score value on 1stPCA. The As-tolerant genotypes identified in this pursuit would certainly help in planning As tolerance breeding in rice.

Keywords: Arsenic stress, early growth parameters, vigour index, tolerance index, bioaccumulation, principal component analysis, rice (*Oryza sativa*).

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Keynote

Mainstreaming of traditional potential crops for sustainable nutrition security in India

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Abstract:

Growing rice under arsenic (As) stress inevitably invites a huge risk of As exposure to human and livestock in Asian countries. Identification of As tolerant rice genotype(s) with accumulation of As in straw and grains below threshold limit can be a way forward to mitigate such life threatening problem. We systematically evaluated 131 diverse rice genotypes for As tolerance based on germination and seedling growth p rameters and selected a few elite As tolerant genotypes at appropriate lethal (LD50). The rice genotypes responded differentially with marked difference in tolerance under As stress. Exposure to As adversely affected germination and seedling growth. Significantly higher estimates of RSVI and both STI and RTI coherently associated with tolerant rice genotypes with no symptoms of damage on leaves. Major proportion of As uptake was shown to be retained in roots in tolerant genotypes with progressive decrease in the order of leaf sheath> leaf blade> husk> kernel under As stress although extent of partitioning was genotype-specific signifying As exclusion in shoot and grains. First Principal component alone explained 78.16% of the total phenotypic variation. Seedling tolerance indices, vigour indices and germination percentage were shown to be important criteria for As- tolerance based on PCA and correlation analysis. PCA biplot revealed highly As tolerant genotypes e.g., Ashutosh, BRRI Dhan-72, CST Sel. 4, Mahanadi, MI 156, OR(CZ) 78-1, PB-1, Pusa Sugandha 3 and Pusa Sugandha 3-1 with higher positive score value on 1stPCA. The As-tolerant genotypes identified in this pursuit would certainly help in planning As tolerance breeding in rice.

Keywords: Arsenic stress, early growth parameters, vigour index, tolerance index, bioaccumulation, principal component analysis, rice (*Oryza sativa*).

Biography:

Dr. Hanuman Lal Raiger presently working as Principal Scientist & Officer Incharge, Agriculture Knowledge Management Unit, ICAR-NBPGR has research experience of 25 years of Research, Teaching and Extension Activities of potential crops in different divisions of NBPGR. He also worked as Network Coordinator at All India Coordinated Research Network on Potential Crop, ICAR-NBPGR, New Delhi. He contributed for the development of 20 varieties high yielding and tolerant biotic and abiotic stress varieties which are estimated to have occupied more than 10,000 ha area in different states of India. Four unique genetic stocks were registered with ICAR-NBPGR and PPVFRA New Delhi. Significant contributions were made for the development, documentation and popularization of agro-technologies and innovations including farmers' participatory variety selection and seed production of potential crop. He has published more than 80 Research Papers and Editor of Annual Report (32) and Technical Bulletins/Crop catalogues (50) and Popular Articles on potential crops (30) and Author of three books on Potential Crops, 20 varieties of Potential Crops has been released by Raiger Association. AICRN on Potential Crops, NBPGR, Pusa Campus, New Delhi – 110012, India.

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ORAL PRESENTATION

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Gender analysis of access to agricultural production technologies among farming households in Akko local Government area, Gombe State, Nigeria

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Abstract:

The study examined gender analysis of access to agricultural production technologies among farming households in Akko L.G.A Gombe State, Nigeria. The objectives of the study were to describe the socioeconomic characteristics of the female and male farmers in the study area, to identify the agricultural production technologies accessible to female and male farmers in the study area and to analyse gender differences in accessing agricultural production technologies by the respondents. Two hundred and forty eight (248) respondents were selected using multi-stage sampling technique. The data collected were analysed using descriptive statistics and proportional two-sample test. The result from socioeconomic characteristics shows that the distribution of gender with the highest percentage are male respondents with 76.7%. Age distribution with the highest percentage are within the range of 20-30 years (32.0%) while the largest distribution of marital status of the respondents in the study area has accounted 70.3% as married. Further results from the study showed that both male and female farmers had access to agricultural production technologies such as improved seeds, insecticide, agricultural information through pamphlets etc although Insecticide (lamdacyholothrin) has the highest mean score for female and fertilizer placement application method has the highest mean score for male respondents. The proportion of male respondents that had accessed to all the production technologies (improved seeds, herbicides and application methods, pesticides and application methods, modern processing equipment's and agricultural information through extension agents, radio, TV and internet) was significantly higher than that of their female counterpart at 1% level of significance. The study therefore recommended that agricultural extension services should be strengthened and adequately funded to provide effective and efficient extension services to farmers, with a specific focus on women farmers, to enhance their access to agricultural production technologies.

Key words: Production Technologies, accessibility and gender

Biography:

Dr. Abubakar Salihu was born on February 28, 1985. He attended New Capital Nursery and Primary School, Abuja (1990-1995), and Government Science Secondary School, Pyakasa, Abuja (1995-2001). He obtained his B. Agric degree and MSc in Agricultural Economics in 2009 and 2015, respectively, from Bayero University, Kano, Nigeria. Dr. Salihu then pursued a PhD in Agricultural Economics at Banaras Hindu University, Varanasi, India, which he completed in 2019. He has been employed at Modibbo Adama University, Yola, Nigeria, since 2012, starting as a Graduate Assistant and rising to the rank of Senior Lecturer in the Department of Agricultural Economics.

Research Interest: Agricultural production economics, farm management

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Effect of different concentrations of neem seed oil in the management of Cucumber Mosaic virus of pepper (*Capsicum annuum* l.) under screenhouse condition

Santuraki Ahmed Aliyu and Josephine Solomon
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Abstract:

This research was conducted to study the effect of different Concentrations of Neem Seed Oil in the management of Cucumber Mosaic Virus of Pepper (*capsicum annuum* L.) of Pepper. A Completely Randomized Design with five treatments including the control and four replication was used throughout the experiment. Treatments consisted of 4mls of neem seed oil + 10mls of distilled water, 3mls of neem seed oil + 10mls of distilled water, 2mls of neem seed oil + 10mls of distilled water, 1ml of neem seed oil + 10mls of distilled water and control. The parameters observed were the incidence of mosaic attack due to CMV, disease severity, number of leaves, branches, flowers, fruits and fresh fruits weight of each plant. Results showed that the application of different concentration of neem seed oil reduced the severity due to CMV. Application of 4mls of neem seed oil + 10mls of distilled water (8.44) was the most effective in suppressing disease severity caused by the virus as they significantly differed from control and other treatments. Results further revealed that 4mls of neem seed oil +10mls of distilled water also increase the growth and yield of pepper plant. Followed by 2mls of neem seed oil+ 10mls of distilled water (2.19) was the second highest in the control of CMV. It is recommended that 4mls of neem seed oil + 10mls of distilled water could be subjected to further studies as a potential substitute to synthetic viricide used in control of cucumber mosaic virus of pepper plants since it as able to significantly reduce the severity of the disease and as well improved the yield of the plant over the control.

Keyword: Cucumber mosaic virus, Pepper, Neem seed oil, Screenhouse.

Biography:

Dr. Ahmed Aliyu Santuraki born on 24th August 1976 to the family late Justice Aliyu Santuraki and Hajiya Binta Santuraki I attended General Murtala Mohammed College, Yola in 1996 for my secondary education and proceeded to University of Maiduguri for my bachelor degree i.e. Doctor of Veterinary Medicine (DVM) then proceed to Usmanu Danfodio University Sokoto for my B, Agric and went to Universti Putra Malaysia for MSc and Federal University of Agriculture Abeokuta for my PhD in Crop Protection (Virology) in 2024. He started his career as a Farm Attendant with the Federal University of Technology, Yola and later converted to Academic Staff as Graduate Assistance and presently Lecturer I with the University.

Research Interest: Agricultural production economics, farm management

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Unpacking the benefits of nano bubble technology

Michael Davidson
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Abstract:

Nano bubbles are oxygen-filled particles of water with a diameter less than 200 nanometers, are electrically charged with a hard shell and provide an exponentially larger surface area than 0.1 mm bubbles. Oxygen-nanobubble significantly increase the dissolved oxygen concentration of water. Nano-bubbles are hydrophobic, do not precipitate out, and can be applied in every water delivery system and every crop. Nano-bubbles can be applied as an in-line unit in the irrigation mainline or lateral, and/or applied at the shore or in a pond or reservoir to clean algae and significantly and positively raise the levels of dissolved oxygen. Applications for this technology include irrigation of all crops, dairies, cattle and sheep feed lots, aquaculture, surface water, oil and gas, mining, and food and safety applications.

This session will unpack the science and benefits and cost points of using nano-bubbles, and explicate peer-reviewed literature and case studies, which explain how the technology reduces pathogens in the root zone, reduces surface compaction, mobilizes salts below the root zone, and reduces surface tension of water molecules for improved water and nutrient efficiency, and for the reduction of GHG methane, carbon, and nitrogen emissions in cattle feed and manure, and in all crops.

Keywords: Nano-bubbles, GHG emission, Rice, Methane, Regenerative Agriculture

Figure 1 Strawberry field control and treated with Nano bubbles, California, US

Biography:

Michael Davidson is a global climate-smart agriculture consultant and hold a PhD in Public Policy. I have consulted on behalf of the International Finance Corporation and Water Resources Group of the World Bank, The German Development Fund (GIZ), The Dutch Sustainable Trade Initiative, the Inter-American Development Bank, and a host of NGO's, to design and implement programs of climate-smart agriculture for smallholder farmers in sub-Asia, East and West Africa, the Middle East, and South America. I am the US Department of State "expert speaker" on climate change and agriculture. I currently manage the interests of ChucaoTech USA and ChucaoTech International, bringing the chemical-free technology of nano-bubbles to the Global South and North America.

Research Interest: GHG emission reductions, Pesticide Reductions, Biodiversity

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A Multifaceted Analysis: Unveiling the Complexities of Wheat Genotype, Fortification, and Processing on Iron and Zinc Bioavailability in whole wheat flour and chapati

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Abstract:

This study examines the complex interactions between wheat cultivar selection and fortification with NaFeEDTA and ascorbic acid (AA) on the bioavailability of iron (Fe) and zinc (Zn) in whole wheat flour (WWF) and chapati. Nineteen hexaploid wheat cultivars were rigorously assessed for their intrinsic Fe and Zn profiles, including total content (TC), solubility (S), and bio-accessibility (B), utilizing an in-vitro gastrointestinal model. Significant variations ($P<0.05$) were observed among cultivars, with Fe content ranging from 32.8 to 42.8 mg.kg^{-1} and Zn content ranging from 34.5 to 43.8 mg.kg^{-1} in WWF. Fortification with NaFeEDTA (T3: 250 mg.kg^{-1}) significantly increased total Fe TC in WWF by 85.0%, Fe and Zn solubility by 51.2% and 22.3%, and bio-accessibility by 165.5% and 84.2%, respectively, compared to control. Conversely, AA fortification (T3: 250 mg.kg^{-1}) elevated Fe and Zn solubility by 98.7% and 62.1%, and bio-accessibility by 282.2% and 230.5%, respectively. Notably, cultivar-specific responses to both fortification strategies were also evident. When translated to chapati, both NaFeEDTA and AA fortification (T3) enhanced Fe and Zn bio-accessibility compared to unfortified chapati. The impact of fortification was cultivar-dependent, with certain cultivars showing greater efficacy in improving Fe and Zn bio-accessibility. Correlation analysis revealed intricate relationships among Fe and Zn bioavailability parameters, highlighting the importance of tailored fortification approaches. These findings have significant implications for optimizing fortification strategies to improve bioavailable Fe and Zn intake through wheat-based diets.

Keywords: Fe and Zn, Bioavailability, Bio-accessibility, Whole Wheat Flour, Genetic Variation

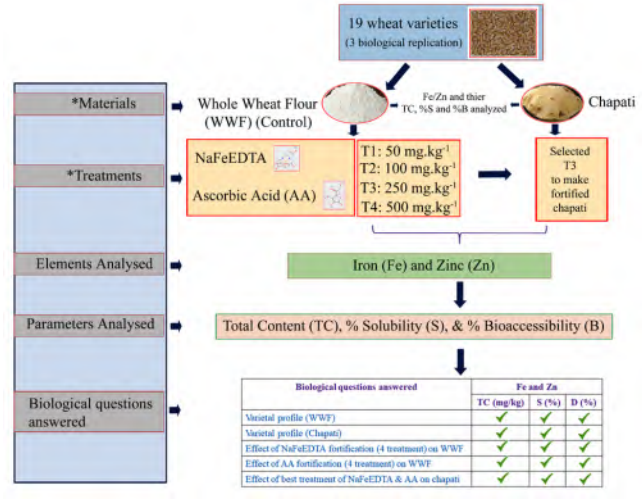

Fig. 1: Schematic representation of workflow used under current study. *indicates that all the three parameters were anlysed for each material and treatment

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Self-Sufficient farming approach: Adaptability with scientific validation

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Abstract:

The self-sufficient agricultural practice needs to be adapted when all around the globe people are discussing about climate change, the side-effects of chemical-based conventional agriculture, and ecological balance. This detailed approach allows us to think and take a shift from conventional to sustainable, self-sufficient farming-based methods, which is the need of current times and farmers all over the globe. Farmers don't need to depend upon any external resources as input in the farming processes and will gain the maximum profit from their field cultivation for their livelihood and the overall well-being of our society will be uplifted depending upon that food.

We are developing self-sufficient agricultural research practices under the Research in Sustainable Holistic Innovation (RISHI) umbrella at IIT Mandi that aims to provide a sustainable agricultural practice, and will make farmers self-reliant and independent to think of utilizing all their natural resources for their farming practices. We started with peas cultivation having various treatments at the agricultural farm of IIT Mandi, HP, India. The various estimations were recorded and observed to scientifically validate the methodology, soil health, water and nutrients requirement, and yield. This approach emphasizes having one or two animals in the farmers' courtyard to allow them to apply soil minerals with natural ingredients without outsourcing from any other places. We compared the control, naturally supplied bio-enriched mixture, and conventional agricultural plots to recommend the guidelines that could improve farmers' livelihood. The results of the study will be presented in the presentation at the conference.

Keywords: Sustainable agriculture, bio-enriched formulation, crop production, water managment

Biography:

Ranjeet Kumar Jha, a Ph.D. graduate in Agricultural and Biological Engineering from the University of Illinois at Urbana-Champaign, USA. My expertise encompasses food-water-climate nexus modeling, crop production management, water management, and assessing climate change impacts on crop production. During my doctoral research, I developed strategies to increase food production by 60% by 2050 while minimizing irrigation requirements, considering the impacts of climate change. This work received widespread international media coverage. He is As an Assistant Professor at IIT Mandi, currently, I focus on the Agriculture-Water-Climate nexus interaction, incorporating principles from soil water mechanisms, crop physiology, and agroclimatic indices. I am also working on reviving indigenous agricultural practices to improve the overall physical and mental health of our society. Therefore, the aim is sustainable agricultural development using modern technologies to provide quality and sufficient quantities of food to the increasing global population.

Research Interest: The development and utilization of decision support systems in agriculture to guide farmers and stakeholders, enhancing agricultural production and optimizing the use of resources in agricultural practices.

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Bio-prospects of *Bacillus megaterium* for Degradation of Selected Novel Pesticides

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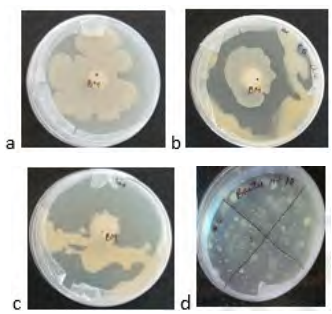
Abstract:

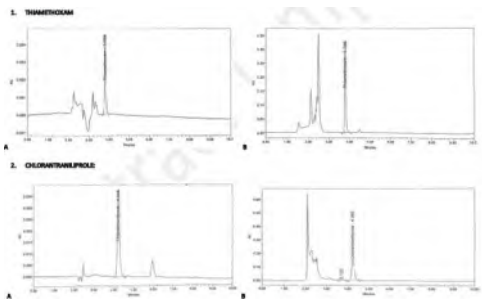
Thiamethoxam and chlorantraniliprole, the systemic novel insecticides, are applied as granular, and foliar formulations. The reported half-lives for these pesticides are in the range of 23.89 - 170 days (Sahu *et al.*, 2019; Li *et al.*, 2018) in soil. However, studies on the potential microorganisms for bioremediation of these novel pesticides are least explored. Similarly, the sublethal effects of these pesticides on native soil microflora are also not studied.

Bacillus megaterium, a gram-positive, phosphorus solubilizer was reported for biodegradation of insecticide, *viz.*, fipronil (do Prado *et al.*, 2022) and allethrin (Huang *et al.*, 2022). The present study evaluated the prospects of this bacterium for the remediation of thiamethoxam and chlorantraniliprole. *B. megaterium* growth was measured at 600 nm on minimal salt and half-strength nutrient broth media supplemented with pesticides in the range of 5-100 mg/kg through independent studies in triplicates. The survivability of *B. megaterium* from these cultures was verified by observing the colonies formed (10^6) on nutrient agar. Further, the effect of thiamethoxam and chlorantraniliprole on the spread of *B. megaterium* on nutrient agar plates spiked at 10 mg/kg was also ascertained against control. In addition, soil microcosm studies were also conducted (21 days) to explore the bio-stimulating effect on degradability in pesticide-treated soils (@ 10 mg/kg) when *B. megaterium* is used along with organic amendments *viz.*, vermicompost and Vesicular Arbuscular Mycorrhiza (VAM) and degradation half-lives were estimated based on their residual concentrations using an HPLC-PDA. The effect of both the pesticides on the activity of soil dehydrogenase, β-D- glucosidase, acid, and alkaline phosphatase was determined to have a comparative analysis of microbial abundance against control treatments.

The results showed that acclimatized cultures of *B. megaterium* could grow in half-strength nutrient broth supplemented with thiamethoxam or chlorantraniliprole in the range of 5-100 mg/kg. The maximum absorbance values were observed as 0.734 AU and 0.965 AU at 100 mg/kg for thiamethoxam and chlorantraniliprole, respectively indicating the bacterium's adaptability for both the pesticides. *B. megaterium* cultures from these treatments exhibited colony-forming units (20-40 x 10^6) when plated on the nutrient agar indicating its survivability. However, the spread of *B. megaterium* on agar plates spiked with pesticides is less compared to the control showing the retarding effect of the pesticides. Soil application of *B. megaterium* in combination with vermicompost or VAM has resulted in synergism with a reduced half-life for both thiamethoxam and chlorantraniliprole (11 to 18 days) compared to natural attenuation (29 - 35 days). The enzymatic activity was negatively impacted for all the enzymes under study in treatments compared to control. Thus, this study concludes that *B. megaterium* could be a potential candidate for bioremediation of thiamethoxam and chlorantraniliprole, and indicated the ill effect of these pesticides on soil microbial activity.

Keywords: Bioremediation, *Bacillus*, thiamethoxam, chlorantraniliprole, half-life





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Regional disparities in Wheat cropping patterns in Himachal Pradesh: A path Towards sustainable agriculture

Kamalpreet Singh and Shivjeet Kaur
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Abstract:

This study examines the district-wise cropping patterns of wheat in Himachal Pradesh from 1990-91 to 2020-21, highlighting their implications for sustainable agriculture. The analysis highlights significant regional disparities, with districts such as Bilaspur, Una, and Kangra maintaining high wheat cropping shares due to favourable climatic conditions and resource availability. Conversely, districts like Kinnaur, Lahaul & Spiti, and Shimla experienced drastic declines, driven by harsh environments, urbanization, and resource limitations. The overall share of wheat cropping in the state declined from 38.86% in 1990-91 to 36.47% in 2020-21, signalling the need for sustainable agricultural practices. Addressing these disparities through crop diversification, improved irrigation, and climate-resilient farming methods is essential to ensure long-term agricultural sustainability. This research provides critical insights for policymakers to design interventions that promote equitable resource distribution, enhance productivity, and align wheat farming practices with sustainable development goals in the Himalayan region.

Keywords: Sustainable agriculture, Temporal trends, Cropping pattern, Agricultural policy, Food security

Biography:

Kamalpreet Singh is a dedicated research scholar with a profound commitment to the higher education industry, demonstrated through continuous academic and professional achievements. Currently at Punjabi University Patiala as a research scholar. He has been significantly involved in research since 2021.Kamalpreet Singh holds an M.A. in Geography and is pursuing a PhD in Geography from Punjabi University Patiala. He is a certified UGC NET JRF recipient, which highlights his geography expertise. Kamlapreet's accolades include leading academic workshops and seminars and contributing research papers on sustainable development and agricultural geography. His strengths lie in communication, leadership, and high professional competence, making him an asset to his institution.

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Development of CNN-based regression model for multi-trait prediction in dwarf tomatoes using RGB images

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Abstract:

This study manifests a CNN-based technique to predict multiple physical traits of dwarf tomato plants from RGB images. The dataset was collected during 4th International Autonomous Greenhouse Challenge, and each dwarf tomato plant image was of a high resolution (3840 x 2160) along with a corresponding ground truth height, fresh weight, leaf area, and number of red fruits.

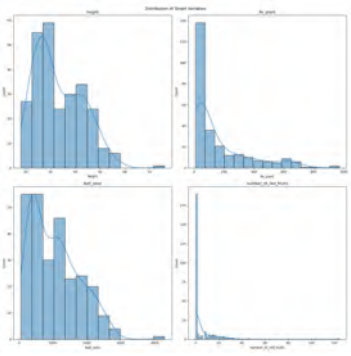
Through our methodology, we have carried out large optimizations of the preprocessing process both inside and out, with multiple denoising techniques (Gaussian, Median, and Bilateral filters) being tested across various kernel sizes. The median filter with a kernel size of 7 did prove to be the choice, as it could keep the highly important plant features while reducing noise. The preprocessing pipeline included further quality aid, resulting in images resized to 224 by 224 pixels, then normalization.

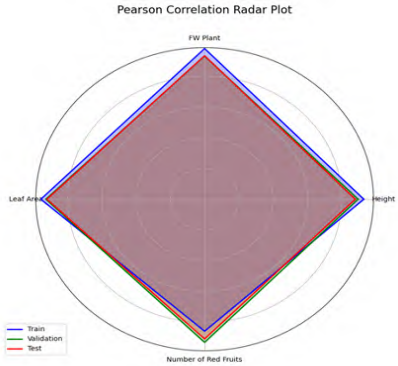
The architecture was implemented with 3 convolutional layers with 32, 64, and 128 filters, respectively, on top of dense layers. Several activation functions (ReLU, Softplus, Linear) were evaluated, among which LeakyReLU (α=0.01) performed the best. The model was trained on 50% of the dataset, with 30% as a validation dataset and 20% for tests.

The model showed good results for all the traits, with R^2 scores on the validation set of 0.77 for height, 0.81 for fresh weight, 0.81 for leaf area, and 0.80 for number of red fruits. Pearson correlation coefficients, shown in radar plots, exhibited mostly strong (>0.88) correlations among training, validation, and test sets across all four traits, with fresh weight showing the greatest correlation (0.93). The radar plot also signifies an impressive resemblance of model performance across different data splits, indicating a strong generalization capacity.

Distribution analysis led to a conclusion that the target variables are distributed according to their very own distribution patterns: bimodal in a range of height (20-70 cm), right-skewed in the case of fresh weight (0-1000g) and leaf area (0-4000 cm^2), and zero-inflated for red fruit count. The variation of distribution patterns across the different dependent variables also indicates the rich capacity the model assumes to deal effectively with real-world agricultural data.

Below Figure shows radar plot of Pearson correlations and distribution plots of target variables





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In vitro studies on Micopropagation and Validation of Genetic fidelity and Biochemical assessment of *Butea Monosperma* (Palash)

Rahul Jitendra Janephalkar * and Narendrasingh R. Chavan
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Abstract:

The study titled "In Vitro Micropropagation and Validation of Genetic Fidelity using ISSR Markers for Butea monosperma (Palash)" aimed to establish a reliable protocol for clonal propagation and to confirm the genetic stability of regenerated plants. Butea monosperma, a valuable yet endangered medicinal tree of the Fabaceae family, is widely known for its multifaceted ecological and pharmaceutical significance. Traditional propagation methods are constrained by poor germination rates, low seed viability, and the laborious nature of vegetative propagation. Micropropagation provides a rapid and effective alternative for large-scale production of true-to-type, elite plants while preserving the species genetic integrity.

The study utilized nodal and shoot tip explants cultured on Murashige and Skoog (MS) medium supplemented with different concentrations of cytokinins, such as benzyl adenine (BA), Kinetin (Kin), meta-Topolin (mT), and 2-isopentenyl adenine (2-iP), to optimize shoot induction. Rooting was achieved in both in vitro (using ½ MS liquid medium with auxins) and ex vitro (soil and vermiculite mixture) conditions. Acclimatization of plantlets was assessed with various potting substrates to enhance survival and growth under natural conditions.

To validate the genetic fidelity of the regenerated plants, Inter Simple Sequence Repeat (ISSR) markers were employed. DNA was extracted from mother plants and in vitro-propagated plantlets, and ISSR analysis was conducted to detect any somaclonal variations. The absence of polymorphism among the analysed profiles confirmed the genetic stability of the micropropagated plants.

This study successfully optimized a comprehensive in vitro micropropagation protocol and verified the genetic uniformity of Butea monosperma plantlets using molecular markers, offering a significant step toward its conservation and large-scale cultivation.

Keywords: endangered, multifaceted, genetic integrity, conservation

Biography:

Rahul Jitendra Janephalkar is a dedicated academic and researcher in the field of Plant Biotechnology, currently serving as the Principal In charge and Associate Professor at the College of Agricultural Biotechnology, Saralgaon, Thane, Maharashtra. I am pursuing Ph.D. in Plant Biotechnology from MGM University and holds a M.Sc. in Genetics from Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. I have qualified ASRB-NET in Genetics and Plant Breeding in 2021 and have a strong background in teaching, research, and student guidance, I have made significant contributions to various areas of agricultural biotechnology, including Plant Tissue Culture, Mushroom Cultivation, and Soil and Water Analysis. I am actively organizes hands-on training sessions and practical modules for undergraduate students, helping them gain valuable skills in the field. I am expertise extends to biotechnology, bio fertilizers, bio pesticides, and mushroom technology, and also played a key role in laboratory development and curriculum design. I have participated in various conferences and training programs throughout my career. Outside of this academic career, I am passionate about sports, particularly table tennis and badminton.

Research Interest: Plant Biotechnology, Environmental and Microbial Biotechnology.

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A novel irrigation system for farming towards environmental sustainability in India

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Abstract:

The extraction of groundwater for irrigation using traditional hand pumps typically requires external power sources such as petrol, diesel, or electricity, making the operational cost very high. Small and medium-scale farmers, in most cases, spend over 50% of their total income on irrigation alone. The article presents a novel irrigation system tailored for small-scale agriculture. Irrigation is one of the critical inputs in crop production and acts as a fundamental input in various agricultural systems. A cost-effective irrigation system developed and implemented would significantly increase agricultural productivity. In small-scale farming, most of the operations use manual methods of irrigation to reduce costs of operation. Consequently, the integration of a technologically optimized manual irrigation system presents a viable solution to improve water management efficiency and overall yield for marginal and small-scale farmers. The research is an innovative irrigation system integrated with an epicyclic gear train mechanism. This system will be interfaced with a common manual hand pump used in agricultural settings. The plunger rod along with the piston assembly constitutes an essential component of the hand pump for extracting water from underground sources due to its reciprocating motion. Where by an increased number of strokes per unit time significantly enhances the water lifting capacity from the well. The proposed model maximizes energy output while minimizing the use of physical effort. The system is entirely self-sustaining, requiring no external power input, and operates with high energy efficiency, making it an eco-friendly solution for sustainable energy generation.

Keywords: Efficiency, epicyclic gear train, farmer, irrigation, external source, hand pump.

Biography:

Dr. Ramesh Chandra Nayak is presently working as the Professor and Head of Mechanical Engineering Department at Synergy Institute of Technology, Bhubaneswar, Odisha, India. Presently he has been awarded with the Post-Doctoral Fellowship at ihub-Anubhuti, IIIT, Delhi, from Department of Science and Technology (DST) Govt. of India. He has 17 years of Teaching, Research and administrative experience. He has done his B. Tech. and M. Tech. in Mechanical Engineering from BPUT, Odisha. and Ph.D. in Mechanical Engineering with a specialization in Thermal Engineering from SOA University [NAAC 'A++' grade] Bhubaneswar, Odisha, India. He has published 20 International papers (Scopus Indexed) 25 Papers (UGC approved) 7 numbers Book chapters. 4 International Books. 2 Patents. His research area is Environment, Heat Transfer, Agriculture, Thermal Engineering, Refrigerator and Air Conditioning, Manufacturing, Production and sustainability. He has been awarded Prof. R P Singh award by The Institution of Engineers (India) for the Paper titled 'Technology to Develop a Smokeless Stove for Sustainable Future of Rural Women and also to Develop a Green Environment' (published in Series A, Volume 103 Issue 1). Er R C Patra Memorial award from The Institution of Engineers (India) Odisha State Centre on 23 March 2024. For work " Innovative irrigation method towards Sustainability agriculture".

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Advancing Agriculture, Aquaculture, and Horticulture with Nanobubble Technology

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Abstract:

Nanobubble technology, an innovative solution developed indigenously through the collaboration of CSIR-NML, MG University-Kottayam , Kerala , and Diva Envitec, is ready to revolutionise agriculture, aquaculture, and horticulture. Nanobubbles, with diameters below 200 nm, bring unprecedented efficiency and sustainability to these sectors by leveraging their unique physicochemical properties.

In aquaculture, nanobubbles enhance dissolved oxygen levels in water, crucial for fish and prawn farming. This ensures improved growth rates, higher survival rates, and reduced disease prevalence, making operations more productive and environmentally sustainable. In agriculture and horticulture, nanobubbles facilitate nutrient delivery and soil aeration. By promoting root oxygenation and microbial activity, they boost crop yield and plant health while minimizing water and fertilizer use.

The science behind nanobubbles lies in their unique characteristics. Their extremely high surface-area-to-volume ratio enhances gas solubility, leading to improved oxygen delivery. The elevated internal pressure of nanobubbles induces reactive oxygen species (ROS) formation, beneficial for sterilization and pathogen control. Furthermore, their prolonged stability allows them to remain suspended in water, creating a consistent supply of oxygen. The microstreaming effect around nanobubbles enhances nutrient mixing and diffusion in soils and water bodies, promoting uniform growth conditions.

This indigenous nanobubble technology exemplifies “Make in India” and the synergy of cutting-edge science and sustainability, providing a cost-effective and eco-friendly solution for critical challenges in agriculture, aquaculture, and horticulture. By improving productivity and reducing resource dependency, this innovation aligns with global goals for sustainable development and environmental conservation.

Keywords: Nanobubbles, Sustainable Farming, Aquaculture Innovation, Horticulture, Agriculture Revolution, Eco Friendly Technology

Biography:

Prof. Lalit Vashista is the CEO of Diva Envitec Pvt. Ltd. He is also professor of practise at MG University, Kottayam, Kerala. With over three decades of expertise in process engineering, wastewater treatment, and advanced separation technologies, he has been a pioneer in developing innovative solutions to address pressing environmental challenges. Prof. Vashista's groundbreaking work in nanobubble technology, conducted in collaboration with institutions like CSIR-NML and MG University, has revolutionized applications in Mining, agriculture, aquaculture, and industrial wastewater treatment. His focus on integrating sustainability into process design has led to transformative advancements, including cost-efficient effluent treatment methods and enhanced resource recovery processes. He is an alumnus of NIT Rourkela , Odisha, Prof. Vashista has served as an industry leader and academic mentor, bridging the gap between research and real-world applications. His company, Diva Envitec, is recognized globally for its cutting-edge products, including advanced oxidation systems, catalytic hydration, and nanobubble generators. A passionate advocate for sustainable manufacturing, Prof. Vashista has contributed significantly to achieving net-zero goals and promoting circular economy practices. His extensive experience in industrial collaborations and his commitment to R&D have positioned him as a thought leader in green engineering and water resource management.

Research Interest: Nanobubbles, Advanced Oxidation, Pervaporation, Water Chemistry

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Revitalizing rural economies:" The role of small businesses in driving sustainable development"

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Abstract:

Rural economies worldwide face persistent challenges, including declining populations, limited infrastructure, and restricted access to markets and resources. However, small businesses in rural areas are emerging as critical drivers of sustainable development, offering innovative solutions to these issues while fostering economic resilience. This paper examines the multifaceted role of small businesses in revitalizing rural economies, focusing on their contributions to job creation, community development, and environmental sustainability. Small businesses act as economic anchors in rural regions, generating employment opportunities and retaining local talent that might otherwise migrate to urban areas. These enterprises also play a vital role in diversifying rural economies, moving beyond traditional agriculture to include sectors such as eco-tourism, artisanal crafts, renewable energy, and technology-based services. By leveraging local resources and embracing innovative business models, rural entrepreneurs are addressing market gaps and catering to both local and global consumers.

The integration of sustainable practices is another hallmark of rural small businesses. Many are adopting eco-friendly production methods, promoting circular economies, and utilizing renewable energy to reduce environmental impact. This focus not only aligns with global sustainability goals but also enhances the long-term viability of these enterprises, as consumers increasingly prioritize environmentally conscious products and services.

Community development is another significant outcome of small business growth in rural areas. These businesses often reinvest profits locally, strengthening infrastructure, supporting education and healthcare initiatives, and fostering social cohesion. Their presence helps to create self-reliant communities, reducing dependence on external aid and mitigating the urban-rural divide. Despite their potential, rural small businesses face numerous challenges, including access to funding, technological barriers, and limited connectivity to broader markets. This paper explores policy interventions and support mechanisms, such as government subsidies, microfinance, and digital literacy programs, that can empower rural entrepreneurs to overcome these obstacles and scale their operations sustainably.

Through case studies and data-driven analysis, this paper underscores the transformative power of small businesses in revitalizing rural economies. It highlights how these enterprises serve as catalysts for sustainable development, addressing economic, social, and environmental challenges while fostering inclusive growth. Ultimately, small businesses in rural areas hold the key to bridging economic disparities, enhancing community resilience, and contributing to a more sustainable global economy.

Biography:

Mr. Rajesh Kumar Das, MBA Agribusiness and B.Sc.Agriculture, with experience of 3 years on work experience and currently working as a Agri program coordinator at Shree Anna Abhiyan, Lathikata , Sundargarh

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Nano DAP in action: A field-based Study on wheat growth and yield enhancement

Abithaa P, Rajeev Ranjan, Rabi N Sahoo, Anchal Dass, Dilip K Kushwaha and Mahesh Kumar
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Abstract:

Modern agriculture faces challenges brought on by the growing expense of fertilizers and the growing demand for food security. The quantity and timing of fertilizer application should have a major impact without compromising soil quality, which is why fertilizers made using nanotechnology, such as nano-urea, are necessary. A field investigation was undertaken at ICAR-Indian Agricultural Research Institute, New Delhi to optimize fertilizer use efficiency and alleviate soil degradation associated with conventional fertilizers. The treatments, included 75 and 50% of recommended dose of nitrogen (RDN) + 2 foliar sprays of nano DAP along with control. The foliar sprays of fertilizers were applied at two critical growth stages of nitrogen requirement (tillering and jointing stages) to evaluate its effect on wheat (*Triticum aestivum*. L). Plant growth parameters such as plant height, leaf area index, dry matter accumulation, leaf nitrogen content and SPAD values were observed during different growth stages. Yield, yield attributes and NUE were also calculated. The study revealed that foliar application of fertilizers combined with 75% RDN significantly impacted wheat growth and yield. The treatment involving 75% RDN + 2 foliar sprays of Nano DAP exhibited superior growth parameters and yield attributes, that curtails the reduction of 25% conventional fertilizers. Increased plant height of 83.6 cm and 93.8 cm, LAI of 4.5 and 2.72, dry matter of 690.8 g/m2 and 1084.6 g/m2, LNC of 4.21 and 3.43% of and SPAD value of 50.1 and 54.1 at 90 and 120 DAS, respectively were recorded. This treatment yielded 62.71 q/ha grain yield, harvest index of 0.41, NUE of 55.02, and B:C ratio demonstrating economic feasibility.

Keywords: Wheat, nano-fertilizer, cost effective, fertilizer use efficiency, soil health.

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Optical remote sensing for estimation of Paddy area in Nagapattinam district of Tamil Nadu

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Abstract:

The study focuses on estimating the kharif paddy area using optical satellite data, specifically during the early monsoon season when cloud-free imagery is more available. Remote sensing for crop monitoring has advanced with the introduction of modern satellites offering high spatial and temporal resolution. For the kharif season of 2019, Sentinel-2A and 2B optical data from the European Space Agency (ESA) were used to estimate the paddy area in Nagapattinam district, Tamil Nadu, during the peak flowering stage of paddy. Both supervised and unsupervised classification techniques were employed, with a preference for supervised classification due to prior knowledge of the region. Training sites were created using field survey-based ground truth data, enabling the classification of land into six categories: Paddy, Waterbody, Settlements, Barren lands, other crops, and Miscellaneous. The data were analysed using the maximum likelihood classifier in ArcGIS software to delineate paddy areas, with iterative refinements and accuracy assessments ensuring reliable results. The total kharif paddy area in Nagapattinam district was found to be 41,170.07 hectares. Block-wise statistics revealed Mayiladuthurai block had the largest paddy area (6,089.49 hectares), while Talanayar block had the smallest (1,613.70 hectares). The study demonstrates the effectiveness of high-resolution satellite data and supervised classification methods for accurate crop area estimation, achieving a kappa index of 0.83.

Keywords: Area estimation; Optical Remote sensing; Rice crop.

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Antimicrobial resistance and molecular detection of extended-spectrum β-lactamases among *Escherichia coli* isolated from dairy cow and their surrounding environment

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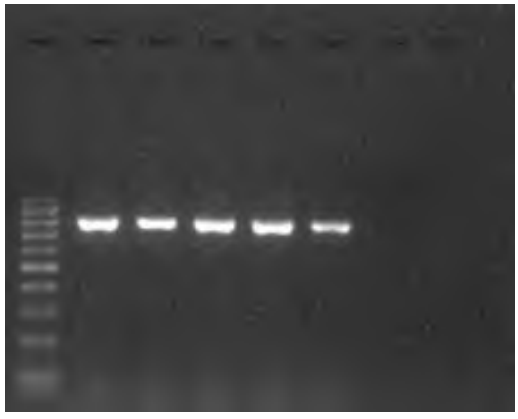
Abstract:

Antimicrobial resistance (AMR), one among the most common priority areas identified by both national and international agencies, is mushrooming as a silent pandemic. Escherichia coli are commonly used as an indicator of AMR in humans, animals, food, and the environment. Extended-spectrum β-lactamase (ESBL) producing *E. coli* are the largest group of multidrug-resistant pathogens affecting diverse host species. The present study was planned to isolate Escherichia coli from fecal samples collected from dairy cow and random samples from their surrounding farm environment and to determine AMR patterns of the isolates and evaluate them for the presence of extended-spectrum β-lactamase using the phenotypic and molecular methods. A total of 275 E. coli isolates belonged to different serogroups and were confirmed by uspA gene PCR with amplicon of expected size of 884 bp as visualized under Gel Doc system. Laboratory based antimicrobial sensitivity profile of E. coli isolates revealed that around 40 % were multidrug resistant strains and mostly resistant to commonly used antibiotic drugs. Out of 275 tested, 96 (34.98%) E. coli were phenotypically confirmed Extended Spectrum β-lactamases (ESBL) producer strains as tested by double disc synergy method. In genotypic study on ESBL phenotypes of E. coli, 77(80.2%) were TEM positive, 17 (17.7%) CTX positive and 13 (13.5%) positive for both TEM and CTX gene specific PCR. The finding indicates the need to address the menace of AMR as a global public health concern. The adoption of the one health approach seems plausible in control and prevention of AMR.

