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Conference Proceedings of

AGRI VISION 2024

January 19 - 21, 2024 | ICAR-NRRI, Cuttack, Odisha, India

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CONFERENCE PROCEEDINGS

Vol.02, Issue 01

ISBN: 978-81-960392-6-4

AGRI 2024 VISION

6th International Conference on

Agriculture for Sustainable Development

January 19 - 21, 2024 | ICAR-National Rice Research Institute
Cuttack, Odisha, India

Organized by

In collaboration with

Society for Agricultural Research & Management
कृषि अनुसंधान और प्रबंधन संस्थान

Conference Proceedings of

6th International Conference on

Agriculture for Sustainable Development

January 19-21, 2024 | ICAR-National Rice Research Institute, Cuttack, Odisha, India

Vol. 02, Issue 01

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Er. Rajesh Kumar Guru

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Government of India

D.O. No.2706/MIN(FAH&D)/20.23-24
14 DEC 2023

Message

I am delighted to know that the Society for Agricultural Research & Management (SARM) is organizing an event on. "Agri Vision 2024: An International Conference on Agriculture for Sustainable Development", from January 19-21, 2024, at ICAR – National Rice Research Institute, Cuttack, Odisha.

As you may be aware that the SARM is a non-profit organization established at Cuttack, Odisha. The aim of the society is to serve as a bridge to promote the research and innovations in Agriculture and allied sectors, encourage the members and provide the opportunities to promote the innovations, exchange knowledge, collaborate and coordinate with various associations to serve the farmers and empower them.

This Agri Vision 2024 is based on the theme "Economic Development through Sustainable Agriculture Practices. Agri Vision 2024 covers all the aspects of Agriculture including Plant Science, Agriculture & Horticulture, Animal Science & Dairy, Fisheries & Aquaculture, Agri – Business, Rural Banking, Agri waste upscaling. Bio- energy from Agri waste and Agri- policies etc. from all around India and abroad as well. Agri Vision- 2024 will comprise of Plenary Sessions, Oral Presentations, Poster Presentations, Farmer expert interaction, Exhibitions and Awards.

I extend my best wishes to the Organizer and Participants for success of this event.

(Parshottam Rupala)

Delhi Office : Room No. 234, 'B' Wing, Krishi Bhawan, Dr. Rajendra Prasad Road, New Delhi-110 001
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सत्यमेव जयते

डॉ. हिमांशु पाठक
DR. HIMANSHU PATHAK
सचिव (डेयर) एवं महानिदेशक (आईसीएआर)
Secretary (DARE) &
Director General (ICAR)

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कृषि एवं किसान कल्याण मंत्रालय, कृषि भवन, नई दिल्ली–110 001

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DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION (DARE)
AND
INDIAN COUNCIL OF AGRICULTURAL RESEARCH (ICAR)
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
Krishi Bhavan, New Delhi 110 001
Tel: 23382629 / 23386711 Fax: 91-11-23384773
E-mail: dg.icar@nic.in

MESSAGE

I am happy to know that the Society for Agricultural Research & Management (SARM) is organizing the 6th International Conference on Agriculture for Sustainable Development (Agri Vision-2024) in collaboration with ICAR-NRRI, Cuttack, Odisha during Jan 19-21, 2024 at Cuttack. 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. It is good to know that the Agri Vision-2024 at Odisha is addressing the challenges the 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 hope the programme will be useful for all the stakeholders.

I wish the event a grad success.

(Himanshu Pathak)

Dated the 8th, January, 2024
New Delhi

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

9th January, 2024

Message

I am happy to know that the Society for Agricultural Research & Management (SARM) is hosting the 6th International Conference on Agriculture for Sustainable Development (Agri Vision-2024) in collaboration with ICAR-NRRI, Cuttack Odisha from Jan 19-21, 2024.

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 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-2024 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 including cultivation of medicinal plants.

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

(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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डॉ. मृत्युंजय महापात्र

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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 6th International Conference on Agriculture for Sustainable Development (Agri Vision-2024) in collaboration with ICAR-NRRI, Cuttack Odisha during January 19-21, 2024.

Weather plays a dominant role in agriculture. Accurate weather prediction helps in taking apt farming decisions. Sound weather knowledge helps in minimizing costs and maximising agricultural yields thereby increasing farmers' income. It also helps in reducing vulnerability to extreme environmental impact.

India is shifting from the traditional agriculture to the modern agricultural practices adopting tools & techniques. The agrometeorological information at farm/village level has become very much essential. We believe that the farmers' income can be enhanced in coming years through the modern ways of sustainable agricultural practices supported by services provided jointly by India Meteorological Department and Ministry of Agriculture and Farmers Welfare, Government of India.

I am pleased to know that the Agri Vision-2024 at Odisha is addressing the challenges of the farming community and helping them to tackle these issues through sustainable and climate smart agricultural practices. This platform will support the farmers in strengthening their economic status and make them self-reliant.

I express my best wishes to the organizers, delegates, exhibitors and all stakeholders for successful organization of Agri Vision 2024 and all their future endeavours.

(M. MOHAPATRA)

Phone : 91-11-24611842, Fax : 91-11-24611792
E-mail : directorgeneral.imd@imd.gov.in / dgmmet@gmail.com / m.mohapatra@imd.gov.in

भारतीय कृषि अनुसंधान परिषद
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Indian Council of Agricultural Research
Ministry of Agriculture and Farmers Welfare
Govt. of India, Krishi Bhavan
New Delhi 110001, India

डॉ. तिलक राज शर्मा
उप महानिदेशक (फसल विज्ञान)

Dr. T. R. Sharma, Ph.D
FNA, FNAAS, FNASc, JC Bose National Fellow
Deputy Director General (Crop Science)

Message

I am happy to know that the Society for Agricultural Research & Management (SARM) is hosting the 6th International Conference on Agriculture for Sustainable Development (Agri Vision-2024) in collaboration with ICAR-NRRI, Cuttack Odisha from Jan 19-21, 2024.

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 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 conditions.

It is good to know that the Agri Vision-2024 at Odisha is addressing the challenges farmers are facing and suggesting ways 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.

(T.R.Sharma)

Dated : 9th January, 2024
Place : New Delhi

E-mail: ddgcs.icar@nic.in Phone: 91-11-23382545 Fax: 91-11-23097003

भाकृअनुप - राष्ट्रीय चावल अनुसंधान संस्थान
कटक (ओडिशा) ७५३ ००६, भारत
ICAR - NATIONAL RICE RESEARCH INSTITUTE
CUTTACK (ODISHA) 753 006, INDIA

डॉ. ए.के. नायक
निदेशक
Dr. A.K. Nayak, FNASc, FNAAS
Director

Message

The agriculture as well as rice sector is facing an abundance of new challenges, such as low productivity and low income, degraded natural resources, threat of climate change, increasing labour and energy shortages and environment friendly disposal of agro-waste. The ICAR-National Rice Research Institute is working to develop innovative research to address these challenges keeping the farmers' welfare in mind.

A timely initiative- "Agri Vision 2024: An International Conference on Agriculture for Sustainable Development" at ICAR-National Rice Research Institute, Cuttack, Odisha, India aim to address important topics such as crop science, agriculture and horticulture, animal science and dairy farming, fisheries and aquaculture, agribusiness, rural banking, valorisation of agro-waste, bioenergy from agro-waste and agricultural policy. I look forward to the collaborative efforts that will shape the future of agriculture at a global level. The themes are based on sustainable development of agriculture and address the most of the challenges of present time from climate change to food security. I believe the present conference will provide the platform for experts, researchers, students and other participants from around the world to share insights, explore innovative solutions and work together to promote sustainable practises that will shape the path of agriculture in the years to come.

I strongly believe that this conference will provide opportunities towards a more resilient, equitable and prosperous agricultural future for our global community. I convey my best wishes to all the members of the Society for Agricultural Research & Management for grand success of the conference on Agriculture for Sustainable Development.

(AK Nayak)

ଓଡ଼ିଶା କୃଷି ଓ ବୈଷୟିକ ବିଶ୍ୱବିଦ୍ୟାଳୟ, ଭୁବନେଶ୍ୱର
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କୁଳପତି
Prof. Pravat Kumar Roul
Vice-Chancellor

Dated the 8th January, 2024

MESSAGE

Sustainable agricultural practices are crucial for ensuring nutritional security, improving environmental health, strengthening livelihood options and fostering economic development. Increased agricultural productivity and farm income can strengthen rural economy and contribute towards poverty alleviation. I am glad to know that the Society for Agricultural Research and Management is organizing "Agri Vision-2024: An International Conference on Agriculture for Sustainable Development" to discuss about various aspects of agriculture. I expect, the deliberations of this conference will pave the path for addressing several challenges faced by the farming community.

I wish this endeavour all success.

(P. K. Roul)

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डा. रविशंकर सी.एन.
निदेशक/कुलपती
Dr. Ravishankar C.N.
Director/Vice Chancellor

MESSAGE

I am happy to know that the Society for Agricultural Research & Management (SARM) is hosting the 6th International Conference on Agriculture for Sustainable Development (Agri Vision-2024) in collaboration with ICAR-NRRI, Cuttack Odisha from Jan 19-21, 2024.

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 doubling farmer's income can be achieved easily in coming five years through the modern ways of Sustainable Agricultural practices.

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It is good to know that the Agri Vision-2024 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.

January 9, 2024
Mumbai

(Ravishankar C.N.)

पंच मार्ग, ऑफ यारी रोड, वरसोवा, अंधेरी (प.) मुंबई - ४०० ०६१. भारत
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डॉ. अजित कुमार शासनी
निदेशक
Dr. Ajit Kumar Shasany
Director

Message

I am happy to know that the Society for Agricultural Research & Management (SARM) is organizing its annual conference "6th International Conference on Agriculture for Sustainable Development (Agri Vision-2024)" from January 19-21, 2024 at ICAR-NRRI, Cuttack, Odisha.

After green revolution we have accelerated the productivity of crops through different technologies which is the silver lining in the growth of the country. We are able to feed the citizens and in addition exporting food grain and products. But we are yet to be self sufficient in pulse and oilseed. Also, we are able to increase the productivity, may be at the penalty of nutrition and tolerances to different stresses. Hence, it is time to focus to improve the improved crops for stress resilience and rich nutrition.

I believe the platform of Agri Vision 2024 will discuss important issues at ground level and find out the most appropriate solutions and empower the farmers to meet the future demand of feeding.

I wish a great success of Agri Vision-2024.

Date: 03.01.2024

(Ajit Kumar Shasany)

Phones : (Off.) (0522) 2205848, EPABX Phone : (0522) 2297800 to 2297999 Fax : (0522) 2205839, Post Box No. 436, Lucknow-226001
e-mail : director@nbri.res.in, Website : www.nbri.res.in

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ICAR-Central Institute of Freshwater Aquaculture
(An ISO 9001:2015 Certified Institute)
Kausalyaganga, Bhubaneswar-751002, (Odisha), India

डॉ प्रमोद कुमार साहू
निदेशक
Dr. Pramoda Kumar Sahoo
Director

MESSAGE

It gives me immense pleasure to know that Society for Agricultural Research and Management is organizing "Agri Vision 2024: An International Conference on Agriculture for Sustainable Development" during January 19-21, 2024 in collaboration with ICAR- National Rice Research Institute, Cuttack at Cuttack, Odisha.

I am happy to know that the Agri Vision 2024 based on the theme "Economic development through sustainable agriculture practices- together we make it possible' will discuss all issues and challenges covering all aspects of agriculture besides addressing sustainable fisheries and aquaculture. I sincerely believe that the platform of Agri Vision will provide valuable strategies for addressing all issues of the sector and stakeholders upon wider deliberation to make agriculture a dependable option for doubling farmers' income.

I wish all the best for successful organisation of the conference.

(Pramoda Kumar Sahoo)

Phone : 0674-2465421, 2465446, 2465502 (O), Fax : 0674-2465407
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Keynote

Advancing sustainable agriculture through process-based crop modeling in the era of climate change

Vangimalla Ramakrishna Reddy*[1], Sahila Beegum[1,2]
[1]Adaptive Cropping System Laboratory, USDA-ARS, Beltsville, MD, USA
[2]University of Nebraska , Lincoln , NE, USA

E: vangimalla.reddy@usda.gov

Abstract:

Climate change has led to fluctuations in temperature and precipitation patterns, increased extreme weather conditions, and higher levels of greenhouse gases. These changes present significant challenges in the agricultural sector, particularly for farmers tasked with producing enough food and fiber for the global population, which is expected to exceed 10 billion by 2050. This situation underscores the need to enhance and adapt farm management practices to mitigate the impacts of climate change on agriculture.

Process-based crop modeling is well-known for its capabilities in simulating crop growth and development under various environmental, management, and cultivar interactions. These crop models can be used to analyze and determine farm management strategies in a changing climate that enhance the resilience of agricultural systems, ensuring food security and supporting economic and environmental sustainability. For instance, they can recommend the most suitable crops for different climates and soil types. They can also assist farmers in timing their planting and harvesting, which is increasingly important as traditional growing seasons shift with new climate patterns. Furthermore, these models can guide sustainable land use, efficient water and nutrient use, analysis of climate-resilient crop varieties, and implementation of strategies to deal with extreme weather events. Additionally, the models can help monitor the environmental impacts of various agricultural practices, such as predicting greenhouse gas emissions and fertilizer leaching into groundwater and surface water sources. Using process-based crop models can lead to informed decisions that enhance crop production sustainability, ensuring a stable food supply while adapting to and mitigating the effects of climate variability.

Keywords: Climate change, Process-based crop model, food security, greenhouse gas, economic sustainability

Biography:

Dr. V. R. Reddy is the Research Leader and Supervisory Plant Physiologist for the USDA-ARS Adaptive Cropping Systems Laboratory (ACSL), Beltsville, MD, USA. Over the years, Dr. Reddy served in various professional and administrative positions, as Acting Associate Director for NEA, BARC, and ANRI and as Beltsville Area representative on the RL Advisory Council. He recently served as a Member of the Scientific Advisory Board (SAB) of the Organization for Economic Co-operation and Development (OECD) in Paris, France. Dr. Reddy is a Fellow of the American Society of Agronomy and Crop Science Society of America and a member of several Editorial Boards of the International Scientific Journals. Dr. Reddy's research focuses on crop responses to climate change, especially processes like photosynthesis, respiration, transpiration, carbon and nitrogen metabolism, and growth analysis of cotton, soybean, and other crops. He has authored over 180 publications in peer-reviewed journals, several book chapters, and books.

Research Interest: Climate change, photosynthesis, respiration, transpiration, plant carbon and nitrogen metabolism, process-based crop modeling

Volume 02, Issue 01, 2024|ISBN: 978-81-960392-6-4

Keynote

Sustainable agricultural intensification to address sustainable development goals: Current status of practices and investments

P.V. Vara Prasad
Kruse Endowed Professor and Director, Feed the Future Sustainable Intensification Innovation Lab, Kansas State University, USA

E: vara@ksu.edu

Abstract:

Our agri-food systems has many challenges such as food insecurity, nutrition insecurity, and climate insecurity. At present about 823 million people are food insecure, about 2 billion are malnourished, and climate change is threatening agricultural productivity. The challenge of food and nutrition insecurity is multidimensional (availability; access; use and utilization; and stability of nutritious, safe and healthy food). To meet demands of growing population, food production and access must be improved, even under the threat of climate change. Our natural resources and biodiversity are depleting rapidly and must be protected and regenerated. Addressing all these challenges will require holistic and systems approach. Sustainable agricultural intensification (SAI) provides such platform with a goal to provide access to safe, nutritious, and healthy food at all times to all people from existing farmland and without damaging our natural resources and ecosystem health. The three major components of SAI include genetic intensification, agroecological intensification and socio-economic intensification. Together these provide comprehensive nutrition-smart, climate-smart, and resource-smart agricultural practices. Some examples of these practices include integrated crop-livestock systems; diversification of our farming systems; integrated cereal-legumes systems; agroforestry systems; integration of perennial trees; crop production using principles of conservation agricultural practices; integrated nutrient, water, and pest management; commercial diversified home-gardens; biofortification of food through crop management and crop breeding. Diverse examples of SAI practices from around the world, status of funding and future needs to address key sustainable development goals will be presented and discussed.

Keywords: Sustainable Agricultural Intensification; Climate-Smart Agriculture; Crop Ecophysiology; Abiotic Stress

Biography:

P.V. Vara Prasad is a University Distinguished Professor, R.O. Kruse Endowed Professor of Agriculture and Director of the Feed the Future Sustainable Intensification Innovation Lab at Kansas State University. His research focuses on understanding responses of crops to changing environments and developing best management strategies to improve and protect yields. He has active programs in several countries in Africa, Asia and Latin America that help improve livelihoods of people and smallholder farmers. He has published >420 journal articles and book chapters; and trained >250 students. He is an elected fellow of the American Society of Agronomy; Crop Science Society of America; and American Association for the Advancement of Science. He was a member of International Commission on Sustainable Agricultural Intensification, and a former President of the Crop Science Society of America. He is among the top 1% of highly cited and influential scientists around the world.

Research Interest: Conducting transdisciplinary research, knowledge sharing, and capacity building activities on sustainable agricultural intensification for improving food, nutrition, climate and water security of smallholder farmers. Understanding impacts of climate change factors on crop yield, crop quality, and developing crop management practices to increase and protect crop yields.

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Keynote

Nanobiotechnology-based Strategies for Enhanced Crop Stress Resilience

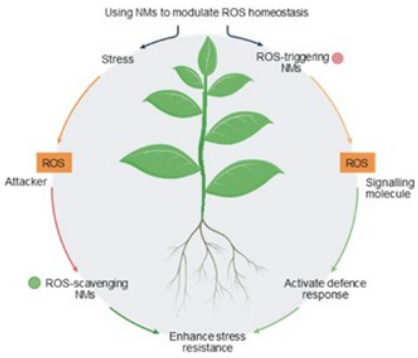
Jason C. White*[1] , Lijuan Zhao[2], Arturo Keller[3], and Jorge Gardea-Torresdey[4]
[1]Connecticut Agricultural Experiment Station, New Haven, CT, USA
[2]Nanjing University, Nanjing, China
[3]University of California, Santa Barbara, CA, USA
[4]The University of Texas at El Paso, El Paso, TX, USA

E: Jason.White@ct.gov

Abstract:

Low use and delivery efficiency of conventional agrichemicals is a significant impediment to maintaining global food security, particularly given that a 60-70% increase in food production is needed by 2050 to support the projected population. Further confounding these efforts is climate change, which may force cultivation of crops under more marginal and stress-inducing conditions. Thus, novel and sustainable strategies for enhancing food production are needed.

Nanobiotechnology approaches to engineer crops with enhanced stress tolerance may be a safe and sustainable strategy to increase crop yield. Under stress conditions, cellular redox homeostasis is disturbed, resulting in the over-accumulation of reactive oxygen species (ROS) that damage biomolecules (lipids, proteins, and DNA) and inhibit crop growth and yield. However, delivering ROS-scavenging nanomaterials (NMs) at the appropriate time and place can alleviate abiotic stress. Importantly, ROS-production in living cells carries both costs and benefits.



When present below a threshold level, ROS can mediate redox signaling and defense pathways that foster plant acclimatization against stress. We find that many NMs are ROS-triggering, such as nanoscale Cu, Fe, S, and CuS, but these materials have the potential to be judiciously applied to crop species to stimulate defense systems, prime stress responses, and subsequently increase the biotic and abiotic stress resistance of crops. This knowledge can be used to engineer climate- resilient crops. It is also clear that the ability to effectively tune nanoscale material structure and composition will be critical to maximizing positive impacts, including significantly reduced amounts of agrichemical use while simultaneously enhancing yield.

Keywords: Nanotechnology, Climate resilient agriculture, Nano-enabled agriculture, Food insecurity

Biography:

Prof. Jason C. White is the Director of the Connecticut Agricultural Experiment Station, the oldest Agricultural Experiment Station in the United States and has a research program on sustainable nano-enabled agriculture. Dr. White is a member of the Connecticut Academy of Science and Engineering and the European Science Foundation College of Experts. He is a Commissioned Official of the US FDA and a Clarivate Web of Science Highly Cited Researcher (2020-2023). He is the Managing Editor for the International Journal of Phytoremediation, an Associate Editor for NanoImpact, on the editorial board of Environmental Pollution, ACS Agricultural Science and Technology, and on the Editorial Advisory Boards of Environmental Science & Technology and Environmental Science & Technology Letters. His Ph.D. is in Environmental Toxicology from Cornell University and has secondary appointments at Yale University and the University of Massachusetts. His h-index is 86 and has published 300 papers with 25,166 citations.

Research Interest: Sustainable Agriculture, Food insecurity

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Keynote

Feeding and fueling the future: Metabolic engineering approaches for increasing oil yield and climate resiliency in oilseed crops

Om Parkash Dhankher
Stockbridge School of Agriculture,
University of Massachusetts Amherst, MA , USA

E: parkash@umass.edu

Abstract:

Renewable transportation fuels (biodiesel and green diesel) from plant seed oils are considered as environmentally and economically feasible alternatives to petroleum-derived fuels. Camelina sativa, due to its unique seed and oil attributes, has attracted much interest as an emerging crop dedicated for biodiesel and jet fuel production. To increase oil yield, we engineered Camelina by co-expressing Arabidopsis DGAT1 and yeast GPD1 genes under the control of seed-specific promoters. Transgenic lines exhibited up to 13% higher seed oil content and 52% increase in seed mass compared to wild-type plants. Further, DGAT1- and GDP1 co-expressing lines produced almost double seed and oil yields per plant basis compared to wild-type or plants expressing DGAT1 and GPD1 alone. To identify the bottlenecks for further improving the seed and oil yield in Camelina, we utilized metabolomic and transcriptomic profiling approaches in developing seeds in Camelina overexpressing TAG related genes. Our approach revealed several key genes/gene networks associated with significant changes especially in the TCA cycle and storage/retention of lipids in seeds. Overexpression of candidate genes showed further increase in oil and seed yield. We are now translating this strategy in edible oilseed crops such as Indian mustard and soybean for increasing edible oil contents and seed yields for food and energy security. Further, to enhance plants productivity under the adverse conditions, we overexpressed novel stress related genes including wax synthase gene (WSD1) and SAP13 for increasing the tolerance to multiple abiotic stresses. WS transgenic plants, when exposed to drought, salinity and heavy metals stresses, exhibited strong tolerance phenotype and had reduced water loss and cuticle permeability due to increased deposition of epicuticular leaf and stem wax loading. Plant expressing SAP13 showed improved tolerance to drought, salinity and heavy metals. Ultimately, our aim is to stack the genes/gene networks responsible for increasing seed and oil yields as well as abiotic stress tolerance to enable these cultivars to growth on marginal lands and under extreme environmental conditions. **Keywords:** Oilseed crops, triacylglycerols, biofuels, metabolic engineering, RNA Seq, metabolome, abiotic stresses

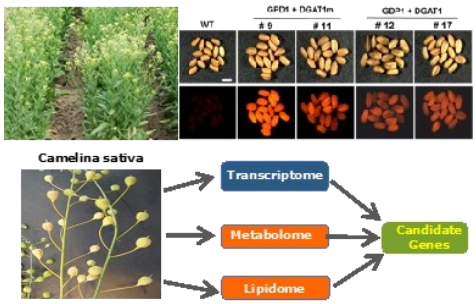

Figure: Engineered *Camelina sativa* plants with increased seed size, oil contents and yields and 'omics' approaches to identify key genes involved in oil synthesis and accumulation.

Biography:

Dr. Om Parkash Dhankher is a Professor at the Stockbridge School of Agriculture, University of Massachusetts Amherst. He received his Ph.D. from Durham University, United Kingdom, and the postdoctoral research training at the University of Georgia, Athens. He has published over 130 refereed papers, 6 edited books, and 5 international patents, and mentored numerous new generation scientists. He has been awarded many outstanding and notable awards including the Award of Excellence for outstanding Research by American Chemical Society, an elected vice president of the International Phytotechnology Society (IPS), Fellow of the Crop Science Society of America, Fellow of the American Society of Agronomy, Fellow of the Indian Society of Plant Physiology, Fellow of the International Society of Environmental Botanists, etc. He is Co-Editor-in-Chief of Plant Physiology Reports, Editor of Plant Cell Report, The Plant Genome, Crop Science, Food & Energy Security, and International Journal of Phytoremediation journals.

Research Interest: Developing climate-resilient crops, environmental remediation of toxic metals and reducing toxic metals uptake in food crops for food safety, metabolic engineering for biofuels production, and sustainable nanobiotechnology.

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Keynote

Genome editing of banana for disease resistance

Leena Tripathi
International Institute of Tropical Agriculture (IITA), Nairobi, Kenya

E: L.Tripathi@cgiar.org

Abstract:

Plant diseases and pests present a significant threat to global food security, causing estimated losses of 20–40% in worldwide food production. This danger is exacerbated by climate change and increased global trade. The impact is particularly pronounced in banana and plantain (Musa spp.), crucial staple crops grown on 11 million hectares across 136 countries, producing 163 million tons annually and feeding over 400 million people. While primarily cultivated by smallholder farmers for local consumption and markets, around 15% of production enters the international market, contributing significantly to income in tropical regions. Africa supplies one-third of the world's banana (including plantain) production, with East Africa being the largest banana-growing region accounting for about 40% of the aggregate production in Africa.

The susceptibility of bananas to devastating diseases necessitates innovative solutions for sustainable production. The adoption of disease-resistant banana varieties, developed through precision genetic technologies like genome editing, emerges as a powerful strategy. CRISPR/Cas9-based genome editing, known for its precision and multiplexing capabilities, offers a promising tool for creating disease-resistant varieties. With a well-annotated genome and robust genetic transformation protocols, banana becomes an ideal candidate for gene editing. The establishment of a CRISPR/Cas9-based gene editing system, using *phytoene desaturase* (PDS) as a visual marker, opens avenues for targeted genome manipulations to enhance disease resistance. A synopsis of recent advancements and perspective on the application of genome editing for generating disease-resistant banana varieties will be presented during this symposium. Additionally, the presentation will address the regulatory landscape, summarizing the current status of requirements for releasing genome-edited crop varieties in different countries. Ultimately, embracing genome editing in banana and plantain cultivation holds promise for mitigating the impact of plant diseases and pests, securing global food production and livelihoods.

Keywords: Genome editing, Banana, Disease Resistance

Biography:

Dr. Leena Tripathi, the Director of Eastern Africa Hub and Biotechnology Program Leader at the International Institute of Tropical Agriculture (IITA), is a distinguished figure in plant biotechnology with over 25 years of research experience. Specializing in crop improvement, she directs transgenic and genome-editing initiatives at IITA, focusing on staple foods like banana/plantain, cassava, and yam to combat diseases and pests. Recognized internationally, Dr. Tripathi has received awards for scientific excellence and is an Elected Fellow of the American Association for the Advancement of Science (AAAS). Her team has established a robust genetic transformation platform in Kenya, fostering collaboration with global labs and regional partners. Serving on the editorial boards of renowned journals, she holds a Ph.D. in Plant Molecular Biology and contributes significantly to advancing agricultural science.

Research Interest: Crop Improvement, Genome Editing

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Keynote

Genetic improvement of crops to balance the needs of food security and climate change

Robert Henry
ARC Centre of Excellence for Plant Succes in Nature and Agriculture and ARC Research Hub for Engineering Plants to Replace Fossil Carbon, University of Queensland, Brisbane, Australia

E: robert.henry@uq.edu.au

Abstract:

Genetic improvement of crops is a key strategy to deliver food security and address climate change by reducing global carbon emissions. Genetic improvement can adapt plants to new climates supporting food security. Crop breeding can also reduce the impact of agriculture on climate by contributing to the achievement of carbon neutral agriculture. However, crop genetics can also deliver biomass that facilitates the replacement of fossil carbon for hard to abate uses. This needs to be done by focusing on opportunities to use biomass that does not compete significantly with food production to preserve food security. Key target crops that satisfy these requirements include sugarcane, sorghum and woody species such as eucalypts. Genetic manipulation of the composition of the cell walls of these high yielding crops is a key strategy to facilitate their efficient conversion to platform chemicals making them attractive alternatives to oil. Transcriptome analysis had revealed large numbers of targets for genetic manipulation. Advances in high throughput mutagenesis and gene editing will allow these options to be explored.

Keywords: food security, climate change, genetic improvement

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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Keynote

Subtropical and tropical ornamental plants: Management, characterization, and genetic improvement

Madhugiri Nageswara-Rao[1]*, Nurhayat Tabanca[1], Amir A. Khoddamzadeh[2], Kevin Cloonan[1], Xangbing Yang[1], Gul Shad Ali[1], Osman A Gutierrez[1], Sukhwinder Singh[1]

[1]USDA-ARS, Subtropical Horticulture Research Station, Miami, FL, USA

[2]Institute of Environment, Florida International University, Miami, FL, USA

E: Madhugiri.Nageswara-Rao@usda.gov

Abstract:

The growing human population and the demand for quality food have presented significant challenges to the agricultural industry. Climate change, plant vulnerability to diseases, and crop monoculture are also major factors affecting the future of agriculture. In this regard, genebanks and germplasm repositories have become vital in conserving and adapting crops making them available to farmers. They provide unique opportunities to develop improved plant cultivars that can increase yield, medicinal and nutraceutical properties, and genetic characteristics that help combat biotic and abiotic stresses. Under the USDA-ARS National Plant Germplasm System (NPGS), the Subtropical Horticulture Research Station (SHRS) in Miami, FL significantly conserves >2500 ornamental plant germplasm accessions. These germplasms are meticulously managed and are efficiently labeled with durable QR-coded UV-resistant metal tags. These tags are compatible with passport information in the NPGS-GRIN global network. Over the last five years >2000 germplasm requests have been met to stakeholders. The taxonomic diversity of ornamentals represents >100 family member plant species representing crop-wild relatives, trait-selective landraces, and native, threatened, rare, endangered, and endemic plant species. For priority ornamental plants, and less genetically studied taxa, over 537 million paired transcriptome nucleotide reads for Amaryllidaceae plants were successfully generated. Key metabolic enzymes and their isoforms (eg., chalcone isomerase, chalcone synthase, flavanone hydroxylase, phenylalanine ammonia-lyase, etc.) in the anthocyanin biosynthesis pathway for white and purple-colored Amaryllidaceae flowering plants were identified. The fragrant white-colored Amaryllidaceae flower shared 88% (Z)-ß-ocimene metabolite concentration as compared to 48% in the non-fragrant purple-colored Amaryllidaceae flower. Research opportunities and challenges of ornamental plant germplasm repositories in crop maintenance, improvement, production, and protection to meet USDA-NPGS systems are discussed in the study.

Keywords: Sustainable 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.

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Keynote

Genome editing potential to transform agriculture in India – What can scientists do to enhance the acceptance of this technology?

Channa Prakash
Dean, College of Arts & Sciences, Tuskegee University, USA

E: cprakash@tuskegee.edu

Abstract:

Gene editing technologies, particularly CRISPR, have considerable potential to advance the sustainability and productivity of agriculture in India. These advanced tools enable the creation of nutritionally superior crops with lower levels of harmful toxins and exhibit enhanced resistance to diseases and pests. They are also more adaptable to changing climate conditions. One of the critical advantages of gene-edited crops over genetically modified (GM) crops is that the former does not involve introducing foreign genes. This distinction results in a lower regulatory burden and potentially greater acceptance among the public. However, realizing the full potential of gene editing in India's farming sector requires streamlined regulations for field testing and approval of these crops. Addressing the controversies and challenges faced by GM crops over the past three decades is essential. Lessons learned from these experiences can guide the successful integration of gene editing technologies. Key to this is the active involvement of the Indian scientific community, particularly from public sector institutions like agricultural universities and the Indian Council of Agricultural Research (ICAR). These bodies need to engage with various stakeholders, including the media, consumers, and policymakers, to transparently address concerns and share information about the benefits and safety of this technology. Moreover, there is a need for innovative communication strategies to promote societal understanding and acceptance of new crop varieties developed through these advanced breeding techniques. The scientific community should leverage modern information and communication technologies, especially social media, to disseminate knowledge and foster a positive perception of these novel crops. In doing so, these efforts must be directed toward educating the public and policymakers, thereby nurturing an environment conducive to the growth and acceptance of gene editing in Indian agriculture.

Biography:

Dr. Channa S. Prakash, Dean of the College of Arts and Sciences (CAS) at Tuskegee University (USA) where he has served on faculty since 1989, is professor of crop genetics, biotechnology. Dr. Prakash's research expertise is on genetic improvement research on food crops of importance to developing countries. His lab was among the first to develop transgenic sweet potato and peanut plants and conduct pioneering genomic studies on the peanut. He is the coeditor of two recent books "Sustainable Agriculture in the Era of the OMICs Revolution" and "Principles and Practices of OMICS and Genome Editing for Crop Improvement." Dr. Prakash has been a global leader in enhancing the societal awareness of crop and food biotechnology issues around the world for nearly three decades. Dr. Prakash was recognized for his outstanding work on agricultural biotechnology outreach with the award of the prestigious 2015 Borlaug CAST Communication Award, by the Council of Agricultural Science and Technology which credited him as "arguably done more than anyone else in academia or industry to promote agricultural technologies that can help feed the world's growing population." He was also recognized by Huffington Post as among the Top 30 social influencers in biopharma and biotech. He has an active presence in the social media, globally ranked as top influencer on 'agricultural biotechnology'. He also serves as Editor-in-Chief of a highly respected journal *GM Crops* & Food. He has been named one of the 'Top Personalities Who have made the Most Significant Contribution to Biotech' by *Nature Biotechnology*: Who's who in biotech - Some of biotech's most remarkable and influential personalities from the past 10 years; 'one of the 100 Top Living Contributors to Biotechnology' by *The Scientist* (chosen by peers via polling); Biotech Food Hero by Crop Life International and the inaugural 'Foodfluencer' award by the US Soybean Export Council in November 2022.

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Trichoderma- Basic biology meets applications

Prasun K. Mukherjee
Former Head, Nuclear Agriculture and Biotechnology Division,
Bhabha Atomic Research Centre, Mumbai , India
Professor, Homi Bhabha National Institute, Anushaktinagar, Mumbai, India

E: prasunmukherjee1@gmail.com

Abstract:

Trichoderma species are the most widely used biofungicides with several commercial formulations being used in agriculture all over the world. In India alone, more than 300 commercial formulations are available in the market. We have isolated a strain of *Trichoderma virens* from soil using the plant pathogen Sclerotium *rolfsii* as a bait. This strain is a very effective mycoparasite on *S. rolfsii* and *Rhizoctonia solani*, with proven efficacy in reducing the disease incidence under field conditions. Using gene knockout, we have extensively studied the role of various genes in mycoparasitism, identifying candidates for strain improvement. We have also isolated two very interesting mutants of this fungus, one downregulated in secondary metabolism and one with improved antibiosis. The former has been used as a novel genetic tool for identifying gene clusters for secondary metabolism, while the over-producing mutant has been formulated into a commercial product. This formulation (TrichoBARC) has been extensively evaluated under field conditions and all the data required for registration have been generated. The formulation, registered with CIB&RC, has been transferred to five companies and some products have been launched in the market. This is the first mutant microbe to have been registered for commercial use.

Biography:

Dr. Prasun Kumar Mukherjee is the former Head, Environmental Biotechnology Section and Group Leader, Agricultural Microbiology, Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, Mumbai and Professor, Homi Bhabha National Institute, Anushaktinagar, Mumbai, India. He obtained Ph.D. in Plant Pathology in 1991 from GB Pant University of Agriculture and Technology and has been a visiting scientist/ scholar at the Israel Institute of Technology, Haifa and Texas A&M University, College Station. Dr. Mukherjee has been working on the biofungicides Trichoderma spp. for more than 20 years and has made seminal contributions in genetics and genomics of these fungi, especially in the area of signal transduction and secondary metabolism. He has also developed novel mass multiplication method for which a patent has been filed and the technology transferred to private entrepreneur. He has published about 50 research papers/ review articles in refereed journals many of which are well cited. He has won several awards for his research contributions and is an elected Fellow of the National Academy of Sciences, India.

Dr. K.S. Krishnan DAE Research Fellowship; Prof. M.J. Narasimhan Academic Merit Award and J.F. Dastur Memorial Award, Indian Phytopathological Society; Pran Vohra Award, Indian Science Congress Association; BOYSCAST Fellowship (DST); VASVIK Award; Govt. of India-Dept. of Atomic Energy Homi Bhabha Science and Technology Award; Govt. of India-Dept. of Atomic Energy Group Achievement Award (as Group Leader, twice); Fulbright-Nehru Academic and Professional Excellence Fellowship; Visiting Scientist, Israel Institute of Technology, and Texas A&M University.

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Plant exploration opportunity, germplasm collection in Indian Himalayan region for sustainable development

Sudhansu Sekhar Dash
Botanical Survey of India, Kolkata, India

E: ssdash@bsi.gov.in

Abstract:

The Indian Himalayan region (IHR), spread over about 5 lakh km2 (about 16.2 % of country's total geographical area), is one of the youngest, fragile, and complex ecosystems in the world. The great variety of climatic and habitat conditions, not only endowed with rich variety of gene pools but also recognized as the centres of origin and centre of diversification of many wild as well as the domesticated plant. IHR supports more than 50 % of the total flowering plants so-far recorded in India. Botanical Survey of India (BSI), the apex research organizations on plant taxonomy have been pursuing taxonomic research in the Himalayan region through its four Regional Centres since independence. This has not only resulted successful collection of huge number of botanically and horticulturally important plants, but also accumulation of information on economically important plant species, gene pools of wild plants, wild relatives of crop plant, prioritizing of future collections, for technology intervened research on crop development, drug development, food security and livelihood generation. As per the current estimate, more than 11157 taxa of flowering plants belonging to 2359 genera under 241 families occur in IHR. Poaceae with 912 species Asteraceae with (820 species), Orchidaceae with 819 species, Leguminosae with 434 species are among the top ten families with maximum diversity.

Botanical Survey of India, is undertaking major efforts in documenting the economically important plant resources of Indian Himalayan region. Many of the western Himalaya wild relative species of the genera of *Pyrus*, *Prunus*, *Sorbus*, *Rubus*, *Ribes*, *Hordeum*, *Elymus*, *Eremopyrum*, *Avena*, *Aegilops*, *Allium*, *Lepidium*, *Carum*, *Linum*, *Cicer* and *Cucumis*, and the eastern Himalayan wild relatives of the genera *Musa*, *Elaeocarpus*, *Myrica*, *Coix*, *Digitaria*, *Oryza*, *Vigna*, *Mucuna*, *Trichosanthes*, *Momordica*, *Cucumis*, *Solanum*, *Brassicaceae*, *Piper*, *Amomum*, *Alpinia*, *Curcuma*, *Zingiber* and *Saccharum* are being conserved in the botanic garden of BSI. As habitat loss in Indian Himalayan region is one of the major threats, these germplasm collections in botanic gardens will pave a way for prioritized future explorations to renew for collection of different populations of threatened species in order to maximize genetic diversity from all population.