Fig.. Agarose gel electrophoresis of PCR amplicons for TEM gene (800 bp) from E. coli.



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Oral

Extraction of charantin, an antidiabetic molecule in bitter gourd and quantification by reverse phase high performance liquid chromatography

Gajanan Solunke* and Arunava Das
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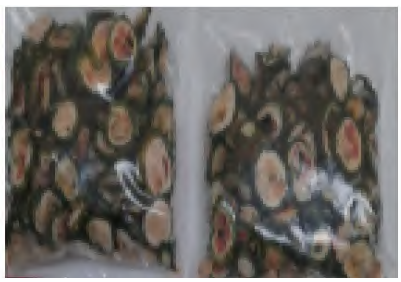
Abstract:

Many of the vegetable crops contain various health-promoting and bio-pharmaceutical nutrients. Bitter gourd (Momordica charantia L) is one of them, which contains many health-promoting phytomolecules. Each individual phytomolecule is useful for one or more deficiencies or diseases. Bitter gourd consists of more than 60 important phytonutrients, making it a functional food for regulating health. Most importantly, bitter gourd contains charantin, which consists of two glucosides, namely stigmasterol and sitosterol, which are effective against diabetes mellitus type 2 (DM2). Charantin is a micromolecule, so it is important to extract, quantify and formulate it to achieve an optimal dosage against diabetes. In the present study, the initial focus was on selecting a suitable solvent for maximizing charantin extraction from the dry fruit powder of bitter gourd. Extraction with an organic solvent is important, and we have chosen methanol for extraction because it is polar, has a high boiling point, is available, etc. There are different extraction methods like ultra sonication, CO2 extraction, and water bath, but we used the Soxhlet extraction method. All three extracts are quantified by reverse phase high performance liquid chromatography (RP-HPLC). Charantin ranges 196 ug/g to 664 ug/ g, 283 to 927 ug/g and 159 to 780 ug/g dry weight in absolute ethanol, absolute methanol and 1:1 mixture of ethanol and methanol respectively. Among these three combinations, methanol was found to be the most suitable solvent for extraction of maximum amount of charantin than ethanol and its combination.

Keywords: type II diabetes, charantin, soxhlet, HPLC, organic solvent



Charantin conc. in ug/g		
Ethanol	Methanol	Ethanol + Methanol
246.358	385.697	322.302
196.030	369.314	317.508
143.402	283.920	159.790
505.210	837.480	687.251
611.364	919.173	659.507
664.811	927.016	780.807
568.058	677.484	598.264
326.758	571.302	330.388
447.507	701.994	520.824
373.485	920.338	505.559

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Carbon credit potential of different land use systems in Vindhyan region of Eastern Uttar Pradesh

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Abstract:

In recent decades, carbon management is an important point on the agenda to identify the best viable mitigation strategies for its reduction. The carbon storage capacity of agroforestry systems varies by region, dependent on the growth characteristics of tree species (Kumar et al, 2024). The Vindhyan region of eastern Uttar Pradesh is characterized by diverse land use systems, including forests, agriculture, and agroforestry. These systems play a crucial role in carbon sequestration, a vital process for mitigating climate change. Understanding the carbon credit potential of these land use systems is essential for integrating sustainable practices and enhancing carbon offset initiatives. The experiment was conducted to study the Carbon sequestration and credit potential of different land use systems 2022-2023 at Barkachha in Mirzapur district of Uttar Pradesh in the Vindhyan Region. This experiment was carried out in a Randomized Block Design with eight treatments and three replications in two soil depths i.e., D1 (0-20 cm) and D2 (20-40 cm). Different treatments were: Karonda Orchard (T1), Guava Orchard (T2), Custard apple Orchard (T3), Bael Orchard (T4), Wheat field (T5), Mustard field (T6), Mixed forest (T7) and Teak forest (T8). The significant result was found regarding the impact of various Land Use Systems (LUSs) on the carbon credits of 14-year-old LUSs. Among the different LUSs, the highest carbon credit was observed in mixed forests (T7), which amounted to 47196.64 ₹/ha/yr. It was followed by Teak forests (T8), Bael orchards (T4), guava orchards (T2), custard apple (T3), karonda orchards (T1), and wheat fields (T5) in descending order of carbon credit values. Similar result was found on total CO2 sequestration. The highest total CO2 sequestration was observed in the Mixed forest (T7) at 158.99 t/ha and the lowest total CO2 sequestration was recorded in the Mustard field (T6) at 16.64 t/ha.

Keywords: Carbon sequestration, carbon credit, Vindhyan region

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Influence of planting methods and nitrogen levels on the growth yield and quality parameters of Menthol mint (*Mentha arvensis* L. var. CIM-Unnati)

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Abstract:

The field experiment was conducted in the experimental farm of CSIR-Central Institute for Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow, India. The experiment was conducted in Split plot design (SPD) to evaluate the impact of different planting methods viz. FB: Flat-bed and RB: Ridge bed along with four nitrogen levels viz. N1: Vermicompost (5 tons/ha)+ 50% RDF (N:P:K-100:60:40)+ Calliterpenone + PGR; N2: RDF + Calliterpenone; N3: RDF + PGR; and N4: Only RDF. The results of the experiment revealed that Ridge plantation showed higher fresh herb yield (6.28 t ha-1), and essential oil yield (81.34 kg ha-1) as compared to flat bed method. In case of nitrogen levels the results indicated that fresh herb yield (6.4 t ha-1) and essential oil yield (80.86 kg ha-1) was significantly influenced by the application of N1 (Vermicompost + Calliterpenone +PGR + 50% RDF) while N2 and N3 had almost similar yields. Quality of essential oil was significantly influenced by the treatment combinations and acceptable in the market. Interaction of both the factors revealed that ridge bed with all combined nutrients source gave higher fresh herb yield (6.74 t ha-1) while ridge bed along with N2 (RDF + Calliterpenone) gave higher essential oil yield (85.75 kg ha-1).

Key word: Menthol mint, Nitrogen levels, RDF, Planting methods, Herb yield, Essential oil yield.

Biography:

Pratik Kumar Shasany working as a research scholar at CSIR- Central Institute of Medicinal and Aromatic Plant – Lucknow, Uttar Pradesh, India – 226015 Lucknow under the supervision of Dr. Rajesh kumar Verma Crop (Division of agronomy and soil science).Research interests include analysis of soil samples, crop management, maintaining nursery and field experiments, recording and analyzing growth and yield data, and extraction of essentials oils.

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Insilco discovery of potential drug compounds against DNA polymerase of Lumpy Skin Disease (LSD) virus in cattle

Pravas Ranjan Sahoo*, Ankita Priyadarshini, Santwana Palei, Ritun Patra, PC Behera
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Abstract:

Lumpy skin disease (LSD) is a contagious viral disease that affects ruminant animals such as cattle, water buffaloes, and giraffes, posing a significant economic loss across the globe. LSD virus DNA polymerase protein has important role in viral replication, represents major target for neutralizing antibodies and, hence, could serve as potential target for drug screening. As there are no approved drugs available for treatment of LSDV till today, this study was carried out with objective of discovery of novel potential drugs against this virus. The structure of DNA polymerase was obtained by homology modeling; 341 phytocompounds and 701 antiviral drugs were retrieved from drugchem and pubchem database. The protein ligand interactions were performed through virtual screening by PyRx and Drug Discovery Studio. Further, in silico ADMET studies were performed to find out the final hit compounds. Among phytocompounds, two compounds such as rhein and taxifolin and among antiviral drugs, Canagliflozin and tepotinib showed highest binding affinity against DNA polymerase protein.

Further, cytotoxicity and antiviral effect of these four compounds were tested in invitro; rhein and Canagliflozin showed highest antiviral effect against LSD virus. So, this study would provide basic information to develop potential antiviral compounds against LSD, but further study is required for extensive validation through in vitro and vivo trials before going to human clinical trials

Keywords: Lumpy Skin Disease (LSD) Virus, DNA polymerase protein, PyRx, Drug Discovery Studio

Biography:

Dr Pravas Ranjan Sahoo is working as Asst. Professor in the Department of Veterinary Biochemistry, CVSc & AH, OUAT since 2015. He obtained both MVSc & PhD degree from ICAR-IVRI with research area in nanotechnology and Host pathogen interaction. He has 10 years of both extensive teaching and research experience in field of Animal Biochemistry.

Research Interest: Drug discovery, Proteomics, Host Pathogen Interaction

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Agroforestry practices in the North Western Himalayas: Options for tree management

Sandeep Sehgal* and Raza Ali Abidi
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Abstract:

A study was conducted to document the existing agroforestry practices in the sub montane North Western Himalayas. The study aimed at identifying the different agroforestry practices prevalent in the area, the types of trees commonly planted by the farmers. The specific use for which the trees were planted/retained and the constraints faced by the farmers in planting trees. A sample of 180 randomly selected respondents were interviewed through a pre-structured interview schedule in person and the data so collected were analyzed using statistical software to draw conclusions. The average household size consisted of 7 people with an average age of 53 years. Boundary plantation (39.4%) was the major agroforestry practice, followed by scattered planting (35.0%), block planting (15.6%) and intercropping (10%). Tree components in the area included horticulture and forest tree species. The socio economic and ecological benefits derived by farmers from the planted trees mostly included fodder, fruit, construction material, higher farm income, improved microclimate and erosion control. The major constraints faced by farmers in planting trees on their land included lack of irrigation facilities (88.3%). Lack of fencing (35.6%), stray cattle menace (34.4%) and non-availability of seedlings (23.9%) were other constraints reported by the farmers. The present study indicates that there is a need to scientifically manage the tree component so that the efficiency of existing agroforestry practices can be improved.

Keywords: agroforestry, tree management, agroforestry systems, tree planting constraints

Biography:

Dr Sandeep Sehgal (PhD) holds the position of Head Division of Silviculture & Agroforestry. He has more than 23 years of experience in teaching and research in the field of Agroforestry, traditional forest knowledge and Biodiversity. He is member of various professional societies. He has published more than 32 research papers in national and international Journals of repute. He has supervised more than 10 post graduate students in Forestry. His research interests include tree-crop interactions in agroforestry, traditional forest knowledge and carbon sequestration potential of trees.

Research Interest: Agroforestry, traditional forest knowledge

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Effect of gamma irradiation on flowering attributes and characterization of induced mutant as per DUS in gladiolus

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Abstract:

Present investigation was carried out for three years (2017-2018, 2018-2019 and 2019-2020) at Banaras Hindu University, Varanasi, India to find the morphological changes and post harvest parameters in M1, M2 and M3 (2017-2018, 2018-2019 and 2019-2020). The novel traits for mutants were studied, analyzed and recorded during M3, M4 and M5 generations (2019-2020, 2020-2021 and 2021-2022) as per Distinctiveness, Uniformity and Stability (DUS) parameters. Gamma doses (20 Gy to 50 Gy) were exposed to nine Indian gladiolus varieties (Gula, Jyotsna, Mohini, Pusa Kiran, Pusa Srijana, Pusa Vidushi, Swarnima, Pusa Shubham and Urvashi). Results revealed that gamma dose of 20 Gy resulted in bigger size 3rd floret in field study and maximum number of open florets/spike in vase during both years of observation. Gamma dose of 30 Gy resulted early opening of 3rd floret in field during 2nd year and maximum longevity of 3rd floret during both years. Early opening of 1st floret in vase exhibited with gamma dose of 50 Gy while maximum length of 3rd floret in field was observed with control and it was at par with 20 and 30 Gy. Morphological changes in relation to growth and flowering were observed with cvs. Urvashi, Pusa Kiran and Mohini. An induced mutant was identified in cv. Pusa Shubham with prominent macule of slightly irregular shape in higher gamma dose.

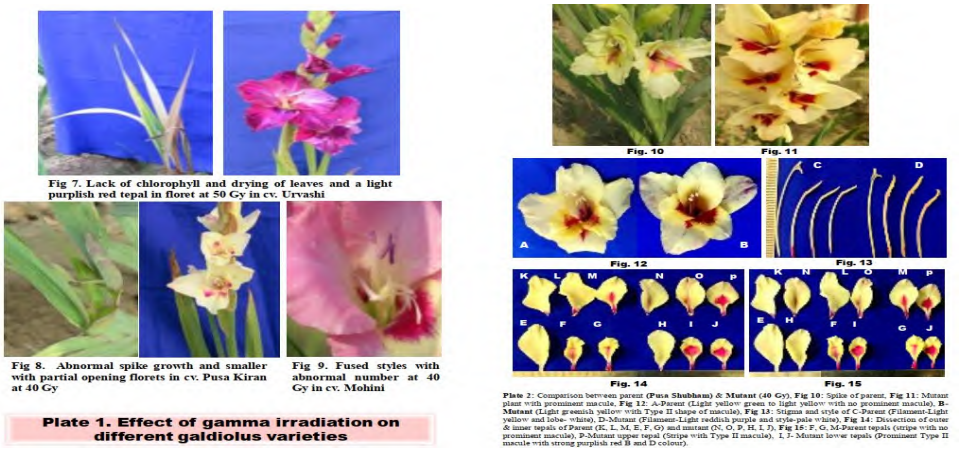

Fig 7. Lack of chlorophyll and drying of leaves and a light purplish red tepal in floret at 50 Gy in cv. Urvashi

Fig 8. Abnormal spike growth and smaller with partial opening florets in cv. Pusa Kiran at 40 Gy

Fig 9. Fused styles with abnormal number at 40 Gy in cv. Mohini

Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

Plate 1. Effect of gamma irradiation on different galdiolus varieties

Plate 2: Comparison between parent (Pusa Shubham) & Mutant (40 Gy). Fig 10: Spike of parent. Fig 11: Mutant plant with prominent macule, Fig 12: A-Parent (Light yellow green to light yellow with no prominent macule), B-Mutant (Light greenish yellow with Type II shape of macule), Fig 13: Stigma and style of C-Parent (Filament-Light yellow and lobe- white), D-Mutant (Filament-Light reddish purple and style-pale white), Fig 14: Dissection of outer & inner tepals of Parent (K, L, M, E, F, G) and mutant (N, O, P, H, I, J), Fig 15: F, G, M-Parent tepals (stripe with no prominent macule), P-Mutant upper tepal (Stripe with Type II macule), I, J- Mutant lower tepals (Prominent Type II macule with strong purplish red B and D colour).

Biography:

Minakshi hold a Ph.D. degree in Horticulture from Banaras Hindu University and have over two years of work experience as a Young Professional (YP-1) in a research project funded by Uttar Pradesh Council of Agricultural Research (UPCAR), Lucknow, in the Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh. Additionally, I have qualified NET in the discipline of Floriculture & Landscaping. I have been appointed as a judge in numerous flower shows conducted by the Department of Horticulture and Food Processing, Govt. of Uttar Pradesh. I have been awarded with best paper awards in conferences and seminars.

Research Interest: Floriculture, Mutation breeding

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Harnessing the potential of wild Lathyrus species to enhance Grasspea (*Lathyrus sativus* L.) crop improvement

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Abstract:

Grasspea (*Lathyrus sativus* L.) is a hardy, protein-rich pulse crop known for its resilience to drought and flooding, making it ideal for rice fallow lands in Eastern India, including Bihar, West Bengal, Odisha, Chhattisgarh, and Madhya Pradesh. Despite its potential, its use is limited due to the presence of the neurotoxin β-N-Oxalyl-l-α, β-diaminopropionic acid (β-ODAP), which can cause neurolathyrism upon prolonged consumption. Wild relatives of grasspea offer critical traits, such as reduced β-ODAP content and resistance to biotic stresses like rust, powdery mildew, and broomrape, essential for grasspea crop improvement. To advance grasspea breeding efforts, the entire genebank collection of *Lathyrus* wild relatives conserved in the National Genebank has been characterized. This agro-morphological evaluation focused on genetic diversity study, including the influence of photoperiod on traits such as flowering patterns. Key findings included *L. pseudocicera*, which consistently flowered early regardless of photoperiod, and *L. odoratus*, which exhibited photoperiod insensitivity among all wild species tested. Unique traits were also identified, such as production of both aerial and underground pods in *L. amphicarpos*, and the highest biomass accumulation in *L. ochrus* and *L. clymenum*. To exploit this genetic diversity, pre-breeding initiatives had successfully achieved hybridization between grasspea and four wild species (*L. amphicarpos*, *L. ochrus*, *L. pseudocicera*, and *L. cicera*) as male parents. A significant hurdle observed in hybridization was the non-synchronous flowering among species, thus, limiting the pollen availability. Pollen viability in wild *Lathyrus* species was also accessed using various staining techniques. Results revealed that pollen of wild species were viable (80-95%). Present study on wild *Lathyrus* species underscores the immense potential of wild relatives in grasspea improvement programs. By harnessing their genetic diversity, these efforts aim to develop more resilient, nutritious, and sustainable varieties of grasspea, paving the way for enhanced food security and agricultural resilience.

Keywords: Grasspea, β-ODAP, wild relatives, evaluation, pollen, hybridization.

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Leveraging Generative AI for predictive stress response in Tomato cultivation: An advanced climate– smart agriculture framework

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Abstract:

As climate change intensifies agricultural challenges, developing robust systems for predicting and managing deficit moisture stress becomes increasingly critical. This study presents an innovative framework integrating Generative AI and Retrieval-Augmented Generation (RAG) for simulating and optimizing irrigation responses to moisture stress in tomato cultivation. The proposed system analyzes experimental data from two irrigation regimes: optimal irrigation (100%) and deficit irrigation (50% of water requirement). By combining real-time sensor data with AI-generated simulations, the framework aims to predict crop responses under these specific moisture conditions and recommend optimal irrigation interventions. This predictive approach represents a significant advancement in climate-smart agriculture, offering a proactive rather than reactive methodology for moisture stress management in horticultural systems. The study explores the potential of AI-driven scenario planning in developing resilient agricultural practices, contributing to sustainable food production under increasingly unpredictable climatic conditions. Integrating historical time series data through RAG with forward-looking scenario generation through GenAI presents a novel approach to agricultural decision support systems.

Keywords: Generative AI, Climate stress simulation, Predictive agriculture, Irrigation optimization, Tomato cultivation, Climate resilience, Sustainable horticulture

Biography:

Hemamalini is a PhD candidate specializing in precision agriculture and computer vision at ICAR-IIHR, Bengaluru. My work focuses on integrating IoT, AI, and imaging techniques for smarter agricultural solutions. Over the years, I have developed methods for thermal image segmentation and time series forecasting to monitor crop stress and optimize water use efficiency. I have also worked extensively on high-throughput phenotyping and exploring machine learning for precision crop management. My passion lies in addressing the challenges of IoT adoption in agriculture, combining technical innovations with practical applications to enhance sustainability and productivity in farming systems.

Research Interests: Computer vision, IoT, Precision agriculture, High-throughput phenotyping

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Floral biology reveals mechanisms underlying species specific pollination in Buckwheat (*Fagopyrum* spp.)

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Abstract:

The self-incompatibility of buckwheat (*Fagopyrum spp.*) necessitates cross-pollination, making floral biology and pollination dynamics pivotal to its reproductive success and seed set. This study examines the floral traits, nectar production, and pollination mechanisms of common buckwheat (*Fagopyrum esculentum*) and tartary buckwheat (*Fagopyrum tataricum*), focusing on their distinct reproductive strategies. Common buckwheat, with heterostylous flowers and obligate outcrossing, relies heavily on pollinator activity, while tartary buckwheat, characterized by cleistogamous flowers and partial self-compatibility, demonstrates a more autonomous reproductive system. Nectar secretion, a critical attractant for pollinators, varies between species and morphs. In common buckwheat, thrum flowers produce higher nectar volumes compared to pin flowers, significantly influencing pollinator preference and behavior. Tartary buckwheat, with its reduced reliance on nectar for pollination, displays unique adaptive traits. Understanding these dynamics is essential for designing targeted breeding programs that address the challenges posed by self-incompatibility in common buckwheat while optimizing the self-compatible traits of tartary buckwheat. Such programs are crucial for developing genotypes adapted to diverse agro-climatic regions, including the plains of Uttar Pradesh. The integration of pollination ecology with breeding strategies can enhance genetic diversity, improve yield stability, and ensure the successful cultivation of buckwheat in varying environmental conditions. As an underutilized crop with immense nutritional and ecological potential, buckwheat holds promise for agricultural diversification and food security in the Indian subcontinent. This study emphasizes the importance of leveraging floral biology insights and pollination dynamics to develop sustainable, region-specific cultivation practices and breeding strategies for both common and tartary buckwheat.

Keywords: Self-incompatibility, Reproductive strategies, Heterostyly

Title: Floral biology reveals mechanisms underlying species specific pollination in Buckwheat (*Fagopyrum spp.*).

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Development of value-added products by incorporating millets for nutrition security

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Abstract:

Millets are rich in protein, dietary fibre, vitamins, minerals such as calcium, iron, selenium, magnesium, zinc, phosphorus and various phytochemicals. High prevalence rate of life style disorders like diabetes mellitus, hypertension, obesity, atherosclerosis etc. needs incorporation of protective nutrients in our daily diet nowadays. Thus, the present study has been undertaken to develop processed products i.e. cookies, pizza base and bun by utilizing millets. Cookies (C1, C2, C3 and C4) were prepared from refined wheat, finger millet and barnyard millet flours in proportions 80:10:10, 70:15:15, 60:20:20 and 50:25:25, respectively. Pizza base and bun were prepared by using refined wheat, finger millet and little millet flours i.e. P1 (80:10:10), P2 (70:15:15), P3 (60:20:20) and P4 (50:25:25) with addition of peanuts (5%) and flax seeds (5%) and by using refined wheat, finger millet, barnyard millet and little millet flours i.e. B1 (85:5:5:5), B2 (70:10:10:10), B3 (55:15:15:15) and B4 (40:20:20:20), respectively. Control (C0) treatments of cookies, pizza base and bun were prepared by using only refined wheat flour. All the developed products were analyzed for nutrient composition and sensory scores by using standard AOAC methods and nine-point hedonic rating scale, respectively. C2, C3, P2, P3, B2 and B3 had sensory scores comparable to the control treatments. All highly accepted treatments contained higher content of total ash, fibre, calcium, phosphorous, iron and fat as compared to control. Shelf-life evaluation of the products showed their safe consumption in between 60, 3 and 3 days for the cookies, pizza base and bun, respectively. The products developed not only provides the essential nutrients but also ensures nutrition security in the community.

Keywords: Processed products, Millets, Sensory scores, Nutrient composition, Nutrition security

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Constraints faced in credit management by the goat rearers of Mayurbhanj District of Odisha

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Abstract:

Small ruminates especially goat contributes to the food as well as nutritional security to the landless and weaker sections. Due to shrinking of the forest area and need for large scale farming, the goat rearers need financial support. Presently, both the public and private institutions are providing credit, still they are facing a lot in fully utilizing the benefits. With this view a study was conducted in Mayurbhanj district of Odisha to find out the constraints faced by goat farmers in credit management.

The findings of the study indicated that It the beneficiaries of PSB ranked high rate of interest, payment/ recovery method of the interest, insufficient subsidy from government, irregular/untimely payment by the institution, no incentives for poor and marginalized farmers, no initiative from the government to popularizes various financial option available for them, negligence by the authorities because of lesser loan amount, demand of collateral security, lots of documentation, record keeping of proper documents ranked 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th respectively. In case of the goat farmers in MFI, no initiative from the government to popularizes various financial option available for them, demand of collateral security, negligence by the authorities because of lesser loan amount, lots of documentation, no incentives for poor and marginalized farmers, insufficient subsidy from government, high rate of interest, irregular/ untimely payment by the institution, payment/recovery method of the interest, record keeping of proper documents ranked 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th, respectively. So the Animal Husbandry department, govt. of India and financial institution must seriously think about the constraints and devise a strategy in future in order to address the problems like how to popularize the financial option for the farmers, how to reduce the burden of collateral security and high interest rate.

Keywords: Credit management, Goat rearers, and Odisha

Biography:

Dr. Kumari Shweta is an Asst. Prof. & Head of the department of Veterinary and Animal Husbandry Extension Education, CVSc & AH, OUAT, Bhubaneswar, Odisha, India and a researcher concentrating focus on social issues of livestock owner.

Research Interest: Bottlenecks in rural livestock farmers' socio-economic development

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Biochemical diversity analysis and selection of nutritional-rich genotypes through HCA, EFA, MGIDI and multivariate analysis in potato (*Solanum tuberosum* L)

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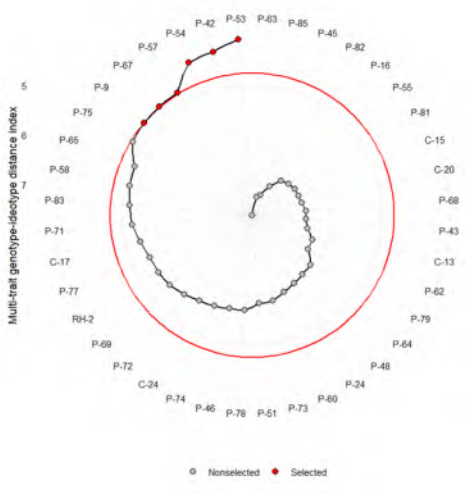
Abstract:

Potato is a vital global food crop, providing essential nutrients like carbohydrates, vitamins, and minerals. This study aimed to identify nutritionally superior potato genotypes using advanced statistical techniques such as hierarchical cluster analysis (HCA), principal component analysis (PCA), exploratory factor analysis (EFA) and multi-trait genotype ideotype distance index (MGIDI). The combined analysis of variance revealed significant genotypic variation for traits including pH, moisture content, dry matter, total soluble solids and ascorbic acid, indicating strong potential for genetic improvement. Sensory evaluations identified genotypes P-57 and P-58 as top performers in attributes like taste and texture. Instrumental colour profiling uncovered significant diversity in skin and flesh colour among genotypes. The HCA grouped genotypes with similar biochemical profiles into distinct clusters, providing insight into genetic relationships and facilitating targeted breeding strategies. The PCA analysis revealed that the first 11 components explained 79.67% of the total variance, with colour-related traits, chlorophyll content, mineral content, and acidity being the primary contributors to the observed biochemical diversity. The factor analysis of identified key underlying factors explaining 78% of the variance, with successful selection gains observed for traits such as titratable acidity, fat, dry matter, fiber and ascorbic acid, while negative selection gains were noted for carbohydrates, iron, zinc and protein content. The MGIDI analysis identified genotypes P-53, P-42, P-54, P-57, P-67 and P-9 as superior genotypes for breeding programs focused on improving nutritional quality for selecting nutritional rich potato genotypes to address nutritional security.

Keywords: Sweet potato, genotype-environment interaction, abiotic stress tolerance, nutritional enhancement.

Fig. 1. Selected potato genotypes based on MGIDI values for biochemical parameters



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Effects of dietary supplementation of drumstick (*Moringa oleifera*) leaf meal on the performance of Hansli cross chickens

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Abstract:

With the rising population and the need for protein requirement is ever increasing with time, the poultry products have proved to be a cheaply and commonly available source of protein for the nutrient requirement of the population. An experiment has been conducted to study the effect of dietary supplementation of drumstick (*Moringa oleifera*) leaf meal on the performance of Hansli cross chickens. The trial was conducted in 2 Hansli cross chickens i.e. HanslixCSML and CSMLxHansli chickens. 120-day old chicks of each cross were divided into 10 birds per replicate, in 3 replicates, across 4 treatment groups. The trail consist of four treatment group: - T1 was fed basal diet and the rest treatment groups T2,T3,and T4 were fed with 1%, 2% and 3% of drumstick (Moringa oleifera) leaf meal, respectively. Over the course of the 7 weeks trial body weight growth, feed consumption, and feed conversion ratio were measured weekly. Six birds from each group were assessed at the end of 7th week for haematological, serological, carcass and meat composition characteristics. The treatment group fed with 2% drumstick (*Moringa oleifera*) leaf meal in basal diet was found to have highest body weight at the end of the trail period. The feed conversion ratio was better in the groups fed with drumstick (Moringa oleifera) leaf meal in basal diet and best in the treatment group fed with 2% drumstick (*Moringa oleifera*) leaf meal. The cholesterol and triglyceride levels decreased in the treatment groups fed with drumstick (*Moringa oleifera*) leaf meal. The crude fat content in the muscle decreased in the treatment groups fed with drumstick (*Moringa oleifera*) leaf meal. For better growth performance, less input and more profitability, 2% inclusion level of drumstick (Moringa oleifera) leaf meal in basal diet is most suitable.

Keywords: drumstick leaf meal, Moringa, Hansli cross chickens, dressing%, haematological parameters

Table: Mean weekly body weight of birds fed different levels of Moringa leaf meal

AGE	CROSS	TREATMENT				P Value
		T1	T2	T3	T4	
DAY 1	HanslixCSML	40.67±0.33	40.67±0.33	39.67±0.33	40.00±0.57	0.287
	CSMLxHansli	35.00±0.57	34.67±0.66	34.67±0.33	35.33±0.66	0.821
1st Week	HanslixCSML	118.67±0.88	121.67±0.88	122.33±1.45	123.33±1.33	0.097
	CSMLxHansli	98.67±1.76	99.67±1.76	100.33±2.33	101.67±2.40	0.782
2nd Week	HanslixCSML	251.67±4.91	257.67±3.38	260.33±3.71	264.67±7.12	0.376
	CSMLxHansli	210.67±3.18	213.00±4.61	216.00±4.72	221.67±3.52	0.321
3rd Week	HanslixCSML	482.67±10.74	500.67±16.19	507.67±12.91	510.33±12.78	0.492
	CSMLxHansli	436.33±8.66	444.00±6.55	452.67±6.17	448.67±5.60	0.422
4th Week	HanslixCSML	755.33±20.73	780.67±21.05	800.33±19.93	792.00±13.22	0.418
	CSMLxHansli	676.33±9.28	695.00±10.58	716.33±11.72	705.33±13.01	0.155
5th Week	HanslixCSML	1069.00±11.13	1122.00±18.68	1132.00±18.68	1078.33±15.85	0.064
	CSMLxHansli	941.00^{a} ±8.08	987.33^{ab} ±12.23	998.67^{b} ±11.14	981.33^{ab} ±8.76	0.019*
6th Week	HanslixCSML	1367.67^{a}±22.18	1438.33^{ab}±17.63	1473.33^{b}±16.75	1383.00^{a} ±15.71	0.012*
	CSMLxHansli	1225.67^{a}±12.73	1290.00^{ab}±14.43	1316.33^{b}±11.62	1283.67^{ab}±14.26	0.008*
7th Week	HanslixCSML	1710.33^{a}±29.35	1792.33^{ab}±18.46	1829.33^{b}±17.79	1735.33^{ab}±25.86	0.026*
	CSMLxHansli	1510.67^{a}±19.15	1586.00^{ab}±11.26	1620.33^{b}±22.55	1571.33^{ab}±16.19	0.015*

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Insights into the genetic diversity of Pigeonpea germplasm conserved in the National Genebank

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Abstract:

Pigeonpea (*Cajanus cajan* (L.) Millsp.) is a vital grain legume crop in the semi-arid tropics, playing a crucial role in subsistence agriculture as a rich source of protein (22–24%), carbohydrates, and minerals. In India, it ranks second among pulses after chickpea, with cultivation spanning approximately 5.05 million hectares and annual production of 4.34 million tons. The National Genebank located at the ICAR-National Bureau of Plant Genetic Resources (ICAR-NBPGR), New Delhi, conserves about 12,000 accessions of pigeonpea under long-term storage. Among them, 4000 accessions have been characterised at the Zonal Agricultural Research Station, Kalaburagi, Karnataka, India, under the Consortia Research Platform of Agrobiodiversity (CRP-AB) project. Observations on nine quantitative and 14 qualitative traits was recorded in five randomly selected plants from each genotype and data were analysed by using R software. Significant variations were recorded for the morphological traits and identified promising accessions exhibiting desirable traits, such as accessions IC405218 identified for white seed coat, moderately resistance to wilt with high yielding; IC245560 for early maturity; IC523145 validated for more trichome density and length & hence can be used against the pod fly host plant resistance. Based on mean performances for yield and yield related traits, accessions IC329120, IC405218, IC468130, IC468145 were found promising. The genotypes IC355599 and IC343931 are trait specific for seed weight and pods per plant. Principal component analysis (PCA) revealed that the first four principal components (PCs) explained 85.4% of total variation with PC1 (40.61%) and PC2 (25.15%) contributing the most. The two-dimensional PCA plot highlighted a broad distribution of accessions, with some distinctly associated with key agro-morphological traits. The findings from this study provide valuable insights into genetic diversity and trait-specific potential, offering a strong foundation for ongoing and future pigeonpea breeding and improvement programs.

Biography:

Dr. Padmavati obtained her Masters and PhD degrees in Plant Genetic Resources from ICAR-IARI, New Delhi. Currently, she is working as a Scientist (Legume Curator), at the Division of Germplasm Conservation, ICAR-National Bureau of Plant Genetic Resources, New Delhi. She contributed to Plant Genetic Resources management, including seed biology and genetic enhancement of pulses. Her research work at ICAR-NBPGR since 2016 has brought to credit 11 legume genetic stocks registered (4 as main developer) and seed dormancy breaking & germination protocol. She developed promising genetic resources in pulse crops which are being evaluated by National Agricultural Research partners for enhancing the utilization of germplasm. She delineated wild species of Vigna, lentil and Lathyrus and developed descriptors of tuber cowpea. She published 33 research papers in peer-reviewed national and international journals. She has been awarded IARI Gold Medal, Dr KL Mehra award of ISPGR, ICAR-SRF Fellowship; INSPIRE Fellowship; Best Poster award, Harlan Travel Grant for participating in Harlan III (France). Presently, She is handling a flagship project, CRP on agrobiodiversity (Pigeonpea) funded by ICAR while as Co-PI in DBT, Alliance of Bioversity international & CIAT funded projects. Besides this, Ishe is teaching as Post Graduate School faculty of ICAR-IARI for the last seven years and has contributed to teaching and guiding MSc and PhD students. Recognizing my contributions, she was awarded the 'Research Wizard Award' by Agrivision.

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Studies on potentiality of botanicals for eco-friendly storage of Sesame seed

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Abstract:

Sesame (*Sesamum indicum* L.), commonly referred to the "queen of oil seeds," as the seeds are highly nutritious, containing folic acid, oil, protein, unsaturated fatty acids, vitamins, and minerals. Approximately 70 per cent of global sesame production is processed into oil and meal, while the remaining 30 per cent is directly utilized in the food, confectionery, and beverage industries. Traditionally farmers store sesame seed for direct consumption or until next season for seed purpose in polypropylene bags (used fertilizer bags). The seed such stored is prone to pest infestation leading to loss in quantity and quality of seed and usage of chemicals to waive off pests poses a serious threat to human health and also causes environmental pollution. A study was taken up to evaluate certain botanicals as protectants during storage of field harvested sesame seed for a period of ninety days. The natural build-up of *Tribolium castaneum* (Herbst), commonly called as red flour beetle was counted manually, every thirty days. The adult population of red flour beetle was least (7.0 beetles per 100 g of seed) in seed treated with sweet flag powder @5gkg^{-1} followed by neem leaf powder @ 5gkg^{-1} which recorded 9.1 beetles per 100 g of seed when compared to untreated control (29.0 beetles per 100 g of seed) after ninety days of storage. The percent reduction in pest damage was 75.8 in sweet flag and 68.6 in neem powder. Grain damage was less in both sweet flag and neem powder (7.19 % and 7.3 %) while it was 19.17 per cent in untreated control. Consequently, higher thousand seed weight was recorded in of stored sesame was higher in sweet flag (3.05 g) and neem powder (2.94 g) in comparison to untreated control (2.41 g). The superiority of these botanicals was reinforced by the well retained germination per cent of sesame seeds in sweet flag and neem powder (84%) compared to polypropylene bags (61%). Hence, it can be concluded that if a farmer opts for organic and eco-friendly method of storage pest management in sesame, he can invariably utilize sweet flag or neem powder @5gkg^{-1} for quality storage of sesame seeds.

Keywords: sesame, post harvest quality, Tribolium, botanicals

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Aetiopathology, haemato-biochemical and imaging studies of renal disorders in dogs

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Abstract:

Dogs (n=167) presented to the Veterinary clinical complex of the college pertaining to various ages, breeds and sex were screened on the basis of history, clinical signs as well as imaging studies (USG) recorded prevalence of renal disorders as 6.58%. Increased renal affections observed among older (>8 yr) dogs (44.44%), males (83.33%), Labrador breed (38.88%) and in post monsoon period (61.11%). Prominent clinical signs were vomition, haematuria, oliguria and ulcerative stomatitis. There was anaemia, thrombocytopenia with leucocytosis as well as relative neutrophilia. Peripheral blood smear examinations revealed stomatocytes, schizocytes, elliptocytes and ecchinocytes. There was increased renal specific (BUN, Creatinine) serum biochemical markers. Urinalysis recorded a decreased specific gravity, protenuria, bilirubuniuria, hematuria, pyuria besides crystalluria, cylindruria besides uroepithelial cells like renal epithelial cells, transitional epithelial cells and squamous epithelial cells along with clumps of pus cells and mucus threads. Molecular confirmation of microbial etiology such as *Proteus mirabilis, Comamonas kerstersii* and *Enterococcus faecium* were confirmed through colony PCR and 16s-rRNA sequencing. NCBI data base for Gene bank accession numbers are PQ577993 (*Proteus mirabilis*), PQ577999 (*Enterococcus faecium) and PQ577994* (*Comamonas kertersii*). Ultrasonography comprised of distended urinary bladder with echogenic sediments showing "comet tail" artifacts, hyperechogenic renal cortex, loss of cortico-medullary differentiation with presence of hyperechoic cystolith. Necropsy findings were shrunken and pale kidneys while prominent microscopic lesions comprised of atrophy of glomerulus, thickened Bowman's capsule and interstitial nephritis.

Keywords: Dogs, Aetiology, Necropsy, Renal disorders, Urine

Biography:

Dr. Annushree, is a dedicated 2nd-year M.V.Sc student specializing in Veterinary Pathology at the College of Veterinary Science and Animal Husbandry, Orissa University Of Agriculture and Technology, Bhubaneswar. With a keen interest in clinical pathology and necropsy, I have dedicated my academic career to understanding the intricate mechanisms of animal diseases. My expertise includes performing diagnostic tests, analyzing blood and urine samples and conducting postmortem examinations to identify pathological changes and determine causes of mortality in animals. With my precise approach to necropsy and diagnostic pathology, I aim to enhance the quality of veterinary diagnostics and solidify the role of veterinary pathology as an essential pillar in advancing animal health and welfare.