Climate change has a huge implication for biodiversity and germ plasm conservation. Three possibilities i.e., adaption of plants to a new climate regime with selective plasticity, migration of plant to higher latitudes, and loss (extinct) of species from the ecosystem have been forecasted. While the past plant exploration efforts focused on collecting a broad range of species and many accessions; the future plant exploration demands for collection of priority taxa, threatened species particularly with narrow range of distribution, and insufficiently represented taxa in, existing ex situ germplasm collections..

In the post 2020 global biodiversity framework scenario, issues such as involvedness of ex situ plant conservation, the impacts of climate change, the spread of invasive species, access to genetic resources, equitable sharing the benefits, and the change in policies and regulations are the key challenges for the plant exploration and germplasm collection. Therefore, there is an urgent need for revamp each of these efforts for effective conservation of biodiversity and sustainable uses natural resources of our country. The issues listed above present opportunities for BSI and other likeminded research institutes of India to help meet the challenges presented by our changing world.

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Keynote

Pathogen informed disease management strategies in crops for sustainable farming

Deo Mishra
Bayer CropScience, Hyderabad, India

E: deo.mishra@bayer.com

Abstract:

Farming community faces a lot of challenge during crop cultivation including many biotic and abiotic stresses that results into huge economic loss annually. Breeding programs and performance of commercial varieties are being hampered by emergence of highly virulent pathogen strains. Study of diversity and dominance pattern within existing pathogen population helps to identify, select, and deploy effective and sustainable resistance genetics in target geographies for better and long-lasting product performance. Advent of genomics era has revolutionized the field of host-pathogen interaction and population biology, and by genome sequencing insights we can generate and access complete genotype of an organism at an unprecedented rate and scale. Such mega-genomic studies and resources are highly valuable in surveillance of the plant pathogen and to track their diversity and movement, thereby effective deployment of durable resistance genetics. By understanding the interactions between pathogens and crops, tailored and environmentally conscious management approaches can be developed. The talk delves into key examples, technological advancements, and the potential impact on achieving resilient and sustainable agricultural practices.

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.

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Keynote

Emerging trends in agricultural marketing: Issues and challenges

Samarendra Mahapatra
Former Professor and Head, Dept. of Agribusiness Management,
OUAT, Bhubaneswar, India

E: samarendra.mahapatra@gmail.com

Abstract:

Government of India and State Governments have introduced various schemes and policies to enhance the agricultural marketing system, with a predominant focus on the production side. However, there is an urgent need to strengthen the marketing system through effective implementation. As agricultural yields and production increase with the adoption of advanced technologies, the significance of marketing becomes more pronounced. Farmers often lack awareness of market conditions, including price dynamics, demand, and supply. This information gap can lead to farmers being compelled to sell their produce to middlemen, resulting in distress sale situations. To address these challenges, there is a pressing demand for an efficient and regulated marketing system that can support farmers and prevent them from being exploited in the market.

Biography:

Dr. Samarendra Mahapatra graduated in Agricultural Engineering from Orissa University of Agriculture and Technology (OUAT); did his post-graduation from Xavier Institute of Management, Bhubaneswar and doctorate in Business Administration from Utkal University. He has worked for more than two decades in corporate in Agri Input Industry and then in acdemics for about 15 years, teaching Management students at post-graduate level in the area of Marketing and Agribusiness. He was nominated as an expert member in many Organizations like ICAR for Syllabus Development and NET in Agribusiness Area besides AP State Agricultural University, Indira Gandhi Krishi Vishwavidyalaya-Raipur, KIIT, Utkal University for faculty recruitment. He was an external examiner to ANGRAU, Mysore University, Telangana State Agricultural university, Rajasthan Agricultural University-Bikaner for Agribusiness students. He is an expert member of the Technical Committee for Project Evaluation of State Government, Odisha, besides staff recruitment in PSUs. sHe has authored books like Management of Agricultural Inputs, Food Retail Management and Supply Chain Management in Agribusiness independently besides several other book chapters

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Potassium enriched biochar: A low cost green technology to enhance production of *Litopenaeus vannamei* (Boone, 1931) reared in inland saline water

Vidya Shree Bharti*, Amal C.T, Vinod Kumar Yadav, and Saurav Kumar

ICAR- Central Institute of Fisheries Education, Mumbai , India

E: cprakash@tuskegee.edu

E: vsbharti@cife.edu.in

Abstract:

Salinization of the agricultural land leads to lower productivity. These resources can pave the way for sustainable production by adoption of aquaculture in Inland saline water. Biochar has shown its potential for remediating array of problem related to agriculture. Inland saline water is deficient in Magnesium and Potassium ions, required for the moulting and immunity built up of the shrimp. The present study aimed at elucidating the effect of the potassium enriched biochar on sediment and water quality and overall growth performances and physiological responses on shrimp reared in Inland saline water. A 50 days experiment indicates that there is enrichment of potassium and Magnesium in the water and reduction of the ammonia-N in the treatment as compared to the control. There was significant increase in the sediment water holding capacity, soil organic carbon, pH, and cation exchange capacity in the treatment. Growth parameters showed a significant increase in weight gain percent, SGR, PER with reduced FCR in biochar-treated groups. Furthermore, the activity of digestive enzymes (protease and amylase), metabolic enzymes (AST, ALT in hepatopancreas), and oxidative stress enzymes (SOD in gills and hepatopancreas; CAT in gills) were significantly higher in biochar-amended treatment groups. Paddy straw activated is better than sugarcane bagasse activated biochar. The results of the present study revealed biochar-amended sediment has potential to improve vital water and sediment parameters, physiological profiles and growth of *L. vannamei* juveniles reared in inland saline water.

Table. Growth Parameters of *Penaeus vannamei*

Parameters	C	T1	T2	T3	T4
Weight Gain Percentage	$173.23^{a}\pm0.73$	$180.73^{ab}\pm2.89$	**$191.75^{b}\pm6.82$**	$178.54^{a}\pm2.17$	**$191.70^{b}\pm1.39$**
Survival Percentage	$72.5^{a}\pm5.2$	$86.3^{ab}\pm7.1$	**$86.3^{ab}\pm2.0$**	$96.1^{b}\pm2.0$	$84.3^{ab}\pm2.0$
Specific Growth Rate (SGR) % day-1	$2.23^{a}\pm0.01$	$2.29^{ab}\pm0.02$	$2.38^{b}\pm0.05$	$2.28^{a}\pm0.02$	$2.38^{b}\pm0.01$
Feed Conversion Ratio (FCR)	$1.56^{c}\pm0.01$	$1.50^{bc}\pm0.02$	$1.41^{ab}\pm0.05$	$1.51^{c}\pm0.02$	$1.41^{a}\pm0.01$

Mean values (Mean ± S.E.) in each row not sharing a common superscript are significantly different ($P < 0.05$). One-way ANOVA was used following Duncan's multiple range test in SPSS-26.0.

Keywords: Potassium enriched Biochar, L. vannamei, Inland saline aquaculture, Growth, Sediment, PSB, SBB

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Keynote

Evolution and application of light-dependent Protochlorophyllide Oxidoreductase enzyme to Increase photosynthesis and plant productivity

Pratistha Vedalankar[1] and Baishnab C Tripathy[1,2*]

[1]School of Life Sciences, Jawaharlal Nehru University, New Delhi , India

[2]Department of Biotechnology, Sharda University, Greater Noida , India

E: baishnabtripathy@yahoo.com

Abstract:

Light-dependent protochlorophyllide oxidoreductase (LPOR) is a nuclear-encoded photo-enzyme in many photosynthetic organisms. LPOR originated in primitive cyanobacterial ancestors during the great oxygenation event that was detrimental to the existence of the oxygen-sensitive Light-independent POR (LIPOR) that prevailed in anoxygenic Earth. Both LIPOR and LPOR catalyse reduction of protochlorophyllide to chlorophyllide in the penultimate step of chlorophyll biosynthesis. Except for angiosperms and gnetophytes several oxygenic phototrophs harbour both LIPOR and LPOR. The selection pressure of increased O_2 concentration, changing light quality and quantity at different depths of the ocean, nutrient status of water, gene reorganization during several endosymbiotic events, horizontal gene transfer, LIPOR gene loss and multiple duplication events played a major role in the evolution and diversification of LPOR and its isoforms in photosynthetic and non-photosynthetic organisms. To overcome the photo-damage PORA was expressed abundantly in the plastids of etiolated plants. PORB evolved to take over the function of vanishing PORA isoform in light. Brassicales evolved PORC to protect plants from high light and other environmental stresses.

To understand the importance of PORB in rice, the light-stable and constitutively expressed *OsPORB* (Os10g35370) was overexpressed under the control of constitutive 35S promoter by Agrobacterium mediated transformation to generate transgenic rice (Oryza sativa L cv. IR64). Overexpression of *OsPORB* resulted in higher Chl content and greener phenotype. As compared to wild type, the *OsPORB* over-expressers had enhanced electron transport rate mediated by both photosystem I and photosystem II. The non-photochemical quenching of Chl a fluorescence of WT plants was higher than the transgenics. The light response curve of carbon assimilation revealed that, photosynthetic rates of transgenic rice plants in different light intensities were significantly higher than the wild type. The increased photosynthetic potential of the *OsPORB* rice over-expressers could be further exploited to increase their yield potential in field conditions.

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Value addition and entrepreneurship development in tuber crops

M. Nedunchezhiyan*, Kalidas Pati, V.B.S. Chauhan, K. Hanume Gowda and Arutselvan
Regional Centre of ICAR-CTCRI, Bhubaneswar, India

E: m.nedunchezhiyan@icar.gov.in

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.

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Keynote

Histone variant H4.V: A gatekeeper to H4K5Ac marks and salt stress transcriptome

P.V. Shivaprasad
National Centre for Biological Sciences, GKVK Campus,
Bangalore, India

E: shivaprasad@ncbs.res.in

Abstract:

Paralogous variants of canonical histones guide accessibility to DNA and function as additional layers of genome regulation. Across eukaryotes, mechanism of action and functional significance of several variants of core histones are well-known except that of histone H4. We identified a novel variant of H4 (H4.V) expressing tissue-specifically among Oryza genera members including wild and cultivated rice species. This variant mediated specific epigenetic changes contributing to seed development as well as in salt tolerance. H4.V was incorporated to specific chromosomal locations where it blocked deposition of active histone marks. Stress dependent re-distribution of H4.V enabled incorporation of active H4 Lysine5 Acetylation (H4K5Ac) marks. Mis -expression of H4.V led to defects in seedling growth, reproductive tissue development and in mounting stress responses. H4.V mediated these alterations by condensing chromatin as seen with cryo-EM structures of reconstituted nucleosomes. We report the first chromatin structure for any plant. Our results not only uncovered the presence of a H4 variant among plants, but also of a novel chromatin regulation that might have contributed to the adaptation of semi-aquatic plants to varying levels of water and salt concentrations.

Biography:

Dr. P.V. Shivaprasad is currently working an Associate Professor and Associate Dean of Faculty, National Centre for Biological Sciences, Tata Institute of Fundamental Research Bangalore. He has completed his Ph.D. in Biotechnology, Madurai Kamaraj University, India (Thesis advisor: Prof. K. Veluthambi). Postdoctoral Research (EMBO and SNF), Viral suppressors of gene silencing, Prof. Thomas Hohn's lab, University of Basel, Switzerland and Postdoctoral Research (BBSRC grant), Gene silencing in tomato, Prof. Sir. David Baulcombe's lab, University of Cambridge, United Kingdom. Research in his laboratory deals with molecules called small RNAs. Small RNAs are the key molecules resulting from RNA silencing pathways and they regulate both transcription and translation with the help of their protein partners.

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Keynote

Abiotic stress management in plants: innate behaviors in Mangroves

Sauren Das
Agricultural & Ecological Research Unit, Indian Statistical Institute
Kolkata, India

E: drsaurendas@gmail.com

Abstract:

Mangroves are a forest formation at intertidal estuaries of tropical and subtropical world. Forest with dense formation of a diverse assemblages of plant families possessing to some extent converging adaptive appearances towards coping mechanisms of hostile environmental factors like high saline and di-oxygenated soil, soft, muddy substratum and frequent water logging ailment. The plants have to thrive in extreme salinity. Depending on periodic inundation of high tidal influence, soil salinity differ from places to places, which have direct influence on vegetation formation. Though the different plant species have salt tolerance ability, but tolerance intensity vary to a great extent due to their respective morpho-anatomy-biochemical and genomic appearances. Mangrove forest plays a vital role in terms of productivity and shoreline protection from natural calamities across the world.

Sundarbans, the largest single block of mangrove formation in the world. Due to some geomorphic characteristics, demographic needs and unplanned exploitation of forest product, the salinity level has gradually increased in the Sundarban mangrove forest since last few decades. Salinity rise impose some detrimental effects on sustainability of some key species of the Sundarbans forest. Certain morphologic features, like root structure, leaf succulence, stomatal abundance and seed/seedling germination outline in different plant species and anatomical characteristics like cuticle thickness, stomatal structure, and presence of water storage tissues in leaf, frequency and diameter of vessel elements in stems etc. determine the inherent ability towards salt tolerance of the individual plant taxa. Salt tolerance ability has directly be contingent on the presence of certain free amino acids in leaf cytosol which governed the high osmotic potential in leaf is considered as an advantage features in this regard. Higher accumulation of certain antioxidant enzymes and some secondary metabolites (phenolic substance) in some species are also considered as additional adaptive features against increased salinity. A wide genetic polymorphism is essential for coping with the rapid change of substrate atmosphere. It has been pointed out that the plant with lower genetic polymorphism showing weaker adaptive ability in high saline regime. Inadequate presence of these above criteria, sustainable existence of some important plant taxa are at stake. *Heritiera fomes* (Sundari), *Nypa fruticans* (Golpata), *Kendalia candel* (Khamo), *Xylocarpus granatum* (Dhundul), *Xylocarpus mekongensis* (Pasur) are considered as weaker adaptability in respect of other flourishing plants in elevated salinity level of western Sundarbans. Such comparatively less adaptive plants need special attention towards conservation measure should be taken with proper scientific vision to protect and afforestation of the precarious existence of the threatened plant species.

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Keynote

Exploration of *Argemone mexicana* plant through RNA-seq data assembly, focusing on the annotation of genes associated with secondary metabolite production

Raghunath Satpathy
School of Biotechnology, Gangadhar Meher University,
Sambalpur, India

E: rnsatpathy@gmail.com

Abstract:

Medicinal plants serve as the primary reservoir of diverse therapeutic compounds, manifested as secondary metabolites. These phytochemicals find extensive applications in traditional medicine and pharmaceutical industries. The intricate metabolic pathways within plants orchestrate the production of these compounds, believed to play diverse physiological roles. Consequently, analyzing the genes associated with secondary metabolic pathways becomes imperative. Presently, Next-Generation Sequencing (NGS) methods stand as powerful tools for generating high-throughput RNA sequence (transcriptome) data, facilitating the discovery of novel transcripts in plants. This study employs an in-silico approach to identify genes responsible for secondary metabolite production in the *Argemone mexicana* plant (family: Papaveraceae). The RNA-seq data from the *Argemone mexicana* plant were retrieved from the NCBI SRA database. Quality assessment and raw data trimming were performed using FastQC, Cutadapt, and Trimmomatic 0.39 software. Subsequently, de novo sequence assembly via the Trinity software package generated a total of 29,591 contig sequences. In the next phase, BLASTX and annotation of all contigs were conducted using Blast2GO and the WEGO2 tool, resulting in annotated genes with gene ontology (GO) terms. Further, the prediction of genes involved in secondary metabolite production in the *Argemone mexicana* plant was accomplished through the functional assignment of the contig sequences.

Keywords: Next generation sequencing, gene annotation, secondary metabolite, de-novo genome assembly, gene ontology

Biography:

Raghunath Satpathy received his M.Sc. in Botany (Specialization Biotechnology) from Berhampur University Odisha, (Post M.Sc.) Advanced P.G Diploma in Bioinformatics from University of Hyderabad, M. Tech. degree in Biotechnology from VIT University, Vellore India, also he was awarded the degree for the doctor of philosophy (PhD) in Biotechnology by Sambalpur University, Odisha. Currently he is continuing as the Assistant Professor in the School of Biotechnology, Gangadhar Meher University, Odisha. He has 14 years of teaching and research experiences. His current research interest is development and application of Bioinformatics tools/databases in the areas of environmental science and human therapeutics. He is the principal investigator of a research project sponsored by Odisha Higher education Council (OSHEC). He has authored 35 journal papers, 18 book chapters and one book to his credit and he is the recipient of many academic and research awards.

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Genome engineering in rice for enhancing photosynthesis and yield

Mirza J Baig, Kutubuddin Molla, Alaka Swain, Deeptirekha Behera, Subhasis Karmakar, Sonali Panda & Manaswini Dash
ICAR-National Rice Research Institute, Cuttack, India

E: mjbaigcrri@gmail.com

Abstract:

Engineering the genome with transgenesis and genome editing offers tremendous opportunities to create novel genetic variations for crop improvement. C4 plants, such as maize and sorghum, exhibit superior photosynthetic efficiency compared to C3 plants like rice in hotter and drier climates. Transferring C4 pathway genes to rice presents an attractive strategy for enhancing photosynthetic efficiency. We have genetically transferred three C4 pathway genes (PEPC, NADP-ME, and PPDK) from Setaria italica into rice to assess their impact on photosynthesis and crop yield. Transgenic plants exhibited an increased electron transport rate (ETR), and increased photochemical quenching (qP) compared with non-transformed control plants. SiME-transgenic plants exhibited reduced leaf malate content and demonstrated superior performance under water deficit conditions. Interestingly, transgenic plants exhibited increased electron transport rate (ETR) and increased photochemical quenching (qP) compared with non-transformed control plants.

We are using CRISPR-Cas9 to generate mutants for rice endogenous C3 type PEPC, PPDK, and ME genes to reveal their functions. Furthermore, we have utilized prime editing to transform rice PEPC into a form resembling C4 PEPC, with higher catalytic efficiency.

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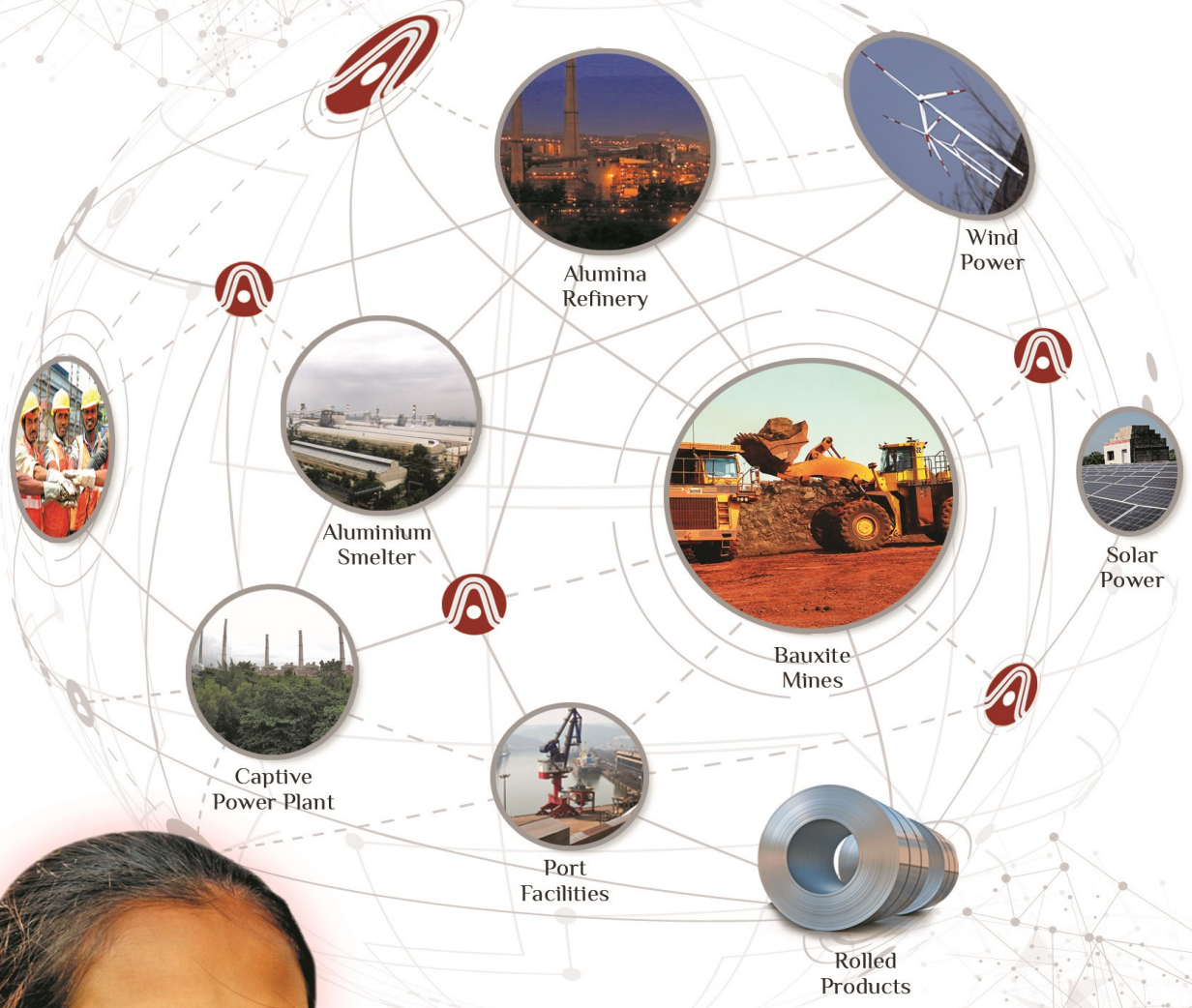

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Supply chain analysis of fruits and vegetables in Odisha: A case study in Kujang Block, Jagatsinghpur

Sachidananda Swain*, Mridula Devi, Jyoti Nayak, Praveen Jakhar and P.K Rout
ICAR-Central Institute for Women in Agriculture, Bhubaneswar, India

Abstract:

A survey was conducted in the Kujang Block to reveal supply chain system of major fruits and vegetables pineapple mango, banana,tomato, okra, cauliflower and cabbage. Due to perishable nature of crops, farmers did not stock harvested produce for sale in lean months. Therefore, no difference in marketable and marketed surplus was observed. Total marketing cost was found lowest in tomato (7.5%) and highest in cucurbits (34.1%) in consumer's rupee.Pineapple recorded highest marketing margin (78.5%) followed by mango (46.3%), okra (43.7%), banana (35.6%), tomato (27.2%), cabbage (24.0%) and cauliflower (21.4%). The major marketing issues faced by the producers are pricefluctuations followed by lack of market information, large gap in consumers' and farm gate prices, sale on credit, lack of collection centers, etc. The farmers' share in consumer rupees was low in banana (21%) and tomato (27%) due to active presence of intermediaries for marketing of these crops.The higher marketing margin could be attributed to seasonality of crops, perishability and wholesaler assembly/ripening price fixed by wholesalers. Price spread was higher in pineapple and cauliflower due to higher costs and profits of wholesaler and retailer. Only two crops (cabbage and cucurbits) showed high marketing efficiency (1.54 and 1.45, respectively). Tomato and banana tagged for low marketing efficiency (0.26, 0.37), indicating the immediate attention of policy makers. In order to fetch the better profit, on-farm marketing, through producers' groups or collectives (SHGs mode) can be considered as viable marketing options for sustainability of supply chain of fruits and vegetables.

Biography:

After joining ARS, I have been posted at ICAR-CIARI, Port Blair in 2010. I have handled five externally funded projects and 8 Institute funded projects. I have 38 research publications in national/international journals, 25 popular technical articles/ bulletins, 36 book chapters and 7 books to my credit. I have developed solar dryer and biomass fired copra dryer suitable for tropical climate for the development of Island sector. Also developed nutraceutical blended beverages from potential underutilised fruits and medicinal herbs of Andaman Islands. I am the Fellow of Andaman Science Association (FASA) and received best book award, best extension scientist award, Young professional award by Society of Community Mobilization, New Delhi. He also received best poster awards, best paper awards in different symposia/conferences and member of ISAE, ASFTI and ASA. Now-a-days, I am actively involved in entrepreneurship development in women sector through value addition and drudgery reduction at ICAR-CIWA, Bhubaneswar since 2019.

Research Interest: Processing and value addition, nutraceuticals, phytochemical analysis and supply chain management

E: sachidananda.swain@icar.gov.in; sachi9463@gmail.com

Edible wild fruits of North-Western Himalayas, India

Sandeep Sehgal* and Gowhar Amin Mir
Sher-E-Kashmir University of Agricultural Sciences & Technology-Jammu,
Jammu & Kashmir, India

Abstract:

A survey was conducted in the Kishtwar, Ramban and Reasi districts of Jammu Division of Jammu & Kashmir Union Territory (JKUT) that lie between the middle and outer Himalayan range. The study was conducted with the objectives to survey, collect, identify and to document the diversity of Edible Wild Fruits and their ethnomedicinal uses. A total of 260 individuals were interviewed by visiting the selected villages based on the pre-structured questionnaire through face-to-face interviews. The interview consisted of some targeted questions regarding the habit, local name of the plants, plant part used, method of crude drug preparation, mode of administration and method of collection and storage. Results revealed that the fruits of 32 plant species (28 genera from 20 families) are commonly found in the study area. Most of the species were trees (54 %) followed by Shrubs (24 %), Herbs (16 %) and Climbers (6%). Different parts of the plant of the plant were used for the treatment of various ailments. The most frequently used plant part was Fruit (49%) followed by Leaves (23%), Seed (13 %), Root (7%), Bark (4%), Latex (3%) and Rhizome (1%). The tradition of using EWFs in treating various ailments is a common practice among the inhabitants of the area. These wild and non-cultivated resources are crucial to local people and require public awareness, community-based management and conservation. Further exploration is suggested into the nutritional profile, phytochemical analysis, and antioxidant potential of these Edible Wild Fruits.

Keywords: Ethnobotany, Wild Edible Fruits, Medicinal Plants

Biography:

Sandeep Sehgal hold a PhD in Agroforestry from Dr. Y. S. Parmar University of Horticulture and Forestry, Solan, Himachal Pradesh. Currently he holds the position of Head Division of Silviculture & Agroforestry. He has more than 20 years of experience in teaching and research in the field of Agroforestry, Medicinal Plants and Biodiversity. He is member of various professional societies. He has published more than 30 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.

Research Interest: Ethnobotany, Biodiversity, Medicinal plants, Agroforestry

E: sehgals1@yahoo.com

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Oral

Strategies for mitigating arsenic toxicity in rice cultivation: Assessing amendments and predictive modeling for safe grain production

Rubina Khanam*, Mohammad Shahid, and Amaresh Kumar Nayak
ICAR-National rice Research Institute, Cuttack, India

Abstract:

Arsenic (As) poisoning is reported to affect 200 million individuals globally, either through the consumption of As-contaminated groundwater or As-laced food crops, especially rice (Oryza sativa L.). The study evaluated the impact of the amendments involving CaSiO3, SiO2 nanoparticles, silica solubilizing bacteria (SSB), and rice straw compost (RSC) on mitigation of As toxicity in rice. The investigation monitored the transference of As from soil to cooked rice, revealing that RSC, particularly when combined with SSB, was most effective, reducing As loading in rice grains by 53.2%. In assessing the risk of dietary exposure to As, key parameters such as average daily intake (ADI), hazard quotient (HQ), and incremental lifetime cancer risk (ILCR) were computed. The findings indicated that under the RSC+SSB treatments, the ADI dropped significantly to one-third (0.24 µg kg−1 bw) compared to the control. Moreover, an efficient predictive model utilizing a random forest algorithm was established. This model highlighted the influence of bioavailable As, phosphorus (P), and iron (Fe) in predicting grain As accumulation. It elucidated that bioavailable As accounted for 48.5%, while P and Fe contributed 5.07% and 2.6%, respectively, to the variation in grain As levels. The model suggested that for cultivating As-safe rice grains, soil should maintain P and Fe concentrations above 30 mg kg−1 and 12 mg kg−1, respectivey, if te soil's As content exceeds 2.5 mg kg−1.

Keywords: Arsenic, Rice, Silicon, Machine Learning, Random Forest Model, Human Exposure

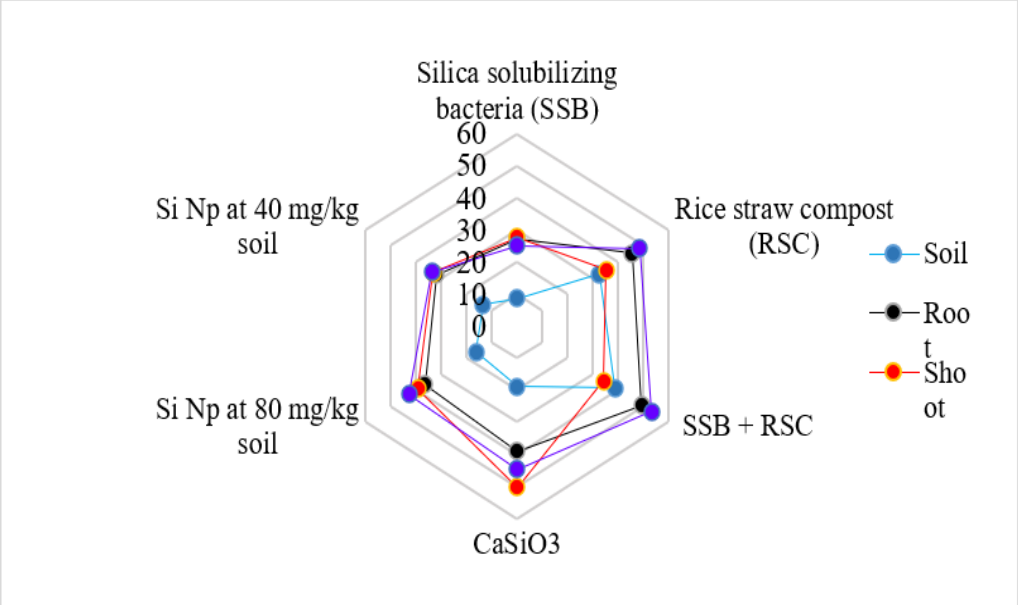

Fig. 1 Efficiency of the soil amendments (singly or in combinations) in causing reduction (% over the control) in arsenic contents in soil, root, shoot and grain at maturity.

E: erinakhanam@gmail.com

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Strategic climate smart approaches in freshwater aquaculture: An empirical analysis

Tanuja S[1]*, Lipi Das[1], Ananta Sarkar[1], Mridula Devi[1], P R Sahoo[2] and B.B.Jena Jena[1]
[1]ICAR-Central Institute for Women in Agriculture, Bhubaneswar, India
[2]KVK, Central Institute of Freshwater Aquaculture, Bhubaneswar, India

Abstract:

There has been a growing national interest to develop the aquaculture subsector in the country for the reasons– providing essential nutrition, supporting livelihoods and contributing to national development. But vulnerability of inland aquaculture to climate related changes and shocks is increasing steadily which is putting the subsectors sustainability at stake. Hence focus need to be shifted to the development, popularization and adoption of climate-smart aquaculture strategies to improve nutritional and livelihood security of the growing population of our country. Climate- smart agriculture (CSA) is built on the three pillars of sustainably increasing productivity and income, improving resilience, and mitigating climate change, respectively. Successful application and adoption of CSA strategies needs integration of expert knowledge and opinion based on evidence and acceptance. The present study encompasses the opinions of experts on the potential of freshwater aquaculture practices to support the three pillars of CSA based on research evidences.

The fourteen practices upon which responses were collected were finalized based on the review of literature. The practices were selected based on its feasibility of application and adoption by rural farmers in homestead aquaculture. As per the experts opinion, eleven among the fourteen practices support the first and second pillars of climate smart aquaculture. Practices like use of farm made aquafeed prepared with locally available ingredients, feeding management, use of passive harvesting gear like gill net and use of solar dryers for drying of fishes and vegetables were identified to be supporting the mitigation of climate change through reduction or elimination of emission of green house gases. The survey also revealed that women's participation in aquaculture and implementing aquaculture practices through women collectives can not only improve aquacultural productivity and income but will also help rural families and communities to adapt and to build resilience to climate related risks and shocks.

Keywords: Climate smart aquaculture, productivity, resilience, mitigation

E: tanuja.s@icar.gov.in

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Dissecting genetic resistance of wheat towards plant-parasitic nematodes

Shailendra Sharma
Chaudhary Charan Singh University, Meerut, India

Abstract:

Common wheat (*Triticum aestivum* L.) is one of the world's most significant staple food crop rich in proteins and micronutrients. Plant Parasitic nematodes (PPNs) like *Heterodera avenae* and *Pratylenchus thornei* limit the production and grain quality of small grain cereals including wheat. Identifying and deploying natural sources of resistance for these group of PPNs is of utmost importance. Inclusion of resistant and tolerant wheat varieties is economical and environmentally sustainable approach to prevent damage due to *Heterodera avenae* and *Pratylenchus thornei*. Results of different genetic/genomic studies have been discussed to decipher resistance in wheat against these two nematodes.

E: shgjus6@gmail.com

Carbon footprint and aggregation of an alfisol in response to different tillage and maize (*Zea mays* L.)/cowpea (*Vigna unguiculata* L.) intercrop

Adesodun J.K[1,2]*, Balogun S.J[2], and Ijiyokun A.O[2]
[1]*Ekiti State Polytechnic, Ekiti-State, Nigeria*
[2]*Federal University of Agriculture, Abeokuta, Nigeria*

Abstract:

Agricultural practices have the potential to contribute to greenhouse gas (GHG) emissions. Therefore, development of low carbon agriculture and carbon storage in soil requires attention globally. This study evaluated improvement in soil aggregation and short-term carbon footprint (CF) of the production system to assess the impact on climate change. This experiment was made up of tillage, i.e., no-tillage (NT), minimum tillage (MT) and conventional tillage (CT) as main plots; cropping system, i.e., sole maize, sole cowpea, and maize-cowpea intercrop as sub plots; and inorganic fertilizer (NPK-urea), organo-mineral fertilizer (OMF) and control as the sub-sub plots.

These treatments were arranged in a split-split plot fitted into randomized complete block design and replicated three times. The trend with soil aggregation followed NT > CT>MT indicating disaggregation with tillage. Organic carbon content was highest in NT and least under CT. The C- N stored were least with NPK and OMF, whereas maize plots had highest C-N than other cropping system. Higher emission of N_2O and CO_2 were observed under CT, while application of NPK-urea fertilizers significantly ($P \leq 0.05$) increased N_2O (36.53 kg CE ha^{-1}) and CO_2 (4.25 kg CE ha^{-1}). Carbon footprint, i.e., GHG emitted per grain yield, was higher under CT and NPK-urea treatments. Sole cowpea planted with NPK-urea contributed more to CF compared to OMF, while it was least with sole maize and maize/cowpea intercrop. This study showed that minimum tillage was better for maize and cowpea production with reduced CF, while lower carbon footprint indicates mitigation against greenhouse gas emissions.

Keywords: Carbon Footprint (CF); Soil aggregation; Tillage; Cropping system; NPK; Organo- mineral fertilizer

Biography:

Prof Johnson K. Adesodun, is a Registered Soil Scientist of Nigeria (RSSN) and joined the services of the Federal University of Agriculture, Abeokuta, Nigeria of 18th February 1999 as an Assistant Lecturer and rose to the position of Professor of Soil Physics on 1st October 2014. I am the pioneer Rector of Ekiti State Polytechnic, Isan-Ekiti, Nigeria from 1st September 2019 to date. He obtained his Ph.D (Soil Physics) in September, 2004 from the University of Nigeria, Nsukka, Nigeria with additional skill on "the application of micromorphological techniques for soil quality assessment" at the University of Stirling, Stirling, United Kingdom in 2003 as 2002 Commonwealth Academic Staff Scholar. He was a 2018/2019 Fulbright Scholar-In-Residence tenable at Alabama Agricultural & Mechanical University, Huntsville, Alabama, USA. His core research interests include "Soil and Climate Change Studies/Soil Remediation". He has published fifty-seven (57) articles in international/national Journals and conference edited proceedings.

E: adesodunjk@funaab.edu.ng; adesodunjk@gmail.com

Alternative management of queen pineapple (*Ananas comosus* Linn. Merr.) mealybug wilt disease in Camarines Norte, Philippines

Arlene C. Alegre, Christine O. Napoles, Michael P. Abriol
Queen Pineapple Research and Development Institute Camarines Norte State College, Philippines

Abstract:

Pineapple wilt is an important disease worldwide and is associated with mealybugs (*Dysmicoccus brevipes*) which acquire and transfer the disease during feeding. Synthetic pyrethroids are commonly used to control the vector but are no longer registered in most countries. This study aims to find a safer and effective alternative in managing the disease using the organic anti-pathogenic solution (Path-Away®). The prevalence of PMWD is devastating in four major Queen Pineapple (QP) producing municipalities in Camarines Norte with highest incidence of 39%. Recovery from the infection sometimes occurred but still produced small unmarketable fruits ranging from 42%- 66%. Infected plants also produced undersized crowns that are not marketable. The anti-pathogenic solution at concentrations 1%, 2% and 3% were applied during hardening of suckers, pre-planting and succeeding applications at early vegetative stage (1to 5 months), late vegetative (6- 9 months) and at fruiting to harvesting stage (10-14 months). Path-Away (PA) reduced the incidence of the Pink Pineapple Mealybug (PPMB) at different QP maturity levels by 16% most effectively by using 2% PA concentration. Also, production of small fruits was reduced to 38%, medium and large sized fruits increased to 39% and 18% respectively compared to untreated with 61% small, 27% medium and 9% large. Path-Away Anti- Pathogenic Solution is basically a disinfectant but also effective both in laboratory and field trials against viruses affecting plants. The use of this solution as virucide provides effective alternative in managing the devastating effect of PMWD on queen pineapple increasing the ROI to 71%.

Keywords: Queen Pineapple, Ananas comosus, Pineapple mealybug wilt disease, Dysmicoccus brevipes, Pink Pineapple mealybug

Biography:

Arlene C. Alegre is an Associate Professor at Camarines Norte State University, Philippines and serving as the Director/ Program Leader of the Queen Pineapple Research and Development Institute. She has completed her Ph.D. in Plant Science/ Plant Pathology. The Queen Pineapple Research and Development Institute (QPRDI) was established in 2021 upon the approval of the proposal submitted to the Department of Science and Technology-Science for Change Program. Since then, the CNSC was declared the QPRD-Center of the Philippines. At the same time, the CNSC was granted Php 26, 835,000.00 for the Research Program composing six research projects. The center was instituted last July 2023.

Research Interest: Field and Post harvest disease management

E: arlenealegre@cnsc.edu.ph

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Oral

Exploring host plant resistance and biochemical responses in ARC genotypes against the rice leaffolder, *Cnaphalocrocis medinalis*

Golive Prasanthi*, Anjan Kumar Nayak, Soumya Shephalika Dash, P. C. Rath, A. K. Mukherjee, S. D. Mohapatra
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

The leaffolder, *Cnaphalocrocis medinalis* is a major pest of rice and its incidence increases both in lowland and upland rice fields, especially in those areas where new and high yielding varieties are grown extensively. Host plant resistance is very important in contrast of spraying insecticide to manage the C. *medinalis*. Forty ARC genotypes were screened in a field and net house condition for evaluating their resistance against rice leaffolder. Results showed that out of 40 genotypes screened, seven genotypes ARC 10416, ARC 10884, ARC 10960, ARC 10827, ARC 10342, ARC 10281 and ARC 10317 were found resistant. Similarly, 11 and 22 nos. of genotypes were found moderately resistant and susceptible, respectively. Further, a laboratory experiment was carried out to assess the biochemical reaction of 10 random different categories of ARC germplasms viz., resistant, moderately resistant and susceptible categories along with standard checks in response to the infestation by leaffolder. The biochemical components such as phenol has been increased along with enzymes like polyphenol oxidase and catalase in the resistant and infested category rice genotypes along with standard resistant check TKM6. While lower level of sugar content was observed in all infested and resistant rice varieties whereas, substantially higher level has been found in uninfested and susceptible category as well as in susceptible check TN1. Genotypes identified as resistant and moderately resistant against C. *medinalis* will aid the breeding for resistance programs to identify the new sources of resistance and long-lasting protection against leaffolder.

Keywords: Assam Rice Collection; Catalase; Leaffolder; Phenol; Resistant

Biography:

Dr. Golive Prasanthi, working as scientist at ICAR-NRRI, Cuttack. Her area of specialization is Soil biology and ecology, Organic farming, Insect taxonomy and systematics specifically on Hymenopteran groups and Host plant resistance.

Research Interest: Host plant resistance and Biological control

E: prasanthigolivi@gmail.com

Rural women entrepreneurship through establishment of custom hiring centres

Chaitrali S. Mhatre*, Jyoti Nayak, Mridula Devi, Pragati Kishore Rout, and Monalisa Pati
ICAR- Central Institute for Women in Agriculture, Bhubaneswar, India

Abstract:

Developing entrepreneurial capability of rural farm women through establishment of Custom Hiring Centres is an opportunity to address multiple issues with one integral solution. Rural women are an integral part of Indian agriculture and allied sector. But, women have lower level in adoption of technological innovations and still work with indigenous technology. In Indian villages, though there is tractor and advance machinery available, still major agricultural operations are performed by manual tools such as spade, fowda, khurpi, desi plough, sickle etc., as the machinery is limited in number. Majority farmers (men & women) being in landless, marginal, categories of land holdings; were not able to afford machines of their own, leading to heavy losses, especially during the short harvesting window in the face of changing climate. But it is known that women farmers, marginal and small farmers even if they can't afford machines themselves, cannot avoid its usage for certain agricultural operations. A custom Hiring Centre is established by women self help group can mitigate these issues at a village level appropriately. A CHC will eensure availability of crop and local-condition specific equipment for use. Promote small and marginal farmers to adopt cooperative agricultural practices. Spawn side business like maintenance of machinery, skill for hire, spare part shops etc. Farmers will be able to afford to buy machinery since the CHC will distribute the expense of ownership among a broader population. A CHC will reduce drudgery and save time. It will also generate an alternate source of income of women, hence encouraging the entrepreneurial side of rural women. Therefore, CHC is a creative, sustainable strategy to combat poverty and drudgery while increasing productivity.

Keywords: CHCs, SHGs, Rental, Improved Machinery Entrepreneurship

E: Chaitrali.Mhatre@icar.gov.in

Rural women: Conserving environment for sustainable development

Jyoti Nayak*, Chaitrali Mhatre and Mridula Devi
ICAR- Central Institute for Women in Agriculture, Bhubaneswar, India

Abstract:

The realization of women's human rights, capabilities and well-being now and in the future requires paying specific attention to the care economy, that is, the provision of care through the family and/or household, markets, the non-profit sector and the public sector and/ or state, especially the "private" domain of non-market or unpaid care work. How societies organize this work is central to their social sustainability. Policymakers rarely consider the production of human resources in the economy, apart from formal education, which is recognized for its contribution to human capital, and yet economic growth cannot take place without the fact that the bulk of unpaid care work is carried out by women and girls has significant implications for their capacity to realize their rights to education, paid work, a decent standard of living and political participation. In this and other domains, gender and other inequalities intersect, and it is women and girls from marginalized social groups whose capabilities and rights are most often compromised and in need of realization. The women are the backbone of the society but worldwide her hard work has mostly been unpaid. Vocational trainings are being conducted, to impart skills to undertake different vocations. In extension activities the women are now the centre point and activities are being planned keeping her in view. Her enlightenment will change the face of rural India. Providing more training opportunities to women will give them ownership of assets like land, access to credit and other inputs, adoption of women-friendly technologies, involving them in planning and decision making at all labels can foster sustainable development of the society.

Keywords: Sustainable, Environment, Vocations, Women-friendly technologies

Biography:

Jyoti Nayak, Principal Scientist Specialization: Major: HDFS, Minor: Food & Nutrition. She has published 55 Scientific papers, 50 Status paper/Profile/Popular/ Technical articles, edited/evaluated/reviewed 06 books, and handled 16 projects. Awards: Faculty counselor, Home Sc. Executive Body of Orissa Society of Extension Education, OUAT. Resource person in farmwomen training on Post Harvest Training Management under National Horticultural Mission. Counselor for IGNOU, in DNHE course. Programme Leader, Developing vulnerability framework for women in Agriculture and appropriate interventions for drudgery reduction. Expert for State Level Advisory Group with TARINA project, CARE India. Member in the expert committee for women scheme for Equity Empowerment Development Division (SEED), Department of Science and Technology, Govt. of India

Research Interest: Occupational Health Hazards, Drudgery Reduction, Life Style Disease Management

E: jyotinayak44@gmail.com

Improving the quality of life of rural farm women through suitable agricultural interventions

Laxmi Priya Sahoo[1]*, Jyoti Nayak[1], Abha Singh[2], and Geeta Saha[1]
[1]ICAR-Central Institute for Women in Agriculture, Bhubaneswar, India
[2]ICAR-Central Institute for Subtropical Horticulture, Lucknow, India

Abstract:

The quality of life for rural farmwomen is determined by different factors like their access to farming technologies, participation in decision-making, basic infrastructure, strong community networks and support systems along with health and nutrition, free from occupational drudgery and enhancement of income from farm and allied sectors as an individual or a member of the community. Assessment of health and nutritional status, resource availability, drudgery reducing activities and need assessment for income generation among 400 households in four states revealed that thirty seven per cent women were facing Chronic Energy Deficiency (CED) from mild to severe degree and 15-30 % families suffered from tuberculosis and diarrhea in the past, which substantially affected their quality of life. One hundred sixty households were subjected to various interventions like nutrition gardens with colorful protein rich vegetables for addressing mal-nourishment and diseases in children and women. Capacity building and nutrition education was imparted on dairy management, kitchen gardening, incorporation of green leafy vegetables in the diet, weaning food, conservation of nutrients during cooking, hygiene and sanitation along with periodic awareness and health check-up camps. Adoption of drudgery reducing tools like revolving Stool, cow dung collector, trowel, hand cultivator, improved sickle, hand sprayer etc was ensured. Backyard poultry and dairy farming were promoted for income generation. These interventions improved the quality of life of rural women as these increased the economic status of women by Rs. 2000-3000/ month/ woman, reduced body pain and increased work efficiency and made positive impact in their health and nutrition status.

Keywords: Farmwomen, Quality Of Life, Drudgery, Nutritional Status

Biography:

Laxmi Priya Sahoo is a Senior Scientist (Seed Technology) at ICAR-CIWA, Bhubaneswar. She has completed her M.Sc (Agriculture) in Seed Science & Technology and Ph.D in Seed Science & Technology. She has published 21 Research papers, 40 Popular Articles, 20 Folders, 5 Checklists, 2 Technical bulletin, and 7 Compendiums & Manuals. Her work experience include: Identified the gender issues of women in seed production and developed suitable gender sensitive models for seed production by women both in rainfed and irrigated conditions, mStandardized seed production of 4 vegetables involving farmwomen, Characterization of local races of chill using DNA fingerprinting (RAPD and ISSR) and seed development pattern of developing chilli using physiological and biochemical parameters, and Developed Village based seed systems using local germplasm and biodiversity

Research Interest: Community seed production, Women and Biodiversity

E: Laxmi.sahoo@icar.gov.in

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Nutri-greens: Super food for nutrition and income

Tania Seth*, Ankita Sahu and Laxmi Priya Sahoo
ICAR-Central Institute for Women in Agriculture, Bhubaneswar, India

Abstract:

In the present busy lifestyle, people are consuming imbalanced diet having nutritional value much below the recommended levels resulting in various diet-related non- communicable diseases and other age-related complications. Nutri-greens are considered as new super food due to rich source of phytonutrients, antioxidants and essential minerals and low in fat and carbohydrates. Consumption of nutri-greens holds a promise to supplement the modern diet with nutrition. The edible part of nutri-greens consists of central stem, cotyledon leaves and one pair of true leaves harvested at 7 to 21 days after sprouting. The bioavailability of nutritional compounds of nutri-greens is much higher as compared to the mature stages. They can add value to regional dishes due to fresh, ready-to-eat functional and nutraceutical values. Nutri-greens being easy-to-grow are promising to find a place in urban agricultural ventures. Due to their short growing cycle, they can easily be grown at home on a portico or balcony and even on windowsill and nutri-rich healthy food can be harvested from limited space at household level. The market values of nutri-greens are five to eleven times greater than their production costs. They can be grown irrespective of season in a variety of growing mediums which reduces the vulnerability of farmwomen and increases their resilience to climate variability. Nutri-greens cultivation can be a promising avenue to improve the livelihood of farmwomen. Awareness creation, skill development, establishing forward and backward linkages will facilitate women farmers and educated youths to initiate entrepreneurship in nutri-greens production.

Keywords: Nutri-Greens, Women farmer, Nutrition, Income

E: tania.seth@icar.gov.in

Government inspections and international trade

Ghanshyam Lal Vyas
TUV Rheinland India Pvt. Ltd, India

Abstract:

In today's world of trade, success is triggered by the ability to offer the right products at the right time complying with the exact requirements. With increasing globalization, the risk of products and materials not being delivered on time and/or lacking the quality agreed upon grows. At the same time business partners in different parts of the world have the common need for a guarantee that ordered components, materials and equipment align with given specifications.

As a result, governments implement PVoC (Pre-Export Verification of Conformity) programmes to ensure that imports comply with their national regulations. As a reliable conformity assessment body, TÜV Rheinland helps governments to navigate the complex regulatory requirements in global trade. TÜV Rheinland's extensive experience gained in global supply chain projects make us your preferred partner. Stakeholders can benefit from our know-how and tailored solutions for your business.

Service Scope:

SERVICE SCOPE

- ALGERIA: Certicate of Conformity (CoC)
- BOTSWANA: Certicate of Conformity (CoC)
- EGYPT: Certicate of Inspection (CoI)
- ETHOPIA: Certicate of Conformity (CoC)
- INDONESIA: Technical Verification & Tracing (VPTI)
- IRAQ: Certificate of Registration (CoR)
- KUWAIT: Technical Inspection Report (TIR)
- LIBYA: Certicate of Inspection (CoI)
- MOROCCO: Certicate of Conformity (CoC)
- SAUDI ARABIA: Certicate of Conformity (CoC)
- UGANDA: Certicate of Conformity (CoC)
- WORLDWIDE: Commercial Inspections

E: Ghanshyam.Lal@ind.tuv.com

Oral

What to grow? Unpacking factors shaping cropping decision: A village level study from Haridwar, Uttarakhand

Divya Sharma
Azim Premji University, Bengaluru , India

Abstract:

When faced with uncertainty, individuals frequently turn to heuristic shortcuts or decision-making rules instead of employing logical approaches such as goal optimization. Given the significant uncertainty and intricacy associated with adapting to climate change, it is seen that people rely on heuristics rather than following structured decision-making procedures. This paper investigates and presents the decision-making processes of the farmers at village level in Haridwar district. Cluster Analysis and Multinomial Logistic Regression is being used to understand the factors that lead to the decision of growing a particular crop. Results show that there are six clusters of crop choices in the village and these clusters are attributed due to land size, soil type and caste of the farmer. Farmers in the study village of Haridwar are resorting to an intensive cropping system as majority farming households in the sampled data are growing at least 3-4 crops in one year. Moreover, the adaptation/coping options in terms of change is crop choice is constrained/ limited to Land size, Soil type and Caste predominantly.

Keywords: Crop choice, Heuristics, Cluster analysis, Multinomial logistic regression

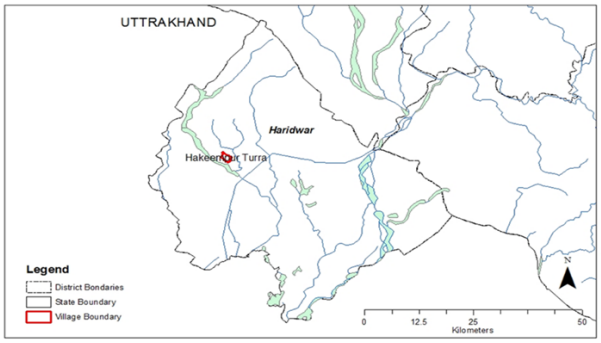

Fig 1: Location of Study Village: Hakimpur Turra

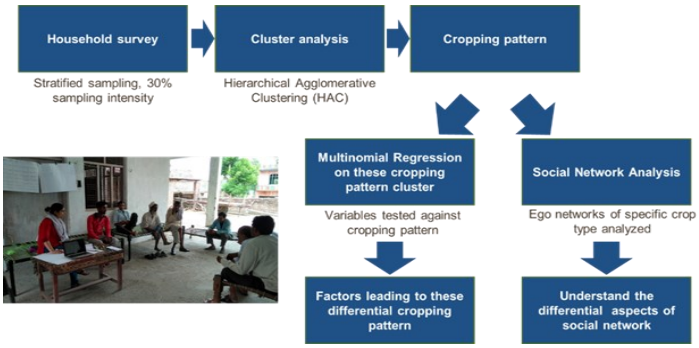

Fig 2: Methodology connecting cluster analysis, multinomial logistic regression and social network analysis

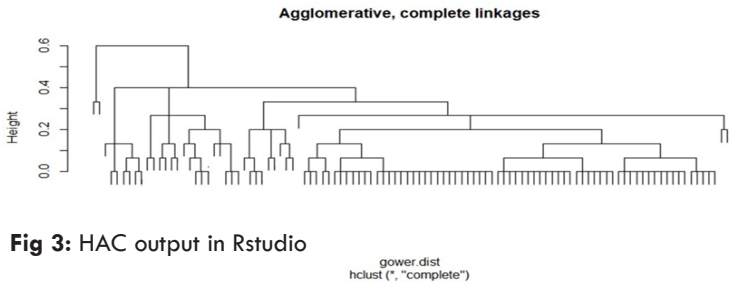

Fig 3: HAC output in Rstudio

Biography:

Dr. Divya Sharma works at the intersection of complexity and adaptive decision-making. She has a keen interest in understanding livelihood decisions through the socio-ecological system lens. She works with tools like agent-based modelling, social network analysis, and system dynamics to understand livelihood decisions. She is currently working as a faculty member, at the School of Development at Azim Premji University. She is a recipient of PhD Grant from the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) supported Himalayan Adaptation, Water and Resilience Research on Glacier and Snowpack Dependent River Basins for Improving Livelihoods programme. She is also a recipient of DAAD grant to conduct research at Environmental Policy Research Centre (FFU), Freie Universität Berlin and Annual fellowship from National Mission on Himalayan Studies(NMHS), Ministry of Environment, Government of India.

Research Interest: Socio-ecological Systems, Adaptive Decision Making, Climate Change, Livelihoods, Agriculture, Agent Based Models, Social Network Analysis, System Dynamics

E: divya.sharma1@gmail.com

Enhancing livelihoods through module-based interventions in farmer-FIRST programme: Impact of seven-year journey

Biswajit Mondal*[1], SK Mishra[2], BS Satapathy[2], Sudipta Paul[1], S. Lenka[1] and Krutibas Jena[1]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]ICAR-Indian Institute of Water management, Bhubaneswar

Abstract:

Farmer FIRST Programme, initiated in 2016-17 by ICAR-NRRI, Cuttack, Odisha comprising villages of Satyabhamapur, Biswanathpur, Laxminarayanpur, and Ganeswarpur with the goal of enhancing farm yield and sustaining rice-based production systems. Among the 1,762 farm families, 800 were randomly selected, with 90 percent being small and marginal farmers. In the 2021-22 period, the program expanded to include four new villages—Purusottampur, Ganapur, Malihata, and Gopinathpur—adopting 250 farmers out of 1,100 families.

A preliminary survey guided the implementation of need-based technological interventions and continuous capacity building through four modules: crop-based (rice, pulses, mechanization), horticulture-based (vegetables, fruits, poly house, mulching technology, nylon net trellis), animal husbandry (poultry, duckery, fishery), and enterprise-based (mushroom cultivation, vermi-composting, honey beekeeping).

Notable impacts include the adoption of high-yielding varieties, resulting in a 30-60 percent increase in yield and 50-300 percent rise in income. In the horticulture module, innovative relay cropping in trellis systems generated approximately Rs.6.75 lakhs/ha/annum for 50 farm families. The animal husbandry module introduced dual-purpose poultry breeds, 'Vanaraja' and 'Khaki Campbell,' yielding three times the investment for over fifty families. Under the enterprise-based module, six entrepreneurs thrived in mass production and marketing of oyster and paddy straw mushrooms, while one entrepreneur specialized in fish fingerlings.

Overall, there was a significant improvement in knowledge, skills, and awareness among farmers, farmwomen, and youths in the cluster. This encompassed new crops, vegetables, animals, fisheries, farm implements, and crop-stress management practices, contributing to a substantial increase in income and livelihoods.

Biography:

B Mondal, a PhD from Indian Agricultural Research Institute, New Delhi is presently working as Principal Scientist at ICAR-National Rice Research Institute (NRRI), Cuttack. He published more than 70 national and international research papers and handled more than 20 research projects. He had been recognized by different professional societies as editor, external expert by Global Environment Facility, received SRF during doctoral program, awarded twice for best research paper by Indian Association of Soil & Water Conservationists, Dehradun and received 'Best Worker' award by NRRI, Cuttack during the year 2022.

Research Interest: Agricultural Water Management

E: bisumondal@rediffmail.com

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Oral

Insights into paddy farmers' price safety-net through micro-level field investigations

Sudipta Paul*, Biswajit Mondal, N.N. Jambhulkar, A.K. Pradhan, and G.A.K. Kumar
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Price incentives in the form of support prices offer an important safety-net for the farmers. We take the instance of MSP policy in India to comment on the significance and sustainability of safety-net in paddy disposal in light of some field-level investigations conducted during 2021-22 in six states - Chhattisgarh, Maharashtra, Odisha, Madhya Pradesh, Jharkhand, and Bihar. The sample of our study comprises a total of 360 paddy growers from these six states (n=360). Our analyses are mainly based on the identification of factors influencing farmers' decisions to avail MSP and unit-level impact estimates. A quasi-experimental design with the help of propensity score matching (PSM) and the Analytical Hierarchical Process (AHP) helped us take up the analyses for the necessary interpretation of significance and sustainability. The results of a probit analysis suggest that multiple sources of income enhance the probability of availing MSP by the rice farmers, whereas, larger family size reduces the probability. The impact estimates obtained using the PSM methodology suggest that the most important advantage of MSP is its contribution to price realization for the produce, which is 38.15% more when compared to the other ways of paddy disposal. The marketed surplus is also impacted by an estimated 9.83% by MSP. Based on these estimates coupled with the results of an AHP we conclude that safety-net in crops like paddy is quite significant to set the floor price, though availing the benefits of this safety-net require convenience at the level of farmers for disposal and aggregation at the local level. Concerted interventions for building awareness about MSP, and increasing the MSP in consultation with different levels of stakeholders will reduce dissatisfaction, and increase effectiveness.

E: sudiptaiari@gmail.com

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Oral

Enhancing soil health and sustainability: Comparative analysis of conservation agriculture in rice-pulse cropping systems

Sushmita Munda*, Rubina Khanam, Aiswarya Nayak, Amaresh Kumar Nayak
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Conservation agriculture (CA) is known for enhancing soil properties, but its impact on transplanted rice and the influence of different varieties under CA remain uncertain. In our study, we compared two CA-based cropping systems: zero tillage (ZT) with direct seeded rice (DSR) followed by ZT with green gram (GG) (ZT-DSR -ZT-GG), and ZT with transplanted rice (TPR) followed by ZT-GG (ZT-TPR-ZT-GG), against a conventional tillage (CT) system (CT-DSR-CT-GG). We assessed soil structure, nutrient levels, carbon sequestration potential, greenhouse gas (GHG) emissions, energy efficiency, and yield. Furthermore, we evaluated the performance of green gram varieties under CA. After five years, we observed a significant increase in organic carbon (OC), nitrogen (N), and phosphorus (P) in the ZT-DSR-ZT-GG system. The rise in total organic carbon (TOC) was 16.90% and 11.86% higher in ZT-DSR-ZT-GG and ZT-TPR-ZT-GG, respectively, compared to CT-DSR-CT-GG. Additionally, in ZT-DSR-ZT-GG, microbial biomass carbon (MBC), dehydrogenase activity (DHA), fluorescein diacetate hydrolysis (FDA), acid phosphatase, and alkaline phosphatase were notably higher compared to CT-DSR-CT-GG. The cumulative seasonal emission of nitrous oxide (N2O) was significantly lower in ZT-DSR-ZT-GG and ZT-TPR-ZT-GG (73% and 35% lower, respectively) compared to CT-DSR-CT-GG. Energy conservation was observed with 32% and 25% savings in ZT-TPR-ZT-GG and ZT-DSR-ZT-GG, respectively, compared to CT-DSR -CT-GG. Furthermore, productivity was comparable between the CA (ZT-TPR-ZT-GG) and CT-based systems. The interaction between CA practices and crop variety showed non-significant differences for most parameters, indicating the flexibility in selecting varieties for crop cultivation under CA.

Keywords: Conservation Agriculture, Rice-Pulse Cropping Systems, Soil Health, Zero Tillage, Direct seeded Rice

E: susmita sustot@gmail.com

Estimation of water requirement of Turfgrass under wastewater irrigation in the semi-arid climatic condition of India

D.S. Gurjar*, R. Kaur, Khajanchi Lal and P.S. Brahmanand
ICAR-Indian Agricultural Research Institute, New Delhi , India

Abstract:

An investigation on turfgrass (*Cynodon dactylon* L var. selection-1) planted under two planting methods (with or without sub-soil plastic mulch) and three wastewater irrigation schedules (75%, 100% and 125% of ETc) were investigated continuously for 3 years (2013-16) at WTC farm of ICAR-Indian Agricultural Research Institute, New Delhi, India. The main objective of the study was to estimate the optimum water requirement of wastewater irrigated turfgrass using soil-water balance method as compared to water requirement of turfgrass calculated by CROPWAT Model. Experiment was laid-out in randomized block design with three replications. Results indicated that turfgrass water requirement was observed minimum as 927 mm in the treatment plots where wastewater irrigation was scheduled at 125% ETc with sub-soil porous plastic mulch and maximum as 1267 mm in the treatment plots of wastewater irrigation scheduled at 75% ETc without sub-soil porous plastic mulch. Calculated reference evapotranspiration (ET0) and actual evapotranspiration (ETturf) or turfgrass water requirement (CWRturf) were estimated as 1077 mm and 915.5 mm, respectively. Based on quality ratings, planting method and water requirement of turfgrass, the best treatment was found as wastewater irrigation scheduled at 125% ETc with sub-soil porous plastic mulch which was associated with higher turf quality/colour. Hence, a water requirement of 927 mm may be considered as most appropriate for turfgrass under Indian climatic conditions.

Keywords: Evapotranspiration, irrigation, plastic mulch, soil-water balance, turfgrass

Biography:

D.S. Gurjar, born at Bandikui, Dausa, Rajasthan on 7th June 1979, is currently working as Senior Scientist (Soil Science) at Water Technology Centre, ICAR-Indian Agricultural Research Institute, New Delhi. He did his academic degrees as B.Sc. (Ag) Hons. (2002) from RAU, Bikaner (SKNCOA, Jobner Campus), and M.Sc. (2004) & Ph.D (2008) in Water Science and Technology (WST) from IARI, New Delhi. He has handled several inhouse and externally funded research projects. He has been awarded Best Oral Presentation Awards in the years of 2015, 2017, 2018, 2023, Young Scientist Award-2017 and Young Scientist Associate Award-2009 by various professional societies. He has published several research papers, review papers, book chapters and popular articles in reputed journals and magazines. He is the life members many professional societies working in the area of agriculture.

Research Interest: Agricultural Water Management

E: dsgurjar79@gmail.com

Created an organic compound fertilizer "Phonska Alam" as an effort of PT Petrokimia Gresik increasing Indonesian organic agriculture

Iqbal Ramadhan[1], Jawad Farisi[1], and Mochamad Taufik Hidayat[1]
PT Petrokimia Gresik , Indonesia

Abstract:

The development of organic agriculture in Indonesia over the last few decades is still slow but people's interest in organic agriculture systems is starting to grow. Health factors that encourage people to try an organic agriculture which can creating a healthy food and environment condition. There are a lot of obstacles in development of organic agriculture such as market opportunities, climate conditions, the research and development which takes a long time, and also the organic fertilizer which provide a complex nutrient in organic agriculture is limited. These days, organic fertilizer has only 1 single primary macro and the compound fertilizer only can be found in anorganic fertilizer such as NPK compound fertilizer. As an effort for supporting the growth of organic culture in Indonesia, PT Petrokimia Gresik is initiating to create an organic fertilizer formula which has a complex macro nutrient such as N, P, and K by brand "Phonska Alam" that corresponded by organic agriculture'standart in SNI 6729-2016. Phonska Alam has certified as an organic fertilizer which the raw material using the natural minerals and also the production process based by SNI 6729-2016 about organic agriculture system. The fertilized by Phonska Alam shows that using a compound fertilizer more effective than an ordinary organic fertilizer which increasing vegetative and generative of plant. The dry grain which using Phonska Alam on 600 Kg/Ha is 7,0 % higher than compost fertilizer. The combination of compost fertilizer and Phonska Alam gives good result that increasing 37,5% the harvested dry grain. The using of Phonska Alam in onion shows that 1200 Kg/Ha Phonska Alam can increasing productivity 37,5% higher than using compost fertilizer. In Paddy plant, the increased of productivity is happened 7% higher than using of the ordinary compost fertilizer.

Keywords: Phonska Alam, Organic, Compound Fertilizer, Organic Agriculture

E: ramadhan.iqbal099@gmail.com

Genetic regulatory switch between Sub1a and SK, the key adaptive mechanism behind shifting from quiescence to elongation in rice under submergence

Sandip pal, Kumar Shubham, Pratyasha Samanta and Narottam Dey*
Visva-Bharati, Santiniketan, India

Abstract:

Background: Though presence and activity of Sub1a is well established with their successful introgression in higher yield background; but the same study for SK loci is yet to be established with special emphasis on their simultaneous presence and combinatorial activity.

Objectives: Considering this lacuna an initiation was taken to identify the genotypes with simultaneous presence followed by combinatorial activity particularly switching of their activity under varied depth and duration of submerged water.

Materials and methodology followed: Physio-biochemical screening followed by genotyping and RT-PCR based expression analysis were followed.

Results: The identified rice genotype with simultaneous presence of both the loci in expression analysis strongly support their combinatorial activity and switching from quiescence to elongation phase under varied depth and duration of field water. From the differential expression profiling across the periodic phases of submergence (8th day to 13th day), it was found that positive control genotype started its expression for *Sub1a* loci on 9th day which was continued up to the 12th of submergence. Contrastingly the expression of *Sub1a* in test line started to decrease from 12th day, though the negative check does not show any significant level of expression except on 11th day. *SK1* significantly expresses under prolonged submergence. The variation of *SK1* in test line changes on the onset of 12th days submergence.

The switching of *Sub1a* to *SK*I is supposed to be start after 11th day of submergence but need more expression base profiling and inclusion of addition test rice genotypes.

Keywords: Rice, Submergence, Quiescence, Elongation, Combinatorial activity, Genetic switch

Expression profiling		Periodic phases of submergence (8^{th} day to 13^{th} day)					
Loci	***Rice Genotypes***	***8^{th} day***	***9^{th} day***	***10^{th} day***	***11^{th} day***	***12^{th} day***	***13^{th} day***
Sub1a	***(+) Control***						
	(-) Control						
	Test line						
SK1	***(+) Control***						
	(-) Control						
	Test line						

Significant level of expression of two studied loci (Sub1a and SK) among three genotypes across 6 days of submergence

E: narottam.dey@visva-bharati.ac.in

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Cerebrospinal fluid analysis, haemato-biochemical profiling and therapeutic studies in buffaloes with babesiosis

Sirigireddy Sivajothi
College of Veterinary Science, Proddatur, Sri Venkateswara Veterinary University, India

Abstract:

In bovines, babesiosis is one of the most important protozoan diseases with high morbidity and mortality if not treated. Presence of inverse age resistance by maternal and innate immunity, babesiosis was limited in young bovines. But, little documentation was available in young calves with *Babesiosis* in India. The study was carried out on buffalo calves presented to the hospital with nervous signs suffering from babesiosis. Confirmation of babesiosis was done by demonstration of pear-shaped intra-erythrocytic piroplasms of *Babesia*. The appreciable clinical signs were the absence of rumination, anorexia, wobbling gait, hyperthermia, scleral congestion, tachycardia, hyperexcitability, delirium, achezia and grinding of teeth. Cerebrospinal fluid analysis exhibited the presence of high protein, nucleated cells and red blood cells. The haemato-biochemical study showed mild anaemia, leucopenia, lymphocytosis and neutropenia; elevated serum globulin, aspartate aminotransferase, blood urea nitrogen and creatinine levels. Electrocardiography and echocardiography was carried out. Calves were treated with diminazene aceturate, flunixine meglumine, dextrose normal saline, mannitol, glycerol along with supportive medication. Electrocardiography and echocardiography findings and the details of the therapeutic outcome will be discussed. The present study concludes that the changes in the cerebrospinal fluid during the cerebral form of babesiosis in buffalo calves might be a justification for the development of neurological signs and babesiosis can consider as differential diagnosis in young calves with neurological signs.

Keywords: Buffaloes, Babesiosis, Calves, Nervous signs, Cerebrospinal fluid

E: sivajothi579@gmail.com

Sustainability in fisheries: Resource intensification and species selection

Surjya Kumar Saikia
Visva-Bharati University, Santiniketan, India

Abstract:

Polyculture practices for fisheries rely on formulated-supplementary feed with available phyto- and zooplanktonic resources in the aquatic ecosystem. Several attempts have been made to propose a species composition-cum-substrate type fishery, with bamboo as proven and reliable substrate with Cyprinus carpio and Labeo rohita. Considering feeding nature, Cirrhinus mrigala, may get additional advantage to this proposed system.

Two studies have critically established the potentiality of intensified planktonic ecosystem for fisheries. The first one is rice-fish culture in Zero valley, Arunachal Pradesh. The Common carp was well established as a candidate to utilize periphyton from the submerged rice stems. South east Asia may intensify this resource with more adaptable species in rice field. The second experiment of L. rohita in fish pond in West Bengal affirmed the shifting of feeding niche from plankton to periphyton when bamboo substrates were installed.

Another sustainable approach could be the integration of nutrient rich small freshwater fish species (SIFs) in substrate-based fisheries. Besides biomass, it offers nutritionally enriched product components from intensified fishery. Initially, Amblypharyngodon mola were projected as potential SIF for such resource-nutrient management fisheries. This concept of fishery suggests aquatic ambiances with a minimum water depth above 50cm (e.g. rice field) to at least 3m (e.g. pond) for stocking fish with substrate.

Further, the concept "social fishery" needs wider attention for extension. For example, "Xeng Fishery" in Assam is an unorganized social fishery, with ample scope for extension as social fishery with resources in hand.

In conclusion, the work in the past highlighted periphyton based fisheries as sustainable fishery with intensification of natural resources and also with potential for product oriented (biomass, multi-nutrient) practice that may be popularized as 'Social Fishery'.

Keywords: Sustainable fishery, periphyton, aquaculture, Indian major Carps, indigenous fish

Biography:

Surjya Kumar Saikia has been working in Visva-Bharati since 2009. He has successfully supervised seven PhD students and published more than 60 research papers in national and international journal. He also authored four books. Dr. Saikia conducted several research projects sponsored by different national funding agencies. Recently, he is working as guest editor for the journal of Frontiers in Sustainable Resource Management. He has also attended several national and international seminar/conferences throughout.

Research Interest: Aquatic Ecology, Fish Biology

E: surjyasurjya@gmail.com

Comparative study of socio-ecological sustainability of cotton farming systems in Central India

Christelle Ledroit
bioRe Association, Khargone

Abstract:

Agricultural land covers 38% of the total world's land surface area. These are man-made ecosystems which provide Ecosystem Services of food, fibre and fuel to human society. With the world population predicted to reach 8.9 billion by 2050, one of the most important challenges the world is facing today is to increase its agricultural production in ways that is sustainable. There have been many studies looking at the ecology of food production but not on cotton production. Cotton is the most important fibre in the world: it is also the most polluting cash crop in the world. India is responsible for 26% of global cotton production of which more than 95% is genetically modified Bt-cotton. Despite this leading role, India has one of the lowest yields per hectare in the world which is attributable to challenges in soil fertility and inadequate plant protection. Focusing on the impact of agricultural management on biodiversity is essential to ensure that cotton productivity is ecologically sustainable in the long-term. In this study, the functional biodiversity above and below ground was evaluated on plot-scale and farm-scale systems using bio-indicators to evaluate the potential ecological sustainability of four cotton farming systems (CFS) practiced in India: conventional; Bt-conventional; organic and biodynamic. The long-term comparison study showed that Bt-cotton had no further significant effect on the above and below ground biota in comparison to the non Bt-conventional cotton systems. Both organic systems showed a significant higher biodiversity in comparison to both conventional systems. The aim of this thesis was to assess the socio-ecological sustainability of cotton farming in Central India. To evaluate the socio-ecological sustainability, this study assessed farm-scale systems using working cotton farms (12 farms: 6 pairs of Bt-conventional and organic systems) by modifying an FAO model to develop a context-based assessment tool. The study showed that conventional management had negative effects on the above and below ground functional biodiversity on the plot-scale and farm-scale cotton systems. On the farms, socio-economic indicators showed that organic systems were significantly more sustainable in comparison to conventional systems, however, there is still need improvement for both farming systems. Adding ecological empirical data to the framework didn't make a difference in determining which of the two systems were the most sustainable. However, integrated the ecological indicators facilitated insightful understanding of farmers management choices and highlighted the contextual problem that farmers face while growing cotton in Central India.

E: christelle.ledroit@outlook.com

Evaluation of coriander (*Coriandrum sativum* L.) genotypes for growth, yield, and quality under central dry zone of Karnataka

Nandakumar K.[1], Chandrappa H.[2], Raviraja Shetty G.[3], Hemanth Kumar P.[4] and Harish Babu B. N[5]

[1]Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, India

[2]College of Horticulture, Hiriyur , India

[3]Brahmavar College of Horticulture, Brahmavar, India

[4]College of Horticulture, Mudigere, India

[5]Zonal Agricultural & Horticultural Research Station, Hiriyur , India

Abstract:

An investigation was carried out in ZAHRS, Babbur farm, Hiriyur during 2016- 2017 rabi season for evaluation of Coriander (*Coriandrum sativum* L.) genotypes for growth, yield and quality under central dry zone of Karnataka. The experiment was laid out in the Randomized Complete Block Design with 20 genotypes and was replicated thrice. Significant differences were observed among genotypes for all the characters under study. The results revealed that, Rcr-475 recorded maximum plant height (70.27 cm), number of primary branches per plant (7.33), number of umbels per plant (28.13), number of umbellets per umbel (5.50), number of seeds per umbellet (5.70), seed yield per plant (6.37 g), seed yield per hectare (16.83 q), highest test weight (14.53 g) and plant spread (645 cm2). The genotype DCC-4 took minimum number of days for first flowering (39.33 days) and maximum essential oil content (0.8%) was recorded in Acr-1and Rcr-728. It might be concluded from the study Rcr-475, Rcr-446, Rcr-41, Co-4, Dcc-4 and Acr-1 were identified as best performing genotypes and offer a good scope of selection for desired traits.

Keywords: Genotypes, Umbels, Umbellets, Essential oil, seed yield

Biography:

Nandakumar K obtained his B.Sc.(Horticulture) and M.Sc.(Horticulture)@ CoH, Mudigere, Ph.D.in Plantation, Spices Medicinal and Aromatic Crops. Worked as Assistant Professor in General Horticulture, at CoH, Hiriyur. Presently Working as Senior Research Fellow under REWARD Project, Department of PSMA, KSNUAHS, Shivamogga,

Research Interest: Plantation, Spices Medicinal and Aromatic Crops

E: harinandu887@gmail.com

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Oral

Optimizing of Shoot cuttings propagation of *Arundo donax* L.