Research Interest: Clinical Pathology, Canine diseases, Histopathology

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Assessing climate change impacts on tomato production in Central India: Process-based yield simulations for mid- and far-future scenarios

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Abstract:

Forecasting crop yields is essential for maintaining food security under climate change. This research aims to assess the effects of climate change on tomato cultivation in Central India utilising the Decision Support System for Agrotechnology Transfer (DSSAT) crop simulation model. DSSAT accurately models crop growth and yields by incorporating biophysical and environmental variables across many scenarios. To improve computational performance, parallel computing methods were utilised for DSSAT parameterisation and simulation across various scenarios. Climate datasets were obtained from the IMD and CMIP6, encompassing historical, contemporary, and prospective periods. The research assesses tomato crop yields under two Shared Socioeconomic Pathways (SSP2-4.5 and SSP5-8.5) for mid-century (2040–2069) and far-century (2070–2099) forecasts. Research indicates a steady reduction in tomato yields in both scenarios and time periods, linked to anticipated rises in maximum (Tmax) and minimum (Tmin) temperatures throughout the growing season. Validation metrics provide moderate to outstanding model performance, with correlation coefficients surpassing 0.75; nevertheless, RMSE (6.75–7.15) and PBias (4.42%–5.36%) highlight some areas for improvement. These findings emphasise the susceptibility of tomato cultivation to climate-related pressures and show the necessity for adaptation measures. The research highlights the incorporation of sophisticated crop modelling, climate-resilient agricultural practices, and conducive policies to alleviate the detrimental effects of climate change on agriculture. These strategies are essential for maintaining tomato production and securing food stability in Central India amidst evolving climate conditions.

Keywords: Crop simulation model, Tomato Crop, DSSAT- CROPGRO, Multi-model projections

Biography:

Mr. Pashupati Nath Singh is currently pursuing a PhD (CSIR- SRF) with a focus on "Tomato Crop Yield Prediction using Remote Sensing, Machine learning and Crop Simulation Models". He is a passionate researcher specializing in crop simulation models, remote sensing, machine learning, and agricultural sustainability. With an academic and professional focus on addressing the challenges of climate change and food security, Pashupati Nath has been at the forefront of innovative solutions to optimize agricultural practices, particularly in tomato crop yield predictions and sensitivity analyses.

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High-throughput in *vitro* propagation, genetic fidelity, biochemical analysis and anticancer activity of Anthocyanin rich purple flesh sweet potato var. 'Bhu Krishna'

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Abstract:

The purple-fleshed sweet potato variety variety 'Bhu Krishna' is a rich source of vitamins, minerals, and valuable natural compound anthocyanin. This variety of sweet potato has a high content of anthocyanin (85-90 mg per 100 grams). However, propagating this plant through stem cutting is a slow process and can lead to the transmission of diseases to the next generation of plants. Because of this, there is a pressing need to create a method for growing a large number of disease-free plants quickly. This is important to meet the demands of farmers and industries. The current study focuses on developing a method for rapidly multiplying disease-free purple-fleshed sweet potato plants. The present study represents towards development of micropropagation protocol for purple flesh Sweet potato var. Bhu Krishna
using mature nodal explants on Murashige and Skoog's (1962) (MS) medium supplemented with different growth regulators. The highest number of shoot regenerated on MS medium with 2.0 mg L^{-1} mT. *In vitro* nodal segments were excised from the primary shoots and inoculated on the above said optimum medium to produce about 1300 shoots. Rooting of *in vitro* shoots was carried out on ½ MS medium augmented with 0.5 mg L^{-1} Indole-3-butyric acid (IBA). All *in vitro* regenerated plantlets were acclimatized on soil, coco peat, and sand (1:1:1); about 95% plants were fruitfully acclimatized and established in the field. Another study was conducted to assess the genetic consistency between plants that were regenerated in a lab setting and their original mother plant. This evaluation involved the use of molecular markers and biochemical analysis to confirm the fidelity of the lab-grown plants compared to the mother plant. Furthermore, the anti-cancer properties of both the mother plant and the lab-grown plant's tubers were examined.

Keywords: Micropropagation, Tissue Culture, Molecular marker, Nodal segment, Phytochemical analysis, Anticancer activity.

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A nexus between safe drinking water, clean air and food for all

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Abstract:

The current study's objective was to simulate a number of factors essential for economic development, including clear water, hunger, sustainability, and the environment, all of which are necessary for life to exist on earth. The method which the farmer adopted as the subterranean is nexus between Safe Drinking Water, Clean Air and Food for All [WAFA] has been developed at five-acre model Ayur jackfruit farm in Veloor Panchayat, Thrissur, and Kerala, India. A confluence between water, food, and air is at the core of sustainable development. Sustainable agriculture models are critical and most needed. The interconnected systems of the soil, water, and land are the breaking points for any models. Water and energy can be saved by efficiency measures taken along the entire agri -food supply chain, such as precision irrigation methods used in the farm, and environmental integrity can be ensured by protecting ecosystems concurrently with agriculture and store underground water and reusing it which is important component of circular economy. This helps to improve agricultural output and address the issue of water scarcity, food security and clean air in hilly areas. This paper examines the nexus between access to clean air, safe drinking water, food security, food safety, and nutrition and human health.

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Essential oil composition and antioxidant activities of wild populations of *Hypericum* spp. from Northeast India

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Context: The genus *Hypericum* is known worldwide for its traditional and modern uses. Therefore, an attempt has been made to assess the diversity, distribution, indigenous uses and identify different chemical composition of different species of this genus in Northeast India (NEI). A number *Hypericum* species are well known for their therapeutic efficacy and use in traditional medicine. The various species of *Hypericum* have been traditionally used for the treatment of wounds, eczema, burns, trauma, rheumatism, neuralgia, gastroenteritis, ulcers, hysteria, bedwetting and depression. A total of six (6) species of *Hypericum* were collected from NEI, of which all are economically important. All the six (6) species are native to NEI, two (2) species are endemic, one (1) spp. is near endemic, one (1) spp. is under threat and two (2) species are common.

Objective: This study evaluated the *in vitro* antioxidant and phytochemical properties of essential oils of *Hypericum williamsii* N. Robson (near endemic), *Hypericum gracilipes* Stapf ex C.E.C.Fisch (endemic), *Hypericum japonicum* Thunb (threat), *Hypericum elodeoides* Choisy (common), *Hypericum lobbii* N.Robson (endemic), *Hypericum hookerianum* Wight & Arn. (common) of Hypericaceae collected from wild populations in Northeast India.

Materials and Methods: The essential oils obtained from dried flowering aerial parts of six *Hypericum* species were analyzed by gas chromatography and gas chromatography/mass spectrometry to determine chemical compositions. The 1,1-diphenyl-2-picrilhydrazyl (DPPH) radical scavenging activity, 2-azinobis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical scavenging activity of essential oils (four species i.e. *Hypericum williamsii*, *Hypericum gracilipes*, *Hypericum japonicum*, *Hypericum hookerianum*) was determined using DPPH assay and ABTS assay respectively.

Results:

Essential oil analysis:

GC–MS analysis was performed to estimate the essential oil composition extracted from the aerial part of *Hypericum williamsii* N.Robson. There is the presence of 90 compounds. The major compounds are Octane 2-methyl (C_9H_{20}), Propanoic acid 2-methyl ($C_4H_8O_2$), Nonane (C_9H_{20}), Undecane ($C_{11}H_{24}$), 5-Hydroxy-2,2,6,6-tetramethyl-4-cyclohexene-1,3-dione ($C_{10}H_{14}O_3$), Petasitene ($C_{15}H_{24}$), Phenol 2,6-bis(1,1-dimethylethyl)-4-mercapto ($C_{14}H_{22}OS$), 2-Acetylmethylamino-5,5-dimethyl-5,6-dihydro-4Hbenzothiazol-7-one ($C_{12}H_{16}N_2O_2S$), Neophytadiene ($C_{20}H_{38}$), Hexadecanoic acid methyl ester ($C_{17}H_{34}O_2$), 6-Methoxy-2,7,8-trimethyl-2-(4,8,12-trimethyltridecyl)chroman ($C_{29}H_{50}O_2$), 1-Heneicosanol ($C_{21}H_{44}O$), cis-13-Octadecenoic acid methyl ester ($C_{19}H_{36}O_2$), 9,12-Octadecadienoic acid (Z,Z)-, methyl ester ($C_{19}H_{34}O_2$), 1,Z-5,E-7-Dodecatriene ($C_{12}H_{20}$), Methyl stearate ($C_{19}H_{38}O_2$), Desaspidinol ($C_{11}H_{14}O_4$), Silane diethylhexyloxyoctyloxy ($C_{18}H_{40}O_2Si$).

GC–MS analysis was performed to estimate the essential oil composition extracted from the aerial part of Hypericum gracilipes Stapf ex C.E.C.Fisch. There is the presence of 177 compounds. The major compounds are 5-(Hydroxymethyl)dihydrofuran-2(3H)-one (C5H8O3), Cyclohexane, 1-methylene-4-(1-methylethenyl) (C10H16), 2,2-Diallylpyrrolidine (C10H17N), 2,3,4-Trimethyl-2-pentanol (C8H18O), Caryophyllene (C15H24), (1R,2S,6S,7S,8S)-8-Isopropyl-1-methyl-3- methylenetricyclo[4.4.0.02,7] (C15H24), (Z)-1-Methyl-4-(6-methylhept-5-en-2-ylidene)cyclohex-1-ene (C15H24), 3-Butylindolizidine (C12H23N), Neophytadiene (C20H38), n-Hexadecanoic acid (C16H32O2), Phytol (C20H40O), cis,cis- and cis,trans-1,9-dimethylspiro[4.5]decane (C12H22), 9-Octadecenoic acid (C18H34O2), 9,12,15-Octadecatrienoic acid (C18H30O2), 2,2-Dimethyl-3-(3,7,16,20-tetramethyl-heneicosa3,7,11,15,19-pentaenyl)-oxirane (C29H48O), Hexadecanoic acid, 2-hydroxy-1- (hydroxymethyl)ethyl ester(C19H38O4), Tetracosa-2,6,14,18,22-pentaene-10,11-diol, 2,6,10,15,19,23-hexamethyl (C30H52O2), Friedelan-3-one (C30H50O), 17.alfa.,21.beta.-28,30-Bisnorhopane (C28H48), Squalene (C30H50).

GC–MS analysis was performed to estimate the essential oil composition extracted from the aerial part of Hypericum japonicum Thunb. There is the presence of 141 compounds. The major compounds are Cyclohexane, 1-methylene-4-(1-methylethenyl) (C10H16), Cyclohexene, 4-methylene-1-(1-methylethyl) (C10H16), 1,5-Heptadiene, 3,3,6-trimethyl (C10H18), Cyclohexane, 1,2-dimethyl-3,5-bis(1- methylethenyl)-, (1.alpha.,2.beta.,3.beta.,5.beta.)(C14H24), Cyclohexane, 1,1-dimethyl-2,4-bis(1-methylethenyl)-, cis (C14H24), 5,9-Undecadien-2-ol, 2,6,10-trimethyl (C14H26O), Caryophyllene (C15H24), Bicyclo[7.2.0]undec-4-ene, 4,11,11-trimethyl-8-methylene (C15H24), 1,4,7,-Cycloundecatriene, 1,5,9,9-tetramethyl-,Z,Z,Z (C15H24), (Z)-1-Methyl-4-(6-methylhept-5-en-2-ylidene)cyclohex-1-ene(C15H24), n-Hexadecanoic acid (C16H32O2), cis,cis- and cis,trans-1,9-dimethylspiro[4.5]decane (C12H22), 2H-Pyran-2-one, tetrahydro-6-tridecyl (C18H34O2), 9,12,15-Octadecatrienoic acid (C18H30O2), Tricyclo[4.2.2.0(1,5)]decane (C10H16).

GC–MS analysis was performed to estimate the essential oil composition extracted from the aerial part of Hypericum elodeoides Choisy. There is the presence of 167 compounds. The major compounds are n-Propyl acetate (C5H10O2), 1,5-Heptadiene, 3,3,6-trimethyl (C10H18), 1,2-Cyclohexanedione (C6H8O2), Cycloheptanone (C7H12O), Furaneol (C6H8O3), Catechol (C6H6O2), benzenemethanesulfonyl chloride, 3-nitro (C7H6ClNO4S), 2-Butanol, 4-(2,2-dimethyl-6-methylenecyclohexylidene) (C13H22O), Phenol, 3-isopropoxy-5-methyl (C10H14O2), 1-Methyl-3,6-diazahomoadamantan-9-ol (C10H18N2O), Dibutyl phthalate (C16H22O4), n-Hexadecanoic acid (C16H32O2), 9,12,15-Octadecatrienoic acid (C18H30O2), Hydroxydehydrostevic acid (C20H30O3), 2,6,10,14-Hexadecatetraenoic acid, 3,7,11,15-tetramethyl-, methyl ester (C21H34O2).

GC–MS analysis was performed to estimate the essential oil composition extracted from the aerial part of Hypericum lobbii N.Robson. There is the presence of 146 compounds. The major compounds are n-Butyric acid tetrahydrofurfuryl ester (C8H14O3), Undecane (C11H24), cis-.beta.-Farnesene (C15H24), Naphthalene, decahydro-4a-methyl-1-methylene-7-(1-methylethylidene)-, (4aR-trans) (C15H24), Naphthalene, 1,2,3,5,6,7,8,8a-octahydro-1,8adimethyl-7-(1-methylethenyl)-, [1R- (1.alpha.,7.beta.,8a.alpha.) (C15H24), Caryophyllene oxide (C15H24O), Pentadecanoic acid (C15H30O2), n-Hexadecanoic acid (C16H32O2), 4-tert-Butylcatechol, bis(trifluoroacetate) (C14H12F6O4), 3,4'-Isopropylidenediphenol, bis(trimethylsilyl) ether (C21H32O2Si2), 3,4'-Isopropylidenediphenol, bis(trimethylsilyl) ether (C21H32O2Si2), Squalene (C30H50), Hentriacontane (C31H64), Octacosanol (C28H58O).

GC–MS analysis was performed to estimate the essential oil composition extracted from the aerial part of Hypericum hookerianum Wight & Arn. There is the presence of 159 compounds. The major compounds are Butanoic acid, 3-methyl (C5H10O2), beta.-Myrcene (C10H16), 1,2-Cyclohexanedione (C6H8O2), Cycloheptanone (C7H12O), 3-Carene (C7H16N2), Catechol (C6H6O2), 2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-, acetate, [R-[R*,R*-(E)]] (C22H42O2), n-Hexadecanoic acid (C16H32O2), 2-Acetyl-2-allylpent-4-enoic acid, ethyl ester (C12H18O3), 2-Cyclohexen-1-one-4-carboxylic acid, 4-(3,7- dimethyl-2,6-octadien-1-yl)-3-ethyl-, methyl ester (C20H30O3), 9,12,15-Octadecatrienoic acid (C18H30O2), D-Alanine, N-(2-fluoro-5-trifluoromethylbenzoyl)-butyl ester (C15H17F4NO3), 3-Cyclopenten-1-one, 3-hydroxy-2-(1-hydroxy-3-methylbutylidene)-5-(3-methyl-2-butenylidene)(C15H20O3), Supraene (C30H50), 1-Tricosene (C23H46).

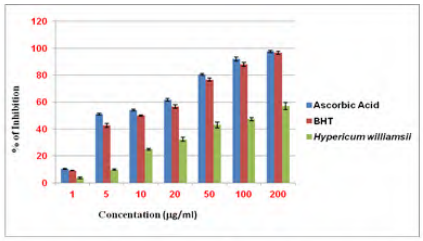
Antioxidant activity:

Antioxidant activity is a complex process that occurs through different mechanisms, therefore the antioxidant activity of plant extract needs to be carried out by multiple in vitro assays. In the DPPH assay, the free radical scavenging ability of the essential oil increased in a concentration-dependent manner. This limited antioxidant activity is due to limited hydrogen capacity and water solubility of compounds. In the ABTS assay, the antioxidant activities of the essential oil increased in a dose-dependent manner. The difference between both the results can be attributed to the fact that ABTS involves transfer of electrons that takes place at a much faster rate compared to hydrogen-donating ability of DPPH free radicals.

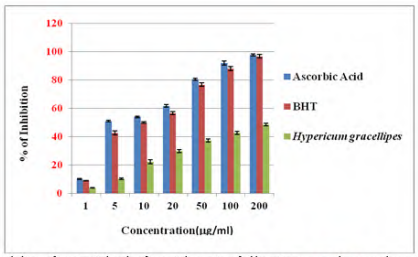
Conclusion:

The present research investigates the chemical composition and antioxidant activities of essential oil from six Hypericum species of North Eastern India. Our results indicated that oil is a rich source of sesquiterpene and monoterpene hydrocarbons. Oil showed a moderate antioxidant capacity. This may be due to the fact that it is composed entirely of terpene hydrocarbons which are not active antioxidants.

Key words: Hypericum; GC–MS analysis; Essential Oils; Northeast India; Antioxidant activity.



Antioxidant ability of essential oil of aerial parts of *Hypericum williamsii* and positive controls (Ascorbic acid and BHT) determined by DPPH free radical scavenging ability.



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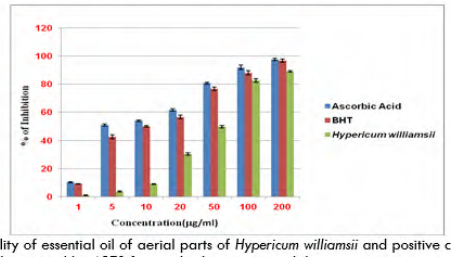
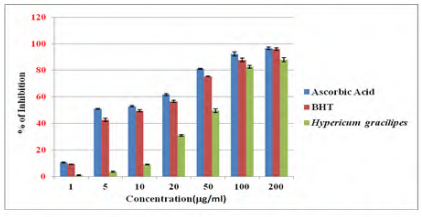


Antioxidant ability of essential oil of aerial parts of *Hypericum williamsii* and positive controls (Ascorbic acid and BHT) determined by ABTS free radical scavenging ability.



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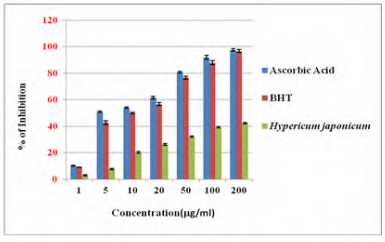
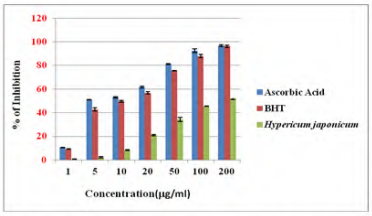
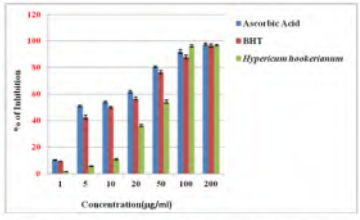


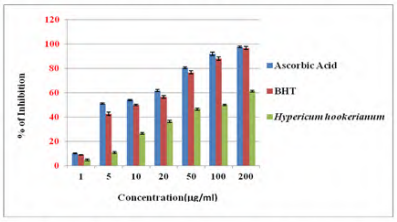
Antioxidant ability of essential oil of aerial parts of *Hypericum japonicum* and positive controls (Ascorbic acid and BHT) determined by DPPH free radical scavenging ability.



Antioxidant ability of essential oil of aerial parts of *Hypericum japonicum* and positive controls (Ascorbic acid and BHT) determined by ABTS free radical scavenging ability.



Antioxidant ability of essential oil of aerial parts of *Hypericum hookerianum* and positive controls (Ascorbic acid and BHT) determined by ABTS free radical scavenging ability.



Antioxidant ability of essential oil of aerial parts of *Hypericum hookerianum* and positive controls (Ascorbic acid and BHT) determined by DPPH free radical scavenging ability.

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Innovating pulse seed system: A community-based model for empowering smallholder farmers in Odisha

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Abstract:

Seed is the lifeline of agriculture and the foundation of successful farming, especially for smallholder farmers in drylands. High-quality seeds can boost production by 20-30%. However, the pulse seed system is underdeveloped, forcing smallholder farmers to rely on saved seeds or source them informally year after year. Smallholder farmers in Odisha face challenges related to low Seed Replacement Rates (SRR) due to limited access to quality seeds, poor supply chain and inefficient market linkages, which hinder pulse cultivation and income generation. In response, the International Centre for Agricultural Research in the Dry Areas (ICARDA), in collaboration with agriculture department of state, has contributed to strengthen formal seed system (which ensures high-quality certified seeds through regulated production and distribution) and informal system (which leverages traditional seed-saving and sharing practices for wider adoption). Together, they enhance seed security, scalability, community empowerment, and sustainability. This initiative targets sustainable intensification of pulse production by focusing on certified seed production, seed multiplication, and value chain development. This collaborative approach to develop and strengthen community-based pulse seed system, has emerged as a pivotal model for enhancing pulse production in the region. The initiative targets multiple districts focusing on boosting pulse production, productivity, and self-sufficiency in seed availability by creating sustainable, community-led seed systems. The focus of ICARDA's strategy is to give emphasis on certified seed production, multiplication and value chain development for essential pulse crops, including pigeonpea, chickpea, green gram, and black gram. This model integrates Farmer Producer Organizations (FPOs) to empower smallholder farmers through structured seed production and marketing. By focusing on demand-driven crop planning, quality seed production, and capacity building, it ensures adoption of sustainable practices and enhanced productivity. Post-harvest management, branding, and market linkages with entities like OSSC add significant value, enabling better incomes and resilience. This inclusive model strengthens the seed value chain, addressing key challenges like accessibility, quality, and profitability for smallholder farmers in Odisha. Field inspections and certifications are carried out by the State Seed Certification Agency of Odisha (OSSOPCA), adhering to government seed certification standards. As a significant outcome of this model, 345 number of seed growers are registered under pigeonpea, chickpea, greengram and blackgram, in the period of 2021 to 2024, during which 2347, 112, 157, and 112 quintals of certified seeds (BS-FS/FS-CS) of pigeonpea, blackgram, greengram and chickpea, respectively were produced, procured and supplied to Odisha State Seeds Corporation (OSSC) Limited through this community based model of PG-FPO network. This suggests it will cover about 15,648 hectares of pigeonpea, 561 hectares of blackgram, 785 hectares of greengram, and 95 hectares of chickpea area under different government schemes in Odisha. This model exemplifies a sustainable and scalable framework for pulse production, combining technical innovation, institutional strengthening, and market integration. By empowering farming communities, it enhances resilience, productivity, and profitability, contributing to broader goals of food security and agricultural sustainability.

Keywords: Pulse Seed Systems, Certified Seed Production, FPO, Small Holder Farmers

Biography:

Kishor Kumar Behera is an Agricultural Research and Development professional presently associated with ICARDA India. He has more than 20 years of experience of working with development organisations and corporates having national and international stature. He has completed his Masters in Agricultural Sciences by conducting research on "Farmers' Perception on Drought Situation and their Management Strategy in Nuapada District of Odisha" and Doctor of Philosophy in Agriculture (Extension Education) by conducting research titled as "A Study on Work Efficiency of Agricultural Extension Professionals of Odisha from Odisha University of Agriculture and Technology, Bhubaneswar. He has an extensive experience of manging various large government collaborative projects and partnerships (public and private).

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Response of raikia bean to inoculation of native rhizobia under North Eastern Ghat Zone of Odisha

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Abstract:

Biological nitrogen fixation is a key eco-friendly strategy for managing nitrogenous fertilizers in the rhizosphere. Among the nitrogen-fixing microorganisms, Rhizobium is considered the most effective symbiotic partner. Native rhizobial strains outperform non-native strains due to their better adaptation to local environmental conditions, which enhances their growth and proliferation. These native strains contribute significantly to improving soil fertility and pulse crop productivity. This study was conducted during kharif 2022 and kharif 2023, during the field experiment, seeds of French bean (*Phaseolus vulgaris*) were inoculated with two isolated rhizobial strains, with and without the application of inorganic fertilizers, to assess crop growth, photosynthetic activity, and nodule characteristics. Compared to rhizobial inoculation alone, the combination of rhizobia with soil test-based fertilizer doses resulted in 11% to 25% higher chlorophyll a, 4% to 10% higher chlorophyll b, 8% to 21% higher total chlorophyll, and a 1.5% to 14.5% improvement in the chlorophyll a:b ratio. Similarly, rhizobia-inoculated treatments showed significant improvements over non-inoculated controls, with root length, biomass, density, and growth rate increasing by 12% to 15%, 32% to 45%, 31% to 40%, and 32% to 48%, respectively. Nodule attributes also improved with inoculation, with the number of nodules per plant and nodule weight increasing by 21% to 35% and 30% to 35%, respectively. Furthermore, inoculating native rhizobial strains with 75% of the recommended soil test fertilizer dose increased leaf nitrogen content by 41% to 65% compared to the control. Adopting soil test-based fertilizer application alongside rhizobial inoculation resulted in a 21% increase in pod yield compared to the control.

Keywords: Rhizobium; N-Fixation; Productivity; Symbiosis

Biography:

Dr. Debadatta Sethi is a dedicated researcher specializing in soil biology, agrowaste management, and biological waste utilization. With a strong focus on sustainable agricultural practices, Dr. Sethi has made significant contributions to enhancing soil fertility and crop productivity through eco-friendly approaches like biofertilizers and biological nitrogen fixation. Currently engaged in research on food biochemistry and microbiology. He also explores innovative solutions to optimize nutrient cycles and improve crop yield. Their work emphasizes the utilization of native microbial strains, such as rhizobia, for sustainable nitrogen management in pulses and legumes. A passionate advocate for bridging scientific knowledge with field applications, Dr. Sethi actively collaborates with farmers to implement research findings in current environmental scenarios. With numerous publications and a commitment to advancing agricultural sustainability, Dr. Sethi strives to contribute to global food security and environmental conservation.

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Efficacy of new generation post emergence herbicides in pigeonpea (*Cajanus cajan*)

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Abstract:

Long duration, slow growth habit of pigeonpea at initial stages along with wide row spacing, encourages rapid growth of weeds and leads to severe crop weed competition , which finally reduces the crop yield .The most critical stage of crop-weed competition was observed between 15 to 60 days after sowing for the pigeonpea . Herbicides not only control weeds and reduce labour cost, but also allow coverage of more area in a relatively shorter time period thus protecting yield potential. A field experiment was conducted over three consecutive years during kharif season of 2019-20 to 2021-22 at the Centre for Pulses Research ,OUAT, Berhampur which comes under South Eastern Coastal Plain zone of Odisha with the objectives to evaluate new generation post emergence herbicides for efficient weed management in pigeonpea . The trial was laid out in Randomized Block Design with three replications having 13 treatments viz. T1: Weed-free check;T2: Weedy check / Control (No weed management) ;T3: Two hand weeding at 20 and 40 DAS with interculture ;T4: Imazethapyr 10SL @ 100g ai/ha ; T5: Chlorimuron ethyl 25WP @ 9g ai/ha ;T6: Fenoxaprop ethyl 9.3 EC @ 70g ai/ha ;T7: Propaquizalop 2.5% + Imazethapyr 3.75% w/w @ 50+75=125g ai/ha ;T8: Sodium acifluorfen 16.5% + Chlodinafop propargyl 8% @ 245g ai/ha ;T9: Chlorimuron ethyl 25WP @ 9g ai/ha +quizalofop ethyl 50g ai/ha ;T10: Chlorimuron ethyl 25WP @ 6g ai/ha +quizalofop ethyl 37.5g ai/ha ;T11: Chlorimuron ethyl 25WP @ 9g ai/ha +fenoxaprop ethyl 70g ai/ha ;T12: Chlorimuron ethyl 25WP @ 9g ai/ha +fenoxaprop ethyl 50g ai/ha ;T13: Imazethapyr 35% + Imazamox 35% @ 100g ai/ha . Application of Pendimethalin 30EC @ 0.75kg ai/ha(pre-emergence) at 2-3DAS followed by one hand weeding &interculture at 50DAS is common from T4 t0 T13 in addition to post emergence herbicides as per treatment on20-25 DAS .

The variety 'GJP-1' was sown in rainfed condition during Kharif on first fortnight of July during each year. Observations on weed flora, weed density (number/m2) and weed dry matter (g /m2) were recorded at 30, 50 and 70 DAS. The data on growth and yield attributes and yield were recorded at harvest. Derived parameters like Weed Control Efficiency (WCE), Weed Control Index (WCI) and Weed Index (WI) are computed .The pooled data of three years revealed that the growth and yield attributes of Pigeonpea were significantly affected by weed management practices. Broad leaf weeds were found dominant over grassy and sedges .Among the treatments, the lowest weed density & weed dry matter along with the highest Weed Control Efficiency were recorded with T7 (Propaquizalop 2.5% + Imazethapyr 3.75% w/w @ 50+75=125g ai/ha) at each stage , which was very close to the weed free check. Maximum plant height (177.2 cm), yield attributes like, number of primary fruiting branches/plant (12.8), number of pods/plant (135.3), number of seeds/pod (3.62) at harvest were recorded from T7 (Propaquizalop 2.5% + Imazethapyr 3.75% w/w @ 50+75=125g ai/ha) and ultimately the highest grain yield (1470 kg/ha) among post emergence treated plots was obtained from this treatment, which was very close to the weed free plot (1535kg/ha). However, the highest B:C ratio (2.52) and maximum net return (Rs. 53484/ha) obtained from T7 among all treatments including weed free plot, which may be due to higher cost of production in weed free plot.

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Shade stress exhibited leaf and root adaptation affecting physiological mechanisms and gene expressions in Mung bean (*Vigna radiata* L.)

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[2]DST-SERB, Ministry of Science and Technology, Govt. of India

Abstract:

Shade stress is a major constraint in any agroforestry system, which can drastically change the physiology of the underlying crops and lower crop yield and overall growth. Different morphological, physiochemical and molecular traits of green gram [Vigna radiata var. Virat] were assessed under varied shade-stress regimes (0%, 25%, 50%, 75% shade stress) under a controlled net house arrangement at ICAR-CAFRI, Jhansi, during 2023–2024. Study revealed a significant reduction in various plant growth, leaf morphological and yield parameters at 50% shade and beyond. Roots length, density and volume got dramatically lowered same stress level. Reduced leaf greenness, CCI, MDA, NDVI and enhanced reflectance of near-infrared radiation, and absorption of red light under shade-stress conditions. Photosynthetic parameters like net photosynthesis rate, transpiration rate, and stomatal conductance got significantly suppressed under shading effect. A pattern of conserving water and CO2 was observed to mitigate the shade stress at initial levels. Leaf and root anatomical structure showed little disruption in tissues under shade. The relative expression levels of gene sequences controlling endogenous hormone biosynthesis were upregulated by shading stress in mung bean. However, further studies are required to understand the molecular mechanisms involved in determining the underlying processes of shade stress tolerance in mungbean which could help in developing the shade resilient varieties for sustained production in the future.

Keywords: Shade stress, Green gram, , physiological traits, biochemical traits, molecular responses

Biography:

Dr. Hirdayesh Anuragi is the scientist (Senior Scale) of genetics and Plant Breeding working at ICAR-CAFRI, Jhansi, having a research experience of more than 6 years. He holds a working experience on mutation breeding, molecular breeding, omics, plant tissue culture, stress breeding, tree breeding. Dr. Anuragi is the awardee of DST-INSPIRE fellowship, University Chancellor's gold medal, best young scientist awards, several oral and poster presentation awards, best research paper and popular article award, etc. He is the author of several high rated peer reviewed research papers, review papers, books, book chapters, popular articles and presented papers in international and nation conferences.

Research Interest: Molecular breeding, Omics, Plant tissue culture, Stress breeding, Mutation breeding, Tree breeding.

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Biological control of root-rot disease in Mungbean by *Trichoderma spp.*

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Abstract:

A pot experiment was carried out at the Department of Botany, Aligarh Muslim University, Aligarh, to investigate the antagonistic effects of Trichoderma virens a well-known biocontrol agent, against the root-rot disease caused by *Rhizoctonia solani* Kuhn. Trichoderma species were isolated from soil using the serial dilution method, and pure colonies were obtained from a mixed population. Identification of Trichoderma virens was confirmed on the basis of morphological and colony features. Fifteen-days-old seedlings of mungbean were inoculated with R. solani at 2g per 10 mL in one pot. Seven days post-inoculation, different concentrations of *Trichoderma virens* viz. 1g, 1.5 g, 2 g, 2.5 g and 3 g were applied to each plant to assess their antagonistic effects against the pathogen affecting mungbean. Uninoculated plants served as control. After 70 days, the plants were harvested, and different plant growth parameters were measured. Results showed a significant reduction in root-rot infection and fungal activity. The plant growth parameters, such as plant height, fresh and dry weight, chlorophyll content, carotenoid content and fruit yield per plant, significantly improved. This study suggests that biocontrol agents offer an eco-friendly and cost-effective alternative to chemical fertilizers, enhancing plant growth and yield.

Keywords: Antagonistic, biocontrol, mungbean, *Trichoderma* spp.

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Social and infrastructural development of Tribal population in Koraput District of Odisha: A case study

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Abstract:

This study examines the socio-economic development of the tribal population in Koraput district, Odisha, focusing on health, education, agriculture, women's empowerment, and rural development. Koraput, one of the most backward districts in Odisha, faces significant challenges due to its geographical isolation, poor infrastructure, and socio-economic disparities. The health sector is severely underdeveloped, with high infant and maternal mortality rates, limited access to healthcare services, and reliance on traditional medicine. Despite government initiatives like Ayushman Bharat and the National Health Mission, the region continues to struggle with healthcare access, especially in remote tribal areas. The lack of proper infrastructure and healthcare facilities further exacerbates these issues, making it difficult to achieve sustainable health outcomes.

Education is another critical area where Koraput faces substantial challenges. While the government has made efforts through residential schools and scholarship schemes, the literacy rate remains low, and the district experiences high dropout rates. This is due to factors such as socio-economic pressures, lack of trained teachers, and the geographical remoteness of tribal villages. Agriculture, the primary livelihood for many tribal families, is severely impacted by climate change, water scarcity, and inadequate irrigation facilities. Despite government support for sustainable farming practices, market access and financial instability continue to hinder agricultural growth. Women's empowerment programs, like self-help groups, have shown positive results, enabling women to earn income and take on leadership roles, but challenges related to skill development and resource access remain.

In conclusion, while various government programs have made progress in Koraput, the tribal population continues to face numerous obstacles to achieving sustainable development. There is a pressing need for a comprehensive, culturally sensitive approach to address issues in health, education, agriculture, and women's empowerment. Focusing on improving infrastructure, access to quality services, and economic opportunities while preserving the region's rich cultural heritage is key to fostering long-term, inclusive development in Koraput.

Keywords: Tribal development, Health, Education, Agriculture, Women's empowerment, Rural development.

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Transforming watersheds from grey to green: A REWARD Initiative

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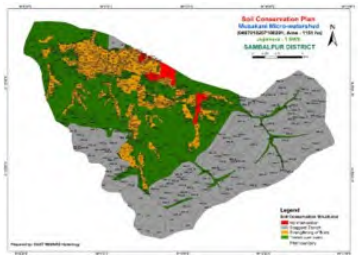
Abstract:

The REWARD (Rejuvenating Watershed for Agricultural Resilience through Innovative Development) project adopts a lab-to-field approach to revitalize watersheds for sustainable agriculture and climate resilience. Watershed degradation, often caused by inadequate planning that overlooks geo-hydrological properties, leads to the failure of conservation structures. The unavailability of high-resolution data for micro and sub-watershed scales in India further hampers scientific planning. To address this, REWARD is piloted in select watersheds of Odisha, integrating advanced technologies with participatory planning. The project focuses on land surveys, preparation of high-resolution Land Resources Inventory (LRI) databases, hydrological and crop modeling, and developing decision support systems (DSS) for watershed management using micro-watersheds as the planning unit. High-resolution maps (1:8000 scale) for land use, slope, soil properties, runoff, erosion, and groundwater potential have been developed. These enable the formulation of Soil Conservation Plans (SCP), Drainage Line Treatment (DLT) plans, and Water Storage Plans using GIS platforms. The initiative underscores integrated watershed management by following a step-by-step methodology, including field implementation, precise resource quantification, potential-based planning and community consultations. A robust DSS is complemented by a digital library and real-time agro-advisories to assist farmers in improving productivity and adapting to climate challenges. By bridging scientific innovation with local needs, the REWARD initiative paves the way for transforming degraded watersheds into resilient green ecosystems, ensuring sustainable livelihoods and environmental conservation.

Keywords: REWARD, Watershed, Hydrological Modeling, Agricultural Resilience, Soil Conservation Plan, Drainage Line Treatment, Water Storage.



Biography:

Dr. Dwarika Mohan Das is a Scientist (Agricultural Engineering) at Krishi Vigyan Kendra, Jagatsinghpur, OUAT. He completed his B.Tech in Agricultural Engineering from the College of Agricultural Engineering and Technology (CAET), OUAT, Bhubaneswar, followed by M.Tech in Land and Water Resources Engineering from IIT Kharagpur, and Ph.D. in Soil and Water Conservation Engineering from OUAT, Bhubaneswar. With nine years of experience in the OUAT system, his research interests include hydrological modeling, remote sensing and GIS, crop modelling and agricultural water management. Dr. Das has significantly contributed as Co-Principal Investigator in several externally funded major projects of OUAT including the REWARD-Hydrology Project, NICRA-TDC Project, and YES-Tech Projects.

Research Interest: Hydrological Modelling, Remote Sensing and GIS, Crop Modelling

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Encapsulation of Anthocyanins from Jamun pomace extract

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Abstract:

Jamun (*Syzygium cumini*), *commonly known as Indian blackberry contains many natural bio-active compounds e.g. anthocyanins, tannins, ellagitannins, ellagic acid, galloyl-galactoside and gallic acid. Extraction of anthocyanins from jamun pomace dried powder were carried out with solid to solution ratio of 1:15 at temperature 45°C for 90 min using two types of solvents i.e. aqueous and ethanol. Purification of anthocyanin in the extracted juice was done using chitosan. The extracts were encapsulated using different combination of sodium alginate as coating material (1.0, 2.0, 3.0 % W/V) and calcium chloride as hardening material (1, 5, 10% W/V) following liquid suspension method and evaluated in terms of encapsulation efficiency, moisture content and bulk density. The ethanolic extracts yield more amount of anthocyanin contents (290.01±02 mg/100g), total phenolic contents (52.8±0.26 mg GAE/100ml extract), antioxidant activity (54.56±0.54). The FTIR analysis of the extract showed, ethanol extract retained maximum number of functional groups as compared to aqueous extract. Encapsulation of anthocyanins bio-active component was found best in 3.0% sodium alginate and 5.0% calcium chloride with maximum encapsulation efficiency (75.93±0.61%) and formed uniformly.*

Keywords: Jamun pomace, solvent extraction, encapsulation, anthocyanins, stability to light, emperature etc.

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A comparative study of ARIMA, ANN and their hybrid technology for forecasting green gram production in Odisha

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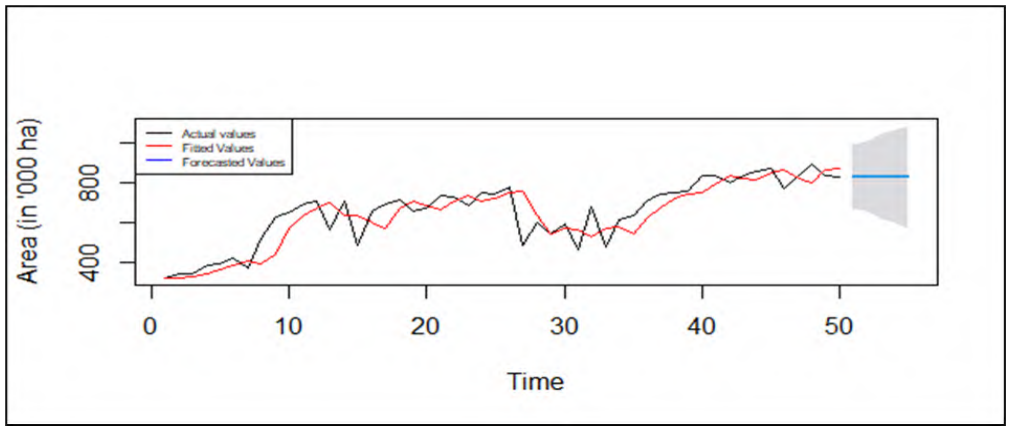
Abstract:

Pulses are under most significant crop groups of Odisha which are the primary determinants of the state agricultural condition. To determine the agricultural strategy and policy of the state, forecasting the production of pulses is of utmost importance. Green gram is the most important pulse crop of Odisha. The ARIMA model can be reliably used to forecast for short future periods. When nonlinear patterns are present, artificial neural network (ANN) models are typically used. A hybrid strategy using ARIMA and ANN models can be applied when both linear and nonlinear time series structures were present. The study focuses on exploring appropriate technique to forecast area, yield and production of green gram in Odisha.