K. Dharmar[1]*, R. Rajesh[1] and K.T. Selvavinayagam[2]

[1]Pasumpon Thiru Muthuramalinga Thevar Memorial College, Kamuthi , India

[2]Jantho Memorial Educational Foundation, Kallathikulam, India

Abstract:

"Seevali" (reed mouth-piece) is handcrafted from Arundo donax L. (Giant reed) by traditional artisans to play Nadaswaram, a highly complex and ancient musical instrument dates back to the 13th century. The reed quality is the most important, which determines the tone, pitch, and controllability of the instrument. This Giant reed typically spread in riparian zones along the Cauvery - Kollidam River, Tamilnadu, India. Due to modernization of water/ irrigational canals, grazing, wild fire, the area of naturalized occurrence is drastically decreasing. The present study is to investigate and optimise the mass propagation through shoot cutting (with axillary bud from top, middle, and bottom shoot parts) in different soil types (Clay Soil, Silt, Silty Clay and Sandy Loam). Axillary bud propagates in 3-5 days in Silty Clay & Sandy Loam soil and 4-7 days in Silt soil & Clay Soil. The artisan cuts the bottom shoot of the grass for preparation of seevali with internode length of 12.90±1.76cm, OD of internode is 1.4±0.1cm, ID of internode is 0.88±0.16cm with wall thickness of 0.27±0.04cm. In grow bag propagation, the grass was grown in clay soil through axillary bud from lower shoot part, it gave internode length of 11.98±1.92cm, with OD of internode 1.30±0.10, ID of internode is 0.86±0.09cm with wall thickness of 0.22±0.03cm. Similarly, in Sandy loam soil the grass gave the internode length of 11.88±1.45cm, with OD of internode 1.37±0.06, ID of internode is 0.85±0.11cm with wall thickness of 0.24±0.04cm. The axillary bud from lower shoot part grown in clay soil and sandy loam soil were almost close to the grass harvested in the natural habitat.The study concluded that the axillary bud from lower stem part grow well in sandy loam soil and clay soil. The propagation protocol can be sustainable and economically viable method to establish *A. donax*.

Keywords: *Arundo donax*, Cultivation, Shoot cutting, & Nadaswaram

Biography:

K. Dharmar, Associate Professor & Head, Research Department of Botany, Pasumpon Thiru Muthuramalinga Thevar Memorial College, (Affiliated to Alagappa University, Karaikudi), Kottaimedu – Post, Kamuthi - 623604, Ramanathapuram District, Tamilnadu, India is an academician and specialized in Plant Bio-Diversity & Conservation, Plant Molecular biology and Phycology. He is chairman of UG Botany- Board of Studies, Alagappa University, Karaikudi. He has presented more than 30 scientific papers in various conferences and also published 25 scientific papers in National and International Reputed Journals. He has received Best Student Award (1991 - 1992), Teacher Fellowship (2009 - 2011 and UGC- Research Award UGC- Research Award (2016-2018). He has successfully guided 15 M.Phil., and 1 Ph.D., Scholars and 6 Research Scholars are perusing Ph. D., in his credential.

Research Interest: Plant Diversity, Molecular Biology, Phycology

E: dharmarsk@gmail.com

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Oral

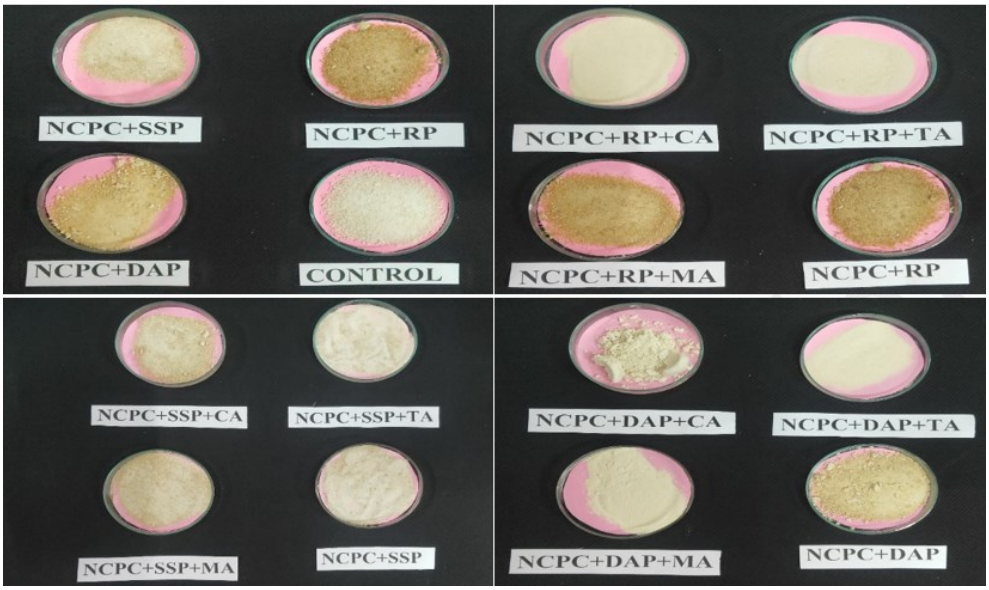
Enhancing phosphorus availability through nano clay polymer composites impregnated with low molecular weight organic acids

Dibyendu Chatterjee*, Totan Adak, E Venkat Ramaiah, Bitish Kumar Nayak, Saikat Ranjan Das, Amaresh Kumar Nayak
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Smart delivery of nutrients through nano clay polymer composites (NCPC) is a recent strategy to improve yield and use efficiency (Chatterjee et al. 2021, 2023; Sarkar et al. 2018). An experiment was conducted at ICAR-NRRI, Cuttack (2021-2023) using three low molecular weight organic acids (LMWOA) (citric acid (CA), malic acid (MA) and tartaric acid (TA)) and three P sources (diammonium phosphate, DAP; simple superphosphate, SSP and rock phosphate, RP) in nine combinations. The synthesis of NCPC impregnated with P source and LMWOAs was modified by adding P source and LMWOA between the process of polymer formation. The simultaneous application of DAP and CA resulted in a higher P concentration, probably due to the chelation of reactive Fe and Al sites by CA. It was also observed that DAP, SSP and RP can be loaded up to a maximum of 10% w/w, 20% w/w and 10% w/w, respectively. The release pattern of P from loaded NCPC in water and soil was studied for DAP, SSP and RP variants. In all cases, the power form of release was observed. In terms of P release in soil, NCPC+SSP (20%) +TA and NCPC+RP (10%) +TA had the highest levels. It was found that the application of DAP using NCPC as a smart delivery system slows down its release compared to crude DAP. We also used Fourier transform infrared spectroscopy (FTIR) and a scanning electron microscope (SEM) to characterize the polymer. In the pot experiment, 11 treatments comprising of all combinations of P sources and LMWOA were replicated thrice. We observed that NCPC+DAP+TA produced the highest yield (19 g pot-1) and better yield attributes compared to treatments. The micro plot experiment was conducted with 8 treatments (control, NCPC+TA, NCPC+DAP, NCPC+SSP, NCPC+RP, NCPC+DAP+TA, NCPC+SSP+TA, NCPC+RP+TA, NCPC+RP+TA, NCPC+RP+TA, NCPC+RP+TA, DAP) in 3 replications with a rice variety (Sahabhagi Dhan). Treatment NCPC+DAP+TA showed yield advantage of 8.3% over sole DAP application.

Keywords: Nanoclay polymer composites, phosphorus availability, release kinetics, low molecular weight organic acids, Fourier transform infrared spectroscopy



E: dibyenducha@gmail.com

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Oral

Role of small RNAs in plant-associated bacteria, *Azospirillum baldaniorum* under abiotic stress conditions

Vatsala Koul*, and Mandira Kochar
The Energy and Resources Institute, New Delhi, India

Abstract:

For a long time, RNA was considered to be important as an information carrying intermediate between DNA and the proteins, and as transfer and ribosomal RNA involved in protein synthesis, but not to have any regulatory function. Due to the serendipitous discovery of the small RNAs (sRNAs) in bacteria, now RNAs are known to carry out many functions in the cell, such as catalysis and gene regulation and this opened up a whole new field. Most sRNAs base pair to the mRNAs to affect its translation and/or stability. Now it appears that the majority of the sRNAs are stress-related, helping bacteria to respond to changes in the environment.

Azospirillum baldaniorum Sp245 is a well-studied plant growth-promoting bacterium and in our study, expression-based sRNA identification (RNA-seq) revealed the first list of ~ 468 sRNA candidate genes in *A. brasilense* Sp245 that were differentially expressed in nitrogen starvation versus non-starved (control) conditions. Altogether, putative candidates were stringently curated from RNA-seq data based on known sRNA parameters (size, location, secondary structure, and abundance). In total, ~ 59 significantly expressed sRNAs were identified in this study of which 53 are potentially novel sRNAs. Sixteen sRNAs were randomly selected and validated for differential expression, which largely was found to be in congruence with the RNA-seq data. In parallel, *in silico* tools also identified two of the above as candidate sRNAs, sSp_p4 and sSp_p6, which were further selected for their functional characterization.

Target gene expression analysis of sSp_p4 confirmed that it influenced gene regulation and plant growth- promoting traits such as poly-hydroxybutyrate synthesis, indole acetic acid production, and biofilm formation. sSp_p4 was overexpressed, knocked-down and complemented to characterize its physiological functions, and importance in plant growth-promoting traits. Its expression in wild type and mutant strains studied in different nutrient conditions revealed variable regulation of different targets. sSp_p6 expression was found to be modulated in carbon and nitrogen stress while forming an interactive network with the target genes, vnfG (encoding vanadium-dinitrogenase) and σ-54 (sigma factor, interaction region) thereby establishing an essential role of this sRNA in biological nitrogen fixation by the strain. Additionally, plant-microbe interaction studies between the host plant, sorghum and sRNA mutant strains, revealed increased root length, lateral root growth and germination rate of the host plant, thus displaying improved plant root morphology. This study established the A. brasilense Sp245 sRNAs, sSp_p4 and sSp_p6 as the potential candidates for improving abiotic stress enduring capability in this strain.

Keywords: sRNA sSp_p4, sSp_p6, *Azospirillum*, Polyhydroxybutyrate, Rhizosphere

E: vatsala.koul@teri.res.in; koul.vatsala@gmail.com

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Oral

Diversity, distribution and indigenous uses of *Hypericum* spp. in Northeast India

Harekrushna Swaina*[1], Deepu Vijayan[1] and Sudhansu Sekhar Dash[2]

[1]Botanical Survey of India, Eastern Regional Centre, Shillong, India

[2]Botanical Survey of India, Kolkata, India

Abstract:

The genus *Hypericum* is known worldwide for its traditional and modern uses. Therefore, an attempt has been made to assess the diversity, distribution and indigenous uses of different species of this genus in Northeast India (NEI). A total of eighteen (18) species of *Hypericum* were recorded from NEI, of which fourteen (14) are economically important. All the eighteen (18) species are native to NEI, four (4) are endemic and two (2) are near endemic species. Amongst the species, *Hypericum lobbii* was the most valued species used for fuel, fodder, dyeing, medicine and extraction of hypericin. Due to over exploitation of this species by the pharmaceutical industries, the natural populations of this species are depleting fast and this species have been placed under vulnerable category by IUCN. Similarly, due to multiple utility of *Hypericum hookerianum*, *Hypericum tenuicaule* and *Hypericum williamsii* are also facing a major threat. It is expected that like *Hypericum lobbii*, other species of *Hypericum* may have high concentration of hypericin. Therefore, chemical extraction of these species has been suggested for the identification of potential of these species. The population assessment using standard ecological methods and development of propagation protocol is also suggested.

Keywords: *Hypericum*, medicinal plant, diversity, distribution, indigenous uses, Northeast India

Biography:

Harekrushna Swain did his B.Sc. and M.Sc. from Ravenshaw University, Cuttack, Odisha and Orissa University of Agriculture and Technology, Bhubaneswar, Odisha respectively. He completed his PhD. in Botany from ICAR-National Rice Research Institute, Cuttack, Odisha and Ravenshaw University, Cuttack, Odisha. Worked as INSPIRE Fellow of DST in ICAR-National Rice Research Institute, Cuttack, Odisha. Worked on DNA fingerprinting, Genomics and proteomics of host pathogen interactions, Molecular diagnostics of plant diseases. Presently working on DNA Barcoding and phytochemical analysis of endemic genus of Northeast India.

E: harekrushna@bsi.gov.in

Preparation and characterization of rice husk biochar-nano particle composite-a novel approach for arsenic remediation

Tridip Mondal[1,2], Mohammad Shahid[1]*, Rubina Khanam[1]and Rabindra Kumar Nayak[2]

[1]ICAR-National Rice Research Institute, Cuttack, India

[2]Institute of Agricultural Science, Odisha University of Agriculture & Technology, Bhubaneswar, India

Abstract:

Arsenic (As) has become a menace affecting billions of people across the globe. In the recent years, a great deal of study has been done on several strategies for effectively removing As from soil. However, many of these mostly conventional methods have substantial drawbacks and to present, have prevented their extensive practical application. In this context, we have used easily available agricultural waste material rice husk and two nano particles namely nano zero valent Iron (nZVI) and nano silicon dioxide (nSiO2) to prepare Rice Husk Biochar (RHB)-nano particle composite to remediate As toxicity. In our experiment we utilized two methods to synthesize the product. In first method, we prepared the composite in pyrolysis chamber after mixing the rice husk with nano particles and in second method, first biochar was prepared then nano particles were mixed to develop composite through proper protocols. In both the methods, different ratios of biochar/rice husk and nanoparticles (biochar and rice husk: nZVI-10: 0.25, 10:0.5, 10:1 and biochar and rice husk: nSiO2-10:0.5, 10:1, 10:2) were used for preparation of composite. The product was characterized using SEM-EDX and higher loadings of both nanoparticles in the composite (nZVI- 36.5% and nSiO2-58.4%) have been noticed in the first method. We have also conducted the adsorption study of As (V) and As (III) on composites prepared by both methods using different ratios of nanoparticles. Both the composites prepared through first method using lowest ratios of nanoparticles showed the highest sorption and removal of As species i.e RHB- nZVI: 94.6 % and RHB-nSiO2: 98.5 % As(III) removal and 93.7 % and 97.3% As(V) respectively.

Keywords: Arsenic, biochar, biochar-nano composites

E: shahid.vns@gmail.com,

Effect of bunch feeding on yield of banana cultivation

H.C. Parmar and Vinod B. Mor
Anand Agricultural University, Jabugam , India

Abstract:

The field experiment was conducted during two consecutive years 2018-19 and 2019-20 at Agricultural Research Station, College of Agriculture, Anand Agricultural University, Jabugam -391 155 Dist. ChhotaUdepur (Gujarat) on effect of bunch feeding on yield of banana cultivation. The soil of experimental site was loamy sand in nature.The experiment conducted in RBD in three replications. Total nine treatments of bunch feeding consisted T1: 500 g Cow dung+ 7.5 g Urea +7.5g SOP (IIHR-recommended), T2: 2.5% Panchagavya (250 ml solution), T3: 5% Panchagavya (250 ml solution), T4: 7.5 g Urea+7.5 g SOP (250 ml solution), T5: 15 g A.S.+7.5 g SOP (250 ml solution), T6: 500 g Cow dung, T7: 500 g Cow dung+7.5 g SOP, T8: 500 g Cow dung+15g AS+7.5g SOP and T9: Control (without bunch feeding). Fertilizer applied per plant was 10 kg FYM + 300:100:200 NPK g/plant. 1.8 x 1.8 m spacing maintained during plantation.The pooled data result shows thattreatment T8 (500 g Cow dung+15g AS+7.5g SOP) produced significantly maximum yield (84.86 t/ha), which was at par with treatment T1 (500 g Cow dung+ 7.5 g Urea + 7.5g SOP). Same trend observed in case of finger length and finger girth. Statistically lowest yield was produced by the treatment T9 (70.05 t/ha), followed by treatments T2, T6, T3 and T7. On the basis of result, it can be concluded that the bunch feeding in banana after de-navelling with 500 g Cow dung+ 7.5 g Urea + 7.5g Sulphate of Potash or 500 g Cow dung+ 15g Ammonium sulphate + 7.5g Sulphate of Potash is effective to get higher yield, quality and net return.

Keywords: Banana, Bunch feeding, Bunch yield, Panchagavya, Cow dung, Urea, SOP

Biography:

H.C. Parmar Ph.D. and M.Sc. in Agril. Economics, Developed varieties of Black gram (Shyamal), Mango (Anand Rasraj), Banana (Anand Vaaman and Prasadam) and also contributed in development of nine other crop varieties. 22 recommendations/technology made for farming community, 08 project completed related to economics.

Research Interest: Crop improvement, crop production and economics

E: hcparmar@aau.in

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Using artificial intelligence for integrated pest management and smart farmer advisories

Chandan Agrawal, Chandan Gupta, Ashish Papanai, Manas Jain, Siddhi Brahmbhatt, Sonali Ghike*, Ruby Pathania, Gokul Deep Girish, Laxminarayan Nateriya, Anika Muraraka, Lakshya Vijh, Adarsh Singh, Sarthak Maheshwari, Siddharth Verma, Mohammad Salman, Tanmaya Vyas, Shalini Talluri, and Jatin Agarwal

Wadhwani Institute for Artificial Intelligence, Mumbai, India

Abstract:

Pests and diseases wreak havoc on agricultural yields worldwide, reducing them by 20% to 40%. Reduced agricultural production also has an impact on nutrition and food security, as well as the national economy and household income. Wadhwani AI developed the CottonAce application to address this challenge. It is an AI-powered early warning system widely available on Android smartphones. Our outreach was 113 K cotton farmers through deep-learning-based pest detection techniques, helping them make timely decisions to reduce pest infestation by applying the right type and optimum amount of pesticides. The deployed solution detects pests like American and Pink bollworms, which cause 70% of all pest damage to cotton. The farmer empties pests from traps onto a white paper, takes a picture with a mobile phone, and an AI model identifies and counts them, applying an economic threshold to determine infestation levels and provide pesticide advisories. We expanded this solution to detect four prominent diseases in rice crops and are working on covering more pests on cotton and rice, chili, and apples. Through AI-based pest detection, we strive to empower underserved farmers by providing them with cutting-edge technology that is accessible through the convenience of their mobile devices. For disease detection in the rice crop, the farmer clicks a picture of the affected region of the plant and gets information about the cause, type, and severity of the infection. To keep stakeholders informed for prompt decision-making, we leveraged AI technologies to identify relevant agriculture news articles and extract meaningful information. Offering real-time alerts based on customizable keywords to track major agriculture outbreaks happening across the country.

Keywords: AI for Social good, Agriculture, IPM, IRM

Biography:

Sonali Ghike, Agriculture Expert, Wadhwani AI, has over 19 years of working experience in agriculture research and development, with specialization in the field of Agricultural Entomology and has worked at various leadership capacities with Ag- tech start-ups, as well as ICAR institutes with special reference to IPM, IRM, climate resilient pest management strategies

Research Interest: Artificial Intelligence, Sustainable agriculture, Agriculture

E: sonali@wadhwaniai.org

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Evaluating in vivo efficacy of new and commercially available fungicides against sheath blight disease of rice

Srikanta Lenka, Totan Adak, Raghu S and S.D. Mohapatra
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Sheath blight disease of rice caused by the fungus, Rhizoctonia solani Kuhn {Teleomorph: Thanatephorus cucumeris (Frank) Donk} is a major biotic constraint in rice production in almost all the rice growing areas affecting grain yield and quality. Yield loss due to this devastating fungal disease in our country has been reported upto 54.3% (Rajan, 1987; Roy, 1993). To the major concern that till date no resistant varieties have been developed against this disease. Different cultural practices in combination with application of fungicides are found as the common options for management of this disease. Management of sheath blight disease through application of fungicidal chemicals have been found successful in the field conditions. Keeping this in view, one field experiment through use of seven new and commercial available fungicides was conducted in the research farm of ICAR-National Rice Research Institute, Cuttack during kharif season of 2021 and 2022 with taking of susceptible variety Tapaswini. The fungicidal treatments taken up during the experimentation were difenoconazole 25EC @0.5ml/l, isoprothilane 40EC @1.5ml/l, kasugamycin 3%SL @2.0ml/l, Kitazin 48EC @1.0ml/l, Propineb 70WP @3.0g/l, tebuconazole 25.9EC @1.5ml/l and thifluzamide 24SC @0.8g/l.The plants of the susceptible rice variety Tapaswini were artificially inoculated with at maximum tiillering stage with the virulent strain ShBSL4 (of sheath blight fungus, Rhizoctonia solani Kuhn) by inserting the bids of mycelia with five sclerotial bodies inside the leaf sheath followed by wrapping with a swab of moist cotton and cello tape just above the water line. After 10 days of inoculation i.e. establishment and initiation of disease symptoms, the test chemicals at their recommended doses were sprayed to the rice plants twice at an interval of 15 days. In control, the plants were sprayed with water only.

From the critical observations and critical analysis of the data out of the experimented during two consecutive years (kharif, 2021 and 2022), out of seven fungicides, the best treatment against the sheath blight disease with the fungicide, isoprothilane 40% EC @1.5ml/l was found by showing 18.3% disease severity, 22.7% disease incidence and grain yield of 5.3t/ha. Another fungicide, difenoconazole 25 EC @0.5ml/l was the second best to control the disease with showing 18.4% disease severity, 23.7% disease incidence and production of grain yield of 5.26t/ha. The untreated control showed 67.9% disease severity, 70.4% disease incidence and produced 3.4t/ha.

E: srikantalenka@yahoo.in

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Oral

Identification of potential physiological and biochemical stress indicators during thermal stress and its recovery in synthetic prolific (FecB^{BB}) and native non prolific rams (FecB^{++}) of semi arid region

Vijay Kumar[1]*, S.S. Dangi[2], Srobana Sarkar[2], Raghvendar Singh[3], and Arun Kumar Tomar[2]

[1]ICAR-CSWRI, Arid Region Campus, Bikaner, India

[2]ICAR-Central Sheep and Wool Research Institute, Avikanagar, India

[3]ICAR-Indian Veterinary Research Institute, Izatnagar, India

Abstract:

Physiological and biochemical stress indices were studied in native non prolific Malpura (FecB++) and synthetic prolific Avishaan (FecBBB) adult rams (n=8 each) to identify the potential indices and their adjustments under acute exposure to extreme heat stress during winter season. Rams were exposed to 49°C in a controlled climate chamber for 4 hours beginning 10.00h till 14.00h and then returned to the semi open shed in the natural environment for recovery. All physiological responses, surface temperature of wool fleece at rump and skin at rump, scrotum and pre-scapular regions were recorded at 06.00h (-4h pre exposure), 10.00h (0h exposure), 11.00h, 12.00h, 13.00h, 14.00h, 16.00h, 18.00h, 22.00h, 02.00h, and 06.00h. All responses increased significantly ($p<0.01$) during heat stress. Peak response was attained at 3 and 4 h of heat stress, wherein panting got initiated. Panting was more severe in Avishaan rams with a significantly higher respiratory rate ($p<0.05$) at 14.00h (after 4h of heat stress). During the recovery period, the climatic conditions were thermoneutral (8-18°C Dry bulb and 6.5-13°C wet bulb temperature). The recovery was similar in both the breeds and no adverse impact was observed in the animals. The fleece was effective in creating a thermal insulation zone which provided a negative temperature gradient of 3.83±0.74°C during extreme heat stress and a positive gradient of 14.17±0.44 (°C) during extreme cold at the skin surface beneath. This insulation also contributed to effective thermoregulation in sheep under extreme heat and cold. Among the circulating biochemical indices, such as Glutamic oxaloacetate transaminase (GOT), glutamine pyruvate transaminase (GPT), Creatine kinase (CK), Lactate dehyrogenase (LDH), creatinine, tryiglycerides, total oxidative status (TOS) and total antioxidant content (TAC) and Oxidative stress index (OSI), only TAC, TOC, OSI, Creatine kinase and creatinine exhibited a significant change and a particular trend in both the breeds in response to heat stress. High levels of OSI were observed post heat stress in the recovery period. Total antioxidant content however gets reduced as the heat stress progresses which indicate utilization of the available antioxidants in the animal cells for combating heat stress. Among the stress hormones (cortisol, triiodothyronine and thyroxine), cortisol increased significantly ($p<0.05$) after initiation of heat stress until two hours in the Malpura and then declined while a similar but lower amplitude was observed for Avishaan. triiodothyronine exhibited significant rise in response to stress in Avishaan rams. Avishaan is a synthetic, prolific triple cross breed in which the FecBBB gene of Garole sheep (native of West Bengal) has been introgressed through selective breeding. Variation found in the stress indices as compared to native Malpura indicates variation in this breed with respect to adaptation and stabilization to thermal stress in the semi arid region.

Keywords: Climate, thermal stress, stress indices, rams, hormones

E: vijay.kumar2@icar.gov.in

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Oral

Rice millet based ready-to-eat (RTE) extruded products fortified with underutilized crop of Eastern India

Sivashankari M*[1], Sourav Kumar Panda[2] and A. Tiwari[2]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]Assam Central University, Silchar, India

Abstract:

Due to a qualitative and quantitative lack of dietary protein and calories, the malnutrition results in serious health issues. Protein energy deficiency is a severe risk, particularly for young people in underdeveloped nations. Fortification or the combination of two or more food elements can, to a certain extent, address this nutritional deficiency. By combining green leaf vegetable, food products with improved nutritional profiles can be created. Modern consumers' diets include a lot of ready-to-eat food products. Extrusion cooking is a cutting-edge technology that the food industry has adopted since it is a quick, continuous, and economical procedure. As a result, research has been done to create ready-to-eat food products with added protein and nutrients from manipuri black rice, finger millet, maize(corn) and leafy vegetables (water spinach) using extrusion technology. The feed composition selected for the extrusion were same for all the trials, and the physicochemical analysis of the feed mix was conducted and recorded. The process variables used in the study were temperature (100,110 and 115°C), moisture content (5, 10 and 15%) and screw speed (290, 320 and 350 rpm). The optimization of process parameters was analyzed using Response Surface Methodology (RSM) based on the quality characteristics of the extrudates. The optimum operating conditions of extrusion process namely, barrel temperature, moisture content and screw speed was found to be 114.2°C, 5.8% and 311.5 rpm respectively. The physical parameters (expansion ratio, water activity, bulk density, true density), functional parameters (water absorption index, water solubility index), sensory properties (color, texture), proximate analysis of protein, nutritional analysis of anthocyanin of RTE products were analyzed.

Keywords: Extrusion, fortification, ready-to-eat extrudate, response surface methodology, physicochemical, functional properties

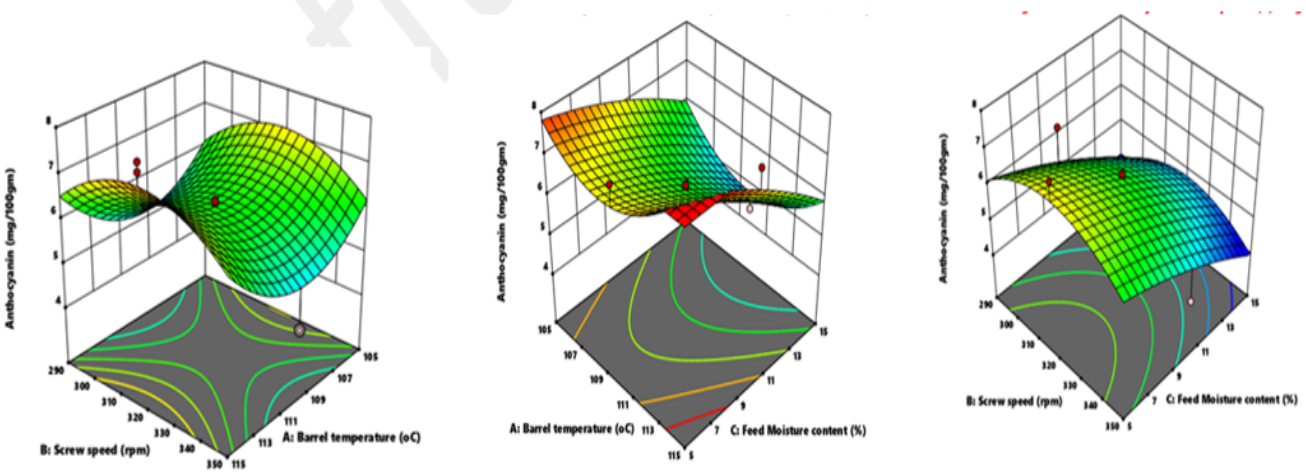

Fig. 1 Response surface plots showing the interaction effect of extrusion processing parameters on Anthocyanin Content

E: sivashankari.m@gmail.com

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Oral

Analyzing the impact of economic freedom on farm-level efficiency - An empirical analysis

Rajni Kapoor
Janki Devi Memorial College, University of Delhi, New Delhi, India

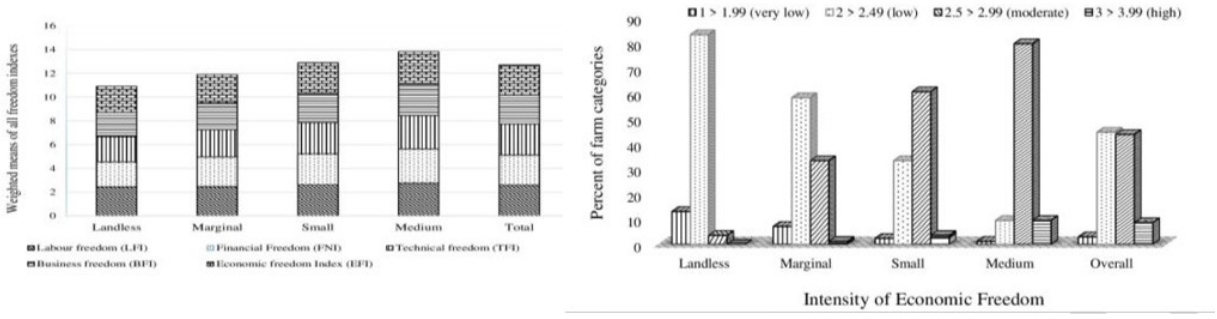
Abstract:

This article explores economic freedom in the agricultural sector to analyze its impact on farm-level efficiency. Indeed, freedom is required for growth, development and efficiency. The current study aims to review and estimate economic freedom index for the agricultural sector which is the composite average of labour, financial, technical, and business freedom indexes, measured through primary survey in one of the agricultural leading state of India. A questionnaire was designed to assess qualitative responses of all freedom indexes quantitatively. Principal component analysis is used for reducing the size of data sets by measuring the interrelationships among 28 specified indicators of economic freedom. In the first stage of economic analysis, input-output data (cost and output data) for cereals is collected in the reference year 2020-21. The data is used to quantify farm-level efficiency using the stochastic production frontier. In the second stage of the economic analysis, Tobit framework is used to analyze the impact of freedom indices on farm efficiency. The result depicts the fact about strong association between size-based different categories of farms and intensity of freedom indexes, although the extent of the freedom indicators varies across farms. It is observed that marginal and medium-sized farms are more efficient than smaller ones.

Nevertheless, a group of farmers have obtained the lowest value of economic freedom index because economic opportunities could not be fully accessed by them. Thus, the paper has created the awareness, and responsiveness among the farming community towards freedoms and opportunities provided by the authorities for the growth and development of the agricultural sector.

Keywords: India, economic freedom, agricultural efficiency, policy reforms

Graphs: Farm-wise Weighted Average of all Freedom Indexes



Biography:

Rajni Kapoor has completed her masters', M. Phil in Economics from Kurukshetra University and qualified for the UGC NET examination in 2004. She has been awarded PhD Degree on the topic, 'Economic freedom in agriculture and farm-level efficiency' in April, 2023. Dr. Rajni Kapoor joined University of Delhi, Shaheed Bhagat Singh College as Assistant Professor of Economics in August, 2011 and worked till March, 2023. Currently, she is working as Assistant Professor in Janki Devi Memorial College, University of Delhi. She worked at several reputed AICTE approved management colleges like Asia Pacific Institute of Management (2007-2010), JIMS, New Delhi (2010-11) and M.L.N.College, Yamuna Nagar (2001-2007) Haryana. She participated and presented a list of papers in many national and international conferences though out her journey of teaching and learning till now. She used to attend FDP, Technical sessions, Research Oriented Programs relevant to the field of research. Her research papers are published in SCOPUS, UGC care and good peer-reviewed journals.

E: rajnikapoor@jdm.du.ac.in

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Oral

Impact of e-NAM adoption on farmers in Lucknow district, UP: A comprehensive analysis

Ashish Kumar Awasthi[1]*, Anjali Awasthi[2], and Rishika Kaushik[1]

[1]Maharishi university Information Technology, Lucknow , India

[2]University of Lucknow, Lucknow, India

Abstract:

In this context, contemporary business strategies and technology have the potential to empower Indian Agriculture in addressing critical challenges such as poverty and food insecurity. Government initiatives have encouraged farmers to directly sell their produce to end consumers, bypassing intermediaries. The electronic trading portal, e-NAM, operates nationwide with the goal of linking all Agricultural Produce Market Committees (APMCs) to establish a unified system. A research study conducted in the Lucknow District of Uttar Pradesh focused on exploring issues and limitations associated with the use of e-NAM. The sample comprised 180 farmers and 41 traders from Lucknow 3 Block. Key challenges identified included a lack of training to comprehend the e-NAM system and limited awareness among farmers. The study recommends the establishment of training camps and widespread awareness campaigns to educate farmers about the e-NAM process and its benefits, fostering their active participation.

Keywords: Electronic-National Agriculture Market (e-NAM), mandis, APMCs, Process

E: awasthiashishup@gmail.com

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Oral

Micropropagation of *Limonium* 'Misty Blue' based on in vitro floral reversion and their morpho- histological study

Priyanka Raha*, Gourab Saha, Ishita Khatua, Tapas Kumar Bandyopadhyay
University of Kalyani, Kalyani , India

Abstract:

The reversion of the floral meristem into the vegetative meristem is a very exciting and complex process. This reversion process has been used for the regeneration and culture establishment of many tissue-cultured recalcitrant plants species. *Limonium* 'Misty Blue', a hybrid of Limonium latifolium X *Limonium ballidifolium*, is very popular in the floriculture industry for both fresh cut flowers and dry flower production. Previously, only one group recommended the use of the floral reversion process for the culture establishment of *Limonium* 'Misty Blue', but they did not critically analyse the anatomical features during floral reversion. In the present research, the thin cell layer (TCL) of inflorescence node explants was cultured in the MS basal medium + BA (4.44–8.88 µM) + NAA (0.5–3.65 µM). The significantly best response (7.52±0.19 number of shoots/node) was recorded in MS + 8.88 µM BA + 1.07 µM NAA. The regenerated shoots were multiplied by 0.88 µM BA and rooted in MS+4.5 µM IBA + 0.44 µM BA before hardening and being transferred to the field after genetic fidelity assessment through the ISSR marker.

The histological study revealed stepwise inflorescence meristem formation and shoot buds reversion process. During floral reversion shoot bud differentiation was noticed at the axils of the subtending inflorescence bracts instead of inflorescence meristem formation. The shoot bud organogenesis was also directly formed on meristematic region of isolated inflorescence bract or from the dedifferentiated tissue of TCL. Even, both shoot bud and inflorescence meristem formation were recorded on the dedifferentiated tissue of explant or directly on the nodal explant.

Keywords: Floral reversion, Shoot & inflorescence meristem, Histology, Limonium hybrid, Floriculture

Biography:

Priyanka Raha completed the secondary and upper secondary exams at Naihati Katyayani Girls' High School. She has completed her master's degree at Barasat Govt. College, which is under West Bengal State University, after receiving her bachelor's degree in botany honors from Rishi Bankim Chandra College for Women. Under the direction of Professor Tapas Kumar Bandyopadhyay, She is currently pursuing her PhD at the University of Kalyani in the Department of Biotechnology and Molecular biology.

Research Interest: Micropropagation, Somatic embryogenesis, *in vitro* mutation, Haploid breeding, Hardening & field testing, Molecular marker assisted selection etc.

E: priyankambbt19@klyuniv.ac.in

Bacterial endophytes of wild rice and their potential for rice (*Oryza sativa* L.) plant growth promotion and showing defense response towards rice diseases

Rupalin Jena[1]*, Harekrushna Swain[1,2], Totan Adak[1], Ansuman Khandual[1,3], Soma Samanta[1], and Arup K Mukherjee[1]

[1]ICAR-National Rice Research Institute, Cuttack, India

[2]Botanical Survey of India, Eastern Regional Centre, Shillong, India

[3]Institute of Agricultural Sciences, S'O'A University, Bhubaneswar, India

Abstract:

Bacterial endophytes live inside the plant tissues and known to play a crucial role in the functioning of host plants through influencing their physiology and development. The use of endophytes is foreseen as a method to decrease the production expense and onus on the natural environment by minimizing the reliance on breeding for yield enhancement and agrochemicals. Along with having various economically significant traits like being tolerant of abiotic stresses and resistant to biotic stresses, wild rice also has an enhanced diversity of endophytic bacteria, which makes it a potential resource for sustainable agriculture practices. The primary goal of selecting endophytes is to replace chemical synthetic fertilizers, which harm the environment and human health in addition to depleting soil fertility through frequent precipitation. Choosing endophytic bacteria isolated from wild rice only as previously mentioned, wild rice possesses various economically significant traits, such as resistant to biotic stresses, tolerant to abiotic stresses, which could impede the potential benefits of endophytes for crop improvement and the still-unresolved issue of total health management of rice (*Oryza sativa* L.). Therefore, the current research concentrated on bacterial endophytes that were isolated from wild rice species only, such as *Oryza rufipogon, Oryza nivara, Oryza fficinalis, Oryza granulate, Oryza latifolia, Oryza barthii, Oryza grandiglumis*, etc. These endophytic bacteria were used to study rice plant growth promotion and various facades of endophyte-plant implications for their advantageous role in maintaining disease control mechanisms.

Current investigation focused on isolation and molecular characterization of entophytic bacteria was done from different plant parts of wild rice. Bacterial endophytes characterised on the basis of their morphological and molecular characters. The antagonism properties of this identified endophytic bacteria were examined against different rice diseases under both *in vitro* and *in vivo* conditions. Current investigations are to use the best bacterial endophytes for in vitro and in vivo experiments to promote rice crop growth and improve crop health management of rice crops with defense mechanism in different rice varieties. Different agronomical parameters were also statistically analysed. Thus, it is plausible that entophytes could serve as a completely environmentally benign alternative to improved health management of rice crops.

Biography:

Rupalin Jena is currently working as a PhD. Scholar under principal scientist Dr. Arup Ku. Mukherjee at ICAR NRRI, Cuttack as DST Inspire Fellow. She is doing her research on Endophytic Fungus isolated from wild rice species. She did her M.Sc degree from Annamalai University. She loves to do research and involve with new and interesting technology and always wants to develop her skills.

E: rupalinjena2015@gmil.com

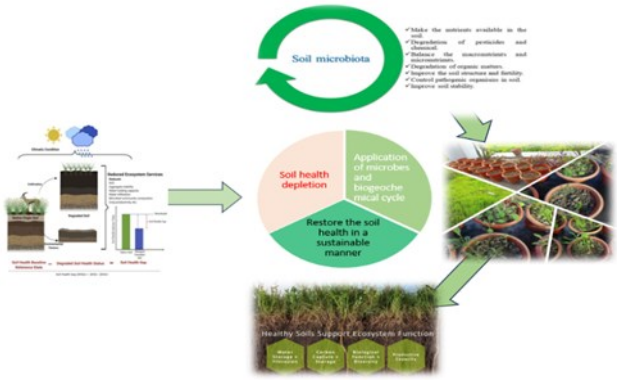
Accelerated rejuvenation of paddy field through microbial interventions

Jyotsna Mondal*, Ranjita Biswas, and Sukhendu Bera
Maulana Abul Kalam Azad University of Technology, West Bengal, India

Abstract:

The quality of the soil is deteriorating daily and is starting to become desertified, which is bad for human health and food production. According to the 2019–20 Soil Health Survey, 44% of Indian soil lacks organic carbon, 42% phosphorus, and 55% nitrogen. FAO has released a report indicating that the average demand for agricultural commodities in 2030 will be 60% greater than in 2020, with developing nations accounting for almost 85% of this additional demand. The idea of raising agricultural yield per unit area has been the world's sole means of meeting its food needs for more than 50 years. Therefore, restoring soil health is increasingly becoming a priority. The nutrient balance of the soil is closely related to soil health and quality, and it can be controlled in several ways. Sustainable farming methods support the microbial biome's growth and circulation in one way and the soil's ability to maintain the ecological balance in another. The health of the land is being adversely affected by it. While organic fertilizers can enhance soil health, they also reduce yield. In addition to raising crop productivity, sustainable development prioritizes the restoration of soil health. One approach to improving and restoring soil health sustainably is to use bacteria as biogeochemical agents to implicate this demand among many processes. It is evident from the main study that adding microorganisms to the soil as formulas can boost the amount of nutrients that are available to the soil. As a result, this can be applied as a long-term strategy for further research to enhance soil health.

Fig: Graphical representation of abstract



Biography:

Jyotsna Mondal, was born in 1996 in the district of Hooghly. After completing her schooling at a local school, pursued a Bachelor's degree in Microbiology at Swami Vivekananda Institute of Science & Technology, culminating in 2017. Eager to delve deeper into this field, she continued her academic pursuit and completed her Master's in Microbiology from Techno India University, WB in 2019. In the face of the global pandemic in 2022, she embraced the challenges and committed herself to further scholarly pursuits. From the corridors of Paschimpara High School to the research labs of MAKAUT, WB She has embraced the ever-evolving journey of learning. As she embark on the next chapter of my Ph.D., she is fueled by curiosity and a commitment to contribute meaningfully to the scientific community. Along with the challenges and twists and turns, she look forward to the unwritten pages that lie ahead.

Research Interest: Agricultural Biotechnology, Soil health, Soil Microbiota, Sustainable ecosystem

E: jyotsna.mondal@makautwb.ac.in

Palynological studies of different grape species for ascertaining their utilization in grape rootstock breeding

Prabhanjan Rane[1]*, Madhubala Thakre[1], Mahendra Kumar Verma[2], Chavlesh Kumar[1], Jai Prakash[1], Vartika Srivastava[3], P. R. Shashank[1], Niranjana M[1], Gautam Chawla[1]

[1]ICAR-Indian Agricultural Research Institute, New Delhi , India

[2]ICAR-Central Institute of Temperate Horticulture, Srinagar, India

[3]ICAR-National Bureau of Plant Genetic Resources, New Delhi , India

Abstract:

India is emerging as a global leader in table grape production and export, underscoring the importance of employing rootstocks to address various environmental stresses, particularly those intensified by climate change. This study focused on palynological study of three grape rootstock namely Vitis parviflora Roxb., Salt Creek (*Vitis champini* Planc.), and Pusa Navrang (*Vitis vinifera* L.). crucial for rootstock improvement programs. Pollen ultrastructural observations by scanning electron microscopy revealed that Vitis *parviflora* Roxb. had inaperturate pollen, which didn't germinate in vitro. In contrast, Pusa Navrang and Salt Creek exhibited tricolporate pollen with in vitro germination capabilities. Pollen storage experiments demonstrated that successful pollen storage for seven days was achieved at 4°C, while the most effective conditions were at –20° C and –196°C (in liquid nitrogen), allowing storage for up to study period of 30 days. These storage conditions can be utilized for addressing challenges related to asynchronous flowering among grape genotypes during pollination. Cross-compatibility studies involving in vivo pollen tube growth, revealed high compatibility in *V. parviflora* Roxb. × Pusa Navrang and *V. parviflora* Roxb. × Salt Creek, suggesting their potential use in grape rootstock breeding. Notably, self-pollinated flowers of *V. parviflora* Roxb. displayed an inability to set berries, indicating that *V. parviflora* Roxb. has functionally female flowers. This research provides both theoretical insights and practical references for improving grape rootstocks by understanding pollen characteristics, storage conditions, and compatibility among different Vitis species.

Keywords: Grape rootstock, *Vitis* spp., Pollen germination, Pollen micro-morphology, Pollen viability, Cross-compatibility

Biography:

Prabhanjan Bhanudas Rane, graduated in Agriculture from College of Agriculture Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra. Post graduated in Fruit Science from Division of Fruits and Horticultural technology, ICAR-Indian Agricultural Research Institute, New Delhi and at present pursuing Ph.D. in Fruit Science at ICAR- Indian Agricultural Research Institute, New Delhi.

Research Interest: Comprehensive investigation on evaluation of the genetic diversity of indigenous Vitis species to identify novel rootstock traits

E: prbhnjnr99@gmail.com

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Oral

Impact of legume residues and nitrogen levels on soil biological dynamics in zero-till maize cropping system

A. Sai Kishore[1]*, D. Sreelatha[2], M. Malla Reddy[3], M.V. Nagesh Kumar[4] and T. Sukruth Kumar[5]

[1]Professor Jayashankar Telangana State Agriculture University, Hyderabad , India

[2]Regional Agriculture Research Station, Polasa , India

[3]Regional Agricultural Research Station, Palem, India

[4]Maize Research Centre, ARI , Hyderabad, India

[5]AICRP on Micro Nutrients, ARI , Hyderabad, India

Abstract:

An experiment was conducted to study the influence of residual effect of preceding legumes and nitrogen levels on zero-till *rabi* maize on soil biological dynamics at Maize Research Centre, Agricultural Research Institute, Rajendranagar, Hyderabad during *kharif* and *rabi* seasons of 2021-22 and 2022-23. The experiment was laid out in split-plot design with 18 treatments consisted of three cropping sequences with 100% RDN and 75% RDN viz., C_1N_1: Groundnut100%RDN-maize, C_1N_2: Groundnut75%RDN-maize, C_2N_1: Soybean100%RDN-maize, C_2N_2: Soybean75%RDN-maize, C_3N_1: Greengram100%RDN-maize, C_3N_2: Greengram75%RDN-maize as main plots and 3 sub-plots viz. F1: 100%RDN, F2: 125%RDN, F3: 150% RDN, during rabi respectively. Among the different cropping systems, significantly higher soil bacterial count, urease, dehydrogenase, acid and alkaline phosphatases at 30, 60 and 90 DAS was noted in preceding kharif greengram with 100% RDN on rabi zero-till maize cropping sequence over soybean and groundnut-maize cropping sequence in two years of study. On the other hand, with the application of 150% RDN for *rabi* maize revealed higher soil bacterial count, urease, dehydrogenase, acid and alkaline phosphatases at 30,60 and 90 DAS than 125% RDN and lowest was observed in 100% RDN in *rabi* respectively. Conversely, further the interaction effect in soil biological properties from sowing to harvest was found to be non-significant during both the years of the study.

Keywords: Cropping sequence, Nitrogen levels. Urease, Phosphatases, Soil bacterial count

E: saikishore361@gmail.com

Study on nutritional diversity in Grasspea (*Lathyrus sativus* L.)

Ramya KR[1]*, Kuldeep Tripathi[2], Padma G Gore[2], Ravi K Pamarathi[2], Rinky Resma Panda[1], Rakesh Bharadwaj[2], KC Bhatt[2]

[1]ICAR- Indian Agricultural Research Institute, New Delhi, India

[2]ICAR-National Bureau of Plant Genetic Resources, New Delhi, India

Abstract:

Grasspea is a versatile cool season legume crop with an exemplary nutritional profile and a spectacular choice as climate-smart species to overcome food and nutritional insecurity. A total of 168 diverse accessions including four checks (Ratan, Prateek, Mahateora, and Narayangon) were evaluated for 14 quantitative and 20 qualitative traits using an augmented block design at Pusa Farm, ICAR-NBPGR, New Delhi over two consecutive winter seasons (2019-20 and 2020-21). Biochemical profiling was done for both seed and leaves. The sample selection is by the FOSS NIRS 6500 for proximate parameters like protein, starch, sugar, phenol, moisture, ash, TDF, minerals like Fe, Cu, Zn, Ca and Mg along with aminoacid profiling and β-ODAP estimation using UPLC with Agilent ZORBAX Eclipse Plus C18 and SB C18 column respectively. Significant difference was observed in ODAP content from 0.074 to 0.34 mg/kg in seed and 0.03 to 0.287 mg/kg in leaves. The identified Low β-ODAP in the seeds of IC525182 (0.074) and IC0634662 (0.078) and leaves of IFLA1193 (0.030) and IC208430 (0.040) was observed. This nutritional profiling and characterization revealed the elite accessions which have superior agronomic traits with a high range of protein, minerals and low β-ODAP in both seeds and leaves which include IC208430, IC0634654, IC0634662, IC0634674, BANG285, BANG31, IFLA143 and IFLA1193. These accessions can be used in further grasspea breeding programmes for the development of low ODAP and agronomically superior varieties which can benefit the marginal farmers of semi -arid regions.

Keywords: Grasspea, biochemical, proximate, aminoacid, β-ODAP

Biography:

Ramya KR is a Ph.D. Research scholar, with thesis entitled “Study on Morpho-nutritional Diversity in Grasspea (Lathyrus sativus L.)” at ICAR- Indian Agricultural Research Institute in the Division of Plant Genetic Resources, NBPGR, New Delhi. She is working on the morpho-molecular and biochemical characterization of grasspea germplasm and molecular characterization using SSR markers and nutritional profiling for neurotoxin β-ODAP and for various other biochemical parameters. She has done my M.Sc (Agri) in Plant Genetic Resources in thesis (entitled with) “Studies on Genetic divergence and development of Core collection in Pearl millet germplasm (Pennisetum glaucum (L.) R.Br.)” at Tamil Nadu Agricultural University . She has eight publication including original research articles and book chapters along with 2 popular articles which was given in the resume.

Research Interest: Pre-breeding in special note to pulse breeding

E: ramyaramasamy135@gmail.com

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Oral

Assessment of phenotypic variability under normal light and low light stress conditions in diverse rice genotypes

Swagatika Das*, Soumya Mohanty, Darshan Panda, Baneeta Mishra, Rameswar Prasad Sah, Anil Kumar C, Reshmi Raj KR, Devanna BN, Awadhesh Kumar, Sharat Kumar Pradhan, Sangamitra Samantray, Mirza Jaynul Baig, Lambodar Behera
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Background: Low light stress is a significant constraint in rice production. Phenotypic variability within rice germplasm offers a crucial resource for developing resilient cultivars adapted to challenging low-light conditions. Genetic diversity forms the cornerstone of crop improvement, enabling the selection of superior cultivars adapted to diverse environments. This study investigated the genetic variability of 192 diverse rice genotypes under contrasting light conditions, normal light (NL) and low light (LL), to identify QTLs/ genes useful for breeding programs.

Methods: The experiment was conducted across two seasons (Kharif 2022 and Rabi 2023) at ICAR-National Rice Research Institute (NRRI), Cuttack, India, employing an Alpha Lattice design. Low light condition (25% and 50% light reductions, respectively in Kharif and Rabi seasons) was created using an agro-shade net. Key agronomic traits, including grain yield (GY) and related parameters like days to flowering (DFF), plant height (PH), tiller number (TN), panicle number (PN), panicle length (PL), grain number (GN), spikelet number (SN), spikelet fertility percentage (SFP), panicle weight (PW), thousand- grain weight (TGW), biomass, and harvest index (HI), were evaluated under both NL and LL conditions.

Statistical analyses were conducted using 3-way ANOVA followed by Tukey's post-hoc test and student's t-test, and phenotypic correlation. Principal component analysis (PCA) was performed to visualize the relationships among traits and identify potential stress-tolerant genotypes.

Results: Significant reductions in all measured traits except DFF in Rabi 2023 were observed under LL stress compared to NL. ANOVA revealed significant variations among all traits due to genotype, light, and season interactions. Correlation analysis demonstrated significant relationships ($p \leq 0.05$) between GY and other traits except DFF and PH under both NL and LL conditions across seasons. PCA revealed that the first two principal components explained a substantial portion of the total variability (71.53% and 70.66% in NL while 76.25% and 72.78% in LL for Kharif and Rabi seasons, respectively).

Conclusions: This study demonstrated distinct genetic variations in response to LL stress among the tested rice genotypes. Some genotypes exhibited remarkable resilience, maintaining or even improving their performance under LL conditions. This information is valuable for breeding programs aiming to develop low-light stress-tolerant rice varieties, particularly in the face of changing environmental conditions and increasing climate variability.

Keywords: Low light stress, Rice production, Phenotypic variability

Biography:

Swagatika Das, currently enrolled as a Ph.D. candidate under the guidance of Dr. Lambodar Behera. Her research focuses on utilizing the association mapping approach to identify Quantitative Trait Loci (QTLs) and genes associated with grain yield traits in rice (Oryza sativa L.) under conditions of low-light stress.

E: swagatikadas876@gmail.com

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Oral

Amaranthus viridis L. and *Lantana camara* L.: a study of their allelopathic effects on seed germination and early crop growth

Ipsita Priyadarsini Samal*, and Gyanranjan Mahalik
Centurion University of Technology and Management, Bhubaneswar , India

Abstract:

Allelopathy is a well-known field of active research in ecology. However, its significance in agroecology is largely undervalued. This review aims to solve this situation by introducing this new and developing topic to a large academic audience and stimulating further research. The review begins with an introduction, followed by talks on allelochemicals, the role of allelopathy in crop production, allelopathy-related crop production difficulties, and suggestions for further research. It also discusses larger studies into allelopathy in agriculture, biosciences, and available literature on the issue. We hope it will inspire additional scientists to study this exciting new subject. The characteristics of allelopathy, allelochemicals and allelopathy mechanisms of exotic invasive plants that were toxic, pernicious or harmed the local ecology were reported in this paper. The development and application possibilities of exotic invasive plants were examined after reviewing the invasion routes, transmission strategies, reproductive characteristics, and environmental adaptation of exotic invasive plant's allelopathy. Lantana camara is a hazardous weed and a popular and attractive garden plant. Allelopathy is distinguished by plant-to-plant biochemical interactions that are both inhibitory and stimulatory. *L. camara allelopathic* effect studies have been undertaken in laboratory and field settings with various crops, trees, shrubs and weeds to determine their allelopathic potential and uses. Allelochemicals in *L. camara* hampered crop, weed, bryophyte and vegetable germination, growth and metabolism. Many chemical elements (P, Ca, Mg, and Fe), germination, shoot length, leaf area, shoot and root fresh and dry weight, chlorophyll content, and chlorophyll content were all inhibited by *Amaranthus viridis* powder. A large body of research has established the allelopathic effects of pigweed on the germination and early growth of examined crops.

Keywords: Allelopathy, allelochemicals, invasive plant, biochemical, seedling growth

E: gyanranjan.mahalik@cutm.ac.in

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Oral

Effect of Gibberellic Acid (GA3) on berry attributes in seeded and seedless grape varieties in mid-hills of Nepal

Anil Kumar Acharya* and Kishor Chandra Dahal
Institute of Agriculture and Animal Science, Tribhuvan University, Kathmandu, Nepal

Abstract:

In the last five years (2017-2021), the import value of fresh and dried grapes in Nepal had been increased by 181 and 200 percent, respectively. The massive gap in demand and production shows the great scope to expand the production of quality grapes. GA3 is used to cluster loosening, thinning berries, and increasing berry size for better yield and quality of grapes. However, the timing and stages of application are crucial. A study was carried out to assess the effect of GA3 doses and to identify the suitable berry stage for its application in var. Cabernet Sauvignon and var. Talizman at Kewalpur Agro Farm, Dhading, Nepal. Experiments were carried out in factorial randomized complete block design. Two factors i.e. three doses of GA3 and three stages of application (post-flowering, 4-5 mm size berry and both post flowering and 4-5 mm berry) considered as treatment. GA3 doses had non-significant effect on berry attributes over berry stages in var. Cabernet Sauvignon, whereas significant effect of GA3doses was found in var. Talizman. The berry transversal diameter (20.45□0.17 mm), berry longitudinal diameter (23.37□0.22 mm) and berry weight (51.67□1.08 g) were maximum with the application of 10 ppm GA3. The R2 value of the berry weight against berry transversal diameter was 0.67 while the berry weight against berry longitudinal diameter was 0.42 in var. Talizman. GA3 10 ppm application showed the beneficial for achieving the higher yield in var Talizman.

Keywords: Berry size, berry transversal diameter, berry weight, GA3 doses, post flowering

Biography:

Mr. Acharya is currently a PhD schloar in the Institute of Agriculture and Animal Science (IAAS), TU and have more than 28 years' professional experience in the promotion of horticultural commodities as a Senior Horticulturist, agro-biodiversity conservation and utilization-former compliance member of International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), food and nutrition security. His expertise includes in the wider areas of research and development of horticulture sector, enterprise and value chain development, project designing, documentation and review works, regional/ global planning and program development representation. He has published more than 75 different scientific and technical papers along with reviewing and editing of different national and international journal papers and books. He is also delivering his expertise as an expert/reviewer of different national projects and national educational centres and as a member advisor of M.Sc. Agriculture (Horticulture) students of IAAS and Agriculture and Forestry University (AFU), Nepal.

Research Interest: Horticulture, Agro-biodiversity, Food and Nutrition Security

E: acharyanilku@gmail.com

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Oral

Sustainable agriculture and food security: A case study of Osmanabad District in Maharashtra

Ashwini Pandhare[1]* and Gunvant Birajdar[2]

[1]Tata Institute of Social Sciences, Mumbai and [2]Institute of Chemical Technology, Mumbai, India

Abstract:

Sustainable agriculture has gained significant attention in recent years as a response to environmental concerns and the need for long-term food security. It considers the long-term health of the environment, economic viability, and social equity. Also, it maintains soil health, conserves water, and reduces the use of synthetic inputs, and it helps to ensure the long-term productivity of the land and reliable food production. Osmanabad District is known for its agrarian economy, and farmers have been practising sustainable agriculture for many decades. Therefore, this research aims to understand the impact of sustainable agriculture on food security in the Osmanabad District of Maharashtra. The research employs a mixed-methods approach, combining qualitative interviews with local farmers, agricultural experts, and government officials, along with quantitative data analysis of crop yields, soil health, food crop production and economic indicators. The study explored the socio-economic implications, considering the impact on local livelihoods, income distribution, and overall community well-being. Also, it investigated the role of technological interventions, government policies, and community initiatives in promoting sustainable agriculture and ensuring food security. The findings of the research indicate a positive correlation between the adoption of sustainable agricultural practices and improvements in food security indicators. Farmers who have been involved in these methods stated increased crop resilience, reduced input costs, and enhanced soil fertility. Furthermore. The findings of this research contribute valuable insights to the ongoing discourse on the intersection of sustainable agriculture and food security, offering practical recommendations for policymakers, farmers, and other stakeholders in Osmanabad District and beyond.

Keywords: Sustainable Agriculture, Community well-being, Food Security and Livelihood

Biography:

Ashwini Pandhare is a Doctoral Scholar at the School of Rural Development, Tata Institute of Social Sciences, Tuljapur Campus, Maharashtra. She has completed her Bachelors, Masters and M Phil in Rural Development from Tata Institute of Social Sciences, Tuljapur campus. She has received the Best Student Award for a Bachelor's degree. She has been awarded the National Fellowship for Higher Education from the Ministry of Tribal Affairs Government of India (2-year Junior Research Fellow (2019-2021) and 3-year Senior Research Fellow (2021-2024). She has cleared UGC-NET and SET in Social Work. She has visited five countries (Indonesia, Australia, Sri Lanka, Bangladesh and Philippines) to attend international conferences. Her main area of research is Agriculture, Women Empowerment, Sustainability and Argo-allied activities broadly. She has presented more than ten research papers at various international and national conferences. She has published three research articles, and one is under review.

Research Interest: Agriculture, Sustainability, Women Empowerment, Rural Entrepreneurship

E: ashwinipandhare22@gmail.com

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A DNA-gold affinity-based electrochemical assay for amplification free detection of *Leifsonia xyli* subsp. *xyli*, the causal agent of sugarcane ratoon stunting disease

Moutoshi Chakraborty*, Narshone Soda, Simon Strachan, Shamsul Arafin Bhuiyan, Muhammad J.A. Shiddiky, Nam-Trung Nguyen, and Rebecca Ford
Griffith University, Nathan Campus, Queensland, Australia

Abstract:

Sugarcane ratoon stunting disease (RSD), caused by the bacterium Leifsonia xyli subsp. xyli (Lxx), poses a significant threat to sugarcane crops globally. Detecting RSD is challenging due to the absence of visible symptoms, leading to an increased incidence of the disease in commercial plantations. Existing molecular detection methods are costly, require sophisticated equipment, labor intensive, and entail prolonged sample-to-answer times. This study presents an innovative electrochemical biosensor approach for detecting Lxx DNA in sugarcane xylem sap. The method involves three key steps: (i) boiling lysis-based DNA isolation from sugarcane sap; (ii) magnetic purification of target sequences directly from the lysate using magnetic bead-bound capture probes; and (iii) electrochemical detection of the target by AuNPs-modified screen-printed gold electrodes. Our method exhibits outstanding detection threshold (10 cells/µL), reproducibility (SD = <5%, for n = 3), and a broad linear dynamic range (10 nM–1 fM or 10^5-10^0 copies/µL, r = 0.99). Furthermore, the method was also validated with infected sugarcane cultivars with known industry resistance ratings (susceptible, intermediate resistant, and moderately resistant). The novel electrochemical molecular biosensor method for *Lxx* diagnostics holds promise for conversion into a commercially viable and handheld device, facilitating on-farm detection and quantification of the RSD-causing pathogen.

Keywords: Nucleic acid isolation, plant pathogen detection, ratoon stunting disease, *Leifsonia xyli* subsp. *xyli*, Lxx, electrochemical detection, sugarcane, biosensor, affinity interaction, resistance screening

Biography:

Moutoshi Chakraborty is graduated from the University of Rajshahi (RU), Bangladesh, and completed her M.S. in Genetics and Plant Breeding from Bangladesh Agricultural University (BAU), Bangladesh. Currently she is doing her Ph.D. study under the Centre for Planetary Health and Food Security (CPHFS) and the School of Environment and Science (ESC) of Griffith University (GU), Queensland, Australia. She is working in an ARC linkage research project which is a collaborative project between Griffith University and Sugar Research Australia (SRA). Her current research focuses on advancing the understanding of biomolecular interactions and pave the way for developing novel portable diagnostic tools to detect major sugarcane diseases on-farm to develop effective management strategies at the early stage of disease infection.

Research Interest: Agricultural science, plant-pathogen interactions, disease diagnostics, molecular tools, disease management, electrochemistry, nanotechnology

E: moutoshi.chakraborty@griffithuni.edu.au

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Oral

Enhancing precision in wheat crop water stress index quantification through support vector regression model

Aditi Yadav*, Hitesh Upreti, and Gopal Das Singhal
Shiv Nadar Institution of Eminence, Greater Noida, India

Abstract:

In the ever-evolving landscape of global agriculture, sustainable practices become paramount, especially in the face of a burgeoning population and the pervasive impacts of climate change on food security and the economy. This study focuses on a plant based index known as Crop Water Stress Index (CWSI) which plays a crucial role in irrigation scheduling for higher crop yield along with water conservation in agriculture. CWSI is derived for wheat crops in the semi-arid region of western Uttar Pradesh, subjected to varying irrigation treatments across two cropping seasons by empirical method with help of three fundamental variables canopy temperature (Tc), air temperature (Ta), vapor pressure deficit (VPD). Furthermore, a machine learning model, Support Vector Regression (SVR) is utilized to predict CWSI. The prediction performance of the SVR across eight distinct scenarios, arising from distinct combinations from variables Tc, Ta, VPD, net solar radiation (Rn), wind speed (U), and soil moisture depletion (SD), are assessed based on metrics such as determination coefficient (R2), mean absolute error (MAE), and root mean square error (RMSE).The hierarchy of efficacy across diverse input combinations in decreasing order of performance from most effective to least effective is Tc, Ta, VPD, Rn, and U (R^2 = 0.997, MAE =0.901%, RMSE = 2.223%); Tc, Ta, VPD, Rn, U, and SD (R^2 = 0.996, MAE = 1.140%, RMSE = 2.626%); Tc, Ta, VPD, and Rn (R2 = 0.995, MAE = 1.198%, RMSE = 2.811%); Tc, Ta, VPD, and U (R^2 = 0.995, MAE = 1.239%, RMSE = 2.988%); Tc, Ta, VPD, and SD (R^2 = 0.995, MAE = 1.239%, RMSE = 2.988%); Tc, Ta, VPD, SD, and Rn (R^2 = 0.994, MAE = 1.260%, RMSE = 3.023%); Tc, Ta, VPD,U, and SD (R^2 = 0.994, MAE = 1.435%, RMSE = 3.178%); Tc, Ta, and VPD (R^2 = 0.993, MAE = 1.477%, RMSE = 3.304%). The significance of additional variable Rn alongside fundamental variables in prediction of CWSI can be seen by its consistent presence in three best performing scenarios. These findings underscore the promise of SVR models not merely as predictive tools but as catalysts for ushering in a new era of smart agriculture. The subtle dance of variables yields insights into the intricate web of irrigation scheduling, hinting at applications in an envisioned future of sustainable agriculture. Our study charts a course towards integrating SVR models into practical solutions, by its integration into an irrigation decision support system (IDSS) for crop stress mitigation, higher crop yield and efficient water management in agriculture.

Keywords: water stress, semi-arid region, winter wheat, support vector regression, input combinations

Biography:

Aditi Yadav holds a Bachelor's degree in Civil Engineering (B.E) and completed her post-graduation in Water Resources (M.E) from P.E.C., Chandigarh. Currently pursuing her Ph.D. at the Shiv Nadar Institution of Eminence, Delhi NCR. Aditi is an integral part of the Water Management Laboratory, working under the guidance of Dr. Gopal Singhal and Dr. Hitesh Upreti. Her research focuses on advancing water efficiency and crop productivity in the agriculture of semi-arid regions. Aditi has demonstrated her scholarly contributions through the publication of both review and research articles, along with multiple international conference proceedings. Her work has been featured in Scopus and SCIE indexed journals affiliated with reputable publishing houses such as Elsevier, Springer, and IWA Publishing

Research Interest: She is actively engaged in investigating a plant-based parameter of the Crop Water Stress Index (CWSI) for scheduling irrigations in the context of climate change. Her research explores diverse methodologies to formulate CWSI, employing various machine learning models.

E: ay453@snu.edu.in

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Abundance of Megachile pollinators on Cowpea during blooming period in Pantnagar

Suman Kumari[1]* and M. S. Khan[2]
G.B. Pant University of Agriculture and Technology, Pantnagar , India

Abstract:

Cowpea's provision of pollen and nectar has been demonstrated to positively impact pollinator populations and diversity, potentially leading to enhanced agricultural yields. However, the precise influence of pollinators on cowpea production remains uncertain due to the varied floral characteristics affecting insect pollinators. The diversification of crop pollinators is crucial for overall agricultural health, benefiting both wild and managed bees across diverse agricultural landscapes. Solitary bees of family Megachilidae, such as leaf cutter bees, mason bees, and resin bees, possess useful anatomical and behavioural adaptations enabling them to effectively pollinate a wide range of important crops. The present study on cowpea was conducted at vegetable research centre, G.B.P.U.A.T., Pantnagar, during Kharif 2021. Insect pollinator counts on cowpea flowers per square meter were obtained using a manual tally counter and stopwatch over five-minute intervals at various times of the day (07:00 a.m., 10:00 a.m., and 02:00 p.m.). Four distinct Megachile species were identified foraging on cowpea flowers. During the entire blooming period, M. lanata exhibited the highest abundance among the four species, recording a bee count of 6.92, while M. bicolor displayed the lowest abundance with an average count of 1.10. A notable variation in bee abundance across season was observed, indicating a significant difference ($F(3,7)=20.65$, $p = 0.000001$).

Keywords: Cowpea, solitary bees, Megachilidae, pollinator abundance, Megachile, M. lanata.

Biography:

Suman Kumari, an academic achiever, graduated from high school and intermediate school with honours, earning 78.8% and 77.8% from the CBSE board, respectively. Her academic path led her to a bachelor's degree in agriculture at GBPUAT, Pantnagar. She obtained her master's degree in entomology from GBPUAT, where she focused her study on managing insect complexes harming chilli and capsicum crops. Suman is currently pursuing her Ph.D. in entomology at GBPUAT in Pantnagar in order to further her knowledge. Her thesis work focuses on Megachile bees, showing her dedication to investigating and understanding pollinator behaviour and ecology. Suman Kumari's academic endeavours and emphasis on entomology demonstrate her commitment to furthering agricultural sciences.

Research Interest: Solitary bees, Megachile bees, non-Apis bees, pollinators

E: suman.k1606@gmail.com

To understand soil fertility: A comparative study of different trials

Kamlesh Sharma[1], Akanksha Singh[1], Ishwar Patidar [1], Bhupendra Singh[1], Chigusa Keller [1], Christelle Ledroit [1], Amrit Bir Riar [1], Hans Martin [2] , Gurbir S. Bhullar[2]

[1]bioRe Association, Kasrawad, India

[2]Research Institute of Organic Agriculture, Frick, Switzerland

Abstract:

Soil fertility refers to the ability of soil to provide essential nutrients and a suitable environment for plant growth. It is a Major factor in agricultural productivity and ecosystem health. The fertility of the soil is influenced by various physical, chemical, and biological factors that interact in complex ways. Sustainable soil fertility management involves practices such as crop rotation, and cover cropping.

This study aims to maintain or improve soil fertility without depleting natural resources or causing environmental harm from a long-term farming system comparison trial under semi-arid conditions in central India regarding different management regimes. The trial has been running since 2007, comparing biodynamic, organic and conventional with GM and without GM cotton management. All treatments include two two-year crop rotations: first-year cotton-wheat/chickpea and second-year soybean-wheat. To assess soil fertility, we took soil samples to analyse parameters like pH, Ec, N, P, K, OC and other soil properties.

The result shows that organic carbon has improved significantly in biodynamic and organic systems compared to conventional GM and Without GM, Soil pH significantly decreases in organic and biodynamic systems compared to conventional GM and Without GM

The result considering which management practices are the most important and which are of lesser importance provides some insight into changes in management effect on soil health parameters. It provides some basis for further investment in research. this bears relevance to sustainable ecosystems.

Keywords: Soil fertility, Biodynamic, Conventional, pH, Crop rotation, Cotton

Biography:

Kamlesh Sharma has a master's in biotechnology he is working as a soil laboratory manager with a focus on soil analysis. Since 2019, he has been working with the bioRe association in collaboration with the Organic Research Institute (FiBL)

E: biore.kamlesh@gmail.com

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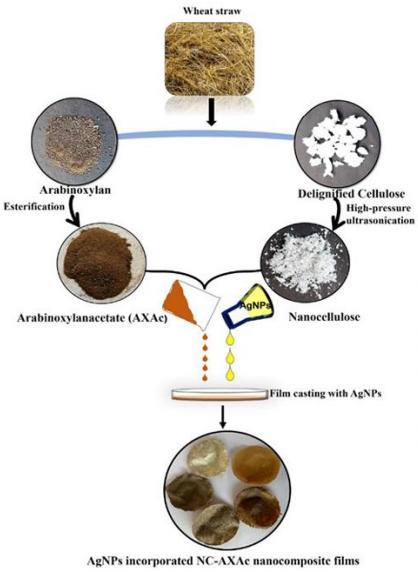
Oral

Development of biodegradable antimicrobial nano-composite packaging material for shelf-life extension of perishable commodities

Sakshi Gumber* and Koushik Mazumder
National Agri-Food Biotechnology Institute, Mohali, India

Abstract:

Major portion of food has been wasted after harvesting due to improper handling, inadequate storage facility and microbial contamination. To solve this, food companies are highly dependent upon conventional packaging materials which are non-biodegradable and hinders the transmission of gases.



This present study involves the preparation of active packaging material from agricultural waste material, i.e., wheat straw. Two major polysaccharides cellulose and arabinoxylan, were extracted from wheat straw and transformed into nanocellulose and xylan acetate respectively. Subsequently, mixture of nanocellulose and xylan acetate was further used as base material (water as solvent) for the preparation of nano-bio composite formulation with plasticizer and emulsifier. It was observed that, hydrophobic nature of xylan acetate is responsible for enhancing the microstructural and functional properties of packaging material by two-fold as compared to the native nanocellulose packaging material. Furthermore, silver nanoparticles were blended with packaging material suspension to impart antimicrobial properties. The antimicrobial composite packaging material was observed to be highly effective against food-borne pathogens (bacterial and fungal species) such as E. coli, P. aeruginosa, P. vulgaris and S. flexneri., etcetera. This improved packaging material with biodegradable properties is highly beneficial for industrial food packaging purposes to extend the shelf life of perishable commodities.

Figure: Schematic diagram for the preparation of AgNPs incorporated composite films from wheat straw.

Keywords: Nanocomposite, Xylan acetate, Nanocellulose, Silver nanoparticles, Antimicrobial Packaging

Biography:

Sakshi Gumber, submitted PhD thesis to the National Agri-Food Biotechnology Institute (NABI), Mohali, affiliated with the Regional Centre for Biotechnology (RCB) in Faridabad, India. She is a versatile researcher specializing in polymer chemistry and sustainability. With expertise in polysaccharide extractions, biodegradable polymers, molecular biology, nanotechnology, and more, she actively tackle scientific challenges and communicate effectively.

Research Interest: Nanocomposite, Xylan acetate, Nanocellulose, Silver nanoparticles, Antimicrobial Packaging

E: Sakshi.gumber92@gmail.com, Sakshi.gumber@nabi.res.in

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Oral

Automated annotation and segmentation of horticultural crop images using Segment Anything Model (SAM) and YOLOv8

Hemamalini P[1]*, Chandraprakash MK[1], Suneetha K[2], Laxman RH[1]
[1]ICAR- Indian Institute of Horticultural Research, Bengaluru, India
[2]Jain (Deemed-to-be) University, Bengaluru , India

Abstract:

In the era of digital agriculture, where technological advancements drive transformative changes, the automated annotation and segmentation of horticultural plant images emerge as a pivotal tool. Precision annotation and segmentation not only form the bedrock of digital agriculture but also empower researchers and practitioners to unravel the complexities of plant growth, health, and environmental interactions. The integration of the Segment Anything Model and YOLOv8 presents a holistic solution, catering to the intricate requirements of horticultural imagery, where diverse plant species, growth stages, and environmental conditions necessitate nuanced and comprehensive analysis.

The importance of image annotation and segmentation in agriculture cannot be overstated, particularly in the context of image analysis and biomass estimation. Accurate annotation is fundamental for training machine learning models to recognize and interpret various features within agricultural images. In the realm of horticulture, precise segmentation allows for the delineation of specific plant structures, enabling a detailed understanding of growth patterns, health conditions, and inter-plant interactions.

Automated annotation and segmentation play a crucial role in expediting the analysis of vast agricultural datasets, offering efficiency in data processing and interpretation. The scalability of these processes contributes significantly to agricultural and horticultural research, facilitating the handling of large volumes of data generated by modern sensing technologies, such as drones and satellite imagery.

Moreover, the enhanced granularity in image analysis facilitated by automated annotation and segmentation models equips researchers and practitioners with valuable insights for informed decision-making. This is particularly vital for optimizing resource allocation, monitoring crop health, and promoting sustainable agricultural practices. In the dynamic landscape of agriculture, the ability to accurately annotate and segment images ensures that machine learning models are well-equipped to extract meaningful information, leading to more precise and actionable results.

In the specific context of biomass estimation, accurate image annotation and segmentation are paramount. The integration of the Segment Anything Model and YOLOv8 in this study not only provides a comprehensive solution for annotating diverse plant features but also addresses the specific needs of biomass estimation in horticultural settings. Accurate biomass estimation is essential for understanding crop health, predicting yields, and optimizing fertilization practices, all of which are critical factors in modern precision agriculture.

This research, positioned at the forefront of digital agriculture's evolution, not only contributes to the advancement of automated image analysis in horticulture but also exemplifies the transformative potential of AI-driven solutions in addressing the challenges and opportunities of modern agricultural practices. The integration of automated annotation and segmentation models serves as a beacon for the future of sustainable and efficient agricultural practices in the digital age.

E: malinihema2024@gmail.com

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Oral

Effects of intensive farming on land management and soil Health: Insights from farmers in Telangana State, India

Srinivas Katherasala* and Ram Shepherd Bheenaveni
Osmania University, Hyderabad , India

Abstract:

This research paper aims to examine the reasons for the adoption and engagement in intensive farming and compare the land management techniques of intensive farming with sustainable farming methods. Additionally, it delves deeper into the adverse implications of intensive farming on soil health and highlights the significance of employing sustainable land management techniques to preserve soil fertility and mitigate the damaging effects of intensive farming on the ecosystem.

The study was survey-descriptive in nature and conducted in KB Asifabad district of Telangana State. The universe was obtained from the list of beneficiaries of Rythu Bandu Scheme implemented by the Government of Telangana. The total number of farmers who cultivate either paddy and cotton are 17,630, and out of them, 182 participants were selected through a simple random sampling technique. A semi-structured interview schedule was utilized as the primary data gathering tool and the analysis of data involved the use of both descriptive and inferential statistics.

According to the findings, 50.8% of farmers employ both mechanical and traditional agricultural techniques; others hire labourers to complete the mechanical portion of their land tillage. While traditional methods may still be preferable for some chores or crops, mechanical alternatives are more effective and save time. Merely 2.2% employ both approaches independently, while 29.8% employ conventional techniques, favouring mechanical approaches due to their effectiveness and time-saving nature. Furthermore, because chemical fertilisers are effective and time-saving, 98.3% of farmers choose them. But overuse may be risk for the environment and farmers' health. Since livestock manure offers nutrients and organic matter, just 1.7% of respondents occasionally use both fertilisers and manure. Chemical fertilisers are the favoured option overall. According to data, 95.0% of farmers favoured chemical pesticides because of their effectiveness and time-saving qualities, while just 5.0% rarely used them, possibly because of the hazards to human health and the environment. Some people favour natural insecticides in spite of this inclination.