The data on area, yield and production of green gram are collected from 1970-71 to 2021-22 are stationarised and then used to fit the tentative ARIMA models found suitable from ACF and PACF plots. The significance of computed coefficients, model diagnostic tests, and model fit statistics are taken into consideration while choosing the best fit model. The selected best fit ARIMA model is finally confirmed after successful cross validation. The outcomes of the BDS test determine whether the selected ARIMA model is to be retained or ANN model has to be used to capture the non linearity if present in the data. The need for hybrid ARIMA-ANN model is also felt in cases where both linearity and non linearity is found in the data as confirmed by BDS test. The selected models which can be ARIMA model, ANN model, or a hybrid ARIMA - ANN model. These selected best fit models are used to obtain the forecast values (along with the 95% confidence interval) of area, yield and production of selected pulse crops for the future period from 2022-23 to 2026-27.

The forecast values for area of green gram are found using ARIMA model but for yield hybrid ARIMA-ANN model is used. The future prediction values for green gram production obtained after choosing the best fit model are anticipated to be nearly constant for the years 2022–2023 to 2026–2027.

Fig.: Actual with fitted and forecasted values of area under green gram from ARIMA (1,1,0) without constant model



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Effect of weed management on yield and economics of Sunflower under modified spacing in coastal plain zone of Odisha

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Abstract:

A field experiment was conducted during January, 2022 at Instructional farm, OUAT, Bhubaneswar, Odisha, India under AICRP on sunflower to study the effect of integrated weed management in sunflower under modified spacing (75×25 cm2). The experiment was laid out in a randomized block design with a total of seven treatments replicated thrice. The hybrid variety 'DRSH-1' was grown as test crop. Prominent narrow leaved weeds like Cynodon dactylon, Dactyloctenium aegyptium, Eleusine indica, Digitaria ciliaris, Digitaria sanguinalis, Sorghum halepense, Cyperus rotundus, Cyperus alternifolius, Cyperus iria and Fimbristylis miliacea and broad-leaved weeds like Heliotropium indicum, Alternanthera philoxeroides, Spilanthes acmella, Parthenium hysterophorus, Cirsium arvense, Melilotus indicus, Amaranthus viridis were found in the experimental site. Weed free (Three hand weeding at 15, 30 and 45 DAS) treatment recorded highest seed yield (2060 kg ha-1) and oil yield (815 kg ha-1) which remained at par with treatments-farmers' practice (Two intercultivation at 20 and 40 DAS fb one hand weeding at 30 DAS30), one intercultivation at 20 DAS fb one hand weeding at 30 DAS and Pendimethalin at 1kg a.i ha-1 as pre-emergence fb Quizalofop-p-ethyl at 37.5 g a.i. ha-1 at 20 DAS. As compared to other weed management methods, weed free (Three hand weeding at 15, 30 and 45 DAS) treatment recorded highest gross return (Rs. 123909 ha-1) (Rs. 55131 ha-1) but treatment having Pendimethalin at 1 kg a.i. ha-1 as pre-emergence fb Quizalofop-p-ethyl at 37.5 g a.i. ha-1 at 20 DAS recorded highest B: C(1.88).

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Assessment of indigenous aromatic rice varieties for higher profitability

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Abstract:

An on-farm testing was conducted during khairf 2023 and 2024 in the adopted villages of Krishi Vigyan Kendra, Subarnapur on assessment of indigenous aromatic rice varieties for higher profitability. After completing the baseline survery Krishi Vigyan Kendra, Subarnapur conducted an on-farm testing taking kalajeera as farmers' practice. The on-farm testing was conducted in 1 ha area taking 7 no of farmers as 7 replications. 2 no of technologies i.e. TO1: Gangabali and TO2: Kalikati were selected from technology pool by sourcing from RRTTS, Bhawanipatna, 2020 and assessed taking comparison with farmers' practice. The average duration of gangabali and kalikati is 130-135 days and 135-140 days compared to Kalajeera which is having average duration of 135-140 days. The soil taken in on farm testing is sandy loam in texture having low pH (5.9), low in available nitrogen (146.2 kg/ha), medium in available phosphorus (18.5 kg/ha) and medium in available potassium (201.5 kg/ha). From the pooled data of two years, it was revealed that cultivation of Kalikati produced higher number of ear bearing tillers (15.7) compared to cultivation of kalajeera (11.8) and gangabali (13.9) whereas cultivation of kalajeera produced the highest plant height (142.2 cm) compared to gangabali (136.6 cm) and kalikati (134.1 cm). Similarly, cultivation of Kalikati produced the highest ear bearing tillers (15.7), filled grains/panicle (304.3), 1000 seed weight (12.7 g) and grain yield (30.2 q/ha) compared to cultivation of gangabali (13.9, 264.4, 10.3 and 24.6) and kalajeera (11.8, 212.8, 10.9 g, 21.5 q/ha), respectively. Cultivation of Kalikati fetched 40.4 % higher yield than farmers' practice. Taking economics to consideration, Cultivation of Kalikati fetched higher gross return (Rs. 120800/ha), net return (Rs. 64800/ha) and B:C ratio (2.15) compared to gangabali (Rs. 98400/ha, Rs. 42400/ha and 1.75) and kalajeera (Rs.86000/ha, Rs.30000/ha and 1.53), respectively.

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Evaluation of sulphur sources in groundnut in *Mid-central* table *land zone* of Odisha

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Abstract:

An experiment was conducted at RRTTS, OUAT, Mahisapat, Dhenkanal where 7 treatments namely: (1) control, (2) STD (NPK) + S0, (3) STD (NPK) + S40 (ES), (4) STD (NK) + S40 (SSP), (5) STD (NPK) + S40 (Gyp), (6) STD(NPK) + LS-Spray @0.5% after 15-20 DAS, (7) STD(K) + S20 (APS) + LS- SPRAY @ 0.5% after 15-20 DAS were compared. As sulphur was the critical nutrient in the district as well as in the state so it was applied from five different sources as Elemental Sulphur, Gypsum, SSP, Liquid formulation and Ammonium Phosphate Sulphate, out of which the Elemental Sulphur, Gypsum, SSP were applied @ 40 kg/ha, the Liquid formulation @ 0.5% as foliar spray at 15 DAS and the Ammonium Phosphate Sulphate @ 20 kg ha-1 applied as basal and LS spray at 15 DAS. Total pod yield of groundnut due to this practice was 2287 kg ha-1 with harvesting index of 56.6 per cent. The rate of economic yield: uneconomic yield was lowest 1: 1.55. Such management of S in groundnut crop helped the crop to remove highest amount of N, P, K and S of 65, 33, 80 and 15.4 kg ha-1 respectively maintaining extra nitrogen gain of 31.5 kg ha-1, highest P recovery of 53.5 % , K recovery of 75 % and S recovery of 33 % against that of 56.2 kg N ha-1(extra gain 22.4%), 33 kg P uptake ha-1 (recovery 29.2%), 70.5 kg K ha-1 (49.5% recovery) and 9.7 kg S ha-1(11% recovery) with common gypsum source. Such practice recorded better and positive post-harvest soil properties in terms of Soil pH of 5.82 and organic carbon of 6.8 g kg-1 (improved from the initial level). The available N in this practice was depleted from the initial level but the level of P (13.2 kg ha-1), K (232 kg ha-1) and S (17.13 kg ha-1) was improved compared to initial status. The proposed practice helped generating highest net return of Rs.71.370/- ha-1 where rupee earned was Rs.2.65 per rupee invested.

Key words: sulphur, Harvest Index ,uptake, post-harvest soil properties

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Sustainable agriculture's use of indigenous practices and plant nutrients in relation to pests, food quality, and marketability

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Abstract:

The growing trend of utilizing chemical inputs in our Indian agriculture has significantly decreased soil fertility and productivity status, improved resistance to chemical inputs in pests and diseases, decreased food nutritional quality, and polluted the environment daily. Therefore, the current situation forces the search for alternate methods of controlling plant diseases and pests that do not negatively impact the environment while simultaneously increasing production and improving product quality. The proper management of nutrients to control disease in sustainable agriculture has not gotten much attention, even though the significance of nutrients in disease control has been acknowledged for some of the most serious diseases. The following goals have been maintained for the study in light of the aforementioned concerns: the function of nutrients in pest control; the use of indigenous technical knowledge by farmers to manage pests and plant diseases; and the marketability of the products produced using indigenous technical knowledge. This study uses a case-oriented methodology for several crops.

Keywords: indigenous technical knowledge, marketability, sustainable agriculture, pest, disease, plant nutrient

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Growth performance Aseel Kadaknath breed of poultry in Mayurbhanj district of Odisha

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Abstract:

The economy of Odisha among all the states of India always depends on Agriculture, hence government always give primary importance to thedevelopment of Agriculture sector. In addition to the traditional agriculture, importance is also given to the allied agriculture sector like Animal husbandry, Fishery and Horticulture. Now a day Poultry rearing at backyard, goatery, sheep rearing and mushroom cultivation are becoming the ways of different entrepreneurship development. Among all these entrepreneurial activity, poultry rearing is one of the most important entrepreneurial activity. Mayurbhanj is a tribal dominated district having 58.74% of the different tribal people belonged to this district. In areawise Mayurbhanj is the largest district in Odisha. It contains most of the natural plants and there is wide opportunity for the development of animal sector. In most of the household we always find either poultry or goatery or both. The present study was carried out by KVK Mayurbhanj-1in Kadalibadia, Takatpur, Badakhaladi, Bholagadia villages of Mayurbhanj district of Odisha to assess the growth performance among local breed, Aseel and Kadaknath breed of poultry chick. Body weight, egg production and net return were significantly higher in Aseel breed of poultry chicks in comparison to local poultry breed and Kadaknath breed of poultry. The twenty nos of beneficiaries were provided with twenty one days of both aseel and kadanath chicks. The comparison was studied among local breed, Aseel and Kadanath chicks. Different parameters like body weight, egg laying (days), age at first egg production (days) and sexual maturity (days) were also studied. Then the data were statistically analysed by SPSS, M-stat C and excel-22.The acceptability and adoptability of the aseel breed of poultry was significantly ($P<0.01$) more than that of local breed and Kadaknath breed of poultry breed. The incidence of disease of aseel breed of poultry was significantly ($P<0.01$) less than that of Local and Kadaknath breed of poultry.

Keywords: Poultry breed, Body weight, egg production and growth performance

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Heterosis in papaya (*Carica papaya* L.): Impact on fruit yield and quality attributes

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Abstract:

In the present investigation, information regarding magnitude of heterosis and combining ability were generated for fruit yield and its related components; adopting Griffing's diallel analysis (Method I, Model II) involving six parents and their 30 F1 hybrids (including reciprocal crosses) with a commercial hybrid check 'Red Lady' of papaya; tested at Instructional Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat during the year 2018 to 2021 in randomized block design with three replications. Among the parents, Pusa Delicious and CO-8 emerged as the best performing parents for fruit yield per plant as well as for quality attributes. Lucknow Local and Gujarat Junagadh papaya-1 being used as parents exhibited medium-dwarf stature, early flowering and fruiting in hybrid combinations. Significant differences were observed among parents and hybrids indicating considerable genetic variation among those genotypes. Hybrids did not exhibit positive and significant standard heterosis for fruit yield per plant. Non-significant and desirable heterosis over standard check for fruit yield and its component traits indicated little scope for commercial exploitation. Nevertheless, possibilities of isolating desirable segregants from these hybrid combinations do exist. The hybrid Pusa Delicious x Lucknow Local exhibited higher standard heterosis in positive direction for fruit yield in papaya. However, as far as the quality attributes the hybrid, CO-8 x Pusa Delicious exhibited significant standard heterosis in desired direction. The hybrids made using CO-8 as a parent (male or female) exhibited red pulp which indicated that this trait is governed by oligogenes and it has high heritability also.

Keywords: Papaya, High Yield, Quality, Heterosis, Combining Ability

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Elevating farmers' livelihoods: A strategy for doubling income through KVK interventions in integrated farming systems in Puri District, Odisha

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Abstract:

This study examines the impact of Krishi Vigyan Kendra (KVK) interventions on the extensive adoption of Integrated Farming Systems (IFS) in the Puri district, Odisha, with a focus on the economic benefits and sustainability of multiple farming techniques. Data from respondents before and after KVK interventions indicate a significant increase in participation, with notable shifts towards systems such as Crop + Horticulture and Crop + Dairy, which demonstrated average net incomes of ₹407,319.50 and ₹760,200.00, respectively. The study highlights three key components contributing to the success of IFS: diversified income sources, enhanced resource utilization, and improved risk management. These factors foster economic resilience and sustainability among farmers, underscoring the critical role of KVK in providing education, training, and access to resources. The methodology employed included quantitative analysis of respondent data and comparative assessments of economic outcomes, revealing that KVK interventions positively influenced farming practices. The conclusion highlights the necessity of continued assistance and IFS farming strategies scaling of significantly improve farmer livelihoods and community empowerment. Overall, the results show that KVK activities had an important effect on agricultural practices, improving the region's economic viability and environmental sustainability.

Keywords: Integrated Farming Systems (IFS), Krishi Vigyan Kendra (KVK), Economic Impact, Agricultural Sustainability, Diversification

Biography:

Dr. Sumita Acharya (b.1975) is currently working as a Scientist (Home Science) at Krishi Vigyan Kendra, Puri, under OUAT, Bhubaneswar. She completed her graduation in Home Science from the College of Community Science, OUAT, Bhubaneswar and pursued her MSc and PhD in Food & nutrition from Berhampur University, Odisha. She has over 13 years of research and extension experience in various agro-climatic zones of Odisha like west central table land zone, Mid-central table land zone and East & South East Coastal Plain Zone etc. She has been working as Co-PI of ARYA project operating in Puri district for the past 5 years. She received the best Extension scientist award of OUAT for the year 2023-24. Her work focuses on trial & demonstration of income generating activities to empower farm women. She has published 11 research papers in national journals and authored several extension leaflets, booklets and popular articles.

Research Interest: Women empowerment, livelihood development of farmers & farm women, Drudgery reduction, Nutritional security

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Genetic variability and character association in pre-release hybrids of sunflower (*Helianthus annuus* L.)

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Abstract:

Sunflower (*Helianthus annuus* L.) has emerged as an excellent crop in oilseed landscape of India for its high-quality oil, thermo sensitivity, short duration and high yield. An experiment was carried out for assessment of genetic variability, character association as well as direct and indirect effect of attributing traits on yield through path analysis. The experimental materials comprising of 23 experimental hybrids and two checks were sown in Randomized Block Design with two replications to study the performance of 11 different yield and yield contributing characters. The observations were recorded from five plants of each replication on yield and different yield attributing characters such as days to 50% flowering, plant height, head diameter , number of leaves per plant, days to maturity, 100-seed weight ,100 volume weight ,oil content ,oil yield, plot yield and seed yield per plant. The data recorded using the sample mean of various characters under observation were subjected to suitable statistical analysis. The different parameters of variability like mean, range, standard error of difference, critical difference (CD), genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability (h2) and genetic advance were estimated. The analysis of variance revealed existence of significant variation among the hybrids for all the characters studied. All the characters under study showed higher magnitude of PCV than the corresponding GCV which indicated the influence of environment on the expression of these characters. The values of PCV and GCV were relatively high for plant height, head diameter, oil yield, plot yield and seed yield per plant. High heritability and high genetic advance was exhibited by seed yield/ plant which indicated the abundance of additive gene action on controlling of this trait. High heritability and moderate expected genetic advance as per cent mean were recorded for plant height. At both phenotypic and genotypic level, positive and highly significant association was found between seed yield and yield component characters viz. days to 50% flowering, plant height, head diameter, no. of leaves/plant, oil yield and plot yield. Phenotypic path coefficient analysis revealed that all characters had positive direct effect on seed yield/plant except days to 50% flowering. Correlation coefficients of plant height, head diameter, days to maturity, 100-seed weight, 100-volume weight and plot yield exhibited similar trend as direct effects. Indirect effect of these traits through other traits may be the reason for high correlation coefficient. Oil content exhibited significant negative correlation with pant height, head diameter, no. of leaves /plant, 100- seed weight, 110- volume weight and plot yield at genotypic level. plant height, head diameter, 100- volume weight and plot yield had high direct positive effect on seed yield/plant, whereas days to 50% flowering, number of leaves per plant were showing negative direct effect on seed yield/plan at genotypic level. Plant height, head diameter, 100-volume weight were showing high indirect effect on seed yield/plant. So the traits like plant height, head diameter, days to maturity, 100-seed weight and 100-volume weight might be considered as important traits for yield improvement. IOSH-1329, IOSH-1331 and IOSH-1335 and IOSH-1336 seems to be promising hybrids with respect to plot yield (>20.0 q/ha), whereas IOSH-1329, IOSH-1335 and IOSH-1346 were elite hybrids for oil yield (>800 kg/ha).

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Age-dependent variations in carbon sequestration in mango orchards on alfisols in tropical climates

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Abstract:

Understanding carbon fluxes from land-use transitions is vital for climate change mitigation, as activities like deforestation and urban expansion alter carbon storage and emissions. These alterations impact the carbon cycle, affecting the balance between carbon dioxide (CO2) absorption and its emission into the atmosphere. A thorough understanding of land use and land-use change dynamics in a specific region is essential for this analysis. Notably, the growing cultivation of fruit crops on agricultural land greatly enhances carbon sequestration potential. The experiment was carried out from 2021 to 2023 at the CHES laboratory in Bhubaneswar and the Soil Science Laboratory at IIHR, Bengaluru.This study found that carbon sequestration in mango orchards increased with age of the trees. On average, 115.57 t C/ha was sequestered in Dhenkanal and 130.48 t C/ha in Rayagada. In these orchards, above-ground carbon constituted 24.45% in Dhenkanal and 27.69% in Rayagada of the total carbon sequestered per hectare, using the recommended 8 m x 8 m tree spacing. Collecting fundamental data on the carbon content of various land-use and land-use change categories at the regional level is crucial for effective climate change mitigation. This study provides novel insights into carbon stocks in mango orchards relative to tree age, enhancing our understanding of the carbon cycle within mango cultivated systems. Subsequent research should encompass mango orchards from many regions around the country, employing higher sample sizes to more accurately measure carbon sequestration in farmed mango orchards countrywide.

Keywords: Carbon sequestration; mango; litter biomass; root biomass; soil carbon stock; tree biomass

Biography:

Ms. Sipra Mohapatra is currently pursuing Ph.D. in the Department of Fruit Science and horticulture technology from Odisha University of Agriculture & Technology, Bhubaneswar, Odisha. She has been awarded DST-INSPIRE fellowship. She has done M.Sc. in Horticulture from Calcutta University, Kolkata, West Bengal in 2020, following her B.Sc. from SOA University, Bhubaneswar, Odisha. Ms. Sipra also brings working experience, having served as Senior Research Fellow at KVK. She has an extensive research background with more than 10 research papers in National and International journals, several popular articles, review papers, book chapters and abstracts to her name.

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Nitrogen management practices in conjunction with farmyard manure improves soil properties and fruit yield of chilli (*Capsicum annuum* L.)

Dimple Kamboj*, A.A.S Gill and Vijay Kant Singh
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Abstract:

Nitrogen (N) management practices has a significant impact on soil sustainability and fruit yield. Therefore, an experimental study was conducted at Research Farm, Department of Soil Science, Punjab Agricultural University, Ludhiana, Punjab during the summer season of 2022-23 to evaluate the effect of N-fertilizer management strategies on crop performance and soil health. The soil of experimental field was sandy-loam in texture, optimal pH and EC, low in available nitrogen, medium in available phosphorus and potassium. The experiment was conducted in split-plot design with three replicates. There are two main plots i.e., without and with farmyard manure (FYM) and thirteen N treatments in sub plots i.e. Four different N-fertilizer levels i.e., 0, 75, 113 and 150 kg N ha-1 applied in two, three, four and five split doses. The results revealed that INM plots i.e., integration of N-fertilizer practices in conjunction with FYM @ 25 t ha -1 result significantly higher fruit yield and nitrogen use efficiency along with improving the soil properties than N-fertilizer practices without FYM. The T8 treatment i.e., 113 kg N ha-1 applied in four split doses has significantly higher fruit yield (45.8 %) along with higher macro and micro-nutrients with respect to T2 treatment (RDF) i.e., 75 kg N ha-1 applied in two split doses. Only two split N-fertilizer doses were ensured the sustainable crop performance. Therefore, 113 kg N ha-1 applied in four equal split doses integrated with FYM @ 25 t ha-1 in chilli would be beneficial for sustainable fruit production and soil fertility.

Keywords: Chilli, Farmyard manure, Fruit yield, Nitrogen management and Soil fertility

Biography:

Dimple Kamboj is a research scholar in one of the renowned agricultural university i.e., Punjab Agricultural University, Ludhiana, India. During my master's I conducted research on "Optimizing the timing and levels of nitrogen application on soil sustainability, productivity and nitrogen use efficiency of chilli". As a step towards revolutionizing agriculture and enhancing the accessibility of advanced agriculture solutions for the farming community, my research focused on sustainable production of Chilli hybrid CH 27 to improve the economic feasibility to famers. I am particularly interested in integrated and precision nutrients management approaches by applying site-specific fertilizers in field and horticultural crops.

Research Interest: Plant Nutrition, Precision Agriculture, Sustainable Farming for security and nutritional security

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POSTER PRESENTATION

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Unveiling the morphological features, nutritional composition, bioactive compound profiling, and quantitative assessment of secondary metabolites of *Curcuma angustifolia* Rhizome

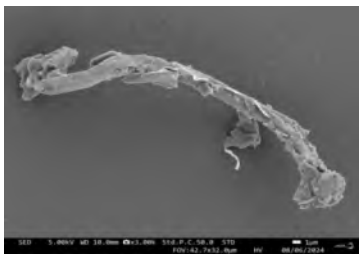
Monalisha Sahoo*, Tilothama Bhotra, and Sujata Mahapatra
Rama Devi Women's University, Bhubaneswar, India

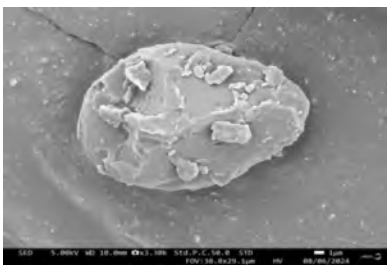
Abstract:

This study investigates the chemical composition, nutritional value, and phytochemical diversity of *Curcuma angustifolia* (C.A.) rhizome, emphasizing its nutraceutical and therapeutic potential. Preliminary phytochemical screening revealed high levels of essential minerals, including sodium, potassium, iron, sulphate, phosphate, and chloride. Nutritional analysis showed high moisture content (86.73%), significant amounts of carbohydrates (175 mg/g), protein (95 mg/g), total ash (7.6%), crude fiber (1.2%), and low crude fat (0.785%). Elemental analysis (EDAX) revealed a rich mineral profile with significant levels of carbon (40.2%), copper (20.4%), potassium (6.5%), and iron (3.6%), along with trace elements like molybdenum (1.3%), zinc (1.5%), and selenium (2.3%). The FESEM provided the rhizome surface identification of variety of microstructures, such as granular starch grains, isolated vessels, unicellular trichomes and parenchyma cells. Secondary metabolite quantification showed phenolic content ranging from 8.03 mg/100g (aqueous extracts) to 26.07 mg/100g (methanol extracts), and flavonoid levels varying from 3.75 mg/100g (aqueous extracts) to 11.72 mg/100g (acetone extracts), demonstrating solvent-dependent variation. Fatty acid profiling (FAME) identified arachidate (55.37%) as the dominant component among 14 fatty acids, followed by tridecanoate (14.58%) and hexanoate (5.87%). GC-MS analysis of volatile oils identified 49 compounds, with camphor (5.95%), α-pinene (4.39%), and α-ionene (4.59%) as primary constituents, along with minor bioactive compounds such as eugenol and coumarone.These findings highlight the nutritional richness and bioactive compound diversity of C.A. *rhizome*, underscoring its potential for nutraceutical, pharmaceutical, and therapeutic applications.

Keywords: *Curcuma angustifolia* rhizome, FESEM, Nutritional, Phytochemical, Elemental analysis (EDAX), Fatty acid (FAME), Secondary metabolites, GC-MS, Volatile oil, Bioactive compounds.

Images showing the FESEM analysis of rhizome surface:





Biography:

Monalisha Sahoo, a Ph.D. research scholar in Biotechnology with a solid academic background in Botany. She has completed her Bachelor's degree in Botany from Sambalpur University, Govt. Autonomous College (Rourkela). She later pursued advanced research in Botany during my Master's studies, from Utkal University, Vani Vihar. Currently, she is doing her doctoral research at Rama Devi Women's University in Biotechnology focusing on "Study of the prebiotic potential of Curcuma angustifolia rhizome." My research work has been presented at National Seminar of "25th Odisha Bigyan O Paribesh Congress" and also awarded with best poster presentation. Beyond academics, she hasbeen actively mentoring students and engaged in teaching programs. With a vision for sustainable innovation, she will strive to advance biotechnology for a healthier and greener future.

Research Interest: Phytochemistry and Plant microbiology

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Quantitative assessment of improvement in soil health with biochar application

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Plaksha University, Mohali , India

Abstract:

Biochar, often referred to as 'Black Gold', is a carbon-rich material derived by heating organic matter in the absence of oxygen. Its application has recently garnered attention as a rapid and effective approach to improving soil health, particularly by enhancing soil organic carbon (SOC) levels. This study evaluated the immediate effects of biochar on soil properties through a field trial using Sesbania bispinosa, a legume crop. The experiment was conducted over a 100x100 feet area, divided into 10 treatment plots including two control plots, and eight other plots testing two biochar dosages (20 and 25 tons/hectare), both with and without plantation. Soil samples were collected from three randomly selected 2x2 feet sites within each plot at four timepoints: day 0, 8, 25, and 45. Plant samples were also collected during the final sampling. Soil samples were analyzed for physical properties (electrical conductivity and porosity), chemical properties (SOC, pH, moisture retention, and NPK), and biological properties (microbial biomass and root nodule formation). Results showed significant increase in SOC, nearly doubling in treated plots (0.34%) compared to the controls (0.16%), with similar improvements observed in soil porosity. Additionally, biochar positively influenced microbial biomass and root nodule formation. Importantly, no adverse effects were observed on soil pH or electrical conductivity. NPK values remained the same as control. The study concluded that biochar had an overall positive effect on soil's physical, chemical, and biological properties, with no immediate negative impact.

Keywords: Biochar, Soil health, Soil Organic Carbon

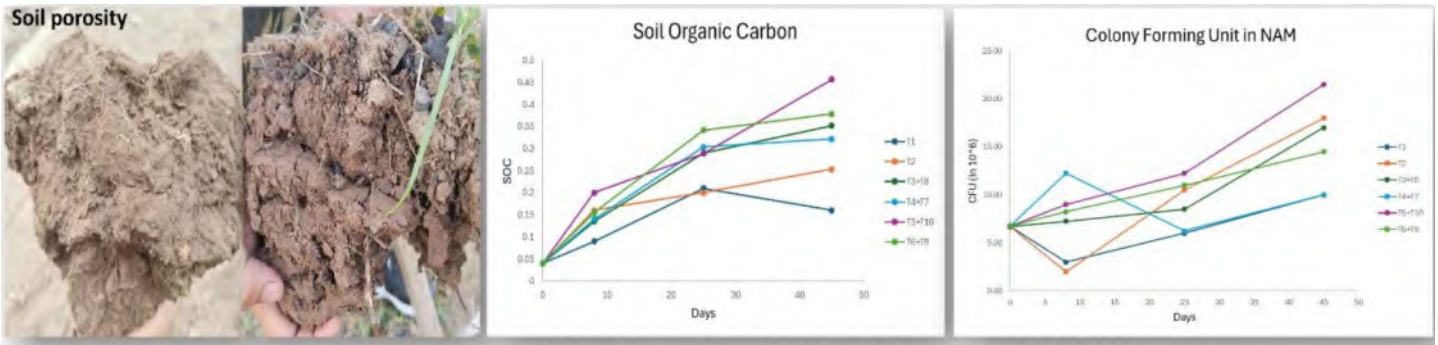

Fig: Significant improvement in Soil porosity, Soil organic carbon, and Microbial biomass

Biography:

Siddhant, a Microbiology master's graduate from Gurukul Kangri University, specialized in medicinal plants for microbial and fungal control. He gained experience developing nano-bio fungicides, microalgae-based air purifiers, and enhancing biogas through microbial electrosynthesis at IISER Mohali. Skilled in phytochemical extraction, microbial culture handling, and bioreactor management, he now works in NK's research lab, analyzing microbial biocontrol agents (MBCAs) and validating their real-time efficiency on a field scale. Dr. Navjot Kaur, a molecular biologist specializing in diagnostics and biosensors, completed her PhD at IISc Bangalore in 2021 and joined Plaksha University in 2022 as founding faculty in Biosystems Engineering. Her research focuses on agricultural diagnostics, fungal biocontrol, and soil health. Highlights include a farmer survey across Punjab and biochar studies for soil carbon improvement, sponsored by Menterra Ventures. She also spent 2023 in Prof. Rodolphe Barrangou's CRISPR lab at NC State University.

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Economic profitability of organic Chickpea vs. organic Wheat in the cotton-based production system in a long-term experimental trial in India

Ishwar Patidar[1], Bhupendra Singh Sisodia[1]*, Dharmendra Patel[1], Sawan Kushwaha[1], Manish Chouhan[1], Christelle Ledroit[2], Chigusa Keller[2], Akanksha Singh[2]

[1]bioRe Association Agronomy, India

[2]Research Institute of Organic Agriculture (FiBL) Switzerland

Abstract:

FiBL and its partner bioRe have established a long-term farming systems comparison field trial (LTE) to compare the performance of conventional and organic production systems for a period of 20 years from 2007 to 2026. Among other parameters, the trial aims to compare the productivity and profitability of cotton rotational systems under different management scenarios (organic, biodynamic, conventional, and Bt-conventional) in central India. Cotton is grown in a 2-year crop rotation at this study site, including soybean, wheat, and chickpea as rotational crops.

Wheat had been grown after harvesting the cotton in all the systems until 2018. The production and market price of wheat has been low. Therefore, to improve the profitability of the system, chickpea has been sown instead of wheat in organic and biodynamic systems in 2019. This presentation will present the effect of integrated chickpea crops in the rotational systems on the economic profitability in the organic and biodynamic systems.

In both organic systems (organic and biodynamic) the gross margin increased and chickpea has shown to be more profitable than growing wheat in this rotation crop system. Overall, this study showed that planting chickpea crop in organic systems significantly increased the overall profitability of the organic system.

Keywords: Organic, Biodynamic, Conventional, Cotton, Chickpea, Wheat, Productivity, Gross Margin

Biography:

Bhupendra Singh Sisodia, have been working with a research organization as a scientific research coordinator for more than 12 years. My post-graduation is also in Agriculture. I have a great interest in the Agricultural research field.

Research Interest: To find out the more sustainable options for organic cotton rotational crop systems

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AGRI 2025 VISION

7th International Conference on
Agriculture for Food Security & Nutrition
January 17-19, 2025 | OUAT, Bhubaneswar, Odisha, India

Poster

Towards diverse climate-resilient cotton systems using short-duration intercrops in India

Manish Chouhan[1], Sawan Kushwah[2], Dharmendra Pate[l3], Ishwar Patidar[4], Chigusa Keller[2], and Akanksha Singh[2]

[1]bioRe Association, India

[2]Research Institute of Organic Agriculture (FiBL), Switzerland

Abstract:

Cotton is an important cash crop in India, providing income and livelihoods to millions of smallholder farmer households. However, climate change and resulting irregular rainfall patterns have increasingly become a threat to rural cotton farmers and their livelihoods. The delayed onset of the monsoon and erratic rainfall patterns have caused yield losses in the study area in central India's Nimar Valley. Farmers must adapt their practices and develop sustainable strategies to increase their resilience. Short-duration intercrops may be one such strategy, generating additional income within a short cultivation time, and less prone to extreme weather events. A field trial in Nimar Valley tested the effects of intercropping cotton with apple gourd and cucumber on crop yields and system profitability. Conducted over one cotton season (June – November) in 2023, the trial employed a randomized block design with four replications. Data was collected on the yield of cotton and companion crops, input and labor costs, income generated from selling the harvest, and the resulting gross profit. Results from this first season show cotton with apple gourd to be the most profitable combination. In this combination, cotton yield was maintained and while total production costs were significantly increased, apple gourd also provided substantial additional income, resulting in an average gross profit of 227.60 USD ha−1 higher than in cotton monoculture. As a reference, The average monthly income per agricultural household was 100.70 USD in 2019. In contrast, cotton with cucumber was not a suitable combination as it reduced cotton yield, had higher production costs (e.g. costly cucumber seeds) and cucumber had a low market price, leading to an average gross profit of 49.77 USD ha−1 below cotton monoculture. The trial will be continued for another season. In addition, we will investigate the mechanisms that led to differences in cotton yield with the cucumber companion crop. Our study demonstrates the potential of short-duration intercrops to increase the profitability of organic cotton systems while highlighting the delicate interplay of market conditions and biophysical crop interactions affecting the system's profitability.

Keywords: Climate resilience, cotton, India, intercropping, organic agriculture

Biography:

Manish Singh Chouhan, have been working as a scientific researcher for a research organization for more than eight years. His graduation is in Biotechnology. I have a great interest in Agricultural research.

Research Interest: To find out the potential of short-duration intercrops to increase the profitability of organic cotton systems.

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AGRI 2025 VISION

7th International Conference on
Agriculture for Food Security & Nutrition
January 17-19, 2025 | OUAT, Bhubaneswar, Odisha, India

Poster

Physiological evaluation of TNAU cotton cultures for drought stress

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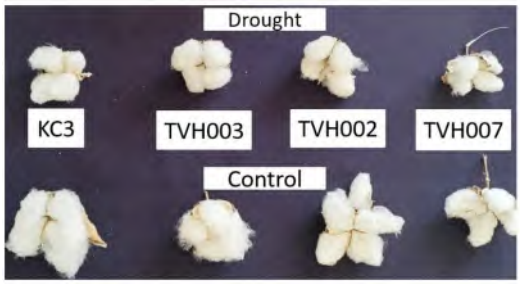
[1]Odisha University of Agriculture and Technology, Bhubaneswar, India

[2]Tamil Nadu Agricultural University , Coimbatore, India

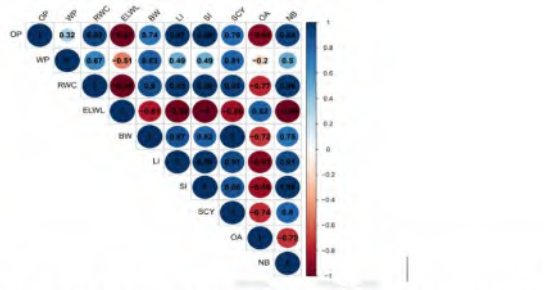
Abstract:

Cotton is an important commercial crop grown in tropical and sub-tropical regions of the world. Due to change in various environmental factors like irregular rainfall, high temperature, soil condition, etc., the growth and development of cotton is affected. Hence, a pot experiment was conducted at the Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore, during 2022-2023 to identify the best performing TNAU cotton cultures under drought stress. The TNAU pre - released cotton cultures viz., TVH002, TVH003, TVH007 and a check variety KC3 were subjected to drought stress. Drought stress was imposed by Dry Down method. Pots were maintained at 45% of pot capacity for 14 days during square formation stage. Physiological traits such as osmotic potential, osmotic adjustment, water potential, relative water content (RWC), excised leaf water loss (ELWL) was recorded before the imposition of stress and at the end of stress period. Plants showed lower values in these physiological parameters under drought condition. However, result recorded for TVH002 were on par with KC3. Drought stress reduced the yield by 22.12% in TVH002 and 20.05% in KC3. Hence the study concludes that, TVH002 showed drought tolerance compared to the other TNAU cotton cultures. Also, it was concluded that RWC and ELWL are the important physiological parameters which can be used to assess the drought tolerance indices in cotton plants.

Keywords: Cotton, Drought tolerance, Physiological traits, Yield



Harvested bolls under stress and control



Correlating the plant water status and yield components with yield under stress in TNAU cotton cultures

Biography:

Soumya is currently pursuing a PhD in the Department of Plant Physiology at Odisha University of Agriculture and Technology (OUAT). Prior to this, I completed my master's degree in Crop Physiology from Tamil Nadu Agricultural University (TNAU), where my research focused on understanding abiotic stress tolerance, specifically drought and heat stress, in cotton plants. Her work contributed valuable insights into the physiological mechanisms of stress adaptation in cotton, culminating in a research paper published as part of my academic endeavors. As a dedicated scholar, She is passionate about exploring plant stress physiology, with a vision to contribute to the development of resilient crop varieties that can withstand the challenges posed by climate change and environmental stresses.

Research Interest: Plant Physiology, molecular studies, sustainable development

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To what extent are consumers in India willing to choose gene-edited food and what factors influence that decision?

Keshika Gajbhiye*, Vinayak Joshi, Brainerd Prince, and Navjot Kaur
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Abstract:

Despite a rich agricultural heritage, India has struggled with devastating famines in the past and ranks 105th on the Global hunger index. In addition to being world's most populous country, India also faces escalating challenges due to resource depletion and climate change. Gene edited (GE) crops with improved crop productivity, nutritional content, or stress resistance are a promising solution. Globally, crops like GE mustard leaves, tomatoes and soybeans are already being consumed in countries like USA, Japan and Brazil. But the success of GE crops hinges on consumer acceptance which eventually determines market viability. The Indian population is unique in this perspective as Indian food choices are strongly connected to religious, cultural, and ethical values. Introduction and implementation of GE crops in India is enmeshed in these values but it has never been evaluated. This study investigates Indian consumers' acceptance of GE crops through a survey assessing their willingness to buy (WTB) GE food and how it is influenced by factors like demographics, knowledge, benefit and risk perception, sources of food information, and dominant food choice drivers. A representative sample of 500 Indian residents (18+) was surveyed through heterogeneous sampling approaches. Statistical analysis will reveal: (i) preferences across demographics, (ii) if knowledge and benefit and risk perception influence WTB, and (iii) reliable primary sources of information consumers rely on. This first-of-its-kind study in India, will shape communication strategies, guide policy development and promote responsible integration of gene editing technologies in Indian agricultural while considering public values and societal needs.