Based on farmers' experiences, 90.1% of them think that chemical fertilisers result in crops that are viable because of their effectiveness and time-saving qualities. Nevertheless, overuse can have a detrimental effect on both the environment and farmers health. Just 9.9% of respondents think that livestock manure or natural fertilisers are superior substitutes. Farmers often have a preference for chemical fertilisers.

This article explains the rationale behind intensive farming methods and examines the actual activities of farmers in the region. The study concludes that while intensive farming may increase yields, it can also harm the ecology and soil health. Therefore, it is critical to use sustainable land management techniques that can preserve soil fertility and mitigate the damaging effects of intensive farming on the ecosystem.

Keywords: Conventional Mechanism; Intensive Farming; Land Management; Soil Health; Tillage

Biography:

The author is a Senior Research Fellow at the Department of Social Work, Osmania University. Currently pursuing a Ph.D. under the UGC-NET JRF Fellowship Program. And completed MSW and MA (Public Administration) from Osmania University, and also qualified for NET/SET. The author is presently working on a research project titled, "Knowledge and plans for Sustainable Agriculture" which is a comparative study of intensive and conservative farmers of K B Asifabad District of Telangana State.

Research Interest: social sciences, social work research, sustainable agriculture. And Rural development studies

E: sri.katherasala@osmania.ac.in

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Oral

In-Silico studies of *Momordica charantia* L. extract as a potential treatment against Alzheimer's Disease targeting Amyloid Beta Protein (3NYL)

Sanjib Kumar Mohanty, Yashaswi Nayak*, Bikash Ranjan Sahu, Somya Shephalika, B. Jyotirmayee, and Chandrasekhar Tripathy
Centurion University of Technology and Management, Bhubaneswar , India

Abstract:

Herbal plants are more crucial now-a-days to this ill world. One such plant is *Momordica charantia* belonging to Cucurbitaceae family pertaining many phytocompounds which have many antifungal, antibacterial, antiviral, anti-neuronal properties. Owing to its result, it also resist the effect of a disease which becomes the leading cause of the death worldwide called Alzheimer. Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills and eventually, the ability to carry out the simplest tasks. In an insightful In-silico analysis, this abstract explores the potential therapeutic efficacy of Momordica charantia phytochemicals against amyloid beta (Aβ) protein, a key player in neurodegenerative disorders like Alzheimer's disease. The goal of this work was to investigate the inhibitory effects of phytocomponents found in *Momordica charantia* fruit extract on Amyloid beta protein of Alzheimer's disease, utilizing GC-MS analysis and molecular docking studies. The structure of Amyloid beta protein was downloaded from RCSB using PDB ID 3NYL with resolution: 2.80 Å. In the present study, In-silico molecular docking analysis of phytoconstituents present in Momordica charantia N-Hexane fruit extract details by GC-MS was studied against Amyloid beta protein. The result revealed 38 phytochemicals constituents derived from GC-MS analysis. Out of these 38 phytocompounds, Laurifolin , gamma Isomorphine, Armepavine, 3-Epi-Schelhammericine and Flabelline were ranked the highest with binding scores ranging from −10.0 kcal/mol to −9.4 kcal/mol compared with the standard, Cholamide, with a binding score of −7.7 kcal/mol. From the results obtained, it can be concluded that Laurifolin , gamma Isomorphine, Armepavine, 3-Epi-Schelhammericine and Flabelline act against Alzheimer's disease inhibiting the Amyloid Beta Protein and therefore can be further developed into potent drugs for Alzheimer's disease treatment.

Keywords: Amyloid beta (Aβ) protein, Laurifolin, gamma-Isomorphine, Armepavine,3-Epi-Schelhammericine, Flabelline

E: mohantysanjib698@gmail.com

Oral

Evaluation of fibre and vessel morphology in selected families of four *Corymbia* taxa for pulp and paper making

D.R. Sahoo[5], E. V. Anoop[5], M. Varghese[1], P.G. Suraj[1], R. Hegde[2], R. Kamalakannan[1], D.J. Bush[3], and C.E. Harwood[4]

[1]ITC Life Sciences and Technology Centre, Bangalore, India

[2]College of Forestry, Ponnampet, UAHS Shivamogga, India

[3]CSIRO Australian Tree Seed Centre, Canberra, Australia

[4]University of Tasmania, Tasmania, Australia

[5]Kerala Agricultural University, Thrissur, India

Abstract:

The present research entitled "Evaluation of fibre and vessel morphology in selected families of four *Corymbia* taxa grown in Prakasam and West Godavari districts of Andhra Pradesh for pulp and paper making". Open pollinated family seeds of *Corymbia* species were imported from CSIRO Australia to raise provenance-progeny trials. Inter-specific hybridization was carried out between *Corymbia torelliana* x *Corymbia citriodora* subsp. *variegata*. The objective was to analyse fibre and vessel morphology among selected families of *Corymbia* taxa. It is intended to screen best taxa and families for pulp and paper making.

Morphological characteristics were studied and analysed using an Image analyser. In order to assess suitability of *Corymbia* taxa for pulp and paper making, ratios and factors were considered. Among these Runkel ratio, fibre slenderness ratio and Luce's shape factor were found to be within the acceptable range for pulp and paper making. *Corymbia* hybrid and C. *torelliana* taxa were found superior among four taxa based on their ratios and factors. C. *torelliana* was having poor growth and low heritability. Hence, only *Corymbia* hybrid can be recommended as an economically viable raw material for pulp and paper industry.

World paper production is expected to grow 700 Mt (low estimate) and 900 Mt (high estimate) by 2050. The bulk of this growth will take place in China, India, and other developing countries (Bajpai, 2016). It is still a challenge for the local government to get a balance between the goals of economic and environment. The seminar devotes particular attention to how different breeding programs and improvement plans are going to reduce the burden on environment without jeopardizing industrial competitiveness and future investments.

Keywords: Clone, Fibre traits, Wood density, Pulp yield

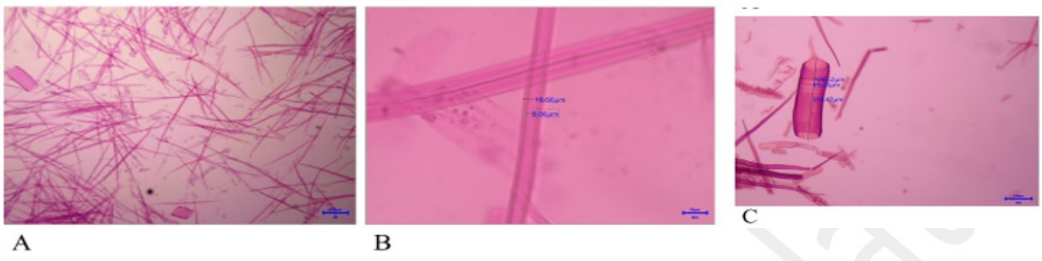

Fig.3. Photos taken using image analyser (A) Fibre (4x) isolated by maceration and (B) Fibre diameter and lumen (40x) recorded from macerated samples **Fig.4.** (C) Vessel diameter and lumen (10x) recorded from macerated samples

Biography:

D.R Sahoo graduated from College of Forestry, Odisha University of Agriculture and Technology. He did his Masters in Forest Products and Utilization, College of Forestry, Kerala Agricultural University. He also Recipient of ICAR PG Scholarship. Currently working as Livestock Inspector, Fisheries and Animal Resources Development Department, Govt of Odisha.

Research Interest: Pulp production and Carbon sequestration of myrtaceae family

E: deepakranjansahoo12345@gmail.com

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Oral

Impact of nutrient and irrigation management practices on productivity and quality of mango + pineapple agroforestry system

Pujashree Mishra[1]*, Sasmita Behera[1] and Subash Chandra Mohapatra[1]
Odisha University of Agriculture and Technology, Bhubaneswar, India

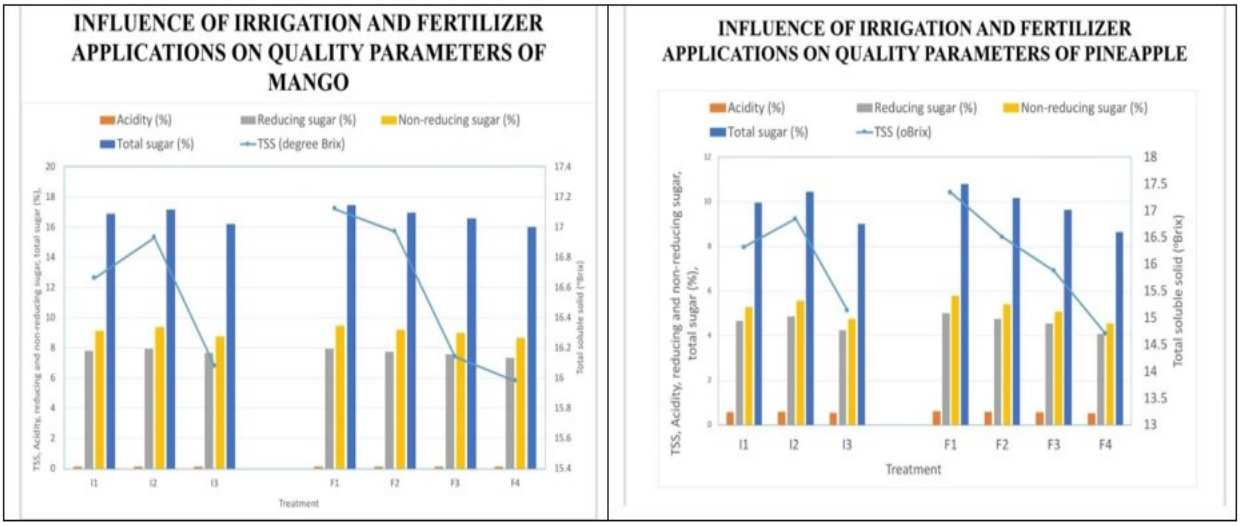
Abstract:

The fruit-based agroforestry system, a sustainable and self-reliant approach, is being explored for its potential to enhance land productivity and meet population needs. A field experiment was conducted at AICRP on Agroforestry Research Farm, OUAT, Bhubaneswar, Odisha during May 2020 to June 2021, to study the impact of irrigation on the mango-pineapple agroforestry system. The experiment comprised of three main plots including three irrigation systems i.e., sprinkler, drip & ridge furrow and four subplots including nutrient management such as organic [FYM + Dry leaf mulch + biofertilizer (Azotobacter: Azospirillium: PSB in 1:1:1){4 kg each/ha}], recommended dose of fertilization (RDF) (75%) + FYM, RDF (100%) + FYM, RDF (125%)+ FYM. The experiment replicated treatments in a split plot design, with mango trees placed 6x6m2 apart and pineapple plants planted 75x60 cm2 between 20-year-old mango trees.

The study found that mango trees and pineapples showed the highest growth parameters with RDF (125%) + FYM, while drip irrigation showed the highest growth parameters in both species, regardless of nutrient management practices. Organic nutrient application significantly improved the Total Soluble Solid, acidity, reducing, and non-reducing sugar of pineapple and mango fruit, while RDF + FYM showed the lowest results. The RDF (125%) + FYM fertilization method yielded the highest mango and pineapple yields, resulting in a gross return of Rs 5.65 lakhs per year per ha and a net return of Rs 4.02 lakhs per year per ha. The drip system outperformed sprinkler and ridge furrow methods in terms of gross return, net return, and BCR values per year per ha.

Achieving zero hunger is one of the seventeen sustainable development goals of the United Nations (SDG 2). Flagged off in 2015, the United Nations has decided to achieve it by 2030. My research will pave a way for making this dream come true by giving utmost productivity by utilisation of minimal resources and also not compromising with the soil health which ultimately leads to production of crops of enhanced quality.

Keywords: Sustainable production, agroforestry system and integrated nutrient management



E: Pujashree1010@gmail.com

Unveiling the effects of pendimethalin on *Zygogramma bicolorata*: exploring biological parameters and oxidative stress response

Neha Singh, Nikhil Maheshwari, and Ayesha Qamar*
Aligarh Muslim University, Aligarh, India

Abstract:

Within the realm of agricultural practices, the herbicide pendimethalin serves as a pivotal tool for weed control. However, our comprehensive investigation into its impact on *Zygogramma bicolorata*, a key biocontrol agent of *Parthenium hysterophorus*, revealed significant sublethal effects. Exposure to pendimethalin resulted in a marked decrease in fecundity, adult longevity, oviposition days, and hatchability, highlighting its influence on the life history and reproductive success of *Zygogramma*. At the biochemical level, we observed a decline in antioxidant enzymes—catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPX), and reduced glutathione (GSH)—and a simultaneous increase in lipid peroxidation (LPO) levels, indicative of heightened oxidative stress in the treatment group. These findings underscore the intricate dynamics of pendimethalin impact on *Zygogramma*, emphasizing the need for a nuanced understanding of pesticide effects on beneficial insects in the pursuit of sustainable and environmentally conscious agricultural practices.

E: nehasingh3884@gmail.com; ayesha.zoology@gmail.com

Marker trait association analysis for drought tolerance at germination stage in rice

Priyadarsini Sanghamitra[1]*, Jyotirmayee Mishra[2], and Swastideepa Sahoo[2]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]College of Agriculture, OUAT, Bhubaneswar, India

Abstract:

Moisture stress is the one of the major environmental factor affecting seed germination, crop growth and productivity in rice. Identifying promising genotypes from the natural variation and association of microsatellites marker with the drought tolerance trait at seed germination stage will help in breeding drought tolerant cultivars. 120 rice genotypes were subjected to moisture stress by using polyethylene glycol (PEG 6000: 20%) to study the variability in responses to drought stress conditions at seed germination stage. Seed quality traits such as seed germination, speed of germination, shoot length,root length and drought tolerance index were estimated. Marker trait association was carried out by using 136 SSR markers by using General Linear Model (GLM) and Mixed Linear Model(MLM). Six markers, RM1347, RM324, RM452, RM502, RM228 and RM1812 were found associated with germination percentage. Whereas RM1347, RM324, RM452, RM502 also found associated with drought tolerance index. Association of markers, RM 201 with speed of germination; RM1347 and RM3735 with seedling length; RM1347 and RM1341 with root length were also observed both by GLM and MLM Model .These novel QTLs after validation will be useful in marker-assisted improvement programs for germination stage drought tolerance in rice.

Keywords: Moisture stress, association mapping, rice, markers. seedling vigour index

Biography:

Priyadarsini Sanghamitra is working as a Senior Scientist,ICAR-NRRI,Cuttack.She has expertise in various field of research related to invitro conservation, evaluation of genetic purity based on isozyme/SSR matkers, morphological characterization and doccumentation of rice germplasm based on DUS characteristics. Involved in nucleus and breeder seed production of NRRI varieties. Evaluation of rice genotypes for various antioxidants such as total anthocyanin content, gamma oryzanols, total phenolics, total flavonoids and antioxidant activity. Phenotyped rice genotypes for seed dormancy, seed vigour traits based on physical/physiological/biochemical traits and mapped QTL associated with seed vigour which is reflected in research publications in national and international journal of repute.

Research Interest: Seed quality, Germplasm characterisation, Pigmented rice, Antioxidant

E: p.sanghamitra1@gmail.com

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Screening of rice genotypes for low phosphorus tolerance in hydroponics

Reshmi Raj K.R, Meghna Saha, J. Meher, R.P. Sah, Parameswaran C, and P. Sanghamitra, S. Samantaray
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Phosphorus is an important macronutrient required for the growth and development of rice. A major part of rice growing soils in India have moderate to severe P deficiency (Dobermann and Fairhurst 2000). The preliminary step in breeding for low phosphorus tolerance is identification of donors. Therefore, an experiment was conducted to assess low phosphorus tolerance in 80 rice genotypes. The screening for low phosphorus tolerance was carried out in hydroponics using modified Hoagland solution with two phosphorus treatments (phosphorus deficient and phosphorus sufficient) and two replications in a completely randomized design. The seedlings were grown in nutrient solution for 21 days and data was recorded on shoot length, root length, shoot-root ratio, shoot fresh weight, shoot dry weight, root fresh weight, and root dry weight. It was observed that the genotype, AC 35119 recorded highest shoot length in phosphorus sufficient condition; whereas, Gobindobhog and AC 35000 recorded highest shoot length under phosphorus deficient condition. Kasalath, AC 35100 and AC 35097 recorded highest root length under phosphorus sufficient condition, whereas, Dular, Kasalath and AC 35090 recorded highest root length in phosphorus deficient conditions. Under phosphorus sufficient conditions, AC 35090 showed highest root-shoot ratio whereas, AC 35003 recorded highest root-shoot ratio under phosphorus deficient conditions. Gobindobhog and AC 35173 recorded highest shoot fresh weight under phosphorus sufficient and phosphorus deficient conditions. Under phosphorus sufficient condition, AC 35178 and Kasalath recorded highest shoot dry weight whereas, AC 3498, Dular and Gobindobhog recorded highest shoot dry weight under phosphorus deficient condition. Under phosphorus sufficient conditions, Kasalath, Gobindobhog and AC 34981 recorded highest root fresh weight, whereas, Kasalath, Gobindobhog and AC 35196 recorded highest root fresh weight in phosphorus deficient condition. Under Phosphorus sufficient condition, Kasalath and AC 35196 showed highest root dry weight, whereas, Kasalath, AC 35066, AC 35137, AC 35178 and AC 35090 recorded highest root dry weight under phosphorus deficient condition. Therefore, these genotypes which performed better under phosphorus deficient condition can be used as donors for improving low phosphorus tolerance in rice.

E: reshmirajkr@gmail.com

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Poster

Sowing sovereignty: The atmanirbhar clean plant program and India's self-reliant ecological future

Anupama Kar* and Ajay Mahajan
State Bank Institute of Rural Banking, Hyderabad, India

Abstract:

Horticulture is an important part of India's agricultural industry, helping to improve food security, increase income, and create a lot of employment opportunities. India is proud to be the second biggest producer of horticultural goods in the world. But this sector can grow further and have a better export opportunity. The availability of high-quality disease-free planting materials, proper pests and diseases control measures, innovative cultivation practices and post-harvest measures for managing crops after harvest are the prime focus of the Government to meet the growing demand for horticulture production. As a way to meet these needs, the Indian Government has started the ambitious Atmanirbhar Clean Plant Programme. This important project is expected to lead to growth that will improve India's horticulture scenario and make the country richer in the future.The effort, as outlined in the 2023-24 Union Budget, seeks to focus disease-free and superior planting material for esteemed horticultural crops. The programme proposed to start 10 "Clean Plant Centres" across the nation, with a budget allocation of Rs. 2,200 crore spread over a period of seven years. These centres will actively participate in research, diagnostics, and therapies, consequently enhancing the accessibility of certified planting material and diminishing the duration of quarantine periods. This programme has the potential to bolster India's agricultural economy, foster sustainable practises, and enhance the country's international position in horticultural commerce through the improvement of quality and production of horticultural crops.

This instrument provides an overview of the strategies employed by the programme and examines the advantages it offers to both farmers and consumers. This program bears a resemblance to the comparable programmes such as the National Clean Plant Network in the United States. It emphasises the importance of India's efforts to achieve self-sufficiency and enhance competitiveness within the horticulture industry with the help of financial institutions to support and onboard the participants involved in the implementation of this program.

Keywords: Horticulture, Atmanirbhar Clean Plant Programme, Union Budget 2023-24, Disease free quality planting material, Sustainable practices , Economic empowerment, Financial products

Biography:

Mrs Anupama Kar is presently working as Chief Manager (Faculty) at the Apex level training institute “State Bank Institute of Rural Banking” situated in Hyderabad .She had joined bank as Probationary officer in 2006 and had 16 years of professional experience in the Banking industry. Mrs. Anupama Kar had completed her Masters degree in Horticulture from “ Orissa University of Agriculture and Technology” situated in Bhubaneshwar, Orissa .

Research Interest: Agriculture ecosystem, value enhancement in horticulture segment

E: anupama.kar@sbi.co.in

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Poster

From cows to capital: Revolutionizing Indian dairy economics with credit empowerment and value chain breakthroughs

Ajay Mahajan* and Anupama Kar
State Bank Institute of Rural Banking, Hyderabad, India

Abstract:

The dairy products business plays a crucial role in contributing to the overall growth and development of the Indian economy. The utilisation of value chains as a strategy to mitigate financial risks and enhance the creditworthiness of small and marginal farmers (SMF) in India has much promise in advancing these objectives. The potential of the dairy value chain strategy in promoting sustainable agricultural development and economic empowerment for small and marginal farmers (SMF) in India, utilising India-specific data. The small and marginal farmers (SMF) encounters the difficulties in accessing loans and participants in value chain can explores different strategies to enhance the accessibility of financial resources for these dairy producers.

The utilisation of a blockchain-based platform enables the implementation of innovative financial instruments, such as the Farmers' Choice Card Loan, crowd funding platform and Contract as Collateral. These instruments present diverse possibilities for effectively addressing the financial requirements of dairy farmers in India.

Keywords: Credit accessibility, Dairy value chain, Economic empowerment, Financial products, Small and marginal farmers (SMF)

Biography:

Mr. Ajay Shashikant Mahajan is presently working as Chief Manager (Faculty) at the Apex level training institute "State Bank Institute of Rural Banking" situated in Hyderabad. He had joined bank as Probationary officer in 2011 and had 12 years of professional experience in the Banking industry. Mr. Ajay S. Mahajan holds a Bachelors degree in Dairy Technology and has also completed his M.B.A. in Banking and Finance from IGNOU.

Research Interest: Agriculture ecosystem, Value enhancement in Agri allied activity

E: ajay.mahajan@sbi.co.in

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Poster

Assessing the impact of ARC genotypes on the fecundity and survival of rice leaffolder, *Cnaphalocrocis medinalis*

Soumya Shephalika Dash[1]*, Golive Prasanthi[2], P. C. Rath[2], Hirak Chatterjee[1], Anjan Kumar Nayak[2], P. Bhavana[2], and S. D. Mohapatra[2]

[1]Department of Agricultural Entomology, Palli Siksha Bhavana, Sriniketan, India

[2]ICAR-National Rice Research Institute, Cuttack, India

Abstract:

The significance of *Cnaphalocrocis medinalis*, a key pest affecting rice crops, has increased notably with the introduction of high-yielding rice varieties and corresponding changes in agricultural practices over the years. These developments have led to reduced crop yields, underlining the need for effective pest management strategies. In this study, the effect of ARC genotypes on C. *medinalis* was investigated. The research encompassed an evaluation of ten ARC genotypes, classified into resistant, moderately resistant, and susceptible groups based on field and net house screening. Then the study assessed fecundity and survival rates of leaffolder across various developmental stages on those ten rice varieties to understand the impact of resistance levels on the pest's life cycle. Findings revealed that genotypes with resistance significantly curtailed the pest's reproductive and survival rates across different life stages compared to susceptible genotypes. Lowest fecundity of leaffolder was 68.33 eggs in resistant rice variety ARC-11942, whereas, highest fecundity was 168.33 eggs recorded in susceptible variety ARC-11951. Similarly, larval survival % varied between 55.81%-63.66% and 76.83%-84.68% in resistant and susceptible varieties, respectively. This suggests the presence of antibiosis factors in these resistant genotypes. The study highlights the potential of these genotypes in breeding rice varieties resistant to the leaf folder, thereby offering a promising avenue for enhancing pest management in rice cultivation.

Keywords: ARC Genotypes; Biology; *Cnaphalocrocis medinalis*; Fecundity; Resistant

Biography:

Soumya Shephalika Dash is a dedicated Ph.D. research scholar, specializing in Agricultural Entomology at the prestigious Department of Agricultural Entomology, Palli Siksha Bhavana, Visva-Bharati, Sriniketan. Acknowledging her academic brilliance and potential to make transformative contributions to her field, Soumya is honored to hold the distinguished DST Inspire Fellowship. Currently, she is immersed in groundbreaking research at ICAR-NRRI, Cuttack, delving into the intricate dynamics of host plant resistance.

Research Interest: Host plant resistance, Biological control, IPM

E: soumyadashshephalika@gmail.com

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Poster

Valorization of lignocellulosic biomass Banana peel to high value-added biopolymer through a sustainable thermochemical extraction process

Renupama Bhoi, Debapriya Sarkar, and Angana Sarkar
National Institute of Technology Rourkela, India

Abstract:

The main constituents of banana peel, which is one of the most prevalent agro biowastes globally, are cellulose, hemicellulose, lignin, pectin, and other extractives in different ratios. The current study outlined the advantages of sequential biorefinery methods over single extraction procedures. Lutein, a high-value pharmaceutical compound, was extracted using ethyl acetate as a solvent. Subsequently, value-added biopolymer pectin was isolated through acid treatment. The remaining biomass that had been acid-treated was then treated with an alkaline bleaching solution. An integrated extraction process with proper banana peel utilization resulted in a high yield of high-quality commercial products. Through a sustainable thermochemical sequential extraction process, the yield of biopolymers was found to be 22% cellulose, 5.23% lignin, 13.63% hemicellulose, and 11% pectin. Furthermore, the developed integrated extraction process was optimized using response surface methodology to increase the yield of the respective product while considering various parameters. The isolated biopolymers were characterized using Fourier transforms infrared (FTIR), X-ray diffraction (XRD), and Scanning electron microscope (SEM) and compared to their corresponding standards for molecular structure and functional group analysis. The integrated valorization of banana peel not only provides a waste management approach but also properly utilizes the waste by isolating different value-added products.

Keywords: Extraction, Characterization, Valorization, Biopolymers, Thermochemical, Integrated process

Biography:

Renupama Bhoi is pursuing a Ph.D. in the Department of Biotechnology and Medical Engineering National Institute of Technology. She researches in the field of biorefinery, waste to value, and bioenergy. Qualified GATE(2020). MSc in zoology at Gangadhar Meher University from 2018-2020. BSc in Zoology at Gangadhar Mehere Autonomous College, Sambalpur from 2014-2017.

Research Interest: Biorefinery, Waste to value, and Bioenergy

E: bhoirenupama.97@gmail.com

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Poster

Novel insights into rice innate immunity against bacterial leaf blight

Soumyashree Purohit, Totan Adak, Rupalin Jena, Aiswarya Priyadarsini, Meera K Kar and Arup Kumar Mukherjee1*
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Rice is the 2nd most important staple food all over the world just after wheat. The crop is so important that it is known as queen of cereals. As the growing population needed more food and rice can grow in versatile environment so dependence on rice is increasing decades after decades. The dependency of rice for higher food supply has forced the agriculturist to introduce high yielding semi dwarf rice varieties which need more input to harvest higher yield. But with introduction of these varieties many diseases have become serious threat to rice production especially bacterial blight caused by *Xanthomonas oryzae pv. oryzae*. The disease was first reported by a Japanese farmer 1884, as a seed-borne disease. BLB can affect rice at any stage of crop growth. Depending on the crop stage, degree of susceptibility, and environmental factors, yield losses from the disease can range from 20% to 30% and, in extreme cases, can be as high as 80%. Severe winds and intermittent monsoon rains encourage the spread of diseases and further lower agricultural yields. But unfortunately, there is no proper control measure except use of resistant varieties and till date 46 resistant genes have been reported. However, there are several reports of breaking down of resistant genes. So, the innate immunity can play a major role in protecting the plant from Xoo. The innate immune system of rice is composed of two layers: effector -triggered immunity (ETI) and pathogen-associated molecular pattern (PAMP)-triggered immunity (PTI). Physical cell wall reinforcement, antimicrobial compounds (such the increase of the secondary metabolite phytoalexin), and transcription factor expression are examples of PTI- and ETI-activated defense responses. Pattern recognition receptors (PRRs) control PTI, the first line of defense, which limits the ability of invasive pathogens to colonize by identifying highly conserved PAMPs and inducing a comparatively mild immune response in response. The second line of defense, ETI, on the other hand, is a strong, quick response that is typically accompanied by a hypersensitive reaction (HR). ETI is started by archetypal R proteins, which either directly or indirectly identify avirulence (Avr) effectors, which are extremely varied pathogen compounds. Transmembrane receptor-like kinases (RLKs) and receptor-like proteins (RLPs) are the plant PRRs' representatives. RLPs lack the kinase domain, whereas RLKs normally have both intracellular and extracellular leucine-rich repeats (LRR). The RLK and RLP families work together to provide a broad repertoire of defense sensitive receptors that are able to identify a wide range of exogenous activating ligands, including lipids, proteins, nucleic acids, carbohydrates, and others. More than 1,131 RLK and 90 RLP genes that may be involved in cellular signalling and developmental processes are found in the rice genome. Rice PRRs detect conserved PAMPs from bacteria and fungus, such as peptidoglycan, lipopolysaccharide, and chitin. Numerous novel pathogen-associated molecular patterns (PAMPs), avirulence, virulence effectors in both pathogens, as well as effector targets and receptors in the rice host, have been discovered as a result of genome sequencing and in-depth molecular analysis. New information about innate immunity in plants has been made possible by the characterization of these effectors, host targets, and resistance genes. Effective disease management techniques are being developed using some of the recent discoveries, such as the binding activity of Xoo transcriptional activator-like (TAL) effectors to particular rice genomic regions.

Keywords: Rice; Bacterial blight; *Xanthomonas oryzae pv. oryzae*; PAMP; PRR; PTI; ETI

E: ak.mukherjee@icar.gov.in

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Poster

Comparative analysis of polyhalite-based nitrogenous fertilizer and urea: Impact on rice growth, nitrogen uptake, and utilization efficiency

Mohammad Shahid*, Anisha Mohapatra and Amaresh Kumar Nayak
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Rice is a crucial global food source facing challenges in meeting rising demand with limited resources. Urea fertilizers, while essential for crop yields, contribute to pH imbalances and nitrogen loss, impacting efficiency and the environment. Enhancing nitrogen use in rice is critical for sustainability, especially considering its low nitrogen efficiency, causing environmental concerns such as NO3-N leaching and emissions. In exploring alternatives, Aldor, a polyhalite-based fertilizer, shows promise with balanced nutrients and slower nitrogen release. It could potentially reduce urea reliance, improve nutrient efficiency, and enhance rice production sustainability. Research conducted at ICAR-NRRI in Cuttack involved field experiments during 2022 and 2023, evaluating Aldor against urea in different treatments. These trials involved two rice varieties i.e., Maudamani and Naveen as test crop during kharif season of 2022 and rabi season of 2023 respectively. Eleven treatments including T1: control [No N, P (SSP)]; T2: control [No N, P (DAP)]; T3: 100% RDN (Urea)+ S (Bent.); T4: 60% RDN (Urea); T5: 80% RDN (Urea); T6: 100% RDN (Urea); T7: 125% RDN (Urea); T8: Aldor N (Eq. to urea in T4), T9: Aldor N (Eq. to urea in T5), T10: Aldor N (Eq. to urea in T6), T11: Aldor N (Eq. to urea in T7) were taken in a randomized block design (RBD). During both the kharif season of 2022 and the rabi season of 2023, significant impacts were displayed on rice growth, nitrogen uptake, and efficiency through various treatments. Maximum plant height and no. of panicle/ plant were observed in the treatment T11: Aldor N (Eq. to urea in T7) as compared to control in the respective seasons at different sampling events (60 DAP and 90 DAP). Grain N uptake was highest in the treatment T7: 125% RDN (Urea) during kharif 2022 where as it was recorded maximum in the treatment T11: Aldor N (Eq. to urea in T7) during rabi 2023. However, the straw N uptake was highest in the treatment T7: 125% RDN (Urea) during kharif 2022 and it was highest in the T6: 100% RDN (Urea) treatment during rabi 2023. In the case of agronomic efficiency, it was recorded maximum in T10: Aldor N (Eq. to urea in T6) treatment in kharif 2022, while it was highest in T11: Aldor N (Eq. to urea in T7) treatment during rabi 2023. Physiological efficiency was recorded highest in T11: Aldor N (Eq. to urea in T7) treatment indicating enhanced nitrogen utilization in both seasons.

Keywords: Urea, aldor, rice growth, nitrogen uptake, NUE

E: shahid.vns@gmail.com

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Poster

Assessment of Steel Slag-Based Amendments for mitigating Arsenic Contamination in Green Gram (*Vigna radiata*) Cultivation

Mohammad Shahid*, Kashyapi Kamalini, Rubina Khanam, AK Nayak
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

The cultivation of green gram (Vigna radiata), a vital pulse crop, is indispensable for global food security. However, the increasing contamination of agricultural soils with arsenic poses a severe threat to both crop productivity and human health. Arsenic, a ubiquitous metalloid, is known for its detrimental effects on plants, leading to reduced yields and compromised nutritional quality. Steel slag, a by-product of the steel industry, emerges as a potential remedy, showcasing its efficacy in reducing arsenic uptake by green gram plants. Investigating the practical application of steel slag-based amendments offers insights into environmental-friendly strategies for enhancing soil quality and crop safety in green gram cultivation. This abstract provides an overview in the mitigation of arsenic contamination in green gram cultivation. A pot experiment was carried out at the Crop Production Division of ICAR-NRRI, Cuttack, Odisha during Rabi season of 2022-23. Products based on steel slag was made using various amendments. The Arsenic- contaminated soil was applied with products in various doses, i.e., @ 2.5 t ha-1 and @ 5.0 t ha-1. The treatments included control (RDF 80% and 100%); Steel slag (SS) @ 0.5 t/ha and 1.0 t/ha; Steel Slag based product1 (SSP1) @ 2.5 t/ha and @ 5.0 t/ha; Steel Slag based product2 (SSP2) @ 2.5 t/ha and @ 5.0 t/ha; and Steel Slag based product3 (SSP3) @ 2.5 t/ha and @ 5.0 t/ha. Three replications were taken and completely randomized design was used for statistical analysis of data. Significant effects were observed in seed yield and stover yield; arsenic and chromium content in seed, stover and root; and arsenic and chromium uptake in seed and stover. Maximum seed yield and stover yield were recorded under the treatment SSP3 @ 2.5 t/ha and @ 5.0 t/ha respectively as compared to control. Similarly, minimum arsenic content was observed under the treatment SSP3 @ 2.5 t/ha and @ 5.0 t/ha respectively as compared to control. It has been observed that SSP3 @ 2.5 t/ha and @ 5.0 t/ha has shown notable effect on arsenic mitigation in green gram cultivation.

Keywords: Arsenic, green gram, steel slag, amendments

E: shahid.vns@gmail.com

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Poster

Effect of pest management on American bollworm in different cotton farming systems

Manish Chouhan[1]* , Akanksha Singh[1], Ishwar Patidar[1] ,Eva Goldman[1], Dharmendra Patel[1], Chigusa Keller[1], Christelle Ledroit[1], Amritbir Riar[1], Lokendra S Mandloi[2], Fabian Cahenzli[2], Harun Cicek[2], Marc Cotter[2], Monika Messmer[1], Gurbir S. Bhullar[2]

[1]bioRe Association, Kasrawad, India

[2]Research Institute of Organic Agriculture, Frick, Switzerland

Abstract:

Cotton is the most widely used fibre crops in the world. Its production is highly affected by the American bollworm pest, Helicoverpa armigera. Bt-cotton was designed to fight off the attacks of H. armigera, around 90% of the total cotton production is sourced from Bt-cotton. However, as Bt-cotton crops are not allowed in organic farming, the attacks of the American bollworm remain a major threat to organic cotton production. For this study, we hypothesize that holistic organic cotton pest management that combines agronomic management with botanical extracts can achieve effective pest management to a level similar to synthetic pesticides. This study has been done in Nimar region in Madhya Pradesh, central India. The study has compared three types of treatments in two types of soil, heavy soil and light soil. The first treatment was the holistic organic practices of the region, the second treatment was conventional practices, and the third treatment was the control treatment without any management. The proportion of damage caused by bollworm larvae and yield significantly varied across different years on both soil types. At heavy soil site, holistic organic treatment had a significantly lower percentage of bollworm damage compared to the chemical treatment in 2016 and 2017. At light soil site, the percentage of bollworm damage in Organic was lower in 2017 but higher in 2018 compared to chemical treatment. Although all treatments used different methods for pest control, no one treatment repeatedly succeeded with lower pest damage. This leads us to conclude that pest infestation/pest damage is much more affected by the intensity of the seasonal attack.

Biography:

Manish Chohaun has a bachelor's in science, he is working as a researcher specialised in pest management in cotton crop since 2016 till today. He has been working with BioRe Association in collaboration with the organic research institute (FiBL).

E: biore.manishchouhan@gmail.com

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Poster

Arsenic speciation in grain of rice genotypes grown in arsenic contaminated soil

Mohammad Shahid*, Soumyasesh Maity, Sumanjeet Panigrahi, R Khanam, RP Sah and AK Nayak
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Arsenic is a naturally occurring element in the environment and can be found in various forms, such as arsenite (AsIII), arsenate (AsV), dimethylarsenic acid (DMA), monomethylarsonic acid (MMA) etc. The accumulation of arsenic in rice grains is a major concern due to its potential health risks to consumers.

Different rice varieties have varying abilities to accumulate and convert arsenic species, making it essential to assess their levels to ensure food safety. We analyzed the concentrations of AsIII, AsV, DMA, and MMA in twenty -one rice genotypes, and the results are presented. Among the analyzed rice genotypes, CR 4389- RGA-11 showed the highest concentration of AsIII (79.05 µg/kg) and AsV (286.50 µg/kg), while Kalinga II exhibited the lowest concentration of AsIII (28.97 µg/kg) and Pallavi exhibited the lowest concentration of AsV (90.49 µg/kg). With regard to the organic species of As, highest concentration of DMA was observed in CR Dhan 300 (58.87 µg/kg) and lowest was observed in CR Dhan 304 (7.33 µg/kg). Notably, MMA was either absent or present in very low amounts in most of the samples. The total arsenic content in rice grains ranged from 0.20 mg/kg to 0.54 mg/kg across the varieties. CR 4389-RGA-11 had the highest total arsenic content of 0.54 mg/kg, while CR Dhan 304 had the lowest at 0.20 mg/kg. The data indicate considerable variation in the arsenic levels among different rice genotypes, highlighting the importance of carefully selecting rice cultivars to mitigate health risks associated with arsenic consumption. In conclusion, the analysis of arsenic species in various rice genotypes revealed significant differences in their accumulation patterns. While some varieties exhibited higher concentrations of certain arsenic species, others had relatively lower levels or were entirely absent. The variations in arsenic content emphasize the importance of cultivating and consuming rice varieties that exhibit lower levels of arsenic accumulation, particularly inorganic forms such as AsIII and AsV, which are known to pose higher health risks. By choosing rice varieties with lower arsenic content, it is possible to reduce potential health hazards related to arsenic exposure through rice consumption.

Keywords: Arsenic, Rice genotype, Soil contamination

E: shahid.vns@gmail.com

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Poster

Microbial inoculants as a promising green approach for remediation of pesticide contaminated agricultural soils and plant growth promotion

Navpreet Kaur*, Mridula Chaturvedi and Shashi Sharma
Amity University, Noida, India

Abstract:

The excessive indiscriminate use of chemical fertilizers and pesticides to increase agricultural productivity in order to feed the exploding population has resulted in chronic health issues in humans and ecosystem. Hence, an ecofriendly approach by use of bioinoculants is required for sustainable production of agriculture and bioremediation of pesticide residues for maintenance of safe ecosystem. This approach can be accomplished by formulating a consortium of microbes which can increase soil health by bioremediating toxic hydrophobic residues and promote plant growth development. With this objective, a consortium comprising of six isolates of WHO risk group 1 was formulated having plant growth promoting, biosurfactant producing and pesticide tolerating traits. The 16s rRNA sequencing showed these isolates belonging to genera *Brucella, Gordonia, Lysinibacillus, Kocuria and Achromobacter*. Achromobacter marplatensis showed maximum ammonia production of 0.66 µmol/ml, Brucella sp. showed maximum of 5.22 µg/ml Indole Acetic Acid and Lysinibacillus sp. showed 0.491 mmol/ml ACC deaminase activity. Siderophore production of 63.28 and 65.29 psu was observed only in Achromobacter sp. and Brucella sp. respectively. Gordonia sp. only showed biosurfactant production with surface tension of 29.871 mN/m. The TLC and orcinol-sulphuric acid assay revealed glycolipid nature of biosurfactant with yield of 2.391 g/L. No antagonistic effect was observed in the consortium. All microbes showed pesticide tolerance from 10-50 ppm. Liquid medium and soil spiked with cocktail of pesticides - chlorpyrifos, cypermethrin and lindane (17ppm each) and inoculated with the consortium showed good percentage of degradation of each pesticide via GC-MS analysis with no accumulation of toxic metabolites.

Keywords: Microbial Inoculants, Pesticides, Bioremediation

Biography:

Navpreet is a research scholar at Amity Institute of Biotechnology, Amity University under guidance of Dr. Shashi Sharma (Associate Professor, AIB, Amity University, Noida). I am also working as SRF at Amity University. She has done M.Sc. Microbiology from Maharaja Ganga Singh University. She has cleared CSIR-NET LS, GATE and ICAR-ASRB NET.

Research Interest: Bioremediation of toxic compounds, Plant Growth Promotion, Biosurfactant production

E: navpreet.kaur@s.amity.edu

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Poster

Marker Assisted Resistance gene pyramiding for Sheath Blight and BPH into Improved CRRI Gourav (CR Dhan 316)

Ashish Mohanty[1,2*], Babyrani Panda[2] , Paresh Chandra Kole[1] , Lambodar Behera[2], Sushanta Kumar Dash[2]

[1]Visva-Bharati University, Santiniketan, India

[2]ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Rice (*Oryza sativa* L.) holds a crucial status as the primary dietary staple for more than half of the global population. However, maintaining consistent rice yields faces considerable challenges due to biotic stresses, among which sheath blight and the Brown Plant hopper (BPH) emerge as prominent threats to rice cultivation worldwide. The extent of yield losses inflicted by these biotic factors depends upon growth stage of the rice plant, the duration of infestation, and the severity of insect pest attacks. To secure the sustainability of rice grain yields and protect global food security, it becomes imperative to focus on the development of host plant resistance against these devastating diseases. The practice of pyramiding resistance genes from diverse sources into broadly adapted yet susceptible rice varieties is an essential strategy in modern rice breeding. Conventional breeding methods are often inefficient for achieving this gene pyramiding, but these limitations can be effectively addressed through marker-assisted selection. By incorporating Quantitative Trait Loci (QTLs) associated with tolerance to sheath blight and BPH into various rice varieties, significant improvements in yield stability have been realized. This elite rice cultivars represent a new generation rice genotype, characterized by their high yield potential, resistance to bacterial leaf blight, and a range of improved plant traits. However, this genotype is susceptible to sheath blight and BPH. In this ongoing research investigation, we have successfully introgressed two major QTLs, namely BPH31 and qSHB1.1, into a single rice variety using the markerassisted backcrossing method. CR1014 was utilized as donor for qSHB1.1, providing resistance against sheath blight, while CR-Dhan 317 is the donor for BPH31, offering comprehensive resistance against the Brown plant hopper. The results obtained from foreground marker segregation analysis at the BC1F1 generation for sheath blight and the F1 generation for BPH resistance confirms the presence of these valuable resistance genes for the subsequent generation of backcrossing. This research underscores the importance of combining both conventional and marker -assisted selection approaches in rice breeding with new possibilities to develop rice genotypes with the potential for high yields and multiple stress tolerance.

Keywords: Marker assisted selection, foreground selection, gene pyramiding, QTL

Biography:

Ashish Mohanty, Currently, a Ph.D Scholar at Visva Bharati University, West Bengal. His research work is going on under Prof. Paresh Ch. Kole, Professor, Department of Genetics and Plant Breeding, Visva Bharati University, West Bengal. He has completed B.Sc. in Agriculture from Siksha O Anusandhan University, Bhubaneswar, Odisha, India. He did his M.Sc in Plant breeding and Genetics from from Siksha O Anusandhan University, Bhubaneswar, Odisha, India. He has published one in each book chapters and research articles and multiple international conference proceedings. Now he is continuing his Ph. D research work at ICAR- National Rice Research Institute, Cuttack, Odisha

E: iamashish089@gmail.com

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Poster

Biofortification of rice: A sustainable strategy to address malnutrition and to ensure Nutritional security in India

Kabita Mishra*, and Rukeiya Begum
Bidhan Chandra Krishi Viswavidyalaya, Nadia, India

Abstract:

Indian Agriculture has made impressive progress over the years and phenomenal growth has been observed in crop production. In the race of more production, due care was not given towards quality improvement, that has led to malnutrition which has emerged as one of the alarming problems especially in the under-developed and developing world. Although various avenues such as dietary-diversification, food-fortification and medical-supplementation are available; biofortification of crop varieties is considered as the most sustainable and cost-effective approach where the nutrients reach the target people in natural form. Micronutrient deficiency, also known as hidden hunger is one of the most important provocations facing humanity today. Adoption of biofortified rice varieties in targeted countries would significantly increase daily micronutrient intake and help to holistically alleviate malnutrition in human populations. Keeping these in mind an experiment was conducted in 26 farmers field in 6 villages of Ganjam district during Kharif season of 2020 and 2021 for evaluation of biofortified varieties under jurisdiction of KVK, GANJAM-II. The quality paddy seed of improved varieties was provided to the beneficiary farmers. Among the improved rice varieties, the biofortified varieties play a crucial role in attaining nutrition security. Results of demonstration have shown that under demonstration plots of rice yield was found to be substantially more than that under local check during both years.

Keywords: rice, biofortification, malnutrition, hidden hunger, micronutrient

E: kmishra911@gmail.com

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Poster

Dietary potential of bamboo: Exploring nutritional benefits for both animals and humans

Santwana Samilita Dash* and Gyanranjan Mahalik
Centurion University of Technology and Management, Bhubaneswar, India

Abstract:

Bamboo, traditionally associated with construction and ornamental uses, is increasingly recognized for its nutritional value as a diet for both animals and humans. This abstract explores the multifaceted aspects of bamboo consumption, shedding light on its potential as a sustainable and nutritious food source. In the animal kingdom, bamboo serves as a vital dietary component for various species, particularly iconic ones like pandas. The unique composition of bamboo leaves and shoots provides essential nutrients, fibers, and minerals, contributing to the overall health and well-being of these animals. Research indicates that expanding the use of bamboo as an animal feed may have positive implications for conservation efforts and biodiversity, as it aligns with the natural dietary preferences of certain herbivores. Furthermore, the nutritional benefits of bamboo extend to human consumption. Rich in antioxidants, vitamins, and minerals, bamboo shoots have gained popularity in culinary circles globally. With a crisp texture and subtle flavor, bamboo shoots are not only a culinary delicacy but also offer a low-calorie, high-fiber alternative in various dishes. As societies increasingly seek sustainable food options, bamboo emerges as an eco-friendly choice due to its rapid growth and minimal environmental impact compared to traditional crops. This abstract underscores the potential of bamboo as a versatile and sustainable dietary resource, emphasizing its relevance for both wildlife preservation and human nutrition. As the global community explores alternative food sources to address environmental challenges, bamboo stands out as a promising candidate that bridges the gap between ecological responsibility and nutritional requirements.

Keywords: Bamboo, diet, animals, sustainable environment

Biography:

Santwana is a PhD scholar in biology, have dedicated her career to unraveling the complexities of Environmental Science. Born in 1985, I exhibited a keen interest in the natural world from an early age. She earned her bachelor's degree with honors in Botany from Utkal University. Motivated by a passion for research, she pursued a master's degree in Biosciences (Botany) with specialization in Molecular Genetics delving into the intricate mechanisms of Genetic Recombination. Her groundbreaking thesis on gene expression regulation caught the attention of prominent researchers, paving the way for her doctoral studies. In 2018, she persuaded PhD journey at Centurion University of Technology and Management. Her doctoral research focused on understanding the Ecology, Environment and Climate change.

Research Interest: Ecology, Environmental Biology

E: ssdash02@gmail.com

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Poster

Impact of herbicides on growth of Amur Carp

Lopamudra Sahoo[1], Sanjib Kumar Mohanty[1], Yashaswi Nayak[1]*, Reena C Jhamtani[2]
Centurion University of Technology and Management, Bhubaneswar, India

Abstract:

The increasing use of herbicides in aquatic environments to manage unwanted vegetation has raised concerns about their potential unintended effects on non-target organisms. *Cyprinus rubrofuscus*, Amur carp is a fish, which belongs to family of *cyprinidae* having a good food conversion ratio (FCR) and natural feed selection capacity. Various types of herbicides like Roundup, glyphosate-based ones, and others used in aquatic environments, focusing on their potential impact on this fish. Studies shows that glyphosate herbicides can affect Amur carp's growth by disrupting nutrient availability and altering the aquatic food web, which is leading to reduced growth rates and affecting the entire trophic cascade. These chemical compounds are widely used throughout the India, but especially in Odisha, their uses have increased recent years. To understanding herbicide -induced effects on Amur carp is crucial for effective management strategies, considering environmental factors like temperature and nutrient levels to assess potential fish population impacts. Herbicides impact Amur carp growth performance, but their effects vary depending on herbicide and environmental context. This review examines the impact of herbicides on the growth performance of the Amur carp, a significant ecological and economic fish species, focusing on both short-term and long-term effects.

Keywords: Amur carp, FCR, Herbicides, Growth, Aquatic Ecosystem

E: lopamudrasahoo513@gmail.com

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Poster

Identification of efficient rice genotypes with superior morpho-physiological traits to maximize yield potential

Babyrani Panda[1,2],*, Ashish Mohanty[2], · Subhankar Mondal[2], Jeetendra Senapaty[2], Sushanta K. Dash[2], Koushik Chakraborty[2]

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

[2]ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Grain yield in rice (*Oryza sativa* L.) is a complex trait which is determined by many morphological and physiological traits. So, a field evaluation was carried out during Kharif 2020 at ICAR-NRRI, Cuttack to study the physiological performance of genotypes. In the study 211 genotypes of rice were taken which consisted of 47 new generation rice (NGRs) and 164 non-NGR lines including seven checks. The genotypes were studied for morphophysiological traits namely, flag leaf area, total chlorophyll content, photosynthetic rate, stomatal conductance, transpiration rate, total biomass, pushing resistance, culm strength, and grain yield. We identified 3 genotypes i.e., IG-020, IG-211 and IG-010 to be highly efficient in 4 traits, 2 genotypes i.e., IG-044 and IG-186 in 5 traits, and 2 genotypes; IG-008 and IG-161 were found to be superior in 7 traits along with high grain yield. IG-008 reported high FLA, TCC, PN, gs, E, GY, PR, and CS and IG-161 exhibited high TCC, PN, gs, E, TB, GY, PR, and CS. Most of these highly efficient genotypes belonged NGR lines. Keeping this in mind we performed correlation analysis between NGR and non-NGR members separately. Interestingly, the trait specific analysis revealed a highly positive correlation of grain yield with photosynthetic rate only in case of NGR lines while no correlation was established in case of non-NGRs. The accumulation of superior traits in NGR lines along with the high association between photosynthetic rate and grain yield makes the NGR lines an efficient candidate to use in breeding program to get high grain yield.

Keywords: Grain yield, new generation rice, photosynthetic rate

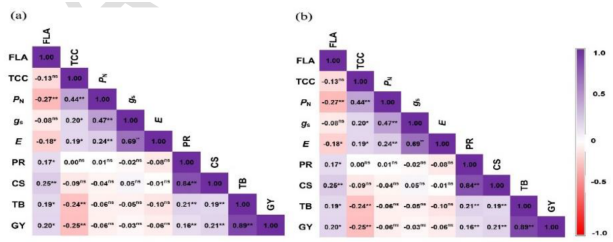

Fig. 1. Phenotypic correlation matrix among the morpho-physiological and yield-related traits for non-NGR genotypes (a) and NGR genotypes (b).

Table 1. Identification of genotypes with superior morphophysiological and yield attributing traits.

Highly efficient genotypes	Traits with high values	No. of traits	No. of genotypes
IG-175	FLA, P_N, E, GY	4	5
IG-018	FLA, TB, CS, GY	4	
IG-208	TCC, TB, CS, GY	4	
IG-042	g_s, E, TB, GY	4	
IG-082	TB, PR, CS, GY	4	
IG-010	TCC, P_N, TB, CS, GY	5	3
IG-211	TCC, g_s, PR, CS, GY	5	
IG-020	P_N, E, TB, PR, GY	5	
IG-186	FLA, g_s, E, PR, CS, GY	6	2
IG-044	TCC, P_N, TB, PR, CS, GY	6	
IG-008	FLA, TCC, P_N, g_s, E, PR, CS, GY	8	2
IG-161	TCC, P_N, g_s, E, TB, PR, CS, GY	8	

E: babyranipanda94@gmail.com, koushikiari@gmail.com

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Poster

Expression study of putative candidate genes for BPH resistance in the landrace Salkathi using BILs (Backcross inbred lines) in rice

Priti Pattnaik*, Swagatika Das, Soumya Mohanty, Priti Ranjan Sahoo, Sudhansu Sekhar, Baneeta Mishra, Saumya Ranjan Barik, Guru P Pandi, Mridul Chakraborti, Meera Kumari Kar, Mayabini Jena, Lambodar Behera
ICAR-NRRI, Cuttack, India

Abstract:

Background: The brown plant hopper (BPH) poses a significant threat to global rice production, jeopardizing food security for over half the world's population. Breeding rice varieties resistant to BPH is crucial for sustainable rice cultivation. This study aimed to identify and validate putative candidate genes associated with BPH resistance in highly resistant rice landrace, Salkathi.

Methods: We performed linkage analysis using 450 F2:3 lines derived from Salkathi, followed by in silico and real-time PCR analysis to identify candidate genes within two QTL regions (qBph4.3 and qBph4.4) on chromosome 4. Subsequently, a parallel backcross inbred lines (BILs) population was developed from the cross CR3006-8-2 (resistant) and Naveen (susceptible) to validate these candidate genes. The advance resistant line CR3006-8-2 has been developed from the cross between Salkathi and Pusa44 (susceptible) using conventional breeding methods. Expression analysis of these genes was performed in both parents and 14 selected BILs based on their SES scores.

Results: Linkage analysis confirmed the presence of qBph4.3 and qBph4.4, and in silico and expression analysis identified four putative candidate genes: LOC_Os04g02920 (Leucine-rich repeat family protein), LOC_Os04g21890 (disease resistance protein RPM1), LOC_Os04g32940 (Leucine-rich repeat family protein), and LOC_Os04g34250 (Serine/threonine-protein kinase receptor precursor). Validation in the BILs population confirmed the association of ten genes with BPH resistance QTLs, including all four candidate genes identified from Salkathi. Importantly, three genes (LOC_Os04g02920, LOC_Os04g2920, and LOC_Os04g34250) exhibited significantly higher expression in resistant parents and BILs compared to susceptible parents.

Conclusion: This study successfully identified and validated three putative candidate genes associated with BPH resistance in Salkathi. These genes, particularly LOC_Os04g34250 (Serine/threonine-protein kinase receptor), hold immense potential for developing functional markers and accelerating marker-assisted selection (MAS) breeding programs aimed at developing BPH-resistant rice varieties. The findings would contribute significantly to our understanding of rice defense mechanisms against BPH in Salkathi, and pave the way for future research toward ensuring food security in a BPH-challenged world.

Keywords: Brown planthopper (BPH), Rice, Resistance genes, QTL mapping, Candidate genes, Leucine- rich repeat (LRR), NBS-LRR, Serine/threonine-protein kinase receptor, Backcross inbred lines (BILs), Marker-assisted selection (MAS)

Biography:

Priti Pattnaik, currently enrolled as a Ph.D. candidate under the guidance of Dr. Lambodar Behera. Her research topic is Fine mapping and identification of candidate genes/QTLs for BPH resistance in rice cultivar, Salkathi.

Research Interest: Plant Biotechnology, Molecular Biology

E: pattnaikpriti@gmail.com

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Poster

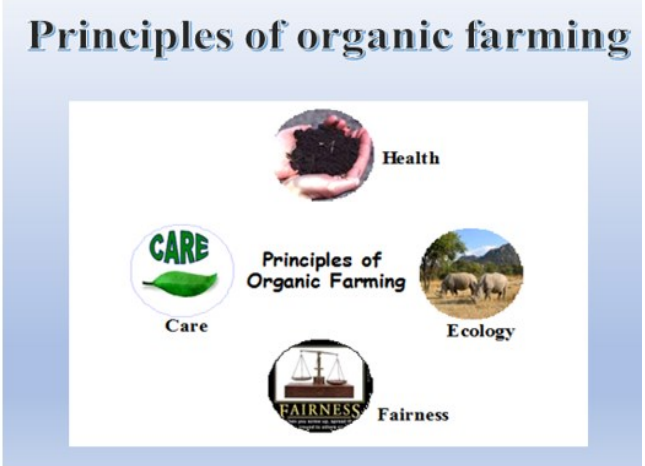
Organic farming

Subarna Nayak*, Sambit kumar Sahoo, and Ankita Samal
BJB Autonomous College, Bhubaneswar , India

Abstract:

Organic Farming is an agricultural process of crop and livestock production that involves much more than choosing not to use pesticides, fertilizers, insecticides, antibiotics and growth hormones. Organic farming works in harmony with nature rather than against it. It includes essential process like crop rotation, green manure, organic waste management, biological pest control, etc. Organic farming is effective in numerous no. of ways which enhances soil fertility, nutritious foodstuff and reduces input cost. It promotes healthy use of natural resources and controls all forms of pollution. The four principles of organic farming are Principle of Health, Principle of Ecology, Principle of Fairness and Principle of Care which shows preventing ecosystem from getting affected negatively and protect crops and livestocks from getting affected in hazardous ways. Organic cultivation is not new in India. In the year 2016 Sikkim became the India's first and only state to proclaim itself as 100% organic state. The changes happened was not a quick change but rather a sustainable one. In initial years crops production was very low and it took several years for the land to reclaim its original fertility which now has turned into more beneficial than inorganic farming. The different types of organic farming shows proper use of manure, management of Nutrient and pest management in the different sectors of agriculture such as poultry, fisheries, mushroom, goat and sheep rearing, dairy farming etc. For organic farming to be adapted throughout India and world farmers needs to be educated about it. As it is a sustainable change it requires patience and with time it creates high nutritional value in food production, maximum profit and employment opportunity. Hence Organic farming is an important transformation that is highly required in Health and food-nutritive management.

Keywords: principles of organic farming, Sikkim



E: subarnanayak970@gmail.com

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Poster

Marker assisted genetic improvement of *Kalajeera*: A short grained aromatic rice (*O. sativa* L.) landrace from Odisha

Soumya Suravita Mishra[2], DBKV Mani[3], M. Chakraborti[1], M.K. Kar[1], T. Adak[1], N. Basak[1], G. Kumar[1], P. Sanghamitra[1], S. Samantataray[1], G.A.K. Kumar[1], S. Sarkar[1]

[1]ICAR-National Rice Research Institute, Cuttack, India

[2]Utkal University, Bhubaneswar, India

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

Abstract:

Odisha is the fifth largest rice producing state in the country and is bestowed with a huge diversity of short grained aromatic rice. *Kalajeera*, with its black cumin like seeds and a black husk color is the most popular short grain aromatic rice in the state. It has a wide adaptability and it is being cultivated from hills to the coastal regions in the state. Several populations of *Kalajeera* are prevailing across Odisha, as it is a landrace and has been traditionally cultivated by the farmers in the state over generations, due to its unique qualities. Recently, Korapurt *Kalajeera* has been geographically tagged that itself reveals the popularity of *Kalajeera* and its economic significance.

The scented landrace was purified at ICAR-NRRI, Cuttack in collaboration with Orissa University of Agriculture, Bhubaneswar and was released as 'NuaKalajeera' by SVRC (State Varietal Release Committee) Odisha, in 2008 envisaging the need to maintain uniformity of harvest and meet the future market demand.

Nua Kalajeera, the purified version of Kalajeera is agronomically inferior in terms of a few traits, when compared to the high yielding varieties. This hinders the realization of maximum profitability by the farmers while growing the variety. This purified traditional variety has more than 140cm height and is prone to lodging. It also shows susceptible reaction towards blast caused by *Pyricularia oryzae* and Brown plant hopper (BPH) (*Nilapravata lugens*), the two major disease and pest affecting yield and quality of this aromatic rice. Marker assisted genetic improvement of the variety is being undertaken to develop semidwarf derivatives of Nua Kalajeera, resistant to Blast and BPH. For the purpose, biparental crosses have been under taken during kharif-2022 using Tetep as the donor for blast resistance and Naveen BPH (*qBph4*.3 and *qBph4*.4) as donor for BPH tolerance. The F_1s of the biparental crosses were developed with the donors using Nua Kalajeera as the recipient parent. The hybridity of the F_1s was confirmed and the true hybrids of two different donors were subjected to intercrossing during kharif-2023, to harvest the IC_1F_1 seeds. Fore ground selection was performed using the SSR (Simple Sequence Repeat) marker RM527 for the blast genes *Pi-2*, *Pizt-5* and RM551 &RM5633 markers for *qBph4*.3 and *qBph* 4.4 respectively. The true IC_1F_1s bearing all the target genes under transfer (confirmed through the gene/QTL linked SSR markers mentioned ahead), will be further subjected to fixation using anther culture and will also be utilized for further trait introgression for genetic improvement of the popular non-basmati short grain aromatic rice variety from Odisha.

Keywords: Quality, lodging, semi-dwarf, biotic stress, blast, BPH, SSR markers, GI tag

E: soumyamishra943777@gmail.com

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Poster

Appropriate barcoding gene responsible for detection of Malaria Parasite

Arpita Arsmika Sahu[1]* , Bikash Ranjan Sahu[1], and Tapan Kumar Barik2
[1]Centurion University of Technology and Management, Bhubaneswar, India
[2]Berhampur University, Berhampur, India

Abstract:

Malaria becoming a global threat and one of the extreme off disease for human lives. Out of five different species of *Plasmodium*, vast majority of mortality and morbidity are seen in case of disease associated to *P. falciparum*. Death in malaria patients are the consequences of delay in detection and treatment. Therefore, for treating the patient in time and obstructing further infection through mosquitoes, malaria must be detected promptly. So the objective of the present study is to find out appropriate barcoding gene of Plasmodium (from both nuclear and mitochondrial) that will be ideal for the detection of Plasmodium positivity. About 157 and 149 number of Cytb and 18s rRNA gene sequences from different geographical location were retrieved from NCBI database and analyzed thoroughly through molecular phylogeny and genetic diversity study. Genetic divergence were inferred using Kimura 2 parameter (K2P) model in MEGA X software. Maximum Likelihood (ML) and Neighbor-joining algorithm analysis with the studied genes of *P. falciparum* were performed using MEGA X. In global and Indian *Plasmodium falciparum* population, the value of genetic divergence of Cytb gene was less than 18srRNA gene. The log-likelihood value of the resultant ML tree for mtCytb and 18s rRNA gene-sets of the *P. falciparum* species were estimated to be -1738.88 and -2772.91 respectively. Low genetic diversity was found in case of both global Pfcytb and Indian PfCytb gene which suggest that it is well-conserved genetically and ultimately indicates, Pfcytb is appropriate gene for diagnosis.

Keywords: Malaria, Barcoding gene, Genetic diversity, Molecular phylogenetic study

Biography:

Arpita Arsmika Sahu has completed her M.Sc in zoology from Rama Devi Women's University, Bbhubaneswar. Her M.Sc project was 'comparative haematological analysis of Cat fishes Clarias batrachus and Heteropneustes fossilis'. She has completed M.Phil in zoology from Berhampur University. Recently, She has joined to PhD programme at Centurion University of Technology and Management, BBSR. She has learned DNA extraction method, gel electrophoresis. I have also worked on instruments like spectrophotometer, centrifugation, UV transilluminator.

E: arpitasahuarpita@gmail.com

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Poster

Black turmeric: Therapeutic value of an endangered species and its role in modern medicine

B Jyotirmayee* and Gyanranjan Mahalik
Centurion University of Technology and Management, Bhubaneswar, India

Abstract:

Curcuma caesia Roxb., or black turmeric, is a lesser-known, non-conventional medicinal herb endangered due to high demand, indiscriminate extraction, and limited production. It exhibits remarkable pharmacological and aromatic benefits. Traditional healers employed Curcuma to cure numerous ailments; however, *Curcuma caesia* Roxb. remains mostly unknown for drug development. The rhizome and leaf extracts included phenolic substances with varying antioxidant and α-glucosidase inhibitory properties. Black turmeric extract can reduce the prevalence of nosocomial infections by acting as an antibacterial agent against gram-positive and gram-negative bacteria. Findings from multiple clinical trials on combining anticancer medications with black turmeric show that curcumin-containing kali haldi improves cancer management, improving patients' conditions, lengthening their survival time, and decreasing adverse effects. Rhizomes provide valuable active components for the food and pharmaceutical industry. The diverse range of compounds which can be identified using a state-of-the-art metabolomics technique, has led researchers to speculate that the plant may have biopharmaceutical applications. The measurement and classification of plant extracts provided documentation on health-promoting bioactive chemicals. At the same time, the species' medicinal and therapeutic uses are supported by their antioxidant and antibacterial activity. Many industries, including food, cosmetics, and medicines, could profit from extracting bioactive chemicals from rhizomes using polar protic solvents. The rhizome has been examined for biologically active compounds, and several phytochemical and pharmacological researches have documented therapeutic benefits. Still, the plant's medical, toxicological, and phytoanalytical characteristics need further exploration for the betterment of society.

Keywords: *Curcuma caesia*, Nosocomial infections, Biopharmaceutical, Bioactive chemicals

E: gyanranjan.mahalik@cutm.ac.in; bjyotirmayee00@gmail.com

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Poster

Phytochemical and nutritional profile examination of wild food plants consumed by Koraput district indigenous peoples

Sameer Jena* and Gyanranjan Mahalik
Centurion University of Technology and Management, Bhubaneswar, India

Abstract:

Uncultivated and underappreciated plant resources were vital in guaranteeing that people all across the globe could eat healthy food. In times of food scarcity, these wild edible plants are necessary for the survival of indigenous communities and other forest dwellers. For generations, indigenous peoples of Koraput district have used edible plants as a main source of nutrition. Wild edible plants are a safe and nutritious way to consume, and many indigenous groups have discovered their therapeutic and nutritional benefits. Recently, there has been a surge in efforts to improve human nutrition and health by cultivating natural crops rich in nutrients but often overlooked, such as edible flowers and fruits. In addition to their culinary value, they hold great promise as sources of several phytochemicals, such as natural antioxidants, carotenoids, flavonoids, and anthocyanins. The indigenous people ate these blossoms after being transformed by a series of transformations performed on them in the forest. Evaluating wild edible plants' nutritional and nutraceutical potential is essential for better understanding the health advantages they can offer humans. Despite their importance as indigenous foods, they cannot be used in developmental therapies due to a lack of understanding of their chemical composition, nutritional profile, and nutraceutical structure.

Keywords: Phytochemicals, Food scarcity, Nutrition, Indigenous

E: sameerj760@gmail.com; gyanranjan.mahalik@cutm.ac.in

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Poster

Crop enhancement by managing the industrial waste through vermicomposting for a sustainable agricultural practice

Purbasha Priyadarshini*, and Sunita Sathpathy
Centurion University of Technology and Management, Bhubaneswar, India

Abstract:

An effective recycling is the key solution for sustainable utilization of industrial waste Fly Ash. The coal based industries; especially Thermal power plants are major sources of huge production of Fly Ash (FA). About 87% of FA are exploited worldwide as per recent study, but the continuous production and over production is still constant. Various scientific reports considered that FA has ability of enhancement of soil nutrition for agricultural practice, due to contain oxides of heavy metals. A succeeding proportion of FA is amended with soil for the present work. Various proportions of FA amended soil are processed by applying the technique vermicomposting. The dynamic involvement of earthworm *Eudrilus eugeniae* along with microbes' aid to convert the heavy toxic waste into organic manure in form of vermicast.

The present study was experimented out by taking various treatments of FA amended with soil (S) + cow dung (Cd) in the research laboratory of Centurion University of Technology and Management, Bhubaneswar, Odisha. The treatments tested were T1-S(1kg) + cow dung(Cd)(1Kg) 100%, T2- S(1kg) at incorporation with Cd(50%) +FA(50%) of 1 kg, T3-FA (75%) at incorporation with (Cd) 25% of 1kg + LS(1kg), T4- industrial waste FA (100%) of 1kg

incorporation with S(1kg) and T0 was taken as control of 100% S (1kg). The result was implemented on crop improvement of rice (*Oryza sativa*) as the main investigation of the present work. The soil nutrition composition nitrogen, phosphorous and potassium (NPK) content estimated in various treatments was effect on the growth of rice plant. It was observed that the N uptake varied from 47.85 to 78.67 kg ha-1, P from 11.29 to 21.78 kg ha^{-1} and K from 48.66 to 76.89 kg ha^{-1} was found in various treatments T0 to T4 of FA. However, it was observed that the result of FA vermicompost incorporation with S+Cd of T1 containing approximate NPK uptake that favourable for improved crop (Oryza sativa) growth as comparable to other treatment. FA vermicompost incorporated soil and cow dung was obtained with suitable result than 100% of soil and 100% FA.

Keywords: Industrial waste, FA, Vermicompost, Eudrilus eugeniae, *Oryza sativa*, NPK

Biography:

Purbasha Priyadarshini, have completed M.Sc. in Zoology from Centurion University of Technology and Management Bhubaneswar. She worked in a project entitled" Finding Small Molecule to Target Dengue Virus NS1 Protein ". Presently she is pursuing her PhD work in department of Zoology at Centurion University of Technology and Management, Bhubaneswar.

Research Interest: Microbiological Study on Vermicompost by using indigenous earthworm

E: purbasha362@gmail.com

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Poster

Contract farming

Sradhanjali Barik*, Rajalaxmi Jena, and Stiti Pragya Samal
B.J.B Autonomous College, Bhubaneswar, India

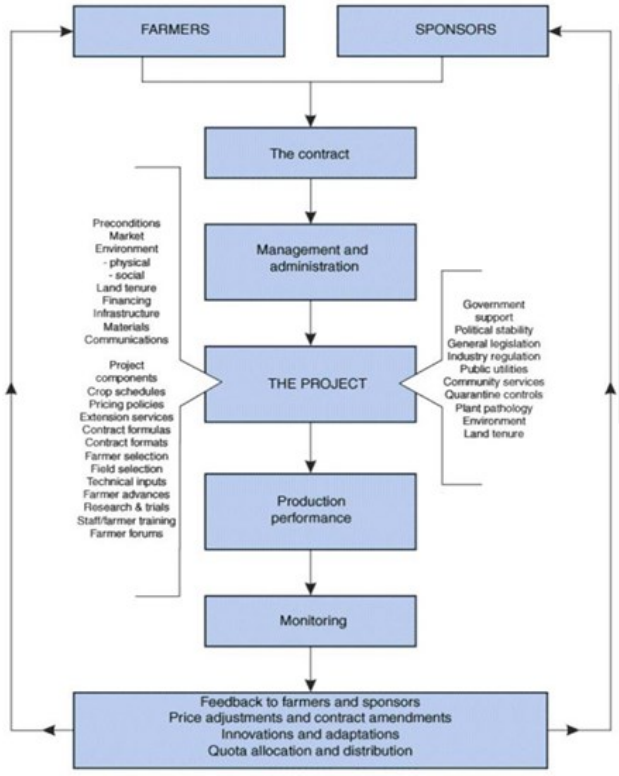
Abstract:

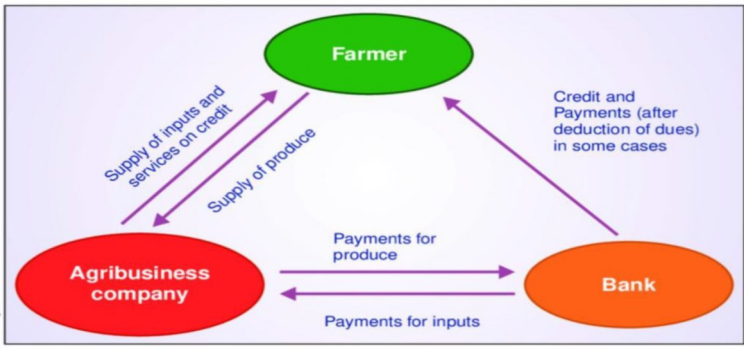
The contract farming system should be seen as a partnership between agribusiness and farmers. To be successful it requires a long-term commitment from both parties. Exploitative arrangements by managers are likely to have only a limited duration and can jeopardize agribusiness investments. Similarly, farmers need to consider that honouring contractual arrangements is likely to be to their long-term benefit. Well-managed contract farming is an effective way to coordinate and promote production and marketing in agriculture. Nevertheless, it is essentially an agreement between unequal parties: companies, government bodies or entrepreneurs on the one hand and economically weaker farmers on the other. It is, however, an approach that can contribute to both increased income for farmers and higher profitability for sponsors. The fact that CF has rapidly emerged and developed implies welfare gains for firms and farms in general. The government and the public often care more about the welfare impact on farmers. We summarize the findings from the literature for developed and developing countries separately, emphasizing the latter.

Conclusion: Recent years have seen movement of contract farming to developing countries, followed by a large body of empirical research aimed at quantifying many effects of CF on farmer welfare. In many studies, explicit attention is given to the understanding of why some farmers choose to contract, while others do not. This body of research has focused widely across both developed and developing countries, as well as commodities.

Keywords: Contract farming, farmer, agribusiness

A contract farming framework





E: shraddhabarik558@gmail.com

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Poster

Agro chemical and bio fertilizer for future

Abhijit Bharati, Himanshu Mallick* and Rakesh Kumar Rout
B.J.B Autonomous College, Bhubaneswar, India

Abstract:

Agrochemical pollution is a serious threat to environmental safety. Exposure to agrochemicals had deleterious health effects such as nervous system damage and cancer. Biological magnification of persistent agrochemicals also occurred. Hence, remediation approaches for agrochemical pollution must be a holistic approach, including environment and crop produces.

The advent of nanotechnology helped to formulate highly efficient methods for the remediation of agrochemicals. High reactive surface area and very small packing space requirements made usage of nanoparticles as a popular agent in agrochemical remediation. Growing interests in surface-engineered nanoparticles promise complete removal of agrochemicals from the environment. Nano sorbents immobilized agrochemicals in the soil and helped microbial degradation of these compounds. However, many of the agrochemicals are persistent, and hence complete removal of these residues practice via photo catalysis. Photo catalytic degradation of persistent agrochemicals using bimetallic nano composites widely adopted. Large-scale environmental remediation of agrochemicals in soil, water, and agriculture products achieved via nanoparticles-based agrochemical cleaning systems such as thin-film fixed-bed reactors and nano-phytoremediation. Bio fertilizers are the substances containing variety of microbes having the capacity to enhance plant nutrient uptake by colonizing the rhizosphere and make the nutrients easily accessible to plant root hairs. Bio fertilizers are well known for their cost effectiveness, environment-friendly nature, and composition. These are effective alternatives to the hazardous synthetic fertilizers. This chapter covers various types of microbial bio fertilizers pronouncing symbiotic and free-living nitrogen-fixers, phosphorus-solubilizer and mobilizers, their formulations, applications of few commercially available bio fertilizers toward sustainable agriculture, and recent approaches to develop next-generation bio fertilizers.

E: abhijitbharati14@gmail.com

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Poster

Agri rural banking and policies

Piyusa Pattnaik, Soumya Ranjan Moharana, and Rohan Priyadarshan
B.J.B Autonomous College, Bhubaneswar, India

Abstract:

Banking sector play very crucial role in every country economies. It helps to increasing strength of the country & its functions and services have a considerable and positive impact on modern economic activities. The Indian economy is based on agricultural sector and it's found mostly in indian villages. In india 70% of Indians rely on agriculture, 60% of industries are agro-based ,the rural sector contributes 50% of national income, and the agricultural sector is India's greatest foreign exchange earner. Rural banking has raised the level of rural farm and non-farm output, income and employment, especially after the Green Revolution and it help in developmentation of economy in rural and tribal areas of an india. At present, there are 43 Regional Rural Bank (RRB)s in the country and each of them is sponsored by the government of India in collaboration with the state government and sponsor bank and in odisha there are 2 rural banks 1st is Odisha Gramya Bank then Utkal Grameen Bank. National Bank for Agriculture & Rural Development (NABARD) is the largest bank of the india which is established on 12 July 1982.It is a financial institution with total balance sheet of over US$ 40 billion. At present there are many types of policies are helps to agriculture like Agricultural Marketing Infrastructure (AMI) policy and it Agri Clinic & Agribusiness Centers policy , Dairy Entrepreneurship Development policy etc and schemes are Krishi Udan Scheme mainly focusing on transporting perishable food products from the hilly areas, North Eastern States and tribal areas , National Food Security Mission Sustainable increase in the production of targeted crops through area expansion and productivity enhancement. Restoration of soil fertility and productivity at the individual farm level. Rise in farm level net income.