Keywords: Gene-edited crops, Consumer acceptance, Knowledge perception

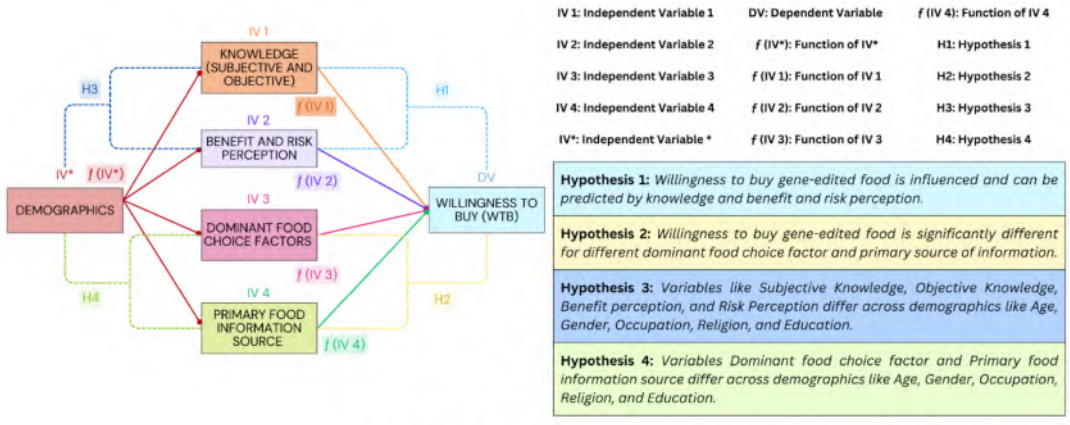

Fig: Study design and Hypotheses

Biography:

Keshika Gajbhiye is a research intern working on a project that examines the stakeholders of gene-edited crops in India. She recently completed her master's degree in Medical Biotechnology from D.Y. Patil International University, Pune. Keshika has gained valuable experience in laboratory work and research through internships at the Bhaktivedanta Research Center and IPCA Laboratories in Mumbai. Her primary interests lie in molecular biology, and she is currently at Plaksha, delving into the world of CRISPR technology and exploring its practical applications in everyday life.

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Evaluation of fruit loading and post-harvest physiology of Bottle Gourd

Nikita Mandala*, Rajkumari Bhol, Swarnalata Das, Simanta Mohanty, and Anita Mohanty
Odisha University of Agriculture and Technology, Bhubaneswar, India

Abstract:

Farmers in the villages harvest the bottle gourd fruits after complete senescence of the plants at once. All the fruits do not reach maturity before senescence, resulting in a mixing of mature and immature fruits after harvest. Postharvest storage of fruits improves maturity from source to sink in cucurbits. To increase the number of matured fruits, fruit loading and post-harvest ripening stages should be recommended to farmers.The present experiment was conducted to evaluate the fruit loading and post harvest physiology of bottle gourd cv. Utkal Sobha during rabi 2021-2022 at AICRP on Vegetable crops, OUAT, Bhubaneswar. The treatments of the trial consisted of two factors viz. (i) fruit load management (1 fruit/vine, 2 fruits/vine, 3 fruits/vine, 4 fruits/vine, control) (ii) 4 post harvest ripening periods (0 day post harvest ripening, 10 days PHR , 20 days PHR and 30 days PHR) and their combinations. The observation of fruit parameters (fruit weight, fruit length and fruit width),biochemical parameters (total soluble solids, total sugar, ascorbic acid, protein content, carbohydrate content) were recorded in the laboratory. There was significant effect of fruit load and post harvest ripening on fruit length (29, 27.60 cm), fruit girth (65.99, 62.61 Cm) fruit weight (1.34, 1.25 kg), Total Soluble Solid (2.68,2.73), Total Sugar (5.91%,6.36%),Ascorbic acid(0.015,0.017),Protein content (37.29%,38.32%),Carbohydrate content(12.82%,13.18%) when four fruit/vine was allowed as compared to other fruit load management repectively. Hence on an average for good fruit quality purpose bottle gourd should be cultivated with four fruits per vine in their respective fields of farmers.

Biography:

Nikita Mandala, Ph.D. Research Scholar of Department of Plant Physiology,OUAT, Bhubaneswar. I belong to Baripada, Mayurbhanj district, Odisha and completed my M.Sc. in Plant Physiology from Department of Plant Physiology,OUAT itself and graduation from Siksha 'O' Anusandhan University,Bhubaneswar. I have the experience of doing research in All India Crop Research Project on Vegetable Crops, OUAT, Bhubaneswar under the guidance of Seed Production Officer and Senior Scientist of AICRP

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Economics evaluation of Marigold (*Tagetes erecta* L.) intercropped with vegetables and essential oil-bearing crops

Sunil kumar*, Nand Ram, Pratik Kumar Shasany, Ashish Singh, Sudheer Kumar Yadav, Manoj Semwal and Rajesh Kumar Verma

CSIR- Central Institute of Medicinal and Aromatic Plant, Lucknow, India

Abstract:

Marigold is important flower crop in flower industry. It is mostly used as loose flower production and garland making. The present research experiment was conducted at experimental farm of CSIR-Central Institute for Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow, India during cropping season 2023-24. The intercropping experiment was included in three treatments combination such as T1 Marigold + Okra, T2 Marigold + Menthol mint and T3 Marigold + Ocimum in Randomized Block Design. The findings of the experiment were revealed that the maximum flower yield recorded in treatment T2 (3628 kg ha-1) followed by T1 (2565 kg ha-1) and T3 (1759 kg ha-1), respectively. There were no significant yields loss observed on intercrops growing with marigold. The highest income of flower was recorded in T2 Rs1,63,260 followed by T1 Rs 1,20,410 and T3 Rs87,950. The income recorded by intercrops were Rs 1,38,425, Rs 1,34,512, Rs 121958, respectively in okra, menthol mint and Ocimum cropping system. The highest net return was found in T2 2,05,218 followed by T1 1,86,335 and T3 1,34,512. The Benefit-Cost ratio was T2 2.57, T1 2.34 and T3 2.16, respectively in (T2 Marigold + Menthol mint), (T1 Marigold + Okra) and (T3 Marigold + Ocimum). Overall, it was observed that cultivation marigold with short duration high value crops would be an innovative farming practices for higher economic output.

Keyword: Marigold, Essential oil, Inter cropping, Economics and Okra

Biography:

Sunil Kumar working as a research scholar at CSIR- Central Institute of Medicinal and Aromatic Plant – Lucknow, Uttar Pradesh, India . Research interests include analysis of, soil samples, plant, samples crop management, maintaining nursery and field experiments, recording and analyzing growth and yield data, and extraction of essentials oils. Besides the field in laboratory works related to plants & soil analysis, also interested in conducting farmer's training & awareness programs.

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Effect of different smoke-water concentrations on germination and seedling parameters of buckwheat genotype PRB1

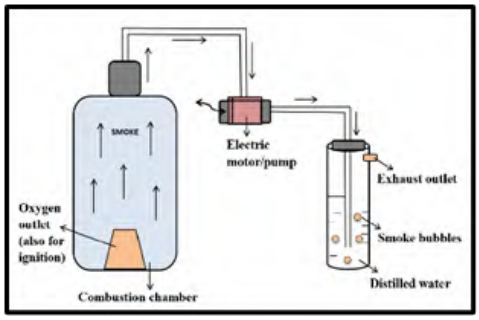
Nidhi Pandey, Sandeep Nalla*, Nitish Kumar Singh, Abhinav Dayal, Prashant Rai, and Vaidurya Pratap Sahi

Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, India

Abstract:

Germination is a critical stage in the plant life cycle, influenced by various external and internal factors. Fire and smoke act as key stimulants for germination in certain species, such *as Leucospermum cordifolium* and *Serruria florida*, which require these conditions to sprout. This phenomenon, known as pyrophytism, has been observed for centuries in ecosystems, particularly after wildfires followed by rain. The use of fire in prescribed burning, common in developing countries for clearing crop residue, has been adapted by researchers to enhance seed germination and conserve rare or threatened species. Studies have explored how seeds respond to smoke and its extracts, often by burning different plant materials and channelling the smoke through water to stimulate germination. Plant-derived smoke contains bioactive compounds that break seed dormancy, improve germination rates, and enhance seed vitality. While the effect is most prominent in fire-prone habitats, species from fire-free regions also respond positively to smoke. The application of smoke-infused water has shown promising results in improving seedling growth and resilience to abiotic stress, contributing to better crop yields. This research examines the impact of smoke water on buckwheat seed genotypes, using various concentrations and burning materials like mango wood, neem wood, and paddy straw. The study focuses on the germination frequency and growth parameters of seedlings in response to different smoke water treatments, aiming to improve seedling quality and boost agricultural productivity. This approach could offer a sustainable solution to declining germination rates and crop failures.

Keywords: Smoke-water, seed germination, enhancing seed vigor, abiotic stress, seedling growth



Biography:

Nidhi Pandey, holding a master's degree in Seed Science and Technology from Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, India. My academic journey has been deeply rooted in plant sciences, with a particular focus on seed physiology and molecular biology, aiming to innovate sustainable solutions for farmers. She published a review paper titled 'Smoke-water treatment of seeds: an ancient technique for increasing seed vigor' in Protoplasma (Springer). Since my school days, I have been fascinated by botany, and during my undergraduate studies in agriculture, I developed a keen interest in genetics and molecular biology. Seeds, as genetic reservoirs and symbols of resilience, have motivated me to explore their development and response to environmental factors.

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Comparative histological and histochemical analysis of meat quality in Hansli and Vencobb broiler chickens

Debasis Mirdha, Ritun Patra, Srinivas Sathapathy, Nripendra Singh, Santwana Palai, and Pravas Ranjan Sahoo

Odisha University of Agriculture and Technology, Bhubaneswar, India

Abstract:

The study aimed to explore the histological and histochemical analysis of meat quality in Hansli (desi bird) and Vencobb broiler chickens. Meat samples from three regions: wing, breast, and leg were collected from six male Hansli birds (18–20 weeks old) and six male Vencobb broilers (6–8 weeks old) procured from the P.G. Department of Poultry Science, C.V.Sc. & A.H., OUAT, Bhubaneswar. Muscle tissues were fixed in 10% buffered neutral formalin, processed for paraffin sections, and stained using Hematoxylin & Eosin, Masson's Trichrome, Verhoeff's Elastic, Gomori's Reticular, Sudan Black, Periodic Acid-Schiff (PAS), Alcian Blue (pH 2.5), and Best Carmine. Histological analysis revealed that Hansli chickens had larger, more organized muscle fibers with narrow interfascicular spaces and minimal fat, indicating an adaptation for endurance. Conversely, Vencobb broilers displayed smaller fibers, thicker perimysium, wider interfascicular spaces, and higher fat deposition, aligning with their rapid growth and body mass accumulation. Histochemical studies showed moderate, uniform glycogen content in Hansli muscles, supporting aerobic metabolism, whereas Vencobb broilers exhibited intense glycogen deposition, reflecting glycolytic metabolism for rapid growth. Hansli birds had weak staining for acidic mucopolysaccharides, indicating collagen-based connective tissue, while Vencobb broilers showed stronger staining, suggesting higher glycosaminoglycan content. Alkaline phosphatase (ALP) activity in Hansli chickens was localized in the epimysium and perimysium, supporting extracellular matrix maintenance for endurance. In Vencobb broilers, stronger ALP activity within muscle fibers and connective tissue indicated its role in hypertrophy and rapid growth. Acid phosphatase (ACP) activity in Hansli chickens supported muscle maintenance and autophagy, while in Vencobb broilers, it reflected higher tissue turnover and repair associated with fast growth. The findings indicate that the meat of Hansli is more tender, of good quality with less fat than Vencobb broiler birds.

Keywords: Hansli, Vencobb broiler, Meat, Epimysium, Mucopolysaccharides

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Pod borer severity in green gram & their management by newer insecticides – A newer approach for sustainable agriculture

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Abstract:

In Mung bean, On an average 2-2.4 million tonnes of pulses with a monetary value of nearly Rs.6,000 crores are lost annually due to ravages of insect pest complex. Avoidable yield loss caused by pod borer complex in mungbean was estimated to 36.41 per cent with grain yield of 513.67kg/ha (Anonymous, 2015-16). *Maruca vitrata* (Geyer) and *Helicoverpa armigera* (Hubner) are most important among the pod borers causing serious damage to grain legumes in the tropics. Hence, the present investigation was conducted to compare efficacy of different newer insecticides against pod borers both in terms of reduction in larval population and also percent pod damage besides yield advantage over control. A Field experiment was conducted in randomized block design to study the effect of different newer insecticides with novel mode of action against pod borers in green gram variety "IPM 02-14" during kharif, 2023. The experiment includes 09 treatments viz., T1- Chlorantraniliprole 18.5 SC @ 20 g ai/ha, T2- Flubendiamide 20 WG @ 60g ai/ha, T3- Flubendiamide 480 SC @48g ai/ha , T4- Lufenuron 5.4 EC @ 30g ai/ha, T5- Thiodicarb 75 WP @ 468 g ai/ha,T6- Indoxacarb 14.5 SC @ 73 g ai/ha, T7- Pyridalyl 10 EC @ 75 g ai/ha, T8- Novaluron 10 EC @ 33.5 g a.i./ha were evaluated and compared with an untreated check for their efficacy against pod borers. One spraying was made throughout the season at 50% flowering stage. The data on number of larvae/plant at 1DBS(days before spraying), 3 DAA(days after application), 7 DAA with respect to imposition of various insecticides and percent pod damage was recorded from ten randomly selected plants from each plot. The data on insect population, % pod damage and grain yield etc. were subjected to suitable analysis as suggested by Gomez and Gomez, 1984.Amongst the newer molecules studied in the field experiment during kharif 2023, foliar spray of Chlorantraniliprole 18.5 SC @ 20 g ai/ha was found most promising with lowest record of number of larva/plant during 03&07 DAA with a range of (0.93-1.47 nos) which was closely followed by foliar spray of Flubendiamide 20 WG @ 60g ai/ha with a record of (1.87-2.13 nos of larva/plant) as against 5.67-6.0 nos /plant in untreated check . Lowest percent pod damage (6.06%) and highest seed yield (10.23q/ha) was observed in case of Chlorantraniliprole 18.5 SC treated plots as against 5.00q/ha in untreated control. In view of incremental cost benefit ratio (ICBR), also Chlorantraniliprole 18.5 SC @ 20 g ai/ha was emerged as the most economic treatment recording the highest ICBR of 5.43. So, From the point of field efficacy and ICBR, Overall performance showed the superiority of Chlorantraniliprole 18.5 SC @ 20g ai/ha against pod borers which can well be recommended for integration into the IPM in green gram.

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Patho-epidemiological studies of urinary tract infections in dogs

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Abstract:

An attempt was undertaken to screen the dogs for suspected urinary tract infections (UTI) based on clinical signs, haemato-biochemical changes, abdominal imaging, and urinalysis. The results showed an overall prevalence of 13.93%, with comparatively higher incidences among Labrador breeds (35%), those older than five years (50%) and females (65%). Affected dogs' hematological changes showed higher leucocyte counts and decreased hemoglobin. Serum biochemistry of affected dogs revealed increased blood urea nitrogen, urea, and creatinine with decreased concentrations of total protein and albumin. In addition to uroepithelial cells, red blood cells, and white blood cells, urinalysis showed positive results for crystals such as triple phosphates, calcium oxalates, and hippuric acid. E. Coli (42.8%), Staphylococcus aureus (28.5%), *Enterococcous faecalis* (14.2%), *Atlantibacter hermanii* (7.14%), and *Klebsiella pneumoniae* (7.14%) were all found during the microbiological examination. Several isolates of bacteria, including *Atlantibacter hermanii, Enterococcus faecalis, and Klebsiela pneumoniae*, were submitted to the NCBI database with accession codes PQ269131, PQ269149, and PQ269167, respectively. ABST was most sensitive to amoxicillin-clavulanic acid and gentamycin. While X-ray assessment revealed many calculi in the bladder, ultrasound imaging revealed fluid columns in the renal pelvis with numerous hyperechoic sediments in the bladder.

Keywords: Dogs, Imaging, Infection, X-ray, Urine

Biography:

Santoshi Priyadarshini Nishank, pursuing her MSc. In microbiology. I've hands-on experience in microbiological, molecular biology and serological works.

Research Interest: Pathology, Microbiology, PCR

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Effect of tillage and weed management on weed dynamics and productivity of blackgram in east and south eastern coastal plain zone of Odisha

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Abstract:

An experiment was conducted at the Agronomy Main Research Farm, College of Agriculture, Odisha University of Agriculture & Technology, Bhubaneswar during the summer of 2023 to study the effects of tillage and weed management on weed dynamics and productivity in blackgram. The experiment followed a split-plot design, with four main plot treatments and three sub-plot treatments, each replicated three times. The main plot treatments consisted of four different tillage methods: conventional tillage (CT), conventional tillage with residue mulching at 5 t/ha (CT+R), zero tillage (ZT) and zero tillage with residue mulching at 5 t/ha (ZT+R). The sub-plots featured three weed management practices: W1 (Pendimethalin + imazethapyr 1.0 kg/ha at 2 DAS), W2 (Pendimethalin + imazethapyr 1.0 kg/ha at 2 DAS followed by one hand weeding at 30 DAS) and W3 (weedy check). Among the main plot treatments, conventional tillage with residue mulching at 5 t/ha significantly reduced weed density and weed dry weight compared to other tillage methods. Similarly, in the sub-plot treatments, the application of Pendimethalin + imazethapyr 1.0 kg/ha at 2 DAS followed by one hand weeding at 30 DAS was the most effective in controlling weed density and weed biomass compared to other weed management practices. In conclusion, the study indicated that, conventional tillage with residue mulching at 5 t/ha followed by pre-emergence application of Pendimethalin + imazethapyr 1.0 kg/ha at 2 DAS followed by one hand weeding at 30 DAS provided optimal weed control and enhanced productivity of blackgram in the east and south eastern coastal plain zone of Odisha.

Keywords: Blackgram, Weed management, Tillage, Mulching

Biography:

Subhashree Samantaray is currently working as a Ph.D. research scholar under the supervision of Dr. G.C. Mallik (Professor & Head, Department of Agronomy) at Palli Siksha Bhavana (Institute of Agriculture), Visva-Bharati, Sriniketan, West Bengal. She previously served as an Assistant Professor in the Department of Agronomy at MITS Institute of Professional Studies, Rayagada. She completed her M.Sc. (Agriculture) in Agronomy and B.Sc. (Hons) in Agriculture from Siksha 'O' Anusandhan University, Odisha. The presented work is a part of her doctoral research, which focuses on crop production, weed management, and sustainable agriculture. Her future research interests include developing innovative strategies to enhance agricultural sustainability and productivity.

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Description of phenological growth stages of taro (*Colocasia esculenta var. antiquo*rum) according to the extended BBCH Scale

Vijay Bahadur Singh Chauhan*, Samarendra Narayan Mallick, Pinki Mohapatra, Hanume Gowda, Kalidas Pati, R. Arutselvan and M. Nedunchezhiyan

Regional Station, ICAR–Central Tuber Crops Research Institute, Bhubaneswar, India

Abstract:

Taro [*Colocasia esculenta* (L.) Schott var. *antiquorum*] is an important tuber crop widely cultivated in tropical and sub- tropical regions, for its corms, leaves and petioles. Millions of people living in developing countries in Asia, Africa and Central America, utilize taro as a staple or subsistence food and it plays a very crucial role there for food security, nutritional security, livelihood improvement and employment generation. It exhibits a capacious range of diversity worldwide regarding plant characteristics. However, its phenology has not yet been described systematically. The present study defines codes and phenological growth stages of taro according to the extended BBCH (Biologische Bundesanstalt, Bundessortenamnt and Chemische Industrie) scale using a three-digit numerical coding system for its description. A total of 9 principal growth stages were described such as germination (0), leaf development (1), side shoot development and elongation of side shoot (2) elongation of shoot/stem elongation (3), tuber formation (4), development of inflorescence/spadix (5), flowering (6), development of berries/fruiting (7), ripening of berries and seed development (8) and senescence and beginning of dormancy (9) and further, each of the principle development stages has been partitioned into optional developmental growth stages. Under remarkable circumstances, it is valuable to use mesostages with three-digit codes for description. The study of extended BBCH scale for taro has immense importance in crop management, crop improvement, germplasm characterization and assessment of impact of the climate on phenology under different agro climatic conditions for the selection of suitable genotypes.

Keywords: BBCH scale, Crop management, Phenology, *Colocasia esculenta* (L.) Schott, Taro.

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Description of phenological growth stages of taro (*Colocasia esculenta var. antiquo*rum) according to the extended BBCH Scale

Vijay Bahadur Singh Chauhan*, Samarendra Narayan Mallick, Pinki Mohapatra, Hanume Gowda, Kalidas Pati, R. Arutselvan and M. Nedunchezhiyan
Regional Station, ICAR–Central Tuber Crops Research Institute, Bhubaneswar, India

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Keywords: BBCH scale, Crop management, Phenology, *Colocasia esculenta* (L.) Schott, Taro.

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Poster

Effect of lime and bioferilisers on growth, yield and economics in Groundnut (*Arachis hypogaea* L)

Tiryak Kumar Samant* and Debasis Mishra
Krishi Vigyan Kendra (OUAT), Angul, India

Abstract:

Groundnut (*Arachis hypo*gaea L.) is considered as a unique and important legume oil seed crop grown over an area of 28.5 mha with a total production of 46 mt in the whole world. In India groundnut is grown over an area of 4.9 mha with total production of 6.73 mt. Combined use of lime and biofrtilisers, organic and inorganic source of nutrients is a better option to alleviate the nutrient deficiency in groundnut. On farm testing was conducted in farmer's field at Khairabareni and Machhakuta village of Chhendipada block in Angul district of Odisha during rabi seasons of 2021-22 and 2022-23 to study the effect of lime and biofertlisers on growth, yield and economics in groundnut comprising three treatments viz. application of 40:28:15 N-P2O5-K2O/ha (farmer's practice), 100% soil test based fertilizer (STBFR) 25:40:40 kg N: P2O5: K2O/ha, STBFR+ lime 0.2 LR+ seed inoculation with biofertilisers (Rhiozobium and PSB @20 g/kg of seed each) laid out in randomized block design with ten replications. The trial revealed that STBFR+ lime 0.2 LR+ seed inoculation with biofertilisers (Rhiozobium and PSB @20 g/kg of seed each) recorded significantly higher pods/plant (20.6), pod weight/plant (18.3 g), nodules/plant (84.9) resulting maximum pod yield (21.6 q/ha) which was 3.8% and 16.8% higher yield, respectively, over farmer's practice and 100% STBFR. This might be owing to increased solubility and availability of N in the rhizosphere due to biofertilisers, improvement of soil pH due to lime and instant availability of nutrients from inorganic fertilisers. The same treatment fetched higher net return (Rs.47527.5/ha) and B:C ratio(1.63) and found suitable for higher growth, productivity, profitability of groundnut in the existing farming situation.

Table 1. Effect of lime and bioferilisers on growth, yield and economics in groundnut (Pooled data over two years)

Treatment	Pods/ plant	Pod weight (g/plant)	Nodules/ plant	Pod yield (q/ha)	Net returns (Rs./ha)	Benefit: cost Ratio
40:28:15 N-P_2O_5-K_2O/ha (farmer's practice)	16.6	14.3	69.9	18.5	36402.5	1.53
100% STBFR (25:40:40 N-P_2O_5-K_2O/ha)	19.3	17.6	72.4	20.8	44704.5	1.61
100% STBFR (25:40:40 kg N: P_2O_5: K_2O/ha, STBFR+ lime 0.2 LR+ seed inoculation with biofertilisers (*Rhiozobium* and *PSB* @20 g/kg of seed each)	20.6	18.3	84.9	21.6	47527.5	1.63
SEm±	0.309	0.787	1.915	0.121	-	-
CD (P= 0.05)	0.92	2.34	5.69	0.36	-	-

Biography:

Dr. Tiryak Kumar Samant, a native of Angul district of Odisha acquired Ph.D. degree in Agronomy from Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha. He is working as Scientist (Agronomy) in Krishi Vigyan Kendra (OUAT), Angul. He has 18 years of experience in extension education system and he has published 60 research articles in reputed scientific national and international journals and also written 70 numbers of different abstracts in seminar/symposium, popular articles and book chapters/bulletins. He had attended more than 30 national and international seminars, workshop and symposiums. He has imparted training to farmers and the officials of the line departments organized by the Govt. agencies, public sectors and NGOs

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Effect of Integrated Nutrient Management on Growth, Yield Attributes, Yield and Economics of Groundnut (*Arachis hypogaea* L.) Grown under North Eastern Ghat Zone of Odisha

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[3]Odisha University of Agriculture and Technology, Bhubaneswar, India

Abstract:

The experiment was conducted during kharif 2022 at farmer's field in Kandhamal district of Odisha under Krishi Vigyan Kendra, Kandhamal, OUAT, Bhubaneswar, Odisha, India to study the effect of integrated nutrient management on growth, yield attributes, yield and economics of groundnut (*Arachis hypogaea* L.). The experiment was laid out in Randomized Block Design (RBD) consisted of four treatments with seven replications. The treatments comprised of T_1: Farmer's practice (FYM @ 1.5 t ha^{-1} and fertilizer @ 22-23-18 Kg N-$P_2O_5K_2O$ ha^{-1}), T_2: 100% RDF @ 20:40:40 Kg N-P_2O_5-K_2O ha^{-1}+ FYM @ 7 t ha^{-1}+ borax @ 15 kg ha^{-1}, T_3: Soil test based NPK+FYM @ 2 t ha^{-1} + lime @ 0.2 LR + seed inoculation with *Rhizobium* @ 20 g kg^{-1} seed and T_4: Soil test based NPK+FYM @ 2 t ha^{-1}+ lime @ 0.2 LR + sulphur @ 40 kg ha^{-1}. From the experiment it was found that integrated application of chemical fertilizers as per soil test results, organic manures (FYM @ 2 t ha^{-1}), lime @ 0.2 LR and secondary nutrient (sulphur) was the best option for achieving better yield. The highest plant height (52.1 cm), number of nodules plant^{-1} (38.3), number of pods per plant (15.3), 100 kernel weight (37.9 g), shelling per cent (69.8 %), pod yield (15.2 qha^{-1}), haulm yield (20.3 qha^{-1}), net return (₹47,200 ha^{-1}) and B C ratio (1:2.3) were recorded with the treatment T_4 followed by and T_3. Whereas, the lowest values of plant height (44.6 cm), number of nodules plant^{-1} (32.9), number of pods per plant (11.2), 100 kernel weight (31.2 g), shelling per cent (60.2 %), pod yield (11.6 qha^{-1}), haulm yield (16.7 qha^{-1}), net return (₹29,900 ha^{-1}) and B C ratio (1:1.9) were recorded with the treatment T_1.

Keywords: growth parameters, yield, sulphur, net return

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Lotus seeds : Miraculous power house of nutrients

Shresthaa Jagadev* and Sashikala Beura
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Abstract:

Sacred lotus (*Nelumbo nucifera* Gaertn.) belonging to family Nelumbonaceae is a superb flowering aquatic plant and regarded as National flower of India and Vietnam. Lotus flowers are used both as cut-flowers and loose-flowers and for enhancing beauty of landscape gardens, while its rhizomes, stems and seed are edible and used as food for about in Asian countries. The lotus seeds are considered to be the power house of nutrients as the seeds contain protein, crude fat, carbohydrates, crude fibre, ash, energy and elements like sodium, potassium, calcium, magnesium, copper, zinc, manganese and iron in various concentrations. The seeds also contain vitamins A, B, D, E, folate, niacin, thiamine and pantothenic acid etc. and various amino acids like alanine, arginine, aspartic acid, cystine, glutamic acid, glycine, histidine, isoleusine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosin and valine. Due to their high nutritional values, the seeds are processed into moon cake, noodles, fermented milk, lotus seed tea, wine, ice cream, pop corns, breads, pastries and different kinds of desserts. The roasted seeds are used as great substitute of coffee. Hence, lotus seeds are not only poer house of nutrients, but also have antioxidant properties in preventing many diseases as they have immunomodulatory, anti-viral, anti-obesity, anti-perkinsonian and hepatoprotective acivities etc.

Keywords: Lotus, Nelumbo nucifera, seed, nutrients.

Biography:

Shresthaa Jagadev completed her graduation degree in Agriculture from the Odisha University of Agriculture and Technology (OUAT), Bhubaneswar in 2024 and currently pursuing her post-graduation studies in Floriculture and Landscaping at OUAT, Bhubaneswar. She was a University merit scholarship holder throughout her graduation years. She was conferred with a number of awards like the Best U.G. Student Award by the Society for Ecological Sustainability and the Best Student Coordinator Award by the Orissa Horticultural Society. She has also published a number of scientific popular articles in various journals and magazines.

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Impact of Drone-based Nano DAP application for increasing Greengram Yield

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[1]Krishi Vigyan Kendra (OUAT), Jagatsinghpur, India

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Abstract:

A field demonstration under the NICRA-TDC project by Krishi Vigyan Kendra, Jagatsinghpur, was conducted at Achyutdaspur Village of Erasama Block, Jagatsinghpur, to evaluate the impact of drone-based nano DAP application in greengram cultivation. In this trial, 250 ml per acre of nano DAP was applied at the pre-flowering stage using a spray drone, resulting in a 23% yield increase compared to traditional practices. The treated plot recorded a yield of 5.2 q/ha, while the conventional method yielded 4.3 q/ha. Although the additional cost for drone hiring and nano DAP was Rs. 800 per acre, the intervention generated an additional income of Rs. 7,500 per acre, highlighting its cost-effectiveness. This significant improvement in yield and profitability demonstrates the transformative potential of drone technology in precision agriculture by ensuring uniform fertilizer application, reducing labor dependency, and optimizing resource use. The success of this demonstration encourages wider adoption of drone-based nutrient management practices in greengram cultivation, promoting sustainable and climate-resilient farming systems.

Keywords: Drone, Nano DAP, Greengram, Yield, Precision agriculture

Biography:

Dr. Dwarika Mohan Das is a Scientist (Agricultural Engineering) at Krishi Vigyan Kendra, Jagatsinghpur. He completed his B.Tech in Agricultural Engineering from the College of Agricultural Engineering and Technology (CAET), OUAT, Bhubaneswar, followed by an M.Tech in Land and Water Resources Engineering from IIT Kharagpur, and a Ph.D. in Soil and Water Conservation Engineering from OUAT, Bhubaneswar. With nine years of experience in the OUAT system, his research interests include hydrological modeling, remote sensing and GIS, and agricultural water management. Dr. Das has significantly contributed as Co-Principal Investigator in several major projects, including the NICRA-TDC Project, REWARD-Hydrology Project, and YES-Tech Projects of OUAT Bhubaneswar.

Research Interest: Precision agriculture, Hydrological Modelling, Remote Sensing and GIS, Water management

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Combating the climatic hazards and nourishing the future population through Millets

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Abstract:

India is vulnerable to climate change and its CRI (Climate Risk Index 2018) ranks 5th. Mainly natural calamities like cyclones, floods and droughts adversely affected Indian agriculture. Millet is a drought-tolerant, climate-resilient crop with profound nutritional benefits. It's rich in iron, zinc and other essential nutrients, making it a promising food against malnutrition and diet-related diseases. Millets possess the huge potential to address global food and nutritional security and meet environmental challenges. Cultivating millets as replacements for water-intensive crops offers a solution to mitigate strain on water reserves and reduce depletion. Finger millet(ragi) is a favourite among fitness experts who choose healthier alternatives to traditional grains like rice or wheat. Not only is it rich in calcium, but it also has a healthy amount of iron and other essential minerals. Over the years, the area production of millets has significantly increased to 15.48 million hectares where the crop yield is 17.2 million tons. This review examines their phenology, stress responses, carbon footprint, biofortification, and diverse culinary applications. Millets adapt well to adverse climatic conditions, thriving in marginal lands with limited inputs. Their efficient root systems contribute to drought tolerance and efficient water use. Millets utilize complex biochemical and molecular mechanisms with antioxidant defence systems and regulating gene expression to enhance resilience to biotic and abiotic stresses. Nutritionally, millets are powerhouses or superfoods rich in essential minerals and packed with dietary fibre and protein. Finger millet contains 344 mg/100 g calcium. The integration of millets into sustainable food systems and climate-smart agriculture is crucial for enhancing food security and environmental sustainability. As millets become more widely recognized and adopted, they have the potential to reduce dependency on other crops and contribute to a more sustainable and climate-resilient food system. Climate change poses significant challenges to global food security, but millets are part of a sustainable and resilient solution.

Keywords: Climate change, climate-smart agriculture, nutritional security and millets

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Climate smart agriculture for environmental sustainability

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Abstract:

The goal of climate smart agriculture (CSA) is to reduce greenhouse gas emissions, adapt to climate change, and increase agricultural productivity and incomes. One of the most important tenets of 21st-century global environmental policy and decision-making is sustainability. Forecasting and implementing better farming practices to increase agricultural output may be aided by an analysis of how global climate change affects sustainable green growth. A variety of tactics can be employed to meet the objectives of climate-smart agriculture. Energy-smart food systems depend on integrated renewable energy farming technology including solar panels, windmills, pyrolysis units, and bio-energy-operated water pumps. Resource-conserving technologies (RCTs), including zero tillage, allow farmers to plant wheat soon after rice or cotton harvest, avoiding warm weather that is harmful to grain. The introduction of newly evolved cultivars that are abiotic stress (heat, drought and salinity etc.) resistant is also a superior CSA technique. Finding locations and crops that are particularly susceptible to climate change is essential in order to move them to more suitable locations. Early warning systems and weather forecasting will be crucial in reducing the likelihood of climate disasters. The degree of impact on crop growth cycle and biomass accumulation depends on nutrient content and the length of environmental constraints. cycle of growth and buildup of biomass. After 2050, crop yields in Asia are predicted to drop by 5–30%, with South and Central Asia experiencing the worst decline. In addition to developing climate-smart agriculture and mitigation techniques, computer-aided crop simulation models can assist in estimating the possible influence of climatic variability on future crop yields. Climate and agriculture are closely interrelated universal phenomena; therefore fluctuations in climate alter agricultural operation (IPCC, 2017).

Key words: Climate smart agriculture, Resource-conserving technologies, Sustainability

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Reinvigorating Sustainable Livelihoods for Inclusive Rural Development in India: Bridging Knowledge and Environmental Dynamics

Bishnupriya Mishra and Kiran Sourav Das
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Abstract:

India's rural development landscape grapples with multifaceted challenges in fostering sustainable livelihoods amid socio-economic disparities, environmental vulnerabilities, and political complexities. With the growing need for reforming livelihood of rural communities, the current scenario demands for adaptation of integrated, people-centric development frameworks. The Sustainable Livelihoods Approach (SLA), emphasizing assets, capabilities, and activities, provides a comprehensive understanding of rural India's socio-economic fabric. However, its practical application must effectively address structural inequalities, environmental uncertainties, and governance constraints. Prior research highlights critical challenges such as bridging micro-level realities with macroeconomic policies, integrating political economy analysis to address power imbalances and developing adaptive strategies to mitigate environmental stressors like climate change. Diversification of livelihood strategies has been proven effective in enhancing rural resilience, while inclusive governance and participatory development are essential for empowering marginalized groups, including tribal populations. Strengthening institutional mechanisms and leveraging local knowledge systems are pivotal for transformative rural development. Fostering better adaptation of a revitalized Sustainable Livelihood Approach shall help in holistically addressing India's rural complexities through participatory governance, adaptive strategies, and inclusive policy frameworks; thereby ensuring sustainable and equitable growth.

Keywords: Livelihood, Sustainability, Rural development, Agriculture, Policy

Biography:

Kiran Sourav Das is currently a Ph.D Scholar (Agriculture) in Agricultural Extension Education in the Department of Extension Education, College of Agriculture, Odisha University of Agriculture and Technology, Bhubaneswar. He has qualified ASRB-NET (Agricultural Extension) and UGC-NET (Adult Education) in 2023. He completed his M.Sc.(Ag.) Extension Education in 2023 and B.Sc.(Hons.) Agriculture in 2021 from OUAT, Bhubaneswar. He has completed courses in Marketing Analytics, Social Psychology, Philosophy, and Epidemiology from the University of Virginia, Wesleyan University, the University of Edinburgh and the University of North Carolina, respectively. He has also interned as a Field Research Fellow at the International Institute of SDGs and Public Policy Research, New Delhi. He has research interests in qualitative research, livelihood research, policy research, and climate research. So far, he has published 2 popular articles, 11 book chapters and 3 research papers in NAAS rated international journals.

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Shaping the future of farming: Next-Gen tools, products, and smart systems

J.Anshuman, Bishnupriya Mishra, and Bhagyalaxmi Satapathy
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Abstract:

Agriculture must transform to address the challenges of feeding a global population projected to reach 9.7 billion by 2050 while adapting to climate change, resource scarcity, and environmental degradation. Recent advancements in next-generation agricultural systems, as documented in leading research, highlight the potential of integrated data, models, and information technologies to enhance productivity, sustainability, and resilience. Key insights from these studies reveal that precision agriculture, when combined with big data and advanced modeling techniques, can increase yields by up to 30% while reducing water and fertilizer use by 20-40%. Furthermore, vertical farming and hydroponics systems demonstrate 95% water savings and up to 390 times higher productivity per acre compared to traditional methods. Information and communication technologies (ICT), such as high-performance computing and IoT-enabled systems, enable real-time analysis of soil, weather, and crop conditions, with applications projected to grow at a CAGR of 12% by 2030.However, significant challenges remain, including fragmented data systems, limited interoperability of models, and inadequate decision-support frameworks for end-users such as smallholder farmers and policymakers. The studies advocate for modular, granular, and open agricultural models that incorporate multi-disciplinary inputs.

Keywords: Bid data, ICT, Resilience, Sustainability, Technology

Biography:

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Cutting edge technologies on biological Nitrogen fixation in Legumes

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Abstract:

Biological nitrogen fixation (BNF) is a crucial process that sustains soil fertility by converting atmospheric nitrogen into a form usable by plants. This process is particularly significant in legumes, which host symbiotic nitrogen-fixing bacteria (e.g., Rhizobium spp.) in their root nodules. BNF in legumes can contribute significantly to reducing the need for synthetic nitrogen fertilizers, promoting sustainable agricultural practices, and mitigating environmental pollution. Recent advances in cutting-edge technologies have the potential to enhance BNF efficiency, optimize legume growth, and provide novel strategies to address global food security challenges. Recent breakthroughs in molecular biology, genomics, and bioengineering are redefining our understanding of the mechanisms that underpin BNF in legumes. The use of high-throughput sequencing and comparative genomics has enabled the identification of key genes and regulatory networks involved in symbiosis between legumes and nitrogen-fixing bacteria. Through the study of these molecular interactions, researchers are now able to engineer legume varieties with enhanced nitrogen fixation capabilities, potentially reducing the dependency on external nitrogen inputs.

Metagenomics and transcriptomics have provided insights into the microbiomes associated with legume root systems, revealing that the diversity and composition of soil micro-biota can significantly influence BNF efficiency. Advances in synthetic biology are also playing a crucial role in manipulating bacterial symbionts, optimizing nitrogen fixation processes, and improving the resilience of legume plants to environmental stressors. Moreover, gene-editing tools like CRISPR/Cas9 are being applied to modify both plant and bacterial genomes to foster more efficient and sustainable nitrogen fixation. In addition to genetic modifications, innovations in nanotechnology and microbial inoculants are enhancing the delivery of nitrogen-fixing bacteria and other growth-promoting microorganisms to legume crops, leading to improved BNF rates. Furthermore, precision agriculture technologies, such as remote sensing and data analytics, are enabling more targeted application of BNF-promoting inputs, thus maximizing the benefits of biological nitrogen fixation in legume crops. Despite the promising advancements, challenges remain in translating these technologies into scalable, field-level applications. Ongoing research must address the complexities of plant-microbe interactions, environmental variability, and economic considerations. However, the integration of cutting-edge technologies in biological nitrogen fixation holds great potential to revolutionize sustainable agriculture and contribute to long-term food security.

Keywords: Biological nitrogen fixation, legumes, genomics, CRISPR/Cas9, synthetic biology.

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Viral-Induced Genome Editing (VIGE): A revolutionary approach to mitigate enzymatic browning in Potatoes

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Abstract:

Enzymatic browning in potatoes, primarily caused by polyphenol oxidases (PPO), is a significant post-harvest challenge, leading to reduced marketability, nutritional loss and diminished consumer acceptance. The browning process occurs when PPO enzymes catalyze the oxidation of phenolic compounds to quinones, which then polymerize to form brown pigments. Traditional methods to mitigate browning, such as physical treatments and chemical inhibitors, have shown limited success and are often not sustainable or effective for long-term storage. Recent advancements in genome editing techniques, particularly the use of viral-induced genome editing (VIGE), offer a promising strategy for targeted genetic modifications to control enzymatic browning in potatoes. Viral-induced genome editing utilizes plant virus vectors, such as Potato virus X (PVX), to deliver genome-editing tools, like CRISPR/Cas9, into plant cells without the need for traditional transformation methods. This approach provides a rapid, efficient, and cost-effective way to modify genes associated with undesirable traits, including those responsible for enzymatic browning in potatoes. This study investigates the potential of VIGE to reduce the expression of PPO genes in potatoes, thereby limiting enzymatic browning during storage and processing.

The application of CRISPR/Cas9, delivered via PVX vectors, enables precise gene knock-out or knock-down of specific PPO isoforms in potato cultivars susceptible to browning. By targeting key genes in the polyphenol oxidase pathway, VIGE can facilitate the development of potato varieties with significantly lower browning propensity. Initial experiments demonstrate that CRISPR/Cas9-induced mutations in PPO genes result in reduced PPO enzyme activity, leading to a noticeable decrease in browning under conditions commonly encountered during post-harvest handling. This approach presents several advantages over conventional breeding techniques, including speed, efficiency, and the ability to introduce specific genetic modifications without the risk of transgene persistence. Additionally, the use of viral vectors allows for transient expression, minimizing regulatory hurdles often associated with genetically modified organisms (GMOs). In conclusion, viral-induced genome editing represents a promising tool for addressing enzymatic browning in potatoes, offering a sustainable and innovative solution for improving post-harvest quality. Future research should focus on optimizing VIGE protocols, evaluating long-term stability, and scaling up for commercial applications to benefit the potato industry and consumers worldwide.

Keywords: Viral-induced genome editing (VIGE), enzymatic browning, potato, polyphenol oxidase, CRISPR/Cas9.

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Exploring farmers' awareness and perceptions of drone technology in agriculture in India: A comprehensive review of opportunities, challenges, and implementation strategies

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Abstract:

Agricultural drones have emerged as a transformative technology in precision farming, offering solutions to challenges such as labor shortages, high input costs, and inefficiencies in monitoring crop health. This review paper investigates farmers' awareness and perceptions of drone technology in Indian agriculture, synthesizing insights from recent studies. A survey in Kerala's Alappuzha district revealed that while 70.83 per cent of farmers were aware of drones, only 22.5 pr cent had adopted them, citing high costs, lack of technical knowledge, and limited access as primary barriers. A similar study on technological adoption highlights the role of education and farm size in influencing uptake, with better-educated farmers and larger landowners being more likely to adopt. Policy initiatives such as subsidies, training programs, and collaborative models between government and private players can bridge this adoption gap. This paper emphasizes the need for a strategic framework to integrate drone technology into Indian agriculture effectively, enhancing productivity and sustainability.

Keywords: Agricultural Drones, Farmers' Awareness, Technology Adoption, Precision Farming, Indian Agriculture

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Poster

Studies on growth pattern and fruit body characteristics of Pleurotus spp.in east and south eastern coastal plains of Odisha

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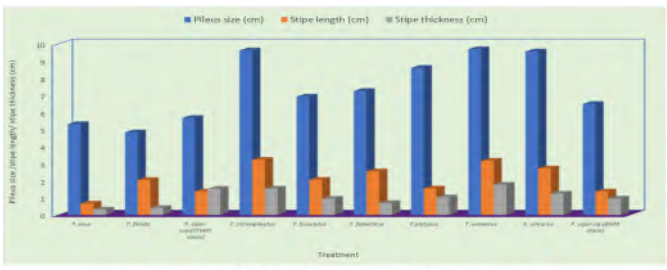
Abstract:

Among all the cultivated mushrooms, *Pleurotus* has maximum number of commercially cultivated species suitable for round the year cultivation. Species of *Pleurotus* exhibit much diversity in their adaptability to varying agro-climatic conditions and this flexible nature provide much more cultivated species in this genus. Variation among the species exists in form of shape, colour, texture and aroma. Ten test species were grown aseptically in the petriplates containing potato dextrose agar medium for observation of the growth pattern of the individual species. The analyzed data on the pileus size, stipe length, stipe thickness alongwith few morphological characters were taken.

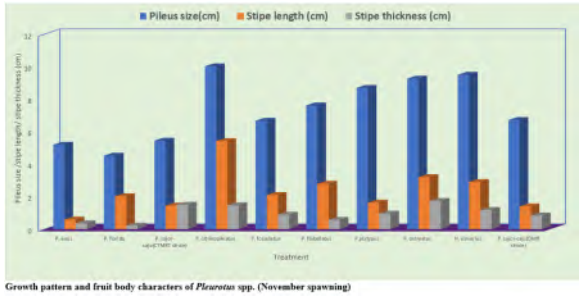
The observation on morphological characteristics of the ten test species raised in the month of September indicated that the mycelium of the *P. sajor-caju* (both the local and the DMR strain) was compact on PDA medium, whereas *P. eous* exhibited fluffy growth. The pattern of mycelial growth in *Hypsizygous ulmarius* was cottony and sparse in others. Likewise, differently coloured fruit bodies were observed among the species. However, majority of the species were having light coloured and/or white sporocarps. The pileus diameter and the stipe length varied between 4.52-10.02 and 0.59 – 5.42 cm respectively among the species. Majority of the species showed entire margin as against dentate and wavy margins shown by *P. sajor-caju* (both strains) and *P. eous* respectively . Similar results were experienced among the test species raised in the month of January in terms of growth pattern on PDA, colony colour and margin of fruit bodies. However, there was little variation in pileus diameter (4.83-9.69 cm) and stipe length (0.67-3.23 cm) among the species. *P. citrinopileatus* produced comparatively larger sporocarps. However, *P. florida* was having sporocarps of smaller size. Stipe in *P. eous* was observed rudimentary whereas in *P. citrinopileatus*, stipe was found longer. Stipe thickness was found to be minimum (0.32 cm) in *P. eous* and maximum in *P. ostreatus* (1.77 cm). This showed that the *Pleurotus* species raised during the winter months were almost alike morphologically .

Table-1 Growth pattern and fruit body characters of *Pleurotus* spp. (November spawning)

Sl. No.	Treatment	Growth pattern on PDAS	Characteristics of fruit bodies on paddy straw substrate				
			Colour	Pileus size(cm)	Stipe length (cm)	Stipe thickness (cm)	Margin of fruit body
1	*P. eous*	Fluffy	Pink	5.19	0.59	0.36	Wavy
2	*P. florida*	Sparse	White	4.52	2.02	0.22	Entire
3	*P. sajor-caju* (CTMRT strain)	Compact	Grey	5.44	1.45	1.50	Dentate
4	*P. citrinopileatus*	Sparse	White	10.02	5.42	1.47	Entire
5	*P. fossulatus*	Sparse	White	6.67	2.10	0.89	Entire
6	*P. flabellatus*	Sparse	White	7.61	2.79	0.57	Entire
7	*P.platypus*	Sparse	White	8.69	1.63	0.95	Entire
8	*P. ostreatus*	Sparse	Deep grey	9.26	3.20	1.73	Entire
9	*H. ulmarius*	Cottony	Bluish grey	9.50	2.90	1.18	Entire
10	*P. sajor-caju* (DMR strain)	Compact	Grey	6.71	1.40	0.84	Dentate
	CV (%)	-	-	1.54	2.22	4.24	-
	CD (0.05)	-	-	0.13	0.06	0.05	-



Growth pattern and fruit body characters of *Pleurotus* spp. (January spawning)



Growth pattern and fruit body characters of *Pleurotus* spp. (November spawning)

Table-2 Growth pattern and fruit body characters of *Pleurotus* spp. (January spawning)

Sl. No.	Treatment	Growth pattern on PDA	Characteristics of fruit bodies on paddy straw substrate				
			Colour	Pileus size (cm)	Stipe length (cm)	Stipe thickness (cm)	Margin of fruit body
1	*P. eous*	Fluffy	Pink	5.31	0.67	0.32	Wavy
2	*P. florida*	Sparse	White	4.83	2.05	0.41	Entire
3	*P. sajor-caju* (CTMRT strain)	Compact	Grey	5.67	1.38	1.53	Dentate
4	*P. citrinopileatus*	Sparse	White	9.62	3.23	1.54	Entire
5	*P. fossulatus*	Sparse	White	6.92	2.06	0.95	Entire
6	*P. flabellatus*	Sparse	White	7.25	2.55	0.70	Entire
7	*P.platypus*	Sparse	White	8.60	1.55	1.03	Entire
8	*P. ostreatus*	Sparse	Deep grey	9.69	3.17	1.77	Entire
9	*H. ulmarius*	Cottony	Bluish grey	9.56	2.72	1.25	Entire
10	*P. sajor-caju* (DMR strain)	Compact	Grey	6.49	1.38	0.96	Dentate
	CV (%)	-	-	3.87	2.27	7.76	-
	CD (0.05)	-	-	0.33	0.06	0.09	-

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Success Story: Cultivation of annual chrysanthemum: A climate resilient initiative to boost farmer's income

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Abstract:

Mr. Laxmidhar Rout resident of Dihakuransh village, Block Rasulpur of Jajpur district is a innovative farmer. He was initially involved in cultivation of tomato, brinjal, chilli, cauliflower. However, he has diversified into floriculture after he faced adversities like heavy incidence of insect pests and diseases, besides very poor economic returns while growing vegetables. He has attributed monocropping and crashing prices as the main reasons for his continuous losses.

Intervention of KVK

Incidentally, he came in contact of scientists of KVK, Jajpur in one training programme conducted in nearby village. There he knew about scientific farming of annual Chrysanthemum. The scientists visited his farm and meticulously observed the whole situation. They suggested him to go for cultivation of annual Chrysanthemum Chrysanthemum coronarium L. (garland Chrysanthemum) and also advised him for drip irrigation and fertigation techniques. Among all the flower crops he has choosen Chrysanthemum due to easy propagation of the flower and flower of Chrysanthemum fetch more returns both as loose and cut flowers.

Technology intervention

He prepares field by ploughing 30cm deep four times to right tilth in the month of October and applies well decomposed farmyard manure @40q/ha and vermicompost 10q/ha before last ploughing in last week of October. He also incorporates DAP @4q/ha and MOP 1.25q/ha at an interval of 20 days. Thereafter, he raises the beds of 2m×3m and make 20cm deep channels around the bed to avoid water stagnation. He plants 15000 seedlings treated with fungicides like Mancozeb @2.5kg/l water per acre with 75cm×75cm apart@2 seedlings/pit. He gives oxyfluofen 1ml/l water at final land preparation to make the land weed free upto 45 days to boost production. He adopts various IPM and IDM control measures suggested by KVK scientists for disease and pest management. The farmer starts plucking flowers after 2 months of transplanting of the seedlings in the main field.

Impact of technology

The farmer has informed that the advice given by scientists of KVK, Jajpur helped him to introduce annual Chrysanthemum to the market which fetched him Rs 70/kg. The initiative has helped him to improve his socio economic status as he could make a profit of Rs 3-5 lakhs/year.

Summary

Now Laxmidhar Rout is a ray of hope for many young farmers of the region, 5-6 young farmers has started annual Chrysanthemum cultivation. Now, he is leading a happy and satisfied life with his family in a newly constructed big house. The farmer got his son and daughter married off and never forgets the scientists of KVK, Jajpur, who helped him to reach this destination.

Monetary return from Annual Chrysanthemum cultivation

Year	Area(ha)	No. of plants	Total production(atl)	Cost of Cultivation (Rs.)	Gross return(Rs.)	Net return(Rs.)
2019-20	0.2	7,500	52	45,000	3,64,000	3,19,000
2020-21	0.3	11,250	78.7	72,000	5,50,900	4,78,900
2021-22	0.4	15,000	90.5	95,000	6,33,500	5,38,500

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Assessment of climate resilient triple disease resistant tomato varieties suitable for Jajpur district of Odisha

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Abstract:

Tomato (*lycopersicon esculentum* L.) under family Solanaceae is one of the most popular and widely grown vegetable in Odisha. It occupies 2300 ha with annual production of 31,901 MT and an average productivity of 138.7 q/ha in Jajpur district of Odisha. Field experiments were conducted by KVK, Jajpur for two consecutive years during 2022-23, 2023-24 at farmers field of village Dihakuransa, block-Rasulpur to assess tomato varieties suitable for Jajpur district of Odisha. Seedlings were planted at a spacing of 90cm×75cm with recommended dose of fertilizer 175:150:175 NPK kg/ha. Observations were recorded on yield and yield attributing characters for two varieties namely Arka Abhed and Arka Samrat. Farmer's Practice was variety Priya. Highest yield of 367.41q/ha was recorded in Var. Arka Abhed which was 33.3 % more than Farmers practice followed by Arka Samrat (353.96q/ha). Variety Arka Abhed recorded highest number of fruits/plant (30.66) followed by Arka Samrat (30.04) and maximum fruit weight 80 gm/fruit followed by Arka Samrat 78.7 gm. It was observed that both the varieties significantly different from FP variety Priya w.r.t no. of fruits/plant , individual fruit weight and yield . But there was no significant difference found between two varieties relating to yield and yield attributing characters. The net return in Arka Abhed cultivation was Rs 2,01,728/- per ha followed by Arka Samrat Rs1,90,968/-with B:C ratios 3.13 and 3.07 respectively. On the basis of present study both the triple disease resistant, climate resilient varieties Arka Abhed and Arka Samrat can be recommended for cultivation in Jajpur district of Odisha for doubling farmer's income.

Keywords: lycopersicon esculentum, Arka Abhed, Arka Samrat, triple disease resistant

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Androgenesis and biofortification: Pathway to Anthocyanin-enriched rice

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Abstract:

Biofortification of rice with anthocyanin enrichment presents an innovative strategy to improve nutritional security and combat malnutrition. Anthocyanins, potent antioxidant pigments, provide significant health benefits, including reducing the risk of chronic diseases such as diabetes and cardiovascular disorders. Conventional breeding approaches often face limitations in achieving targeted anthocyanin levels due to prolonged timelines and genetic variability. Doubled haploid (DH) technology, leveraging androgenesis, offers an efficient solution by rapidly developing homozygous lines in a single generation. This approach ensures stable inheritance of desirable anthocyanin traits while saving time and resources. Androgenesis, involving haploid production through anther or microspore culture, enables accelerated trait fixation, which is further enhanced by chromosome doubling. Coupled with marker-assisted selection (MAS), this method facilitates the precise identification and incorporation of key biosynthetic genes, such as OsMYB and bHLH. Genetic engineering and genome-editing tools like CRISPR/Cas9 complement these efforts, optimizing pathways for anthocyanin biosynthesis.

Anthocyanin-rich rice varieties, exhibiting pigmentation in the pericarp, not only improve nutritional value but also hold aesthetic appeal. Challenges such as public acceptance, regulatory hurdles, and the initial cost of androgenesis implementation need to be addressed for widespread adoption. Advances in in vitro techniques and adaptation to |diverse agro-climatic conditions are crucial for scaling up production. In conclusion, DH technology provides a transformative pathway for developing anthocyanin-enriched rice varieties, making them a cornerstone of nutrition-sensitive agriculture and a sustainable solution to global malnutrition and health challenges.

Keywords: Biofortification, doubled haploid, anthocyanin, androgenesis, rice

Biography:

Aspiring Ph.D 3rd yr student of College of Agriculture OUAT Bhubaneswar having keen interest in biotechnological aspects especially tissue culture and learning innovative approaches to improve plant health and nutrition which can cater the huge population and prevent problems of poverty and malnutrition. I am a Biju Patnaik Research Fellowship (BPRF) holder and I have completed my post graduation from Department of Agricultural Biotechnology, CA, Bhubaneswar.

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Poster

Impact of climate change on hydro-climatic fluxes in the Kantamal catchment of the middle Mahanadi basin

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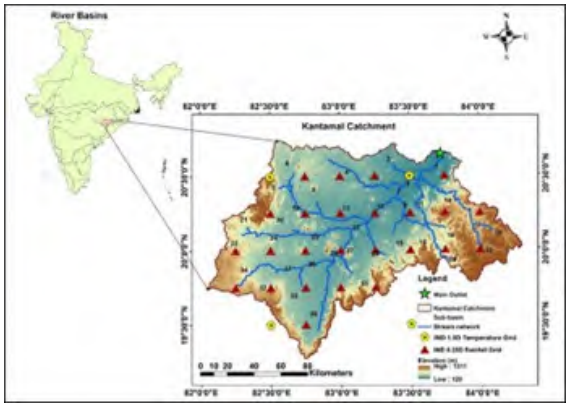
Abstract:

Climate change poses a significant threat to natural resource management, particularly in agriculture and allied sectors. The present study assesses the effect of climate change on hydro-climatic fluxes in Kantamal catchment of the Mahanadi River basin, India. Utilizing the modified Mann-Kendall test, the long-term climatic parameters revealed a decreasing trend in rainfall and increasing trend in temperature. Employing a bias-corrected, multi-model ensemble of three regional climate models (RegCM4-4, RCA4, REMO2009) under RCP4.5 and RCP8.5 scenarios, a rise of 1.01°C and 1.06°C in the average maximum and minimum temperatures, respectively, by 2099 were projected. Rainfall is projected to decrease by 29.53% (RCP4.5) and 24.34% (RCP8.5), with surface runoff decreasing by 13.91% (RCP4.5) and 9.94% (RCP8.5), actual evapotranspiration declining by 7.81% (RCP4.5) and 7.77% (RCP8.5), soil moisture reducing by 11.17% (RCP4.5) and 9.69% (RCP8.5), and water yield expected to decline by 39.45% (RCP4.5) and 33.05% (RCP8.5) as compared to the baseline period. These changes indicate increased water stress in the catchment, highlighting the need for better water management and sustainable farming practices.

Keywords: bias-correction, hydrological fluxes, Mann-Kendall test, RCP, SWAT, trend analysis, water yield



Biography:

Miss Soubhagya Laxmi Ray is a passionate researcher pursuing her PhD in Soil and Water Conservation Engineering at the College of Agricultural Engineering and Technology (CAET), OUAT, Bhubaneswar. She holds an M.Tech degree from the Department of Soil and Water Conservation Engineering, CAET, OUAT, and a B.Tech degree from Centurion University of Technology and Management (CUTM), Paralakhemundi. Her research interests include hydrological modeling, climate change analysis, and the application of AI/ML in agriculture, focusing on integrating advanced technologies in agriculture and watershed management. A budding scholar in her field, Miss Ray has published five research papers in prestigious national and international journals, reflecting her dedication to addressing critical challenges in sustainable agriculture and natural resource management.

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Genome editing and Pangenome: Analysis for viral disease resistance in Potato

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Abstract:

Potato (*Solanum tuberosum* L.) is an important staple food crop globally, yet it is highly vulnerable to viral diseases such as Potato Virus Y (PVY), Potato Leaf Roll Virus (PLRV), and Potato Virus X (PVX). These diseases can cause significant yield and quality losses, posing a major threat to food security. Traditional breeding strategies for enhancing viral resistance in potatoes are often constrained by the crop's tetraploid genome, long breeding cycles, and limited genetic diversity in commercial cultivars. Advances in genome editing technologies, particularly CRISPR-Cas systems, coupled with pangenome analysis, provide a transformative framework for addressing these challenges. This approach offers precision, efficiency and the ability to explore a broader genetic repertoire for improving disease resistance. Genome editing technologies enable targeted modifications in susceptibility genes (S-genes) exploited by viruses, such as eukaryotic translation initiation factor 4E (eIF4E). Knocking out or modifying these genes disrupts viral replication while minimizing impacts on plant fitness. Additionally, resistance genes (R-genes), which confer recognition of specific viral effectors, can be engineered or stacked using multiplex CRISPR strategies to broaden resistance spectra. The incorporation of RNA silencing pathways or antiviral proteins through genome editing further enhances resistance mechanisms. These interventions reduce reliance on chemical treatments and offer sustainable solutions for viral management.

Pangenome analysis, which aggregates genes across diverse potato cultivars and wild relatives, enhances genome editing by uncovering genetic variations beyond the core genome. This approach helps identify rare alleles linked to viral resistance, facilitating their precise introduction into commercial varieties. For example, naturally occurring variants of S-genes or R-genes with improved resistance can be optimized using genome editing tools. However, challenges include mitigating off-target effects, ensuring durable resistance against evolving viruses, and gaining regulatory and public acceptance of genome-edited crops. Continuous monitoring and adaptive strategies are essential for sustainable success. Future efforts should focus on high-throughput screening for resistance loci, leveraging machine learning to refine gene selection, and validating edited potatoes under field conditions. Integrating genome editing with complementary biotechnologies, such as RNA interference and synthetic biology, can provide a holistic solution. Together, these innovations promise to revolutionize potato breeding and enhance global food security.

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Targeted genome editing of GW2, GS3 and GL7 for enhanced grain yield and quality in rice

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Abstract:

Grain architecture, encompassing traits such as size, shape and weight, is a critical determinant of yield, quality and market value of rice (Oryza sativa L.). Key genes, including GW2 (Grain Width 2), GS3 (Grain Size 3) and GL7 (Grain Length 7) play pivotal roles in regulating these traits by influencing cellular development and grain morphology. Traditional breeding approaches for modifying grain characteristics are time-consuming and often limited by genetic linkage and pleiotropy. Genome editing technologies, particularly CRISPR-Cas systems, offer precise tools to target these genes, enabling rapid and efficient improvement of grain yield and quality. The GW2 gene, a negative regulator of grain width, encodes a RING-type E3 ubiquitin ligase that modulates cell proliferation in the outer glume. CRISPR-mediated knockout of GW2 results in increased grain width and weight without compromising plant viability. Similarly, GS3, a major regulator of grain length, encodes a protein involved in G protein signalling. Loss-of-function mutations in GS3 lead to elongated grains, a desirable trait in many premium rice markets. Meanwhile, GL7, a key determinant of grain length-to-width ratio, modulates cell elongation in the longitudinal direction. Editing of GL7 enhances grain length while maintaining a slender shape, improving overall grain aesthetics and milling quality.

By employing multiplex CRISPR-Cas strategies, simultaneous editing of GW2, GS3, and GL7 can synergistically enhance grain yield and tailor grain dimensions to meet diverse consumer preferences. Integration of transcriptomic and phenotypic analyses ensures precise control over gene editing outcomes, minimizing off-target effects and unintended trade-offs. These edits can be seamlessly incorporated into high-yielding, locally adapted rice varieties, accelerating the development of improved cultivars. Despite the yield potential, challenges such as trait stability under field conditions, the durability of edited traits, and regulatory barriers must be addressed. Field trials are essential to validate the agronomic performance and consumer acceptability of genome-edited rice. Additionally, combining genome editing with marker-assisted selection and genomic prediction can further optimize grain traits. In conclusion, targeted genome editing of GW2, GS3, and GL7 represents a transformative approach for enhancing grain yield and quality in rice. By integrating precise genetic modifications with traditional breeding, this strategy offers sustainable solutions to meet global demands for high-yielding, high-quality rice varieties, contributing to food security and agricultural innovation.

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Elucidating genetic pathways for pericarp pigmentation in rice using genome editing

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Abstract:

Pericarp pigmentation in rice (Oryza sativa L.) is an important trait that influences nutritional quality, aesthetic appeal, and market value. The pigmentation, primarily driven by anthocyanins and pro-anthocyanidins, is regulated by complex genetic pathways involving biosynthetic and regulatory genes. Traditional breeding efforts to enhance or modify pericarp colour are often constrained by genetic variability, linkage drag and long breeding cycles. Genome editing technologies, particularly CRISPR-Cas systems, offer precise and efficient tools for elucidating and manipulating the genetic pathways governing rice pericarp pigmentation. This study explores the roles of key structural genes such as CHS (chalcone synthase), DFR (dihydroflavonol 4-reductase), and ANS (anthocyanidin synthase), which are directly involved in the anthocyanin biosynthetic pathway. Additionally, regulatory genes encoding MYB, bHLH, and WD40 transcription factors are examined for their role in activating pigment-related genes. Using CRISPR-Cas9, specific knockouts and targeted modifications of these genes can reveal their functions, interactions, and impacts on pericarp coloration. For example, editing transcription factors like OsC1 and OsRb has shown potential to induce or suppress pigmentation, leading to the creation of diverse pericarp colour phenotypes.

The integration of genome editing with transcriptomics and metabolomics further enables a systems-level understanding of pigment biosynthesis and regulation. High-throughput screening of edited lines allows researchers to identify alleles that enhance pigment accumulation, thereby increasing antioxidant content and potential health benefits. Moreover, genome editing provides a sustainable and rapid alternative to introduce desirable pigmentation traits into elite rice cultivars without disrupting agronomic performance. Despite its promise, challenges remain, including the need to mitigate off-target effects, ensure stable expression of edited traits, and address regulatory and consumer acceptance issues for genome-edited crops. Addressing these challenges requires robust validation of edits, iterative refinement of editing tools, and clear communication of benefits to stakeholders. This research underscores the transformative potential of genome editing in advancing the understanding and application of pericarp pigmentation pathways in rice. By elucidating genetic mechanisms and enabling precise trait modification, genome editing can drive the development of novel rice varieties with improved nutritional and commercial value, addressing global demands for healthier and more sustainable food systems.

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New generation breeding techniques in potato for nutritional security

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Abstract:

Potato has long been cultivated as a staple food crop across numerous countries, serving as a crucial source of sustenance. It holds significant potential to address global food security challenges, offering a higher yield of carbohydrates, proteins, minerals and vitamins per unit of land compared to many other crops. Its versatility as a vegetable, seed source, and raw material for processing also positions it as a key driver in increasing farmers' income. Consequently, genetic modifications have been undertaken to enhance the nutritional profile of potatoes without compromising yield. Research efforts have focused on improving protein content, vitamin C levels, β-carotene, triacylglycerol, tuber methionine, and amylose content etc. Additionally, the removal of anti-nutritional compounds, such as steroidal glycoalkaloids, acrylamide and other food toxins, remains a priority. Traditional genetic engineering approaches have primarily relied on developing transgenic variants, but the commercialization of these products faces challenges due to consumer preferences and regulatory as well as ethical constraints. In this regard, emerging breeding techniques such as TALEN (transcription activator-like effector nucleases) and CRISPR/Cas9 (clustered regularly interspaced palindromic repeats/CRISPR-associated 9) offer precise, efficient, and transgene-free alternatives. Furthermore, advancements in potato genome sequencing and efficient transformation systems have significantly facilitated genetic improvements in the crop. Here we summarize the nutritional benefits of potato and potential application of new breeding techniques to genetically improve the overall agronomic profile of potato.

Keywords: food security, higher yield, genetic modifications, genome sequencing, breeding techniques

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Efficacy of novel insecticides against sucking pests in cotton

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Abstract:

A field experiment was conducted during Kahrif 2021 cropping season at Regional Research and Technology Transfer Station (RRTTS), OUAT, Bhawanipatna to evaluate the efficacy of various insecticides against sucking pests in cotton (Gossypium hirsutum, variety Keshari) under a Randomized Block Design (RBD) with eight insecticides viz., Spinetoram 11.7% @ 50 g a.i/ha, Pyriproxyfen 10% EC @ 100 g a.i/ha, Dinotefuran 20% SG @ 30 g a.i/ha, Spiromesifen 240 SC (22.9%) @ 144 g a.i/ha, Diafenthiuron 50 WP @ 300 g a.i/ha, Flonicamid 50% WG @ 75 g a.i/ha and Imidaclopride 200SL (17.8%) @ 25 g a.i/ha along with untreated control in three replications. The study aimed to determine the effectiveness of novel insecticides in managing the major sucking insects jassids, aphids, thrips, and whiteflies. Results revealed that jassids were the most severe pest. Before spraying, the jassid population ranged from 7.11 to 7.49 per 3 leaves. After two sprays, the lowest jassid population (0.95/3 leaves) was recorded in T6 (Flonicamid 50% WG @ 75 g a.i./ha), followed by T4 (Spiromesifen 240 SC @ 144 g a.i./ha) with 2.04/3 leaves, significantly lower than the untreated control (12.10/3 leaves). For aphids, the pre-spray population ranged from 25.87 to 26.62 per 3 leaves. Flonicamid 50% WG @ 75 g a.i./ha was the most effective treatment, reducing aphid populations to 1.22 per 3 leaves after two sprays, followed by Spiromesifen 240 SC @ 144 g a.i./ha (2.74/3 leaves). Thrips population showed a similar trend, with Flonicamid 50% WG @ 75 g a.i./ha being the most effective (0.13 thrips/3 leaves after two sprays), followed by Spiromesifen 240 SC @ 144 g a.i./ha (0.39 thrips/3 leaves). Whitefly populations were negligible, with T7 (Imidacloprid 200 SL @ 25 g a.i./ha) recording the lowest population (0.40/3 leaves) after two sprays. The findings revealed Flonicamid 50% WG @ 75 g a.i./ha as the most effective treatment against sucking pests in cotton, followed by Spiromesifen 240 SC @ 144 g a.i./ha, providing an integrated pest management solution for sustainable cotton production.

Keywords: Novel insecticides, sucking insects, cotton, management

Biography:

Dr. Uttam Kumar Behera is an accomplished entomologist with a Ph.D. in Entomology and over 25 years of experience in research, teaching, and extension activities. He served as an Assistant Professor for 14 years, imparting knowledge to students and contributing to academic excellence. Dr. Behera also worked as a KVK Scientist specializing in Plant Protection for six years, providing on-field solutions to farmers and promoting sustainable agricultural practices.

Currently, Dr. Behera is a Research Scientist in Seed Entomology, with more than five years dedicated to advancing pest management strategies in cotton crops. His scholarly contributions include over 40 research papers in reputed journals, as well as the publication of booklets, leaflets, and popular articles in the Odia language, bridging the gap between scientific knowledge and local communities. Dr. Behera's extensive work reflects his commitment to improving crop protection and enhancing agricultural productivity.

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Effect of time of sowing and environmental factors on incidence of wilt disease in chickpea

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Abstract:

Chickpea (Cicer arietinum L.) is a major source of human and animal food and the world's third most important pulse crop after beans(Phaseolus vulgaris L.) and peas (Pisum sativum L). Low yield of chickpea is attributed to its susceptibility to several fungal, bacterial and viral diseases. Among the diseases, affecting chickpea, wilt caused by Fusarium oxysporum f. sp. ciceris is the most important. Annual chickpea yield losses from Fusarium wilt vary from 10 to 15% but can result in total loss of the crop under specific conditions. Therefore an experiment was conducted during winter (rabi) season of 2019–20 in Regional Research and Technology transfer station, Keonjhar , Odisha to assess the effect of sowing time and environmental parameters on wilt caused by Fusarium oxysporum f. sp. ciceris in 'JAKI 9218' , 'JG 14' and 'JG 16' chickpea (Cicer arietinum) cultivars. The Chick pea varieties, JAKI 9218' , 'JG 14' and 'JG 16' were sown on 15th Nov, 25th Nov, 5 th Dec and 15 th Dec with 10 days interval. Early sowing minimizes wilt incidence in all the three cultivars. Lowest mean wilt incidence (25.2%) and maximum mean grain yield (1368 kg/ha) were recorded in the crop sown on 15th November. Similarly Lowest mean wilt incidence was seen in JAKI 9218 (24.4%) followed by JG 16 (35.3%) with mean grain yield of 1404 kg/ha and 1138 kg/ha respectively. Maximum and minimum ambient temperature and soil temperature were positively and significantly correlated with wilt incidence in 'JAKI 9218'.

Keywords: Planting date , Chickpea, Fusarium wilt, Environmental variables, Temperature

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Physico – chemical properties of wild Jujube (*Ziziphus oenoplia* L.) fruits as influenced by pre and post harvest conditions

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Abstract:

The investigation entitled "Physico-Chemical Properties of Wild Jujube (Ziziphus oenoplia L.) Fruits as Influenced by Pre- and Post-Harvest Conditions" provides valuable insights into the nutritional quality and potential health benefits of Kanteikoli fruits, focusing on the effects of storage and the collection of fruits from different locations in Odisha. The study uses Randomized Block Design (RBD) with 9 treatments (T1-T9) and 6 replications and collection sites were Bhawanipatna, Kamthana, Bharatpur with three storage durations: Fresh (0 weeks), 1-week storage, 2-week storage. The fruits were analyzed for ascorbic acid, phenolic compounds, sugars, and other biochemical parameters. Bharatpur-sourced fruits exhibited higher levels of ascorbic acid & phenolic compounds, suggesting better antioxidant properties compared to samples from Bhawanipatna and Kamthana. Vitamin C content (ascorbic acid) declined with increased storage duration, consistent with known degradation during storage. Fresh fruits retained the highest nutritional values across all locations. Fruit quality and weight varied significantly across different maturity stages, in line with natural ripening processes. The fruits are rich in minerals and antioxidants, indicating potential as a functional food. Antioxidant and antimicrobial properties suggest therapeutic applications. Study Period was 2020-2022. Experiment was conducted in PG Laboratory, Department of Horticulture, Siksha 'O' Anusandhan University, Bhubaneswar, Odisha. The fruits have high antioxidant content and nutrient density highlight their role in promoting health and combating oxidative stress-related diseases. It has potential for developing health supplements or functional food products, explore therapeutic properties, focusing on antioxidant and antimicrobial activity. It investigates domestication and cultivation practices to optimize production and quality. It evaluates the fruits' role in enhancing food security and addressing malnutrition. Wild jujube fruits present promising avenue for nutritional enhancement and therapeutic applications. Continued research and development could unlock their full potential, contributing significantly to both public health and agricultural innovation.

Keyword: Anti-microbial, Anti-oxidant, Nutritional, Therapeutic, Wild ber

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Enhancing arecanut productivity through integrated nutrient management and strategic intercropping

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Abstract:

Arecanut plantations utilize only about 30% of the land, leaving 70% available for intercropping with medicinal and aromatic plants (MAPs), enhancing productivity by 11–53% and yielding higher net returns per rupee investment (1.95–4.25). A field experiment (2021–2023) in a 5-year-old arecanut plantation (cv. Mohitnagar) in Odisha, India, evaluated the effects of different intercropping systems and nutrient management practices on soil health, microbial diversity, nutrient uptake, yield, and economic returns. Three cropping systems (Arecanut + Turmeric + Black Turmeric; Arecanut + Kalmegh + Tulsi; and Arecanut + Ashwagandha + Sarpagandha) with three nutrient management treatments (Organic recycling + 100% NPK through RDF; Organic recycling + 100% NPK through STD; and Organic recycling + 75% NPK through STD + Biofertilizer Consortia) were studied. The Arecanut + Kalmegh + Tulsi system with organic recycling and 100% NPK (STD) significantly improved soil organic carbon, microbial populations, and enzymatic activities. The Arecanut + Turmeric + Black Turmeric system recorded higher available nitrogen, phosphorus, and potassium, achieving the highest Arecanut Equivalent Yield and net returns. The Arecanut + Ashwagandha + Sarpagandha system with organic recycling and 75% NPK (STD) plus biofertilizers showed superior growth parameters and the highest benefit-cost ratio. Integrating MAPs in arecanut plantations, with suitable nutrient management, can enhance soil health, yield, and economic returns, offering a sustainable approach in Odisha.

Keywords: Arecanut, arecanut-based cropping system, nutrient management practices, arecanut equivalent yield, benefit-cost ratio

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Poster

Integrated weed management practices in Maize (*Zea mays* L.) for higher yield and profitability under changing climatic situation

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Abstract:

Maize (*Zea mays* L.) is known as Queen of Cereals' since it has highest genetic yield potential. It is the second most important cereal crop in the world in terms of production. India is one of the top ten maize producing countries in the world, which contributes 2.41% of the total global maize production. Maize is cultivated throughout the year in all the states of our country for various purposes including grain, fodder, green cobs while sweet corn, baby corn and pop corn are cultivated in the peri-urban areas. In addition to staple food for human being and quality feed for animals, it serves as a basic raw material as an ingredient to thousands of industrial products. Maize is also used in different industrial sectors and activities in India. The biggest user of maize in India is poultry industry with 47% of the share followed by industrial consumption in the form of starch (14%) and other uses include, direct consumption (13%), livestock feed (13%) and processed food (7%).

Maize is cultivated in an area of 9.68 million hectares in India and 2.51 lakh hectares in Odisha. Maize suffers from severe weed competition and its productivity is influenced by numerous biotic and abiotic factors. Among the biotic factors, weeds pose a significant constraint to crop production, leading to substantial reductions in yield and produce quality. Weeds compete with crop plants for essential resources such as nutrients, water, light, and space, resulting in decreased crop yield. Moreover, weed infestations have adverse economic implications and contribute to environmental and health concerns in terrestrial ecosystems. The major grasses associated with maize are comprised of *Eleusine indica, Digitaria sanguinalis, Echinochloa colona Cynodon dactylon Echinochloa crusgalli, ,Setaria verticillata Dactyloctenium aegyptium*. Among broad leaved weeds *Trianthema portulacastrum, Trianthema monogyna, ,Amaranthus spinosus, , Digera arvensis, Tribulus terestris,Celosia argentea, Phyllanthus niruri,Ageratum conyzoides,Portulaca oleracea Xanthium strumarium were dominant and sedges were Cyperus rotundus, Cyperus iria* Maize crop sown at wider row spacing and slow growth during initial stage (2-4 weeks) faces severe competition for nutrients, water and light from the growing weeds. The crop faces extensive weed infestation throughout the growth cycle, from sowing to harvest, owing to favourable conditions created by frequent rainfall in kharif and irrigation during rabi . Under severe weed infestation there is substantial yield loss (35-99%) in maize crop. To reduce the harmful effects of weeds on rice, the weeds population must be kept under economic threshold level to optimise the yield. Therefore, effective weed control measures are needed during the critical period (15-45 DAS) of maize crop growth to achieve higher yield and profits, as this period is particularly susceptible to yield losses caused by weeds. Herbicide application is a cost-effective and efficient method for weed control, but it has potential negative impacts on the environment, human health, and the well-being of domesticated and wild animals. Therefore, integrated weed management which aims to maximize effectiveness, minimize weed resistance, and promote long-term sustainability in crop production is an important strategy to effectively control weeds..

A participatory on-farm trial was conducted during two consecutive wet seasons of 2020–21 and 2021-22 at farmer's fields in Hudisahi ,Patramara and Sansailo village of Sukinda block of Jajpur district of Odisha to assess the effect of post emergence herbicide Tembotrione 42% SC @287.5 ml/ha at 20 DAS on weeds and growth and yield of maize along with manual weeding at 30 DAS . The application of post emergence herbicide Tembotrione 42% SC gave 16.5 per cent higher cob yield as compared to farmer's practice. Further, application of pre-emergence herbicide along with manual weeding at 30 days after sowing treatment gave significantly higher grains per cob, plant height and yield and significantly reduced the weed density and weed dry matter as compared to farmers practice

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Poster

Effect of establishment method and organic nutrient management for enhancing yield and quality of finger millet for nutritional security

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Abstract:

Climate change together with a rapidly increasing population is mounting considerable pressure on the agriculture sector to improve productivity. One possible solution is identifying and improving the yield of traditional or native crops that are highly adaptive to local climate, have high nutrient value and can efficiently withstand biotic and/or abiotic stresses. Finger millet (*Eleusine coracana* L.) is a major staple crop among tribal communities of India, grown in arid region, well adapted to adverse climatic conditions required minimal input (Pradhan *et al.*, 2019) It boasts an impressive nutritional profile, including 6-8% protein, 1.3% fat, essential amino acids such as lysine, tryptophan, methionine and rich content of vitamins, minerals (70-76% calcium) and fibre and thus considered as miracle grain. Various organic sources contain adequate nutrients to produce comparable and sustainable yields (Ghosh, 2005).

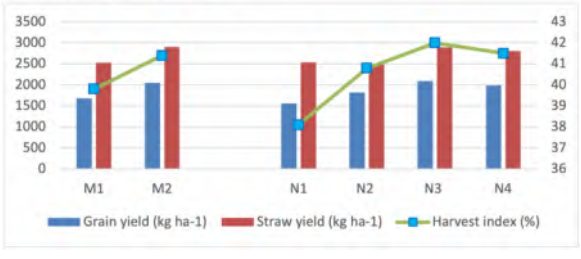
A field experiment was conducted at Agronomy Main Research Farm, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha during the *kharif* seasons of 2020 and 2021.The experiment employed split plot design with three replications. The main plots were assigned with two methods of plant establishment , viz. M_1: conventional method of line transplanting (Spacing: 20 cm x 10 cm) and M_2: system of finger millet intensification (Spacing: 25cm X 25 cm) and sub plot with four organic nutrient sources viz. N_1 : farm yard manure (FYM) @ 100% recommended dose of nitrogen (RDN), N_2 : FYM @ 50% RDN (basal) + Vermicompost @ 50% RDN (basal), N_3: FYM @ 50% RDN(basal) + Vermicompost @ 50% RDN (top dressing) and N_4 : FYM @ 25% RDN (basal) + toria oil cake @ 25% RDN (basal) + Vermicompost @ 50% RDN (top dressing). The RDN applied to finger millet was 60 kg ha^{-1}. In the system of finger millet intensification (SFMI), square planting of 12 days old seedling was done@ 1 seedling per hill and weeding was done by using a cycle weeder. The organic formulation '*Jibamruta*' was sprayed uniformly to all the treatments at 21 days after transplanting for controlling insect pests and diseases.

SFMI method resulted in higher grain yield (2051 kg ha^{-1}), straw yield (2901 kg ha^{-1}) and harvest index (41.42%) than line transplanting. Among the organic nutrient options, applying N_3: FYM at 50% RDN (basal) + Vermicompost @ 50% RDN (top dressing) resulted in higher grain and straw yield of 2092 kg ha^{-1} and 2889 kg ha^{-1}, respectively and a harvest index of 42% but was statistically at par with N_4.

The grains from SFMI (Table 1) recorded higher protein content (7.56 %), protein yield (155.8 kg ha^{-1}), crude fibre (3.6 g per 100 g), vitamin E (0.14 mg per 100 g), calcium (344.1 mg per 100 g) and magnesium (164.3 mg per 100 g), iron (4.86 mg per 100 g) and zinc (3.71 mg per 100 g) contents. Application of N_3 recorded higher protein content, crude fibre and vitamin E (7.91%, 3.9 g per 100 g and 0.16 mg per 100 g, respectively) and mineral content of calcium (346.7 mg per 100 g), magnesium (176.4 mg per 100 g), iron (4.94 mg per 100 g) and zinc (3.98 mg per 100 g). These results were statistically similar to those achieved with N_4.

It may be concluded by considering the yield and quality parameters that growing the finger millet in SFMI and application of organic nutrient sources, FYM @ 50% RDN (basal: 6.55 t/ha) + Vermicompost @ 50% RDN (top dressing: 1.62 t/ha) can be adopted by farmers to improve their livelihood and achieve sustainable agricultural development with nutritional security.

Graph1. Grain yield, straw yield and harvest index of finger millet as influenced by establishment method and organic nutrient management



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Organic nutrient management on productivity and profitability of system of millet intensification Ragi- *Toria* Sequence for sustainable livelihood of tribal farmers of Odisha

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Abstract:

Finger millet (ragi) accounts for about 85% of total minor millet production in India [1] and it has the pride of having highest productivity among small millets. In Odisha, the area, production and productivity is 116.8 th.ha ,128.73 th. tonnes and 1102 kg/ha, respectively (5 Decades of Odisha Agriculture Statistics,2020). The crop has wide adaptation with easy cultivation, free from major pests and diseases and drought tolerance which have made this crop an automatic choice in dry farming system. The system of millet intensification(SMI) principle have been followed in ragi which mainly emphasizes on utilizing early growth and vigour of seedlings, facilitates less competition for light and nutrients, enhancing resource use efficiency (seeds, water, fertilizer and pesticide) and bring down over dependence on chemical fertilizers, promoting healthy root growth and increasing soil microbial activity; and thereby enhancing soil organic matter content.

To fulfill the diverse demand of consumers and cut imports, there is an urgent demand for incorporation of the oilseed crop in millet-based cropping system. As a residual crop, toria can utilize residual nutrients effectively. Conversion of modern chemically intensive agriculture to a more sustainable form of agriculture like organic farming appears to be an option for maintaining the desirable agricultural production in future. Budget 2023 promotes chemical free natural farming (Paramparagat Krushi) all over India for sustainable agricultural productivity.

The field experiment entitled " Organic nutrient management on productivity and profitability of system of millet intensification ragi- toria sequence for sustainable livelihood of tribal farmers of Odisha" was carried out for two consecutive years (2020-2022) in the Agronomy Main Research Farm of OUAT, Bhubaneswar. The soil characteristics were sandy loam, slightly acidic in reaction (pH 4.64), low in organic carbon (4.24g kg-1 soil), medium in available nitrogen (298.1 kg ha-1) and available phosphorus (17.6 kg ha-1) and low in available potassium (95 kg ha-1). The treatments comprised of 4 organic sources of nutrient viz. N1: FYM (farm yard manure) @ 100% RDN (recommended dose of nitrogen),N2:FYM@50%RDN (basal)+VC(vermicompost)@50%RDN(basal),N3:FYM@50%RDN(basal)+VC@ 50% RDN(top dressing) and N4: FYM@25% RDN(basal)+ toria oil cake@25% RDN(basal)+VC@50%RDN(top dressing) applied to ragi during kharif and 3 organic nutrient management treatments viz. T1: residual(no nutrient), T2: FYM@ 50% RDN and T3: FYM@ 100% RDN applied to *toria* in rabi season.

The growth parameters, yield attributing characters, seed yield (2092 kg ha-1), straw yield (2889.5 kg ha-1) and harvest index of ragi (42)were higher in N3 but statistically at par with N4.The protein yield, crude fibre content and Vitamin E content of ragi grains were maximum in N3(160.9 kg ha-1, 3.9g/100g and 0.16mg/100 g, respectively).The Ca, Mg, Fe and Zn content were higher in N3(346.7, 176.0, 4.88 and 3.98 mg/ 100 g seeds, respectively) but was at par with N4. In toria, the seed yield(871 kg ha-1) and stover yield(1820 kg ha-1) were higher in T3 but at par with T2.The oil yield of toria was highest in T3 (339.1kg ha-1).The system finger millet equivalent yield and the system production efficiency was highest in N3 but at par with N4 and in T3 but at par with T2. The energy profitability was also higher in N3 and at par with N4 and in toria it was highest in T3. However, the benefit cost ratio was highest in N3(1.92) in ragi and in toria it was highest in T2(1.83).

Considering the system yield and economics it can be concluded that application of FYM @ 50% RDN (basal) + VC @ 50% RDN (top dressing) to finger millet and FYM @ 50% RDN to toria crop in sequence can be advocated to the farmers of Odisha.

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Cutting edge technologies on biological nitrogen fixation in legumes

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Abstract:

Biological nitrogen fixation (BNF) is a crucial process that sustains soil fertility by converting atmospheric nitrogen into a form usable by plants. This process is particularly significant in legumes, which host symbiotic nitrogen-fixing bacteria (e.g., Rhizobium spp.) in their root nodules. BNF in legumes can contribute significantly to reducing the need for synthetic nitrogen fertilizers, promoting sustainable agricultural practices, and mitigating environmental pollution. Recent advances in cutting-edge technologies have the potential to enhance BNF efficiency, optimize legume growth, and provide novel strategies to address global food security challenges. Recent breakthroughs in molecular biology, genomics, and bioengineering are redefining our understanding of the mechanisms that underpin BNF in legumes. The use of high-throughput sequencing and comparative genomics has enabled the identification of key genes and regulatory networks involved in symbiosis between legumes and nitrogen-fixing bacteria. Through the study of these molecular interactions, researchers are now able to engineer legume varieties with enhanced nitrogen fixation capabilities, potentially reducing the dependency on external nitrogen inputs.

Metagenomics and transcriptomics have provided insights into the microbiomes associated with legume root systems, revealing that the diversity and composition of soil micro-biota can significantly influence BNF efficiency. Advances in synthetic biology are also playing a crucial role in manipulating bacterial symbionts, optimizing nitrogen fixation processes, and improving the resilience of legume plants to environmental stressors. Moreover, gene-editing tools like CRISPR/Cas9 are being applied to modify both plant and bacterial genomes to foster more efficient and sustainable nitrogen fixation. In addition to genetic modifications, innovations in nanotechnology and microbial inoculants are enhancing the delivery of nitrogen-fixing bacteria and other growth-promoting microorganisms to legume crops, leading to improved BNF rates. Furthermore, precision agriculture technologies, such as remote sensing and data analytics, are enabling more targeted application of BNF-promoting inputs, thus maximizing the benefits of biological nitrogen fixation in legume crops. Despite the promising advancements, challenges remain in translating these technologies into scalable, field-level applications. Ongoing research must address the complexities of plant-microbe interactions, environmental variability, and economic considerations. However, the integration of cutting-edge technologies in biological nitrogen fixation holds great potential to revolutionize sustainable agriculture and contribute to long-term food security.

Keywords: Biological nitrogen fixation, legumes, genomics, CRISPR/Cas9, synthetic biology.

Biography:

Aspiring 2nd yr M.Sc. (Ag) student from Department of Agricultural Biotechnology of College of Agriculture OUAT Bhubaneswar having keen interest in biotechnological aspects especially genetic engineering, tissue culture and learning innovative approaches to improve plant health and nutrition which can cater the huge population and prevent problems of poverty and malnutrition.

Research Interest: Genome editing & tissue culture

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Genome editing and pangenome analysis for viral disease resistance in potato

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Abstract:

Potato (*Solanum tuberosum* L.) is an important staple food crop globally, yet it is highly vulnerable to viral diseases such as Potato Virus Y (PVY), Potato Leaf Roll Virus (PLRV), and Potato Virus X (PVX). These diseases can cause significant yield and quality losses, posing a major threat to food security. Traditional breeding strategies for enhancing viral resistance in potatoes are often constrained by the crop's tetraploid genome, long breeding cycles, and limited genetic diversity in commercial cultivars. Advances in genome editing technologies, particularly CRISPR-Cas systems, coupled with pangenome analysis, provide a transformative framework for addressing these challenges. This approach offers precision, efficiency and the ability to explore a broader genetic repertoire for improving disease resistance. Genome editing technologies enable targeted modifications in susceptibility genes (S-genes) exploited by viruses, such as eukaryotic translation initiation factor 4E (eIF4E). Knocking out or modifying these genes disrupts viral replication while minimizing impacts on plant fitness. Additionally, resistance genes (R-genes), which confer recognition of specific viral effectors, can be engineered or stacked using multiplex CRISPR strategies to broaden resistance spectra. The incorporation of RNA silencing pathways or antiviral proteins through genome editing further enhances resistance mechanisms. These interventions reduce reliance on chemical treatments and offer sustainable solutions for viral management.

Pangenome analysis, which aggregates genes across diverse potato cultivars and wild relatives, enhances genome editing by uncovering genetic variations beyond the core genome. This approach helps identify rare alleles linked to viral resistance, facilitating their precise introduction into commercial varieties. For example, naturally occurring variants of S-genes or R-genes with improved resistance can be optimized using genome editing tools. However, challenges include mitigating off-target effects, ensuring durable resistance against evolving viruses, and gaining regulatory and public acceptance of genome-edited crops. Continuous monitoring and adaptive strategies are essential for sustainable success. Future efforts should focus on high-throughput screening for resistance loci, leveraging machine learning to refine gene selection, and validating edited potatoes under field conditions. Integrating genome editing with complementary biotechnologies, such as RNA interference and synthetic biology, can provide a holistic solution. Together, these innovations promise to revolutionize potato breeding and enhance global food security.

Keywords: pangenome, CRISPR-Cas, Knocking out, genome

Biography:

Pursing Ph.D 1st yr student of College of Agriculture OUAT Bhubaneswar having keen interest in biotechnological aspects especially tissue culture, Marker assisted selection, genome editing, DNA finger printing and learning innovative approaches to improve plant health and nutrition which can serve the huge population and prevent problems of poverty and malnutrition. I had worked for more than one and half year as a guest faculty in agricultural biotechnology department in CA, OUAT, Bhubaneswar. I have completed my post graduation from Department of Agricultural Biotechnology, CA, Bhubaneswar

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Targeted genome editing of GW2, GS3 and GL7 for enhanced grain yield and quality in rice

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Abstract:

Grain architecture, encompassing traits such as size, shape and weight, is a critical determinant of yield, quality and market value of rice (Oryza sativa L.). Key genes, including GW2 (Grain Width 2), GS3 (Grain Size 3) and GL7 (Grain Length 7) play pivotal roles in regulating these traits by influencing cellular development and grain morphology. Traditional breeding approaches for modifying grain characteristics are time-consuming and often limited by genetic linkage and pleiotropy. Genome editing technologies, particularly CRISPR-Cas systems, offer precise tools to target these genes, enabling rapid and efficient improvement of grain yield and quality. The GW2 gene, a negative regulator of grain width, encodes a RING-type E3 ubiquitin ligase that modulates cell proliferation in the outer glume. CRISPR-mediated knockout of GW2 results in increased grain width and weight without compromising plant viability. Similarly, GS3, a major regulator of grain length, encodes a protein involved in G protein signalling. Loss-of-function mutations in GS3 lead to elongated grains, a desirable trait in many premium rice markets. Meanwhile, GL7, a key determinant of grain length-to-width ratio, modulates cell elongation in the longitudinal direction. Editing of GL7 enhances grain length while maintaining a slender shape, improving overall grain aesthetics and milling quality.

By employing multiplex CRISPR-Cas strategies, simultaneous editing of GW2, GS3, and GL7 can synergistically enhance grain yield and tailor grain dimensions to meet diverse consumer preferences. Integration of transcriptomic and phenotypic analyses ensures precise control over gene editing outcomes, minimizing off-target effects and unintended trade-offs. These edits can be seamlessly incorporated into high-yielding, locally adapted rice varieties, accelerating the development of improved cultivars. Despite the yield potential, challenges such as trait stability under field conditions, the durability of edited traits, and regulatory barriers must be addressed. Field trials are essential to validate the agronomic performance and consumer acceptability of genome-edited rice. Additionally, combining genome editing with marker-assisted selection and genomic prediction can further optimize grain traits. In conclusion, targeted genome editing of GW2, GS3, and GL7 represents a transformative approach for enhancing grain yield and quality in rice. By integrating precise genetic modifications with traditional breeding, this strategy offers sustainable solutions to meet global demands for high-yielding, high-quality rice varieties, contributing to food security and agricultural innovation.

Keywords: CRISPR-Cas systems, G protein Signalling, ubiquitin, transcriptomic, genome

Biography:

Dr. Laxmipreeya Behera (b. 1994), Ph.D in Agricultural Biotechnology, Odisha University of Agriculture and Technology in 2024. She has been awarded DBT Fellowship for M.Sc. (Ag.) in Biotechnology and gold medal excellency award from governer of Odisha. She has been qualified ICAR-ASRB NET (2018). She has been qualified GATE-XL (2019). She has been awarded with INSPIRE fellowship award from (2019-2024). She has awarded in certification (Expert/Gold) in forensic Biotechnology and DNA Fingerprinting (2023). She is founder member of Society of Biotechnology and Bioinformatics (2016). She has awarded with young scientist from International Scientist awards on engineering, Science and Medicine in 2020. She has published 12 research papers in both national and international journals, 7 review articles, 12 abstracts/papers in both national and international seminars, 7 book chapters, 8 Popular article.

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Viral-induced genome editing (VIGE): A Revolutionary approach to mitigate enzymatic browning in potatoes

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Abstract:

Enzymatic browning in potatoes, primarily caused by polyphenol oxidases (PPO), is a significant post-harvest challenge, leading to reduced marketability, nutritional loss and diminished consumer acceptance. The browning process occurs when PPO enzymes catalyze the oxidation of phenolic compounds to quinones, which then polymerize to form brown pigments. Traditional methods to mitigate browning, such as physical treatments and chemical inhibitors, have shown limited success and are often not sustainable or effective for long-term storage. Recent advancements in genome editing techniques, particularly the use of viral-induced genome editing (VIGE), offer a promising strategy for targeted genetic modifications to control enzymatic browning in potatoes. Viral-induced genome editing utilizes plant virus vectors, such as Potato virus X (PVX), to deliver genome-editing tools, like CRISPR/Cas9, into plant cells without the need for traditional transformation methods. This approach provides a rapid, efficient, and cost-effective way to modify genes associated with undesirable traits, including those responsible for enzymatic browning in potatoes. This study investigates the potential of VIGE to reduce the expression of PPO genes in potatoes, thereby limiting enzymatic browning during storage and processing.

The application of CRISPR/Cas9, delivered via PVX vectors, enables precise gene knock-out or knock-down of specific PPO isoforms in potato cultivars susceptible to browning. By targeting key genes in the polyphenol oxidase pathway, VIGE can facilitate the development of potato varieties with significantly lower browning propensity. Initial experiments demonstrate that CRISPR/Cas9-induced mutations in PPO genes result in reduced PPO enzyme activity, leading to a noticeable decrease in browning under conditions commonly encountered during post-harvest handling. This approach presents several advantages over conventional breeding techniques, including speed, efficiency, and the ability to introduce specific genetic modifications without the risk of transgene persistence. Additionally, the use of viral vectors allows for transient expression, minimizing regulatory hurdles often associated with genetically modified organisms (GMOs). In conclusion, viral-induced genome editing represents a promising tool for addressing enzymatic browning in potatoes, offering a sustainable and innovative solution for improving post-harvest quality. Future research should focus on optimizing VIGE protocols, evaluating long-term stability, and scaling up for commercial applications to benefit the potato industry and consumers worldwide.

Keywords: Viral-induced genome editing (VIGE), enzymatic browning, potato, polyphenol oxidase, CRISPR/Cas9

Biography:

Aspiring 2nd yr M.Sc. (Ag) student from Department of Agricultural Biotechnology of College of Agriculture OUAT Bhubaneswar having keen interest in biotechnological aspects especially genome editing, genetic engineering and learning innovative approaches to improve plant health and nutrition which can cater the huge population and prevent problems of poverty and malnutrition.

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Elucidating genetic pathways for pericarp pigmentation in rice using genome editing

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Abstract:

Pericarp pigmentation in rice (*Oryza sativa* L.) is an important trait that influences nutritional quality, aesthetic appeal, and market value. The pigmentation, primarily driven by anthocyanins and pro-anthocyanidins, is regulated by complex genetic pathways involving biosynthetic and regulatory genes. Traditional breeding efforts to enhance or modify pericarp colour are often constrained by genetic variability, linkage drag and long breeding cycles. Genome editing technologies, particularly CRISPR-Cas systems, offer precise and efficient tools for elucidating and manipulating the genetic pathways governing rice pericarp pigmentation. This study explores the roles of key structural genes such as CHS (chalcone synthase), DFR (dihydroflavonol 4-reductase), and ANS (anthocyanidin synthase), which are directly involved in the anthocyanin biosynthetic pathway. Additionally, regulatory genes encoding MYB, bHLH, and WD40 transcription factors are examined for their role in activating pigment-related genes. Using CRISPR-Cas9, specific knockouts and targeted modifications of these genes can reveal their functions, interactions, and impacts on pericarp coloration. For example, editing transcription factors like OsC1 and OsRb has shown potential to induce or suppress pigmentation, leading to the creation of diverse pericarp colour phenotypes.

The integration of genome editing with transcriptomics and metabolomics further enables a systems-level understanding of pigment biosynthesis and regulation. High-throughput screening of edited lines allows researchers to identify alleles that enhance pigment accumulation, thereby increasing antioxidant content and potential health benefits. Moreover, genome editing provides a sustainable and rapid alternative to introduce desirable pigmentation traits into elite rice cultivars without disrupting agronomic performance. Despite its promise, challenges remain, including the need to mitigate off-target effects, ensure stable expression of edited traits, and address regulatory and consumer acceptance issues for genome-edited crops. Addressing these challenges requires robust validation of edits, iterative refinement of editing tools, and clear communication of benefits to stakeholders. This research underscores the transformative potential of genome editing in advancing the understanding and application of pericarp pigmentation pathways in rice. By elucidating genetic mechanisms and enabling precise trait modification, genome editing can drive the development of novel rice varieties with improved nutritional and commercial value, addressing global demands for healthier and more sustainable food systems.

Keywords: CRISPR-Cas systems, transcription factors, regulatory genes

Biography:

Aspiring Ph.D 2nd yr student of College of Agriculture OUAT Bhubaneswar having keen interest in biotechnological aspects especially tissue culture and learning innovative approaches to improve plant health and nutritional status which can cater the huge population and prevent problems of poverty and malnutrition. I have completed my post graduation from Department of Agricultural Biotechnology, CA, Bhubaneswar.

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Poster

SWOC analysis of ICT tools using dairy farmers in North Karnataka

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Abstract:

Information and Communication Technology (ICT) has revolutionized various industries and the dairy sector is one of them. When assessing the Strengths, Weaknesses, Opportunities, and Challenges (SWOC) of ICT in dairying, it becomes evident that this technology plays a crucial role in enhancing productivity and efficiency in the dairy industry. In this context the current study was carried out to identify the the strengths, weakness, opportunities and challenges associated with using ICTs as expressed by dairy farmers. The study was conducted in two districts viz., Dharwad and Belagavi of North Karnataka, a sample of 120 dairy farmers were purposively selected. The study revealed that cent per cent of dairy farmers expressed that possessing own ICT tools and uninterrupted power supply were major strengths, inadequate training and practical skills to handle ICTs (95.00 %), followed by technology fear (85.00 %) were major weakness. Further, cent per cent of the dairy farmers using ICTs tools expressed that training facilities on ICTs to dairy farmers, creating awareness through digital literacy were major opportunities and non- availability of dairy information in local language in various ICT tools (95.83 %) followed by duplication and contradictory flow of dairy related information in different networking sites/ sources (93.33 %) were the major challenge. The study act as a roadmap for the line departments of state like Veterinary and Animal Husbandry, State Agricultural Universities/ Veterinary Universities, Krishi Vigyan Kendra's and Dairy cooperative, so they can choose the right ICT tools for sharing information on dairy.

Keywords: Dairy farmers, Challenge, Opportunities, Strength, Weakness

Biography:

She has completed B.Sc. (Hons.) Agriculture from Odisha University of Agriculture and Technology, Bhubaneswar and Post Graduation from University of Agricultural Sciences, Dharwad, Karnataka. She is now pursuing Ph.D. in Agricultural Extension Education in the department of Extension Education, OUAT, Bhubaneswar. She is the percipient of University of Agricultural Sciences gold medal for securing the highest overall grade point in Agricultural Extension Education during year 2022-23.

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Scheduling irrigation with mulch under different sugarcane planting methods for enhancing yield and water productivity

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Abstract:

A field experiment was conducted at Sugarcane Research Station (OUAT), Nayagarh (Odisha) during the year 2017-18, 2018-19 and 2019-20 to study irrigation scheduling with mulch under different sugarcane planting methods to enhance sugarcane yield and water productivity. The experimental site was located at 200 54" 90' N latitude and 800 07" 56' E longitude. The soil of the experimental field was sandy loam in texture with low organic carbon content (0.481%). The soil was slightly acidic (PH- 6.3) in reaction. The available N status of the soil was low (240 kg/ha.) whereas available P (11.2 kg/ha.) & K (137 kg/ha.) content was in medium range of soil fertility. The experiment was laid out in strip plot design with planting method as horizontal factor and irrigation scheduling as vertical factor with three replications. There were four planting methods, P1 : Furrow planting (120 cm row spacing) without mulching, P2 : Furrow planting (120 cm row spacing) with brown mulching, P3 : Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up without mulching and P4 : Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up + brown mulching. There were three irrigation schedules based on IW/CPE ratio, I1 : 0.60, I2 : 0.80 and I3 : 1.00. The depth of irrigation water was 7.5 cm. The test variety was CoOr 12346. The net plot size was 6m width x 8m length with 5 crop rows/ plot and 120 cm row spacing. The recommended dose of fertiliser is 250–100-60 kg N, P2O5 & K2O / ha. From results it was revealed that Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up + brown mulching method produced higher NMC and cane yield of 92.93'000/ha and 103.93t/ha respectively which is closely followed by furrow planting (120 cm row spacing) with brown mulching (NMC and cane yield 92.68'000/ha and 103.36 t/ha respectively). Irrigating the crop at IW/CPE ratio of 1.0 produced highest NMC and sugarcane yield of 96.22'000/ha and 106.17 t/ha respectively which is significantly different from irrigating the crop at IW/CPE ratio of 0.6 (NMC and cane yield 82.62'000/ha and 98.94 t/ha respectively). Planting method x irrigation schedule interaction was found not significant. However maximum water use efficiency was recorded with IW/CPE of 0.6 (819.7 kg/ha-cm) followed by IW/CPE ratio of 0.8 (764.3 kg/ha-cm). Furrow planting (120 cm row spacing) with alternate skip furrow irrigation after earthing-up + brown mulching treatment recorded higher water use efficiency (819.6 kg/ha-cm) than other planting methods.

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Geospatial modeling and analysis of groundwater recharge potential areas using GIS based AHP, Entropy, Fuzzy-AHP, and TOPSIS techniques in Bargarh Canal Command Area, India

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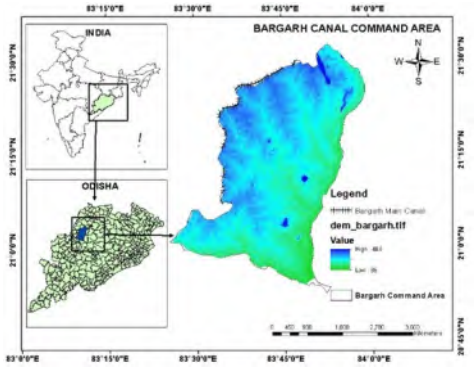
Abstract:

Groundwater is a valuable resource for agricultural productivity, food security, and economic development, particularly in India, where it supports nearly 80% of the population for drinking and irrigation. This study delineates groundwater recharge potential zones (GWRPZs) within the Bargarh Canal command area in Odisha, India, utilizing remote sensing (RS), geographic information systems (GIS), the Analytical Hierarchy Process (AHP), Entropy, Fuzzy Analytical Hierarchy Process (FAHP), and the Technique for Order preference by Similarity to Ideal Solution (TOPSIS) approach. This study integrates various thematic layers, including geomorphology, geology, soil type, and canal density, to develop comprehensive GWRPZ maps. The resulting maps were validated using Error Matrix, achieving overall accuracy scores of 75.65 %, 56%, 70.56%, and 73.72% for AHP, Entropy, FAHP, TOPSIS, respectively. The outcomes of this study offer a comparison among different approaches, scientific guide for the economical placement of wells and insights for the successful planning of groundwater development as well as management, and can be instrumental for policymakers in identifying suitable sites for groundwater extraction.

Keywords: AHP; Entropy; Error matrix; FAHP; Groundwater potential; TOPSIS



Biography:

Ms Priyanka Mohapatra is a PhD research scholar in the Department of Soil and Water Conservation Engineering (SWCE) and is currently serving as a teaching assistant in the College of Agricultural Engineering and Technology, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha. She has completed her Bachelor of Technology (B Tech) in Agricultural Engineering and Master of Technology (M Tech) in SWCE from CAET, OUAT, Bhubaneswar. She has qualified for the ICAR (SRF) and is receiving the OUAT merit scholarship. Her research interests include hydrological modelling, groundwater modelling, and advanced GIS-RS. She has published several research papers in reputable journals and participated in numerous national and international seminars, conferences, and training programmes. She aspires to contribute further to advancements in SWCE and watershed management.

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Extraction and proteomic characterization of in-house derived gelatin from water buffalo hide and pig skins

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Abstract:

This study was targeted to evaluate the possibility of water buffalo hide gelatin (BHG) as potential substitutes for pig skin gelatin (PSG). To achieve this, a comprehensive analysis and proteome characterization of gelatin simultaneously extracted from two different sources as reported by earlier researchers were carried out. Average yield of BHG (9.47%) was higher ($P < 0.05$) relative to PSG (5.98%). BHG had the ($P < 0.05$) higher collagen solubility (75.76%), cohesiveness and chewiness and significantly lower fat content as compared to PSG. The BHG had higher ($P < 0.05$) transmittance %, emulsion activity index, gelling and melting point as compared to PSG. Fourier transform infrared spectroscopy analysis exhibited the presence of amide-II peaks at 1500.67-1523.82 cm-1 frequency for BHG and PSG. Scanning electron microscopy revealed a sheet-like appearance for PSG and SSG with no voids. Presence of collagen alpha 1 (I) chain as a predominant component responsible for gelatin stability with unique species- specific peptides were confirmed by SDS-PAGE followed by MALDI-TOF MS analysis. Current study has successfully demonstrated the superior quality and functionality of BHG as an alternative to porcine gelatin for industrial production.

Keywords: Buffalo hide . Gelatin . Mass spectrometry . Collagen alpha 1 . FTIR

Biography:

Dr. Bidyut Prava Mishra, Ph.D currently working as Assistant Professor in the Department of Livestock Products Technology, C.V.Sc & A.H., OUAT, Bhubaneswar. Dr Mishra Completed her M.V.Sc from IVRI, Izatnagar and Ph.D from SVVU, Tirupati. She has been awarded with Dr B V Rao Global Poultry Award, Inspiring Lady Veterinarian Award, IMSA-Dr Karmegam-Dushyanthan Best Doctoral Thesis Award-2024, IMSA-Prof. K Sudhakar Reddy JMS Best Paper Award-2023. She has published more than fifty research articles in various National & International Journal of repute besides credited as reviewer of many Journals. She is the author of many Veterinary and Animal Science books like “Meat Scan”, “Milk Scan” & “Animal Science at Your Finger Tips”.

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Effect of boron application through drone on growth, yield and economics of Sesamum sown in pre-rabi season

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Abstract:

A drone demonstration on "Effect of boron application through drone on growth, yield and economics of Sesamum sown in pre-rabi season under north western plateau agro-climatic zone" was conducted at seven locations of of Deogarh district during pre-rabi season of 2024. As per the soil test report, we have applied major nutrients as recommended dose of fertilizer (30-15-15 kg N, P_2O_5, K_2O/ha) and Zinc sulphate ($ZnSO_4$) 25 kg/ha as basal application and boron 20% @ 500g/ha was applied through drone during pre-flowering stage which was compared with the conventional method of sesamum cultivation (25-15-0 kg N, P_2O_5, K_2O/ha and foliar application of boron 20% at pre-flowering stage by battery sprayer) . Application with recommended dose of fertilizer (30-15-15 kg N, P_2O_5, K_2O/ha), Zinc sulphate ($ZnSO_4$) 25 kg/ha as basal and boron through drone resulted in higher capsules per plant (24.6), test weight (2.4g) and grain (436 kg/ha) which was 51.4% higher yield than conventional method of sesamum cultivation. The profit and B:C was also more with the nutrient management practice through drone (Rs 31,500.00 and 1.82 respectively).

Key words: boron, pre-rabi, drone, growth, yield and economics

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Geo-spatial based crop suitability modelling of Sikharpur Micro-Watershed in Odagaon Block of Nayagarh District, Odisha

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Abstract:

Cropland suitability must be determined in order to meet the increasing demand for food caused by climate change, environmental contamination, and population growth. In light of this, the current study integrated the Remote sensing and geographic information system (GIS) techniques to evaluate the suitability of crops in the study area. This Study demonstrates the application of GIS technologies for Sikharpur micro-watershed (under Odagaon MWS Cluster, Odagaon block, Nayagarh District) occupies an area of about 477 ha and has been spread across Hariharpur, Angising, Asurdhipa, Dhusuma, Karabaraghunathpur, Sikharpur, Baunsiaraghunathpur, Pancharidamanpur, Dimisar, Bhikaripara, and Pathargar villages. As per crop suitability plan of the MWS, it was observed that maize, pulses, and millets were the most promising crops covering 73.61% of TGA of the MWS under moderate suitability class across various landform situations. Deep soil encompasses an area of 69.38% of TGA. Soils were medium in organic carbon in 73.61% of TGA of the MWS. Available nitrogen, phosphorus, potassium and sulphur were medium in 70.89, 70.89, 73.61, and 70.89% of TGA, respectively. whereas, available micronutrients (viz., Zn & B) was sufficient in about 73.62% of TGA each. Three soil phases from arable lands were selected as benchmark soils covering 307.05 ha (64.42% of TGA) of the MWS area. These phases may be recommended for crop diversification hotspot with appropriate nutrient management plan, soil and water conservation measures with construction of suitable water harvesting structures (hydrological units) and also grouping of farmers as community consultation groups. Restoration of forest has been suggested through Social/ Agro-forestry interventions with Azadirachta sps., Bambusa Sp., and Acacia sp. other multi-purpose trees (MPTs) under hilly terrain situation of Khondalite, Granitic gneiss and Charnokite (OdgB, OdgC, OdgE & OdgJ series) landscape.

Keywords: Remote sensing, TMU, Suitability, Management, phase

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Genetic variability and correlation studies in brinjal (Solanum melongena L.)

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Abstract:

The present experiment on genetic variability and correlation in brinjal was carried out with 38 locally collected genotypes with the objective to improve the yield through selection. The results revealed that wide variability was found for different traits in brinjal. Invariably, higher values were observed for phenotypic coefficient of variation with respect to corresponding genotypic coefficient of variation indicating the impact of environmental factors towards trait expression. High estimates of genotypic coefficient of variation, heritability (broad sense) and genetic advance as percentage of mean together at a glance were observed for the characters such as fruit yield per plant, number of fruits per plant, fruit weight, fruit girth and node at which first flowering appeared, suggesting additive gene action for expression of these characters indicated their possibility of improvement with simple selection procedure in Brinjal. Similarly, correlation studies among the traits indicated that there is a strong inherent association between yield per plant with characters like plant height and number of fruits per plant. Further, plant height, number of fruits per plant, fruit weight, fruit girth, days to 50% flowering, days to first fruiting and days to edible maturity showing significant positive association both at genotypic and phenotypic levels suggested that, these are important correlated characters contributing towards fruit yield of brinjal and simultaneous improvement in these characters will be helpful in brinjal improvement programme.

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Mycoflora associated with seeds, wilt disease and their management in fodder cowpea

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Abstract:

The present thesis titled "Mycoflora associated with seeds and wilt disease and their management in fodder cowpea" was carried out in the Department of Plant Pathology, Department of Seed Science and Technology, and AICRP on Forage Crops and Utilization, OUAT, Bhubaneswar. This study aimed to isolate, identify and manage the mycoflora associated with seed and wilt disease in fodder cowpea. The fungus *Fusarium oxysporum f*.sp. *tracheiphilum*, was isolated and identified as a major threat to cowpea, causing root rot and wilt disease. Survey and monitoring of diseases in fodder cowpea during Kharif, 2023 reflected *Fusarium oxysporum* as the major pathogen initiating the root rot and wilt incidence in second week of August and increasing its severity upto third week of September causing 36% disease severity in the crop. The blotter paper and PDA plate culture of seed mycoflora ascertained that the genera *Fusarium, Aspergillus, Sclerotium, Rhizoctonia, Alternaria* and *Curvularia* were the major fungi associating with cowpea seeds. Among various fungicides tested, Carbendazim 50% WP exhibited the highest efficacy in inhibiting the mycelial growth of test pathogen achieving 100 percent inhibition. *Trichoderma harzianum* was found most efficacious among the tested bio-agents achieving 74.45% inhibition of *Fusarium oxysporum*. Out of seven plant extracts tested *in-vitro*, the rhizome extract of *Zingiber officinale* (ginger) at 20% concentration recorded maximum mycelial growth inhibition (74.23%). Furthermore, the growth promotion studies in field resulted in the conclusion that the soil application of vermi formulation of *Trichoderma asperellum kjr* @4kg/acre enriched with 250kg FYM alongwith seed treatment with the same bioagent @10g/kg recorded significantly highest plant height (35.23cm), number of leaves (26.33) and maximum green fodder yield (337.4 Q/ha). This treatment reduced the wilt incidence by 89.1% and increased the GFY by 27%. One laboratory test on seed health study was done by biopriming with biocontrol agents and it was concluded that *Trichoderma viride* was the most effective antagonist which supported the seed health and plant growth promotion, recording 86% seed germination and maximum seed vigour index-I (4576.2) and seed vigour index-II (179.7) when compared to other treatments.

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A critical review on the indigenous agroforestry system of the East Himalayan region

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Abstract:

Climate resilience refers to a system's ability to handle stresses while maintaining structure, functionality, self-organization, and adaptability. The three pillars of climate-resilient agriculture (CRA) are sustainability, building resilience, and reducing greenhouse gas emissions. The northeastern region of India, known as the Seven Sisters and a brother (Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim), is notable for its unique indigenous agroforestry systems that naturally occur in the Eastern Himalayan region, serving as exemplary models of CRA.The northeastern region spans 2.62 lakh sq km.The ecosystem services from the Himalayan ecosystems supply food, fiber, timber, medicine, drinking water, and irrigation (Kumar et al., 2002; Palacios Bucheli&Bokelmann, 2017; Sharma &Chettri, 2021) and play critical roles in climate regulation, carbon storage, and cultural value maintenance (Sharma et al., 2015; Chaudhary et al., 2017; Xu et al., 2019). This paper explores several traditional agroforestry systems, including the cultivation of large cardamom as a cash crop in Sikkim, India, the pineapple (Ananascomosus) agroforestry system practiced by the Hmar communities in the sub-Himalayan region as a means of restoring land affected by slash-and-burn agriculture, ethnic homestead forests in North-East India, and Piper agroforestry practices in the Indian Himalayas.

Keywords: : plant protection, environmental sciences, agroforestry, dryland agriculture and artificial intelligence

Biography:

Rajashree Krishna Bharadwaj is presently pursuing her masters in the prestigious Banaras Hindu University. She has done her BSc in agricultural sciences from Assam Agricultural University with 8.20 cgpa. A state and national level debater, elocutionist, quizzer, painter, Rajashree is highly involved in working towards achieving sustainable development goals. Her masters work is involved in dryland agriculture in the Vindhyan Region for Climate Smart Agriculture under Assistant Professor of Agronomy Dr Sudhir Kumar Rajpoot of BHU. Her research interest consist of plant protection, environmental sciences, agroforestry, dryland agriculture and artificial intelligence. Attending several national and international conference, she has published a paper in the International Journal for Agriculture Environment and Biotechnology. She aspires to contribute towards dryland agriculture and indigenous agroforestry of North East India.

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Ecological intensification for climate resilient Maize-based cropping system (Rice-Maize) in Odisha

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Abstract:

The study titled "Ecological Intensification for Climate Resilient Maize-Based Cropping System (Rice-Maize) in Odisha" aimed to evaluate the performance of ecological intensification (EI) over traditional farmer practices with respect to crop yield, profitability, and environmental sustainability. Eight treatments were implemented: T1 (Farmer practice), T2 (Ecological intensification), and T3 to T8 (modifications of EI with certain components excluded). The results are summarized in the following table:

Objectives:

The main objective of the study is to compare ecological intensification practices with existing farmer practices. The specific parameters evaluated include:

1. To assess the productivity improvements brought about by EI.
2. To evaluate the economic viability of EI practices through metrics like net returns and benefit-cost (B:C) ratios.
3. To identify the eco-friendliness of these practices concerning resource usage and pest/disease management.

Methodology:

The study employs eight distinct treatments, each focusing on specific aspects of ecological intensification, with T1 serving as the baseline representing current farmer practices:

T1 (Farmer Practice):

- Single ploughing with a power tiller.
- Minimal fertilizer application (30:10:10 kg N:P_2O_5:K_2O/ha).
- Staggered transplanting.
- No irrigation, limited weeding (one hand weeding), and no disease or insect management.

T2 (Full EI):

- Two tractor ploughings for better soil preparation.
- Improved fertilization (80:40:40 kg N:P_2O_5:K_2O/ha).
- Optimized planting density (30 cm × 10 cm spacing).
- Controlled irrigation (two irrigations) and weed management using pre-emergence herbicide (Butachlor at 1.0 kg active ingredient/ha).
- Disease and insect management remain absent to maintain consistency.

T3 (EI minus tillage): EI practices without the enhanced tillage component.

T4 (EI minus nutrient management): EI practices excluding optimized nutrient management.

T5 (EI minus planting density): EI practices without improved planting density.

T6 (EI minus water management): EI practices with no irrigation management.

T7 (EI minus weed management): EI practices excluding herbicide application for weed control.

T8 (EI minus disease and insect management): EI practices without addressing pest and disease control.

Results:

The results demonstrate that ecological intensification (T2) significantly outperformed the traditional farmer practice (T1) in terms of rice grain yield, economic returns, and benefit-cost (B:C) ratio. T2 recorded the highest grain yield of 4869 kg/ha, a net return of ₹40,451/ha, and a B:C ratio of 1.90. These results highlight the enhanced productivity and profitability of adopting EI practices in rice cultivation.

T3, which represented EI minus tillage practices, produced the second-highest grain yield (4339 kg/ha), net return (₹35,228/ha), and B:C ratio (1.84). This indicates that reduced tillage under EI frameworks can still maintain high productivity and economic benefits, showcasing its resource-use efficiency. Among other treatments, T6 (EI minus water management) and T8 (EI minus disease and insect management) also performed better than the farmer practice, producing grain yields of 3906 kg/ha and 4003 kg/ha, with B:C ratios of 1.78 and 1.67, respectively. However, excluding critical components such as nutrient management (T4) or weed management (T7) led to significantly lower yields and economic returns.

In contrast, the traditional farmer practice (T1) produced a grain yield of 3706 kg/ha, with a net return of ₹26,758/ha and a B:C ratio of 1.70, indicating its limited efficiency in maximizing productivity and profitability. The results clearly emphasize the superiority of EI practices in optimizing yields and economic performance while potentially contributing to environmental sustainability.

In conclusion, the study highlights the significant benefits of ecological intensification in improving grain yield, economic returns, and resource-use efficiency in a rice-maize cropping system. T2 (complete EI) emerged as the best-performing treatment, followed by T3 (EI minus tillage). The findings suggest that adopting EI practices can serve as a sustainable approach to enhancing the resilience and productivity of cropping systems under changing climatic conditions.

Conclusion:

The research highlights ecological intensification as a viable strategy for developing climate-resilient rice-maize cropping systems. With significant improvements in yield, economic returns, and B:C ratios, full EI practices (T2) stand out as a promising alternative to conventional farming practices (T1). However, the adaptability of specific EI components offers flexibility for diverse farming conditions, making it a scalable solution for addressing climate challenges in agriculture.

Treatment	Grain yield of rice (kg/ha)	Net return (Rs/ha)	B:C ratio
T1	3706	26758	1.70
T2	4869	40451	1.90
T3	4339	35228	1.84
T4	3585	23492	1.60
T5	3789	27296	1.70
T6	3906	33621	1.78
T7	3721	25651	1.66
T8	4003	27868	1.67
C.D. at 5%	165.9	3088.9	0.08

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Multimodal Sensing for Early Detection of Crop Stress

Ankita Kalra
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Abstract:

Crop stress detection is pivotal for timely intervention and yield optimization. This research explores a multimodal machine learning framework combining RGB-D and ultrasonic sensors for real-time crop stress assessment. Using data collected from autonomous UAV-UGV systems, the study applies YOLO-based object detection and U-Net segmentation to identify stress factors such as drought and nutrient deficiency. Results indicate that integrating depth and ultrasonic data improves stress classification accuracy by ~>10% compared to conventional RGB-only methods. The findings highlight the potential of multimodal sensing for precision crop management.

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Automated Smart Irrigation And Fertilization Using IoT

Uma Maheshwari P
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Abstract:

In the face of evolving environmental challenges and the imperative to sustain agricultural livelihoods, this project explores the integration of technology to enhance agricultural practices. Focusing on the development of an IoT-based automatic irrigation system, incorporating smart sensors, MQTT, and edge computing, the project aims to optimize crop care, reduce costs, and boost productivity for farmers. Additionally, the project proposes a novel approach to nutrient delivery by directly supplying essential elements such as Nitrogen, Phosphorus, and Potassium through drip irrigation. This targeted fertilization method ensures precise nutrient uptake by plants, minimizing wastage and maximizing yield. By combining data-driven recommendations with automated irrigation and fertilization, the project seeks to fortify agricultural sustainability and resilience in the face of global climate change and resource constraints.

Keywords: Agriculture, IoT, smart sensors, automatic irrigation, nutrient delivery, sustainability

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Screening of *Setaria italica* and *Setaria viridis* for salt-tolerance at seedling stage

Nitish Kumar* and Vaidurya Pratap Sahi

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Abstract:

Salinity is one of the most widespread soil problems, posing a significant threat to food security throughout the globe. This study evaluates the performance of 13 Foxtail millet [*Setaria italica (L.) Beauv.*] accessions and wild Foxtail millet (*Setaria viridis*). It uses seedling parameters at the germination stage to identify salt-tolerant genotypes of Foxtail millet. The in vitro experiment was arranged in a completely randomized design with four replications. Screening was carried out using three different concentrations of Sodium Chloride (NaCl) along with a control (75 mM, 100 mM, 150 mM, and 0 mM). Twenty seeds of each accession were germinated on filter paper in closed petri dishes, and seedlings were allowed to grow for seven days in a germination chamber at room temperature (25°C). Five representative seedlings from each petri dish were used for the measurement of seedling parameters, viz. shoot length, root length, fresh weight, relative shoot length (RSL), relative root length (RRL), relative seed germination (RSG), and seedling vigor (SV). These parameters provide insights into the growth responses of different genotypes under varying salinity stress levels. The data for all the seedling parameters of Foxtail millet were analyzed using a paired sample T-test with OPSTAT and Analysis of Variance using GRAPES. An individual stress response index (ISRI) was calculated for each parameter, and the means were used to group the accessions.

The findings reveal a nuanced response to salinity stress, with notable variations among different genotypes. Salinity stress significantly reduces shoot length, root length, germination percentage, and seedling vigor in most accessions, highlighting its detrimental effects on early plant development. However, some genotypes display resilience, maintaining growth under stress conditions. Among the evaluated accessions, ER-101 emerges as particularly tolerant to salinity stress, showing consistent growth performance across varying NaCl concentrations. Additionally, five accessions (ERP 95, EN 83, EN 54, SEA 12, SEA 15) exhibit moderate tolerance, while the remaining accessions are deemed sensitive to salt stress. Notably, wild accessions demonstrate high susceptibility to salinity stress, emphasizing the importance of screening for salt tolerance in breeding programs. This study highlights the significance of genetic variability in determining salt tolerance in Foxtail millet.

Identifying tolerant genotypes offers valuable insights for breeding programs aimed at enhancing salinity tolerance in this important cereal crop. By understanding the mechanisms underlying salt tolerance and leveraging genetic diversity, breeders can develop resilient varieties capable of sustaining productivity in saline-affected environments. Ultimately, these efforts can mitigate soil salinity's adverse effects, boost agricultural productivity, and ensure food security in salinity-prone regions — an essential step toward sustainable agriculture in the face of climate change.

Keywords: Foxtail millet, Salinity Tolerance, Seedling parameters, T-test

Biography:

Nitish Kumar has completed his M.Sc. in Genetics and Plant Breeding from SHUATS. He holds a B.Sc. (Hons.) in Agriculture from Parul University. Throughout my academic journey, I have developed a strong passion for advancing sustainable agriculture practices and sharing my knowledge. My research focused on Foxtail millet, and I have actively participated in various workshops, training programs, and competitions to enhance my expertise. I am deeply committed to contributing to the field of agriculture and working towards impactful advancements in genetics, plant breeding, and agricultural extension.

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Poster

Pre-breeding selection in Barnyard Millet using genetic diversity analysis based on phenotypic and statistical observation for selection impact factor

Samith D Panicker and Vaidurya Pratap Sahi
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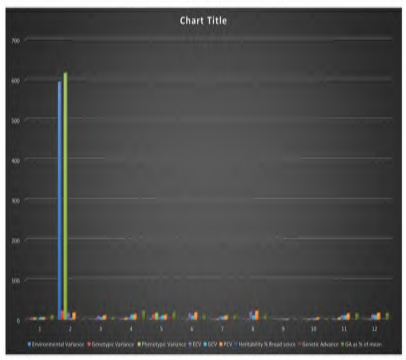
Abstract:

Barnyard Millet *(Echinochloa esculenta/E. frumentacea)* also known as Japanese Millet/Sawa Millet is known for resilience, especially drought, and is nutritionally rich. The present study was conducted using 46 Barnyard Millet genotypes including Single Plant Selections. The observations were made on five randomly selected competitive plants for characters. The observations were noted on the basis of plant population of each genotype following RBD with three replications. The Quantitative data were recorded on 12 characters to study Analysis of variance, Genetic diversity, Principal component analysis, D^2 statistics and Correlation coefficient analysis. Analysis of variance of quantitative traits demonstrated a significant difference among genotypes for most of the traits indicating that the experimental material under investigation has an ample amount of diversity. Scores have been allocated for variable components. The g enotypes have been divided into 7 clusters and each cluster has associated component traits which will give us the insights regarding pre-breeding measures which has to be followed in order to obtain the exact characters in the progenies for further hybridization procedures. Barnyard Millet Initial Advanced Varietal Trial (BIAVT) will overall provide us with the all-round statistical analysis of the trial with respect to the studies conducted in lower Gangetic plains of Prayagraj region in rainfed conditions.

Keywords: Genetic Diversity analysis, Single Plant Selections, Principal Component Analysis, Cluster analysis.



Biography:

Samith D Panicker is a Post Graduate Research Scholar from Department of Genetics & Plant Breeding SHUATS Prayagraj 211007. He has received a Bachelor's degree in Agriculture (Hons.) and Food Business from Amity University in 2021 with a variety of training, work experience in Agriculture and Food industry related fields like Beverages & Dairy in processing technology and field operations. Apart from that he has trained in various training programs from different organizations which are nationally and internationally recognized along with various national and international conferences which are duly certified are accessible in his LinkedIn profile. During Masters he worked in SHUATS under the Directorate of Research, Seed Bank. During the course of his studies, he has been involved in different crop improvement trials but his main work came as Initial advanced varietal trial of Barnyard millet crop (BIAVT) along with other major and minor millets under All India Coordinated Research Project (AICRP) of Millets under the guidance of his Advisor Prof. (Dr.) V. P Sahi who is working as the Project In-charge and Principal Investigator of this trail.

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Root studies in Lentil (*Lens culinaris* Medik.) genotypes reveal correlation between drought tolerance and root architecture

Dixit Tagra*, Rahul Choudhary, Jenny P. Ekka and Vaidurya Pratap Sahi
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Abstract:

Climate change has resulted in elevated temperatures and drought conditions posing threat to agricultural production. Drought, especially, has become frequent and poses a significant threat to crop production. Pulses, an important source of protein face loss of yield due to abiotic stresses which is a major concern. Lentil (*Lens culinaris* Medik.) is an important pulse crop grown worldwide, particularly in drought-prone regions. There is a lack of comprehensive studies focusing on the specific root characteristics that contribute to drought tolerance especially in lentil plants. This study aims to bridge this gap by systematically evaluating lentil genotypes, focusing on their root system characteristics, alongside physiological and agro-morphological responses to drought. In the present study, 24 lentil genotypes were subjected to drought stress and compared with control, grown in Prayagraj. Our findings reveal significant variations among lentil genotypes. Plants have employed adaptive strategies such as early flowering, higher relative water content, accumulation of proline and deeper root systems to cope with drought conditions. Physiological traits such as chlorophyll content and relative water content showed a strong correlation with seed yield emphasizing their significance in drought tolerance. Genotypes with deeper and more extensive root systems demonstrated enhanced water and nutrient uptake, correlating positively with overall plant performance, including seed yield, chlorophyll content and relative water content. These physiological traits are indicative of a plant's ability to maintain growth and yield under stress, highlighting the interconnectedness of root architecture and drought resilience. By integrating root adaptability with other adaptive traits, this study underscores the necessity of a comprehensive breeding approach that prioritizes not only yield but also the maintenance of physiological processes under drought conditions.

Keywords: Climate change, Drought, Lentil, Morpho-physiological characteristics, Root system architecture

Biography:

Dixit Tagra is a Master's student in Genetics and Plant Breeding at SHUATS, Prayagraj. He has participated in the 5th International Group Meeting at IIWBR, Karnal, and the Second National Genetics Congress at ICAR, New Delhi, where he presented a poster showcasing research contributions. Dixit Tagra has also completed an online NPTEL workshop on molecular cloning, enhancing his understanding of advanced molecular techniques. Dixit Tagra is passionate about exploring innovative solutions in Genetics and Plant Breeding, focusing on crop improvement, cell biology and molecular genetics, he aspires to leverage these skills to address key challenges in agriculture and contribute to sustainable crop development. Dixit Tagra is dedicated to furthering his knowledge and contributing meaningfully to the field of genetics and plant breeding through research and innovation.

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Screening of Bread Wheat (*Tritium aestivum* L.) accessions grown in Prayagraj for climate resilience based on evaluation of heat tolerance indices

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Abstract:

Wheat, a major crop, has been globally affected by climate change especially heat and drought. The increasing frequency of terminal heat stress due to climate change poses a significant threat to global wheat production. This study aims to address the yield gap caused by terminal heat stress by evaluating 103 wheat genotypes, obtained from ICAR-NBPGR, New Delhi, for phenological, physiological and yield-related traits under timely and late sown conditions. The present study revealed highly significant differences among genotypes. Heat stress has significantly affected physiological and yield related traits resulting in reduced grain yield per plant. Physiological traits, such as, SPAD readings showed a positive and strong correlation with grain yield under both conditions, suggesting it as a key indicator for heat tolerance. Furthermore, heat tolerance indices were utilized to better characterize the heat-tolerant genotypes from the heat-sensitive ones. Correlation analysis revealed that geometric mean productivity, harmonic mean, stress tolerance index and mean productivity were significantly and positively correlated with grain yield under both conditions. From the results obtained from principal component analysis, biplot and cluster analysis, it was reported that C306, DBW110 and IC355864 are heat-tolerant and good yielding genotypes under both conditions. These genotypes can be used for cultivation at high temperature or as genetic resources for introducing genetic variations in wheat genotypes to improve stress tolerance.

Keywords: Wheat, Heat stress, Climate change, Heat tolerance indices

Biography:

Rahul Choudhary is a Master's student in Genetics and Plant Breeding at SHUATS. He has participated in key scientific events, including the 5th International Group Meeting at IIWBR, Karnal, and the 2nd National Genetics Congress at ICAR, New Delhi, where he has presented a poster. Rahul Choudhary has also attended an offline workshop at IIWBR, Karnal, on "Accelerated Breeding for Mainstreaming Zinc Enrichment in Wheat," which enhanced his understanding of biofortification and breeding strategies.With a strong interest in [specific area, e.g., crop improvement, genetic enhancement], Rahul Choudhary is committed to contributing to agricultural advancements and addressing challenges in food security. He continues to build knowledge and skills to make meaningful contributions to the field of genetics and plant breeding.

Research Interest: Stress Physiology, Cell Biology, Molecular Biology (Genome Editing, Transcriptomics, Molecular Markers, Marker-Assisted Selection, Epigenetics)

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Studies on Quality of Dehydrated Shoe Flower Petals

S. Thanga Lakshmi and M. Selvamuthukumaran
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Abstract:

Hibiscus (*Hibiscus rosa-sinensis*), which is an ornamental shrub commonly known as shoe flower and it belongs to Malvaceae family. They produce flowers of different sizes and colors. It is an important medicinal plant, which has got many nutritional values. Hibiscus petals contain several natural antioxidants and it be effectively used in food and pharma industry as a source of dietary supplements. Fresh petals are having very less stability, therefore in order to retain the quality and stability of hibiscus flower, drying is adopted. In this study, different hibiscus flower petals were dried under various experimental conditions viz. sun drying, shade drying and hot air oven drying (45˚C) in order to ascertain the quality aspects of various dried hibiscus flower petals. The findings shows that the red colored hibiscus variety projected higher antioxidant property during sun drying. The total phenol content was also found to be higher for red colored hibiscus variety, when it was dried under sun. Protein content of red color hibiscus variety is higher during sun drying. Pink variety displayed greater anthocyanin content during sun drying. The shade dried sample retained more moisture content for red colored variety, and elevated ash content was observed for double shade colored hibiscus variety sample, which was dried under shade condition, the hot air oven dried sample exhibited higher crude fiber content for red colored petal samples. Therefore, the quality of petals can be efficiently retained especially by sun drying method, thereby one can retain the bioactive constituents to the greater extent.

Keywords: Shoe flower, Hibiscus, Drying, Quality, Physico-chemical, Antioxidants

Biography:

S. Thanga Lakshmi, completed my UG Specialization in the Field of Agriculture from The Indian College of Agriculture, Radhapuram, which is affiliated to Tamilnadu Agricultural University, Coimbatore. She joined in the Joy University for PG Programme in the stream Floriculture & Landscape Architecture and successfully completed the programme in the year 2024. She has carried out my research work on drying and dehydration of shoe flower petals in order to retain its bioactive properties thereby retaining the stability. She has actively participated in various programmes conducted by Joy University and bagged several prizes during my active participation.

Research Interest: Floriculture Cultivation, Postharvest Handling & Value Addition

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Epidemiological study of web blight in mung bean under natural incidence

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Abstract:

Mung bean (Vigna radiate (L.) Wilczek) is a short season legume crop and belongs to the family Leguminaceae. It contains about 25% of protein. In India total area under mung bean is 47.55 lakh ha with an annual production of 24.55 lakh tonnes with 516 kg/ha productivity. Due to various biotic and abiotic stresses the production and productivity has been lowered down. Among different diseases web blight caused by Rhizoctonia solani Kuhn is one of the major constraint which leads to 33 to 40% loss in grain yield .

As mung bean can be grown throughout the year in different cropping seasons like Kharif, Rabi. Rice fallow and Summer there is a need of epidemiological study to know the impact of different weather parameters on disease development. Keeping this in view an experiment on "Epidemiological study of web blight in mung bean under natural incidence " has been conducted at Nutri Crops Research Station, Berhampur under Odisha University of Agriculture and Technology during 2023-24.The trial conducted in randomized block design . Mung bean variety IPM-02-14 was sown for disease observation in three replication in 10 x 5 m2 plot area. Minimum and maximum temperature ,rain fall and relative humidity recorded in daily basis. Statistical analysis of co-relation regression between standard meteorological week(SMW) and disease severity analysed for epidemiological study.

The web blight disease initiated in 37 SMW when the rainfall continuously occurred from 36 to 39 SMW . The disease developed on 37 SMW and maintained till harvesting of crop on 40 SMW. It has observed that the Tmin, relative humidity and rainfall were negatively correlated to development of the disease. The disease was negatively correlated Tmin (-0.866), relative humidity (-0.432) and rainfall (-0.892) whereas the disease is positively correlated with the rainfall at 0.05 level of significance. The rainfall occurred from 36 SMW to 39 SMW which found favourable for disease development.

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Farmer's perception about direct seeded rice adoption in Haryana

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Abstract:

Direct-seeded rice (DSR) is a possible alternative to conventional puddled transplanted rice. The area under DSR is increasing associated with Covid-19 labour migration and subsequent scarcity. There is a gap in the recommendation and adoption practices of DSR followed by the farmers. Therefore, a study was conducted to ascertain the adoption status of crop management practices of DSR by farmers. Personal interviews were conducted to collect data from randomly selected 180 farmers from 25 villages of 6 blocks of three districts of Haryana (Karnal, Kaithal and Kurukshetra).

The results showed that majority (48.3 %) of the farmers under DSR were in middle age group (30–45 years) and semi-medium category (5-10 acres). Maximum number of farmers (97.2%) preferred dry DSR as compared to vattar/ tar vattar DSR. Maximum 63.9 per cent farmers used scented varieties (Pusa 1509, Pusa 1121, Pusa 1718 etc.) of rice as compared to coarse varieties/hybrids. Further, maximum number of farmers (76.7%) had sown the DSR early between in during 10 May to 30 May against the recommended sowing time (1 June to 15 June). The result of this study showed that there is need of extension interventions to bridge the gap in the recommendation and adoption practices at farmers field.

Keywords: Survey, Early Sowing, Direct seeded rice, Haryana, Transplanted rice

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Cluster Front Line Demonstrations (CFLDs) impact in summer green gram production in Faridabad district of Haryana, India

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Abstract:

In India among different cropping systems Rice–wheat cropping is the major agricultural production system. After harvest of wheat summer green gram could be a great option for the farmers in rice- wheat system. The production of green gram in district Faridabad is very less as compared to state and national average. For large scale popularization of improved technologies, front line demonstrations are an important tool in agriculture. A three-year study from 2020 to 2022 during summer seasons was carried out in various villages of Faridabad district of Haryana by conducting cluster front line demonstrations at farmers' fields. With the participation of farmers, a total of 175 demonstrations were laid out in three years in 70-hectare area with the objective of improving yield productivity and to demonstrate the impact of improved technologies of pulses production potential to the farmers.

Latest variety of moong seed MH 421 was treatment with fungicide Thiram and bio fertilizers like rhizobium and Phosphorus Solubilizing Bacteria, weed management by means of chemical i.e. pendimethalin, balanced fertilizers application and integrated pest management were the improved technologies used. Three years study results showed that there was found a positive impact of CFLDs was on the yield of summer green gram and other aspects. Yield was recorded higher under demonstrated trials as compared to farmer's local practices.

Average summer green gram yield for the years 2020 to 2022 was recorded higher (627 kg/ha) under improved technologies than under farmers practice (463 kg/ha).

In gap analysis there was technological gap, extension gap and technology index were also observed. Higher gross return, net return and benefit cost ratio was found under improved technologies over farmer's practices.

Present study has improved the economic aspects of farming community under cluster front line demonstrations over farmers' practices.

Key words: Economics, Yield, Gap %, Extension gap, Technology index, Technology gap, CFLD, summer green gram.

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Intelligent crop circle: A blockchain-driven, IoT-based, AI-powered sustainable agriculture system

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Abstract:

Conceived as a high-end engine to revolutionise sustainable agri-food production, the intelligent crop circle (ICC) aims to incorporate the Internet of Things (IoT), blockchain technology and artificial intelligence (AI) to bolster resource efficiency and prevent waste, increase the volume of production and bring about sustainable solutions with long-term ecosystem conservation as the guiding principle. The operating principle of the ICC relies on bringing together multidisciplinary bottom-up collaborations between producers, researchers and consumers. Key elements of the framework include IoT-based smart sensors for sensing soil moisture, temperature, humidity, nutrient and air quality, which provide short-interval and timely data; blockchain technology for data storage on a private chain, which maintains data integrity, traceability and transparency; and AI-based predictive analysis, which actively predicts resource utilisation, plant growth and environment.

This data and AI insights are built into the ICC platform, which uses the resulting DSS (Decision Support System) outlined as help in decision making, delivered through an easy-touse mobile app or web-based interface. Farmers are assumed to use such a decision-making aid behind the power of the logic informed by the data pool. Building on existing data available in the farm management systems, the ICC platform is easily interoperable with other IoT devices. ICC facilitates connections and information sharing in real-time between users, including farmers, researchers and industrial partners, enabling them to cooperate in farming innovation and knowledge exchange. Moreover, ICC supports sustainable practice in agriculture by integrating gamification techniques to stimulate farm adopters, deploying VR technologies to model and visualise 3D farm environments and farm conditions, framing the field scenarios using VR headsets and Real-Time 3D engines, and leveraging edge technologies to facilitate secure and fast communication and collaboration between users involved.

And through allowing blockchain-based marketplaces, ICC offers traceability from farm to fork – that is: from producer to consumer. It empowers informed decision-making through tailor-made recommendations generated by means of AI-driven analysis and technology democratisation, enabling small-scale and resource-limited farmers to get their voice heard. It connects with traditional knowledge, brings together multi-stakeholder interactions as well as establishes a participatory ecosystem to incentivise continuous growth and development towards more sustainable agro-ecological food systems. This integrated approach leverages the power of emerging technologies to provide sustainable solutions for a resilient food system, ensuring sustainable agriculture worldwide.

Keywords: Sustainable agriculture, Blockchain, Internet of Things, Artificial intelligence, Decision support system, Virtual reality, Gamification, Traceability

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Effect of Secondary and micronuttrient on yield and economics of groundnut in coastal Odisha

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Abstract:

A field demonstration was conducted on secondary and micronutrient appilication in groundnut by Krishi Vigyan Kendra, Kendrapara at Berhampur village under Garadpur block of Kendrapara. The groundnut farmers of the locality faced problem of shrienkled kernel and unfilled pod and realised lower income from groundnut. So experts from KVK, Kendrapara diagnosed the problem might be due to deficiency of secondary and micronutrient. So a frontline demonstration was planned during Rabi 2023-24 on application of Sulphur and Boron in groundnut. The variety grown was Dharani. The soil of the demonstration site was sandy loam soil with medium level of Nitrogen and Phosphorous with high potassium level. The Sulphur and Boron content of the soil was in lower in range. The crop was grown with line planting of seeds with spacing of 20cmx10cm and the seeds were treated with seed treating chemical before 7 days of sowing. The biofertilizer i.e. Rhizobium spp treatment was done before 12 hrs of sowing. The basal fertilizers were applied according the STBFR.Sulphur @ 30 kg /ha and Boron @ 1.25 kg/ha was applied during the application of basal fertilizer. The results from the study revealed that with application of Sulphurl and Boron increased the groundnut yield by 13% compared to the check. Maximum pod yield was obtained with the demo i.e. 22.3 q/ha as compared to 19.8 q/ha from the check(Table. 1). Application of both secondary and micronutrient resulted in reduction in the number of unfilled pods per plant(1.3 per plant in demo and 5.2 per plant in check). With respect to economics, application of Sulphur and Boron resulted in higher Gross return(Rs 122650/ha), Net return(Rs 50150/ha) and B: C ratio of 1.69.

Table 1: Yield and economics of groundnut as affected by application of Sulphur and Boron

Particluars	Yield (q/ha)	No of unfilled pods per Plant	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio
Demonstartion (Application of Sulpher @ 30 kg/ha and Boron @ 1.25 kg/ha) along with NPK as per STBFR	22.3	1.3	72500	122650	50150	1.69
Check(No Application of Sulpher and Boron) only NPK	19.8	5.2	70600	108900	38300	1.54

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Assessment of physiological and biochemical parameters in brinjal varieties for evaluating salinity tolerance

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Abstract:

Brinjal (*Solanum melongena* L.) is the second most important solanaceous vegetable crop after potato. Under changing climatic conditions, both biotic and abiotic stresses significantly limit its growth and productivity. Salinity, a major abiotic stress, severely impedes crop production, particularly in coastal regions. To identify a salt-tolerant genotype, the physiological and biochemical responses of three OUAT-released brinjal varieties *viz.,* Utkal Tarini (V_1), Utkal Anushree (V_2), and Utkal Madhuri (V_3) were evaluated under induced salinity stress. Salinity stress was simulated using different NaCl concentrations i.e., 0.1%, 0.3% and 0.5%. The study revealed that germination rates decreased as salinity levels increased, with Utkal Tarini exhibited the highest mean germination (71.29%), followed by Utkal Anushree (66.26%) and Utkal Madhuri (63.78%). Morphological traits such as seedling length, shoot length, root length, fresh weight (FW), dry weight (DW), and seedling vigour indices (SVI-I and SVI-II) were adversely affected by increasing NaCl concentrations. Among the varieties, Utkal Madhuri showed superior performance at higher salinity stress levels, recorded a seedling length of 13.19 cm and higher shoot length (10.55 cm), root length(2.65 cm), FW (0.50 g), and DW (0.30 g). Biochemical analyses revealed significant degradation of chlorophyll-a, chlorophyll-b, total chlorophyll, and carotenoid content with increasing salinity. Among the varieties, Utkal Madhuri maintained the highest chlorophyll content (1.09 mg/g FW) under 0.5% NaCl stress, whereas Utkal Tarini showed the highest carotenoid content (0.04 mg/g FW) under similar conditions. Conversely, protein and proline levels increased under salinity stress, with Utkal Madhuri recorded the highest proline (46.68 µmol/g FW) and protein content (6.03 mg/g FW) at 0.5% NaCl stress. It was revealed that Utkal Madhuri as the most salt-tolerant variety among the three, followed by Utkal Anushree and Utkal Tarini, based on physiological and biochemical responses to salinity stress.

Keywords: Salinity stress, brinjal, NaCl, Seedling establishment

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Role of livestock genetics, breeding, biotechnology and nutrition in enhancing food security and nutrition

Sudhansu Ranjan
The Firm Enterprise

Abstract:

Food security and nutrition are critical global challenges, especially in the face of increasing population pressures and environmental constraints. Livestock farming plays a pivotal role in addressing these challenges by contributing to sustainable food production systems. This paper explores the synergistic impact of advanced livestock genetics, scientific breeding practices, animal biotechnology, and optimal nutrition management on improving food security and societal nutrition.

Innovations in animal genetics and biotechnology have enabled the development of high-yielding, disease-resistant breeds, ensuring consistent production of milk, meat, and eggs. By adopting scientific breeding practices, farmers can improve productivity and maintain genetic diversity, thereby strengthening the resilience of livestock systems. Furthermore, precise feeding management and nutrient-rich diets optimize growth rates, reproductive efficiency, and product quality, contributing significantly to the nutritional needs of communities.

As a livestock farmer and Agri-entrepreneur, this paper highlights practical experiences and innovative solutions implemented in sustainable farming systems. The integration of these strategies enhances livestock productivity while promoting environmental sustainability, ensuring food security for future generations. This holistic approach to livestock farming can serve as a model for achieving balanced agricultural systems that address both human nutritional needs and ecological health.

The Vision:

"The improvement of meat quality and quantity in an industrial farming ecosystem can be achieved through sustainable livestock practices that integrate advanced genetics, scientific breeding, biotechnology, and precise nutritional management. This approach not only enhances productivity and profitability but also supports environmental sustainability and creates employment opportunities. By embedding these principles within a sustainably integrated farming system, we can establish a model that balances food security, economic growth, and ecological preservation."

"In Eastern, North Eastern, and Southern India, meat and eggs hold a central place in dietary habits and cultural traditions, far surpassing milk in consumption. From birth ceremonies to weddings, receptions, and even funerals, meat is not merely a food item but a symbol of goodwill, hospitality, and social status. This cultural significance stems from an evolutionary appetite for meat as a primary source of protein and nutrition. However, over time, poor breeding practices, lack of scientific interventions, and inadequate animal husbandry methods have led to a decline in both the quality of livestock and the meat produced. This degradation directly impacts food security, reducing the availability of high-quality protein and essential nutrients. Addressing these challenges is critical to preserving the cultural and nutritional relevance of meat while ensuring sustainability and resilience in livestock farming systems."

Implementation:

We chose goats as the primary source of meat production due to their high demand and the abundance of resources to sustain them. Initially, we began breeding Black Bengal goats in a free-range system in 2017 with a modest stock of 10 female breeding goats and one unidentified breeding buck (a crossbreed of Black Bengal and an unknown breed).

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(Photograph of our initial Black Bengal goat stock and the buck.)

(Photographs where meat is served in all kinds of cultural function as meat curry in odisha)

About Black Bengal Goats:

Black Bengal goats are renowned for their exceptional meat quality, characterized by tenderness, low fat, and rich flavour. They are small-sized, highly adaptable to diverse climatic conditions, and have a high reproductive rate, making them ideal for small-scale and large-scale farming systems. Despite these advantages, the breed's potential often remains untapped due to unscientific breeding practices and limited nutrition.

Initial Breeding Results:

The kids born in the early stages of our project weighed between 1–2 kg (including both single and twin births). However, their weight gain potential was limited to just 20–50 grams per day at maximum. Recognizing the limitations, we began breeding trials using various bucks, including pure Black Bengal bucks, Beetel crosses, and other unidentified crossbreeds. Unfortunately, even with these trials, the weight gain of kids only improved marginally, reaching a maximum of 70 grams per day.

Shift to Semi-intensive Farming:

To overcome these challenges, we transitioned from a free-range system to a semi-intensive farming system. In this setup, goats were primarily fed within the farm using cultivated feed and supplemented with seasonal resources, while grazing was limited to specific periods. This system allowed better control over nutrition and resource utilization.

Challanges:

While the semi-intensive system showed improvements, the weight gain remained below expectations. Additionally, new challenges emerged:

- Parasitic Infections: Goats were frequently affected by ectoparasites and endoparasites, which hampered their growth and overall health.
- Biosecurity Issues: Maintaining biosecurity proved difficult, leading to recurring infections and health risks.
- Nutritional Imbalances: The reliance on available seasonal resources sometimes caused deficiencies, affecting productivity.

Despite these hurdles, the transition helped us identify critical areas for further improvement, laying the foundation for adopting more scientific breeding and feeding practices to enhance productivity and meet the growing demand for quality meat production.

Transition to Scientific Intensive Goat Farming:

To overcome these challenges, we transitioned from a free-range system to a semi-intensive farming system. In this setup, goats were primarily fed within the farm using cultivated feed and supplemented with seasonal resources, while grazing was limited to specific periods. This system allowed better control over nutrition and resource utilization.

Challanges:

In 2022, On supervision of Dr. Pravat Kumar Sahoo (M.V.SC GYNAECOLOGY) and EX-CDVO Malkangiri, Odisha, we transitioned from a semi-scientific, semi-intensive approach to a fully controlled, scientific method of goat breeding through an intensive goatery management system. This decision was based on years of trials and evaluations (2017–2022) in free-range and semi-intensive systems, where we identified key challenges such as biosecurity risks, parasitic infections, inconsistent nutrition, and suboptimal growth rates.

In the intensive system, goats are housed entirely within the farm, ensuring:

- Biosecurity: Minimizing exposure to external pathogens.
- Health Monitoring: Enabling regular veterinary checks and preventive care.
- Nutritional Precision: Feed and fodder intake tailored to the physiological needs of each goat, calculated and monitored daily.

Key learning from 2017 to 2022:

Our trials provided invaluable insights into:

- Feeding and Fodder Management: Understanding the dietary needs of goats based on health and body condition using locally available materials and crop residues for sustainability and cost-effectiveness.
- Nutritional Planning: Recognizing the importance of balancing dry matter, energy, and protein levels for different goat categories, such as dry, lactating, pregnant does, growing kids, and breeding bucks.

This knowledge formed the foundation for implementing an efficient, sustainable, and cost-effective intensive goatery management system.

Practices in intensive goatery management:

To ensure consistent and quality nutrition:

Green Fodder Cultivation: With the help of Brajabandhu Swain (Research Project Coordinator, ILRI, INDIA) Over 3 acres of green fodder were cultivated, including Napier grass and leguminous plants, ensuring year-round availability.

Balanced Concentrated Feed: Formulated to match the energy, protein, and mineral requirements of different goat categories.

Leguminous dry fodder storage: Dry fodder with high protein content is stored annually to meet off-season needs

Whole corn silage: Used as an economical, nutrient-rich feed supplement.

Scientific feeding approach

The feed and fodder allocation is carefully calculated based on the dry matter intake (DMI) requirements of goats in various stages:

Dry Does: Maintenance-level feeding to prevent over conditioning.

Lactating and Pregnant Does: High-energy and high-protein diets to support production and fatal growth.

Growing Kids: Balanced nutrition to maximize growth potential.

Breeding Bucks: Special feed mixes to enhance reproductive efficiency.

Final Breeding Trials with Second-Generation African Boer

In 2022, equipped with the benefits of controlled farming, we initiated our final trial of crossbreeding. Our Black Bengal mother stock was paired with a second-generation African Boer buck.

AFRICAN BOER GOAT: A GAME-CHANGER IN MEAT PRODUCTION:

The African Boer goat, originally bred in South Africa, is renowned for its rapid growth rate, excellent carcass yield, and superior meat quality. These goats are well-adapted to intensive farming systems and exhibit strong resistance to diseases when properly managed. Male Boer goats can reach a weight of 110–135 kg, while females can weigh 90–100 kg in ideal conditions. Their genetics make them a preferred choice for crossbreeding with local breeds to enhance meat production.

CROSSBREEDING RESULTS: ENHANCING GROWTH AND PRODUCTIVITY:

We initiated a crossbreeding program using our Black Bengal female stock and a second-generation African Boer male. The results were remarkable:

1. Birth Weight and Growth Rate

Crossing 20 Black Bengal females with the 2nd-gen African Boer male yielded 30 kids, with an average kidding ratio of 1.5 kids per mother. The birth weights ranged from 2 kg to 4 kg under intensive goatery management with proper feeding and supplementation. During the first 3 months of lactation, these kids grew at a rate of 80–150 grams per day, significantly higher than previous practices.

2. Post-Weaning Growth

After weaning (referred to as post-weaning phase), the kids continued to grow consistently at the same rate of 80–150 grams per day. This was achieved by providing balanced nutrition and feeds calculated based on their dry matter intake (DMI) needs.

3. Productivity Improvements

Compared to earlier practices, where growth was slow and inefficient, this new system demonstrated multiple times the growth rate. The time required to reach marketable weight was halved, while the final weight was doubled.

IMPLICATIONS FOR FOOD SECURITY AND NUTRITION

These results highlight how animal genetics, scientific breeding practices, intensive management, and optimized feeding strategies can revolutionize goat farming. In a growing population where resources are limited, such advancements play a critical role in ensuring food security and improving nutrition.

Meat and Milk as Protein Sources

Goats are vital for fulfilling protein needs in regions where meat consumption surpasses milk consumption. However, the productivity of local breeds has been insufficient to meet the demand.

Crossbreeding with African Boer goats not only increases meat production but also improves meat quality. The time to achieve market weight is drastically reduced, making goat farming more efficient and sustainable.

Sustainability and Resource Optimization

With limited resources, intensive goat farming with improved genetics ensures higher productivity without overburdening the environment. It represents a sustainable approach to meeting society's increasing demand for high-quality protein sources.











Society for Agricultural Research & Management

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