E: pattanaikpiyush321@gmail.com

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Poster

Human and wild-life conflicts

Ankita Samal
BJB Autonomous College, Bhubaneswar, India

Abstract:

The increasing number of human and wildlife conflicts is a concerning factor that needs to be overlooked with utmost priority. Human and Wildlife conflicts are becoming more frequent, serious and widespread since rise in human population has been witnessed. According to WWF (World Wide Fund for Nature) Human-Wildlife conflict is defined as "any interaction between humans and wildlife that results in negative impacts of human social, economic or cultural life, on the conservation of wildlife population or on the environment." The arising factors leading to such conflict situations are increase in human population and their livelihood with increasing disturbance of habitat in addition to pollution which is a global major concern. Some other major factors include deforestation, overgrazing and by livestock. For instance we all are aware about of chandaka, Bhubaneswar elephant attacks with cost lives of both human and elephants. Resolving these conflicts can take a sustainable amount of time, it will never be solved overnight. The animal behavior and welfare needs to be analyzed. The necessary steps that can be taken are translocation of problematic animals, erection of fences and other barriers, compensation and predator-deterring guard dogs. We need to focus mainly on stopping from destroying further forest lands and converting abandoned and degraded lands into forest. We need to increase the number of biosphere reserve, wildlife sanctuary and national parks for balancing our ecosystem. The tribal groups those are well connected with forest and wildlife must be encouraged to maintain habitat within these reserves. According to the closure we can state that Human-Wildlife conflict can be re-solved with proper decisions and changes with a sustainable amount of time.

Keywords: Animal behavior, Biosphere reserve

HUMAN AND TIGER CONFLICT

Elephants	2021-22	2020-21	2019-20
Human Killed by Elephants	533	461	585
Deaths of Elephants by Trains	12	14	19
Deaths of Elephants by electrocution	65	76	81
Deaths of Elephants by poaching	14	9	6
Elephants death by poisoning	14	9	06

HUMAN AND ELEPHANT CONFLICT

Tigers	2021-22	2020-21	2019-20
Human Killed by Tigers	31	44	50
Natural Deaths of Tigers	4	20	44
Poaching Deaths of Tigers	4	8	17
Unnatural Deaths of Tigers (excluding poaching)	2	0	3
Tigers death under scrutiny	104	71	22
Seizure	13	7	10

E: ankitasamal24@gmail.com

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Poster

Millet for nutrition and climate action: A nexus of sustainable agriculture and public health

Rajalaxmi Jena* and Stiti Pragya Samal
B.J.B Autonomous College, Bhubaneswar, India

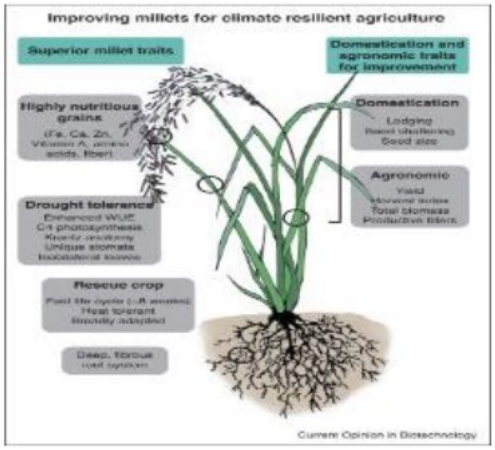
Abstract:

This abstract presents a comprehensive overview of the critical role of millet in addressing the intertwined challenges of nutrition and climate action. Millet, a resilient and versatile cereal crop, has the potential to significantly impact global efforts aimed at improving nutrition outcomes and mitigating the adverse effects of climate change on agricultural systems.

Nutritionally, millet stands out as a powerhouse of essential nutrients, including proteins, dietary fiber, vitamins, and minerals. Its gluten-free nature renders it suitable for individuals with dietary restrictions, contributing to the diversification of diets etc.

In the context of climate action, millet emerges as a climate-resilient crop, capable of thriving in diverse Agro-ecological zones with minimal water and input requirements. As such, it exemplifies a sustainable agricultural alternative, particularly in the face of changing climatic conditions and water scarcity. Its suitability for intercropping and agroforestry further enhances its ecological adaptability and contributes to enhanced biodiversity and soil health, fostering climate-resilient Agro-ecosystems.

Ultimately, this analysis serves as a springboard for advocating increased awareness, policy support, and investment in the production, consumption, and research of millet, positioning it as a linchpin in advancing sustainable agricultural practices, fostering nutrition security, and bolstering global resilience in the face of climate change.



Biography:

Rajlaxmi Jena's passion for agribusiness, and her to make meaning full impact on the agricultural sector with a zeal for understanding the earth intricate geological processes and a profound interest in agricultural sustainability, she embarked on an enriching journey that bridged the realms of geology and agribusiness

Research Interest: Food Processing, Product Development, Agri business.

E: rajlaxmijena2001@gmail.com

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Poster

New generation cooperatives (entrepreneurs): A more agribusiness approach in India

Ritu Anandini Kanhar, Jogamaya Rath and Rajesh Kumar Das
B.J.B Autonomous College, Bhubaneswar, India

Abstract:

New Generation Cooperatives (NGCs) in India signify a transformative shift in the agricultural landscape, addressing longstanding challenges faced by farmers. Distinct from traditional cooperatives, NGCs combine cooperative principles with entrepreneurial strategies, aiming to empower farmers, enhance economic sustainability, and promote inclusive development. This abstract explores the characteristics and objectives of NGCs, emphasizing their role in providing market access and bargaining power to farmers, facilitating value addition and processing through modern technologies, mitigating risks, and promoting capacity building and knowledge transfer. Examining successful implementations in sectors like dairy, fruits, vegetables, and grains, such as AMUL and IFFCO, highlights the positive impacts of NGCs on farmers' incomes, empowerment, and technological advancements. Despite their success, challenges like bureaucratic hurdles and financial constraints persist, necessitating policy support, infrastructure development, and financial assistance for continued growth and sustainability. In conclusion, NGCs represent a pivotal force in India's agricultural transformation, bridging the gap between cooperative traditions and contemporary agribusiness practices, and fostering a sustainable and inclusive future for the agricultural sector.

Biography:

Ritu Anandini Kanhar's passion for agribusiness, and her aspiration to make a meaningful impact on the agricultural sector, with a blend of engineering and business acumen, she is poised to become a dynamic force driving innovation and sustainability in the ever-evolving landscape of agribusiness.

Research Interest: Entrepreneurship, Supply chain, Agribusiness

E: rakanhar266@gmail.com

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Poster

Different milling time of rice influence the iron and zinc content in grain

T B Bagchi, A Kumar, and Ankit A Adhikari
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Six NRRI released rice varieties were evaluated for Fe and Zn content after 30s, 60s and 90s of milling as compared to unmilled rice. The milling was done by the laboratory grade miller machine (Satake , Japan). The minerals content was estimated through microwave digestion system followed by atomic absorption spectrophotometer (Analytik Jena, Germany). The brown rice of CR Dhan 310 and CR Dhan 802 posses higher Fe content i.e.26.82 ppm and 29.29 ppm respectively but after 30s milling, 50% reduction was observed whereas in case of 60s and 90s milling 60% and 65% reduction was observed. In case of Zn content, highest quantity of Zn was observed in CR Dhan310. In unmilled rice it was 23.88ppm while 18-20% reduction was observed in 30s of milling whereas after 60s and 90s milling, 23 to 25% reduction was observed. It was observed that reduction of Zn content was less than Fe and there was no significant difference was noticed in Zn content of rice at 60s and 90s milling.

Keywords: rice, milling, iron, zinc

Variety	Brown rice		30s milling		60s milling		90s milling	
	Fe	Zn	Fe	Zn	Fe	Zn	Fe	Zn
CR Dhan 203	25.14±1.2	18.76±0.8	16.27±0.4	16.83±0.8	12.26±0.6	12.2±0.3	10.86±0.3	11.85±0.6
CR Dhan310	26.82±0.9	23.88±0.7	15.87±0.6	19.62±0.6	13.88±0.5	16.12±0.5	10.96±0.6	15.26±0.6
CR Dhan311	23.99±0.8	21.34±1.3	15.62±0.6	17.79±0.5	11.88±0.4	14.19±0.3	10.37±0.2	14.4±0.7
CR Dhan505	25.1±0.7	21.05±1.2	13.83±0.4	16.33±0.6	12.34±0.3	13.38±0.6	9.85±0.4	14.42±0.9
CR Dhan701	24.62±1.3	21.57±1.2	14.81±0.3	18.32±0.7	12.71±0.6	15.88±0.4	11.08±0.5	15.2±0.8
CR Dhan802	29.29±0.8	18.72±0.6	14.59±0.5	14.32±0.6	13.46±0.4	12.47±0.7	10.77±0.3	12.49±0.4

Biography:

Dr. T.B Bagchi, Sr. Scientist is the winner of "Nanaji Deshmikh ICAR Award for Outstanding Inter-disciplinary Team Research in Agriculture and Allied Sciences" for the development of first high protein rice CR Dhan 310. He is one the developers of four bio-fortified high yielding rice varieties, which had been released and registered by PPVFRA, New Delhi and State Registration Authority, Odisha. The varieties are (a)CR Dhan 310-a high protein rice (12% protein). (2)CR dahn 311 – High protein rice (11.8% protein). (3)CR Dhan 315–a high Zn content rice (23 ppm in polished rice). (4)CR Dhan 411- a high protein rice (10%) with resistant to stem borer. All these varieties are now in seed chain. He published more the 35 research and review articles in reputed national and International journals. He is the author of many book chapters, research bulletins and popular articles regarding rice grain physico-chemical, sensory and nutritional qualities.

Research Interest: Rice grain quality, development of biofortified rice, evaluation of sensory quality of rice products and post harvest processing of rice grain

E: torit.crijaf09@gmail.com

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Poster

Effects of steel slag-based products on rice growth and yield under acidic soil

Mohammad Shahid*, **Shraddha Saha**, **Kashyapi Kamalini**, **Rubina Khanam**, **AK Nayak**
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Soil acidity is a significant challenge for crop production in various regions of the world including India. Acidic soil can adversely affect the plant growth by constraining the essential nutrient availability. The main factors contributing to soil acidity include climate, vegetative and organic matter decomposition, topography and agricultural practices. In Odisha, acidic soil account for 70% of its total geographic area.

When soil becomes too acidic (pH below 5.5), it can negatively impact the essential nutrients availability for plants. Maintaining the soil pH within the appropriate range is crucial for optimizing the nutrient availability and promoting healthy plant growth. This study offers insights into the reduction of soil acidity within rice farming. A pot experiment was carried out at the Crop Production Division of ICAR-NRRI, Cuttack, Odisha during Kharif season of 2023. The study employed three replicates and utilized a completely randomized design for statistical data analysis. The acidic soil was applied with products in two doses, i.e., @ 2.5t/ha and @ 5.0t/ha. The treatments included control (RDF 80% and 100%); steel slag (SS) @0.5 t/ha and @1.0 t/ha; lime (0.5 t/ha); Steel slag-based product 1 (SSP1) @2.5t/ha and @5.0t/ha; SSP2 @2.5t/ha and @5.0t/ha; SSP3 @2.5t/ha and @5t/ha; SSP4@2.5t/ha and @5.0t/ha; and SSP5 @2.5t/ha and @5.0t/ha. Remarkable effects were observed across various plant growth factors, yields of grain and straw, chromium uptake in both grain and straw, and soil acidity levels. Notably, during kharif 2023, the maximum plant height with the highest no. of tillers were seen in treatments SSP1 and SSP2 @2.5 t/ha and @5.0 t/ha, respectively. Highest grain and straw yields were also evident in these treatments compared to the control.

Chromium uptake in both grain and straw showed a slight rise under the SSP1 and SSP2 treatments @2.5 t/ha and @5.0 t/ha, respectively, however it is within critical range. Similarly, soil acidity decreased notably in treatments SSP1 and SSP2 @2.5 t/ha and @5.0 t/ha, compared to the control. Overall, the application of SSP1 and SSP2 @2.5 t/ha and @5.0 t/ha demonstrated a significant role in reducing soil acidity in rice cultivation.

Keywords: Acidic soil, rice, steel slag, amendments

E: shahid.vns@gmail.com

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Poster

Varietal Screening Of Red Rice Genotypes against rice leaffolder, *Cnaphalocrocis medinalis* (Guenee) (Pyralidae: Lepidoptera) in field conditions

P. Bhavana[1,2], Prasanthi Golive[1], Arundhati Sasmal[2],Totan Adak[1], Soumya Shephalika Dash[1], S. D. Mohapatra[1]

[1]ICAR-National Rice Research Institute, Cuttack, India

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

Abstract:

Rice (*Oryza sativa* L.) serves as a vital global food staple for over two billion people in developing nations. However, the pervasive threat of the rice leaffolder (*Cnaphalocrocis medinalis*) poses a substantial risk, causing significant losses during both vegetative and reproductive stages of cultivation. This study investigates the potential of host plant resistance as an environmentally friendly alternative to conventional insecticide spraying for managing the rice leaf folder. Fifty red rice accessions from diverse germplasm were screened for resistance traits against the leaffolder under field conditions. Varied percentages of leaf damage were observed, highlighting distinct resistance-susceptibility statuses among the tested rice landraces. Taichung Native 1 (TN 1) served as a susceptible check and TKM 6 as a resistant check during varietal screening. The leaffolder damage percentage was calculated and was converted into adjusted damaged leaves rating (ADLR).Among the fifty rice genotypes assessed, eight, eleven, and thirty-one were identified as resistant, moderately resistant, and susceptible varieties, respectively. Notably, Klabhat and Aspohl demonstrated high resistance, while Krishnabhog and Tulsi phul exhibited high moderate resistance. Conversely, A-200 (Ginasali),Bangar madhabi and Harinkajali were identified as the most susceptible varieties. These findings offer valuable insights into the resistance profiles of different red rice accessions against leaffolder infestation, contributing to the development of sustainable rice cultivation strategies.

Keywords: Rice leaffolder, red rice accessions, adjusted damaged leaves rating, resistant, moderately resistant, susceptible

Biography:

P. Bhavana, Ph.D. Scholar in Ag.Entomology at OUAT, Bhubaneswar, and a proud recipient of the prestigious Biju Patnaik Scholarship. Currently, her research is centered around the fascinating realm of volatilomics, specifically targeting the control of the notorious rice pest, Rice Leaffolder. Her academic journey has been marked by excellence, as evidenced by securing the first position in M.Sc. Ag Entomology (2017-18) at the Department of Entomology, SHUATS, Allahabad and was honored with a coveted Silver Medal.

Research Interest: Host plant resistance, Integrated Pest Management (IPM), and Biological Control

E: bhavana.dora30@gmail.com

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Poster

SWEET gene and Bacterial blight resistance

Aiswarya Priyadarsini*, Rupalin Jena*, Soumyashree Purohit* and Arup Kumar Mukherjee*
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Bacterial leaf blight is an important disease of rice that is most deadly in south-east Asia and sub - Saharan Africa, where it is made worse by the intense monsoon rains and continuous overcast conditions. Bacterial leaf blight causes up to 75% of crop loss, affecting millions of hectares in rice every year. Strong pathogen virulence mechanisms frequently override plant resistance in the biological arms race known as plant-pathogen interactions. Particular effector molecules produced by the Xanthomonas oryzae pv. oryzae (Xoo) pathogen encourage the host to supply the sugar needed for bacterial development. The SWEET genes, a rice gene family consisting of 21 genes, include effector-binding elements (EBEs) in their promoters that these transcription activator-like effectors (TALEs) attach to it. These genes encode sugar transporters. The activation of target SWEET gene like SWEET11, SWEET13 and SWEET14 gene increases sugar transport, where the pathogen requires it, increasing its pathogenic potential and increasing the susceptibility to disease. These transporters act as bidirectional uniporters/facilitators and aid in the diffusion of sugars across cell membranes along concentration gradients. All three of the SWEET gene promoters have mutations that we introduced using CRISPR-Cas9-mediated genome editing. Sequence investigations of TALE genes in 63 Xoo strains provided further information for editing, revealing several TALE variations for SWEET13 alleles. Two TALEs from the African Xoo lineage also target SWEET14, which has also been mutated. Five distinct promoter mutations were concurrently inserted into the elite mega varieties IR64 and Ciherang-Sub1, as well as the rice line Kitaake. Trials in paddy fields demonstrated that rice lines with strong, broad-spectrum resistance are bred by genome-edited SWEET promoters. SWEETs are extensively distributed in plants and are essential for a variety of biochemical functions, such as pollen nourishment, nectar secretion, seed filling, fruits development, interactions between plants and pathogens, and reactions to abiotic stress. The advancements of plant SWEETs, including information on their discovery, features of protein structure, evolution, and physiological roles, are to be discussed.

Keywords: Rice; Bacterial leaf blight; *Xanthomonas oryzae pv. oryzae*; SWEET; TALEs; CRISPR-Cas9

E: ak.mukherjee@icar.gov.in

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Poster

Calibration and validation of DSSAT crop model for rice-rice sequence under long term fertility experiment

Banabasini Mohanty[1,2], Mohammad Shahid[1]* and Binoy Kumar Saren[2]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]Department Visva-Bharati, Sriniketan, India

Abstract:

Rice (*Oryza sativa* L.) stands as the primary staple food crop in India, sustaining the livelihoods of over 50 million households through rice-centric production systems. The ongoing shifts in management practices pose a significant impact on these cropping systems, potentially jeopardizing the productivity and sustainability of diverse rice-based cultivation methods. Among the various consecutive cropping patterns, the rice-rice sequence holds a paramount position, serving as the cornerstone of India's food security. Crop models offer a promising avenue for exploring and deciding upon long-term management strategies to optimize yields, while also assessing the trade-offs between different environmental inputs and economic outcomes. In this regard a field experiment was conducted at research farm of ICAR- National Rice Research Institute, Cuttack to evaluate the credibility and efficiency of DSSAT crop model. The experiment comprised of two rice sequences i.e. rabi (2021) -kharif (2022) and rabi (2022)-kharif (2023) by taking Lalat and Gayatri variety during rabi and kharif respectively. During kharif treatments were T1: No fertilizer, T2: 60-40-40 N-P_2O_5-K_2O kg/ha, T3-FYM@5t/ha and T4-T2+T3 whereas during rabi T1: No fertilizer, T2: 80-40-40 N-P_2O_5-K_2O kg/ha, T3- residual FYM and T4 -T2+T3 treatments were taken and the experiment was laid in Randomized Block Design. Decision Support System for Agro-technology Transfer (DSSAT) is a collection of independent programs that operate together to simulate crop growth, development, yield and in this study DSSAT-Crop Environment Resource Synthesis (CERES)-Rice model was applied. Sequence analysis of this crop model was used under the above-mentioned long-term fertility experiment including organic matter incorporation along with traditional major nutrients. CERES-Rice of DSSAT4.7 was calibrated and validated using experimental data of two subsequent years respectively. Model accuracy was basically assessed by Root Mean Square Error (RMSE). The study showed a strong agreement between the observed and the simulated yield values. The sequence analysis of DSSAT could satisfactorily simulate the yields of rabi rice-kharif rice under long term incorporation of farm yard manure (FYM) and NPK supplements. It is also necessary to evaluate the economic outcomes of this cropping sequence under modified weather parameters to deal with upcoming climatic adversities and to maintain the sustainable production.

Keywords: Rice- rice cropping system, crop model, Long-term management

E: shahid.vns@gmail.com

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Poster

Productivity, profitability and quality of bread wheat as influenced by Natural farming, Organic farming and varied NPK doses in irrigated ecosystem of Uttarakhand

Prerna Negi[1], **Moinuddin Chisti**[1], **J. P. Singh**[1], **Priyanka Bankoti**[1], **Himanshu Verma**[2*], **Anjana Nautiyal**[1] **and Shalini Chaudhary**[1]
[1]SGRR University, Dehradun, India
[2]Surajmal University, Udham Singh Nagar, India

Abstract:

The field experiment was carried out during the Rabi seasons of 2021-22 and 2022-23 at experimental block, School of Agricultural Sciences, Shri Guru Ram Rai University (SAS-SGRRU), Pathribagh, Dehradun, Uttarakhand to study the effect of various nutrient management approaches on growth, yield, quality, soil health and net profit of wheat crop. The experiment was laid out split plot design with two factors each at different levels. First factor include Absolute control, organic farming practices (Vermicompost @ 5 t ha-1 + seed inoculation with *Azotobacter* and PSB + 2 sprays of Vermiwash at 30 & 45 DAS); and Natural farming practices (Sieved cow dung @ 2.5 t ha-1 + seed treatment with *Bijamrit* + *Jeevamrit* @ 200 l ha-1). The second factor comprises 100% RDF, 75% RDF, 50% RDF, 25% RDF and were replicated 3 times. The implementation of organic and natural farming practices, along with varying dosages of NPK fertilizers, had a notable impact on various growth parameters, yield and yield attributes, including the gluten content of wheat grains, and cultivation economics in both experimental years. In view of the two years of the experimentation, it can be concluded that organic farming practices + 75% RDF showed 15% and 18% yield advantages during 2021 & 2022, respectively over natural farming + 75% RDF and 29% and 35% over absolute control + 75% RDF. Similarly organic farming practices + 75% RDF showed 13% and 10% monetary benefit during 2022 & 2023, respectively over natural farming + 75% RDF and 40% and 41% over absolute control + 75% RDF. Thus adoption of organic farming practices + 75% RDF can be suggested for higher grain yield, net income generation of the wheat crop in western Himalayan zones of the Uttarakhand.

Keywords: Natural farming, NPK, Organic farming, Vermicompost, wheat

E: hvhimanshuverma4@gmail.com

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Poster

Agricultural prospective of Keonjhar district, Odisha: An introspection

Ananya Sankhua
Amrita Vishwavidyalaya, Coimbatore, India

Abstract:

Agricultural production is a stunningly clear-eyed action statement in every district of India. Seeking to inspire us to place a higher value on agriculture and establish wiser approaches to its enhancement, an anthology of inter-connected epochs relating to mankind's relationship to farming has been at center stage since ages. Like many historical events, there are external and internal factors that shape the farming-moment in space and time. Climate change is exacerbating today's mounting crisis of agricultural scarcity by radically altering hydrologic patterns to produce overwhelming issues, as well as the unprecedented droughts. Hand in hand with the concerns of agriculture vis-a-vis the prospects of its production and implications of its sustenance in the Keonjhar District, Odisha have been explored in this article. While the impacts of soil are complex, the issues are further aggravated by the presence of other climatic factors in the region. This article astutely synthesizes a sizable amount of prophetic insight to spotlight the agricultural prospects of Keonjhar District, Odisha

Keywords: Agricultural sustenance, Keonjhar, Crop statistics

Biography:

She has the desire to meet new technological challenges and finding solutions to meet the needs of the farmers in India and aspiring for dynamic, challenging, knowledge acquiring position to excel in the field of agriculture & IoT in agriculture.

Research Interest: IoT in Agriculture

E: anu.sankhua@gmail.com

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Poster

Evaluation of bioefficacy, phytotoxicity of newer insecticides and biopesticides against diamondback moth, *Plutella xylostella* on broccoli

S Hariharan and C Narendra Reddy
Professor Jayashankar Telangana State Agricultural University, Hyderabad, India

Abstract:

The experiment was carried out at Horticulture Garden, College of Agriculture, Rajendranagar, Hyderabad during *rabi*, 2022-23 in order to study efficacy, phytotoxicity of newer insecticides and biopesticides against diamondback moth, *Plutella xylostella* on broccoli. The experiment was laid out in randomized block design with nine treatments *viz.*, T_1 (Acetamiprid 20% SP), T_2 (*Bacillus thuringiensis* subsp. *kurstaki*), T_3 (*Beauveria bassiana*), T_4 (Cyantraniliprole 10.26% OD), T_5 (Chlorantraniliprole 18.50% SC), T_6 (Diafenthiuron 50% WP), T_7 (Emamectin benzoate 5% SG), T_8 (Fipronil 5% SC) and T_9 (*Metarhizium anisopliae*) along with T_{10} (untreated control) replicated thrice. Two sprayings were done during the crop period. The results showed that T_4 (Cyantraniliprole 10.26% OD) recorded significantly lower population of diamondback moth larvae followed by T_5 (Chlorantraniliprole 18.50% SC) and T_7 (Emamectin benzoate 5% SG). Additionally, none of the treatments had any phytotoxic effects on broccoli throughout the crop period.

Keywords: Bioefficacy, Biopesticides, Broccoli, Diamondback moth and newer insecticides

Biography:

S. Hariharan did his graduation B.Sc. (Hons.) Agri from Faculty of Agriculture, Annamalai university, Chidambaram, Tamilnadu. Thereafter, he went for his postgraduation M.Sc. Agri (Entomology) at College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana as an ICAR student (secured AIR 50) with NTS fellowship and he has also qualified ICAR-ASRB-NET during 2023.

Research Interest: Toxicology, biocontrol and pest management

E: hariharanselvamvpm1999@gmail.com

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Poster

Unleashing the potential of functional genomics for sustainable agriculture

Yashaswini R[1*], Prem Sagar S P[1], V C Raghavendra[1], Channabasava[1], Sahana Police patil[2], Vidya shree L K[2], and Prasad[1]

[1]University of Agricultural Sciences, Raichur, India

[2]Indian Agricultural Research Institute (IARI), New Delhi , India

Abstract:

Functional genomics offers a powerful toolkit for dissecting the intricate genetic mechanisms governing key traits in crops. Through trait mapping, researchers can identify and understand the genes responsible for critical agronomic characteristics such as disease resistance, stress tolerance, and nutrient use efficiency. Unlike genomics, which focuses on the identification and sequencing of genes, functional genomics delves into the dynamic aspects of gene activity, expression, and regulation. This knowledge serves as the foundation for developing crops with enhanced performance and reduced environmental impact. The application of functional genomics extends to optimizing nutrient use efficiency, mitigating the environmental impact of fertilizers, and promoting precision breeding techniques. By unraveling the genetic basis of plant-microbe interactions, researchers can harness beneficial associations to improve nutrient acquisition and reduce the reliance on synthetic inputs. A number of technologies are available to study functional genomics. But by far the most effective and versatile is the revolutionary gene editing technology CRISPR/Cas9 – or CRISPR (Clustered Regularly Interspaced Short Palindromic Repeat). Furthermore, functional genomics has the potential in enhancing photosynthetic efficiency, a critical process for crop productivity. Understanding the genetic factors influencing photosynthesis opens avenues for developing crops with improved energy conversion and resource utilization. By unraveling the genetic intricacies of crops, we can create resilient, high-yielding varieties that address the challenges of our time while minimizing the environmental footprint of agricultural practices. Embracing functional genomics is essential for cultivating a more sustainable and resilient future for global agriculture.

Keywords: Genomics, Precision breeding, Crop productivity, Acquisition, Resilient

E: yashaswinirayanki1998@gmail.com

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Poster

Somatic embryogenesis in grapes

Supriya Babasaheb Aglawe[1], Anuradha Upadhyay[2], Komal Thorat[2], and Kashmir Singh[3]

[1]SoA, SR University, Waran**gal**, India

[2]ICAR-National Research Centre for Grapes, Pune, India

[3]Panjab University, Chandigarh, India

Abstract:

Grape (*Vitis vinifera* L.) is a perennial horticultural crop. Grapes are a crucial agricultural commodity, contributing significantly to the global economy. They are not only a popular fruit but also a primary source for wine production. Rich in antioxidants, grapes offer health benefits, making them an essential part of a balanced diet. Grape improvement through conventional breeding is time consuming due to long gestation period and high heterozygosity. Genetic engineering is one of the good alternatives. Optimization of somatic embryogenesis and regeneration protocol is the prerequisite for successful application of genetic engineering for crop improvement. In this study, different explants like young leaf, nodal and internodal segments, ovaries and anthers from three different grape varieties viz., Thompson Seedless, Crimson Seedless and Red Globe are tried for somatic embryogenesis. Different concentrations of auxins and cytokinins were used. We observed callus induction from young leaf in all the tried combination of auxins and cytokinin without much difference. Among nodal section and internodal section, inter-nodal segments were found to be more suitable and responsive for inducing callus. We observed variable response with floral part as explants for embryogenic callus induction. The factors like stages of anther, ovary and buds followed by genotype affects the process of embryogenic callus induction the most. In Thompson Seedless the callus induction was early compared to Crimson Seedless and Red Globe. Obtained embryogenic calli were transferred on somatic embryo development and maintenance medium. Few embryogenic calli from Thomson seedless showed embryogenesis. Around 20 normal seedlings were obtained through somatic embryogenesis by shifting somatic embryos on somatic embryo germination media.

Biography:

Dr. Supriya Babasaheb Aglawe assistant professor at School of Agriculture, SR University in Waranagal, Telangana. Her area of intertest is Molecular breeding, plant tissueculture and genetic engineering, functional genomics, genome editing techniques-CRISPR/Cas.

E: sumukti003@gmail.com

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Poster

Harvesting hope: Examining the socio-economic impact of rural agri-entrepreneurship ventures

Ashok Todmal
MIT College of Management, MIT ADT University, Pune, India

Abstract:

Amidst the constantly changing face of agriculture, rural agri-entrepreneurship emerged as a potentially transformative force that has the ability to impact not just the lives of individual entrepreneurs but also entire communities. The goal of this study is to offer a comprehensive knowledge of the contributions that agri-entrepreneurship ventures make to local development by exploring the socio-economic effects of these activities in rural regions. The study employs a multifaceted approach, encompassing in-depth quantitative surveys focusing on a range of agri-entrepreneurship ventures, from small-scale family farms to larger cooperative initiatives.

The results show that there are more benefits to successful rural agri-entrepreneurship than just financial ones. It encourages community empowerment and resilience by acting as a catalyst for constructive social change. Entrepreneurs frequently serve as hubs, introducing farmers to markets, sharing information about sustainable farming methods, and generating jobs. However, the journey is not without its challenges. Limited access to financial resources, inadequate infrastructure, and fluctuating market conditions pose significant hurdles. This research systematically analyzes these challenges, providing insights into potential mitigation strategies and policy interventions. Furthermore, socio-economic impacts go beyond short-term financial measurements. A sense of pride and ownership is fostered among communities via the development of agri-entrepreneurship.

Policymakers, scholars, and practitioners must grasp the dynamics of rural agri-entrepreneurship as it grows in popularity. This study emphasizes the overall effects of these endeavors on rural cultures in addition to the success elements and difficulties. Through an analysis of the complex relationships that exist between social progress, environmental sustainability, and economic prosperity, "Harvesting Hope" offers a thorough understanding of the transformational power of agri-entrepreneurship in rural areas.

Keywords: Agri-entrepreneurship, rural development, Socio-Economic, success factors

Biography:

Dr. Ashok Todmal is a passionate and dedicated professional with over 13 years of experience in academia and academic administration. He holds a B.Tech in Agricultural Engineering, and MBA with a specialization in Agri and Food Business Management, HR and Operations. His doctoral research is centered on the topic of Food Processing Start-ups. He is currently working as Assistant Professor, Department of Agri and Food Business Management, MIT college of Management, MIT ADT University, Pune. He is a firm believer in the power of innovation and entrepreneurship.

Research Interest: Start-ups, Agri Business, Entrepreneurship

E: todmalashok2006@gmail.com

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Poster

Opportunities of *Bacillus thuringiensis* based nanopesticides in crop protection for increased efficacy

S Hariharan[1], P Duraimurugan[2], K S V P Chandrika[2], and S S Monica[1]
[1]Professor Jayashankar Telangana State Agricultural University, Hyderabad, India
[2]ICAR-Indian Institute of Oilseed Research, RHyderabad, India

Abstract:

The escalating global demand for food production has led to extensive use of synthetic chemical insecticides, posing risks to ecosystems, human health, and beneficial organisms. In response, there is a shift towards biopesticides, with *Bacillus thuringiensis* (*Bt*) being a prominent biopesticide. Despite its high target specificity, Bt faces challenges in competing with chemical pesticides. This paper reviews the evolution of *Bt* formulations and explores the potential of nanotechnology to improve *Bt*'s efficacy. The formulation of Bt has undergone significant advancements, including improved fermentation, harvesting, and formulation techniques. Nanotechnology, specifically nanopesticides, emerges as a promising avenue for enhancing *Bt*'s effectiveness. Nanopesticides, with their increased surface area and unique properties, offer advantages in terms of dispersion, wettability, and controlled release. The paper discusses various top-down approaches, such as microionization techniques, including jet milling and high-pressure homogenization, to produce *Bt* nanoparticles. These methods aim to reduce particle size, potentially leading to faster solubilization and improved insecticidal activity. Additionally, nanocomposites of *Bt* with metal oxides and organic or inorganic nanoparticles are explored to enhance UV protection, efficacy, and shelf life. The paper emphasizes the need for further research in this nascent field of *Bt* nanoparticles, considering their potential benefits in agriculture, including smart delivery, improved storage, and controlled release of pesticides. It also highlights the importance of biosafety and risk assessment in the development of nanocompounds, urging regulatory bodies to establish criteria for evaluating the physiochemical and biological properties of nano-based products. In conclusion, the integration of nanotechnology into *Bt* formulations holds promise for revolutionizing pest management practices, offering a sustainable and environmentally friendly alternative to conventional chemical insecticides.

Keywords: *Bacillus thuringiensis* and Nanopesticides

Biography:

S. Hariharan did his graduation B.Sc. (Hons.) Agri from Faculty of Agriculture, Annamalai University, Chidambaram, Tamilnadu. Thereafter, he went for his postgraduation M.Sc. Agri (Entomology) at College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana as an ICAR student (secured AIR 50) with NTS fellowship and I also qualified ICAR-ASRB-NET during 2023.

Research Interest: Toxicology, biocontrol and pest management

E: hariharanselvamvpm1999@gmail.com

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Poster

Assessment of soil organic carbon and related microbial parameters under rice cultivation of saline– coastal belt, Odisha

Manimala Mahato*, Sophia Swain, Biswajit Behera and Debarati Bhaduri
[1]Professor Jayashankar Telangana State Agricultural University, Hyderabad, India
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

The eastern region of India, often referred as the 'rice bowl' of the country, encompasses diverse ecologies for rice cultivation that are experiencing a decline in agricultural sustainability. To address this issue, there is a need to create a comprehensive quality index that summarizes various soil indicators (physico-chemical and biological parameters) across different ecosystems engaged in long-term rice cultivation, and this would help identify the most sustainable and vulnerable ecosystems in eastern India. With this backdrop the present study was based on the analysis of soil carbon and enzymatic activities within the saline tract growing rice for years. Soil samples were collected from farmers' rice fields saline-coastal belt of Ersama block, Jagatsinghpur district in Odisha. The freshly stored samples were analysed for microbial biomass carbon (MBC) and enzyme activities, while further soil carbon fractions were estimated in three replications. The pH and EC of the soil ranges from 5.35 to 7.82 and 45.26 to 96.26 µS m-1 respectively, across the location. The data revealed that total organic carbon levels varied between 0.574% and 0.894% across the location, whereas percentage distribution of different soil C-fraction varied like: non- labile organic carbon (7.55 to 65.49%) > less labile organic carbon (10.71 to 45.67%), while very labile organic carbon (2.38 to 10.13%). Additionally, KMnO4 extractable carbon and water-soluble carbon ranged from 14.5 to 157.6 ppm and 45.6 to 262.2 ppm, respectively, across the location.

Among soil microbial parameters, microbial biomass carbon (30.5 to 103.8 ppm), dehydrogenase enzyme activity (0.34 - 31.1 and µg TPF g^{-1} day-1, β-glucosidase activity (0.70 and 1.35 µg pNP g^{-1} g^{-1}), fluorescein diacetate hydrolysis activity (0.23 to 4.58 µg fluorescein g^{-1} hr^{-1}). Overall, it is revealed from the present study that a differed labile C distribution and suppression of soil microbial activity is observed in the saline soil as compared to non-saline rice cultivated soil.

Keywords: *Soil C-fractions, Soil enzymes, Rice ecosystem, Saline soil*

E: manimalamahato@gmail.com

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Poster

Studies on the effect of Nickel heavy metal of Odisha on some selected *Fabaceous* plants

Pratyasha Mohanty* and Dr. Gyanaranjan Mahallik
Centurion University of Technology and Management, Bhubaneswar, India

Abstract:

Nickel is one of the essential nutrient for plant growth and development. As it is take part in the enzyme activity (eg. Urease) and some physiological activities. Due to high urbanization and industrialization the Nickel concentration is high day to day. Odisha is the state of mining due to high mining the concentration of different heavy metal in the soil become high. The survey states that Odisha is the 93% of total India resources of Nickel. Plant can tolerate certain amount of this beyond that it become toxic to it. This work gives a general idea about the effect of different concentration of Ni on plant and its phytoremidiation. The rate of this increase of height was observed 32.01, 70.81 and 57.55% higher at Ni application levels of 2.5, 5.0 and 10.0 mg kg−1, respectively, than that of their corresponding values in control treatments. The effects of different levels (0.0, 2.5, 5.0, 10.0 and 20.0 mg kg−1) of Ni applications on leaves of pea plant under pot culture are presented in Table 1. Maximum leaves were observed at 5.0 and 10.0 mg kg−1 (Statistically at par) Ni application level, while decreasing trend in the number of leaves was observed at 20.0 mg kg−1 Ni application. The roots were directly exposed to the metal but they act as transporter by absorbing the metals and transporting it to the shoot, where the metal gets accumulated as evidenced by relatively greater concentration of Ni in leaf than root. This work will provide an elementary idea abound the source of Nickel pollutant and effect on plant. The physiological metabolical activity of plant on pollutant soil will be cover.

Keywords: Nickel, elements, fabaceae plants, soil, metabolism, Odisha

E: pratyasha008@gmail.com

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Poster

Characterization of biological nitrification inhibition (BNI) potential in Indian rice

Subhra Parija*, Bhabani Mishra, Laxmipriya Dash, Rikina Choudhury, Upendra Kumar
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Plant roots exude substances that impede the activity of nitrifiers in the soil through a rhizospheric process known as Biological Nitrification Inhibition (BNI). By arresting the conversion of ammonium nitrogen into nitrate form, BNI has emerged as an excellent alternative to synthetic nitrification inhibitors in enhancing nitrogen use efficiency of crops. Potential BNI effect has been reported in *japonica* and *indica* genotypes of rice cultivars and so far, only one BNI compound (1,9-Decanediol) is identified by Chinese researchers. Positive response in rice BNI is also reported from countries like Japan, Uruguay, and Sri Lanka. We tested the BNI potential of four Indian rice cultivars (Daya, Sabita, CR Dhan 310, and MTU 1001) having varied nitrogen use efficiency. Varieties were grown hydroponically in standardized nutrient solution and their root exudates were collected at different growth stages. FTIR analysis indicated the presence of aliphatic alcoholic groups (3300–3400 cm-1 absorption band), similar to the only identified rice BNI, 1,9-Decanediol. Soil incubation with (NH4)2SO4, rice root exudates and *Nitrosomonas europea*, resulted in significant nitrification inhibition indicated by higher NH4+-N content in all treatment combinations. Observations recorded 3 days after incubation showed higher inhibition potential in sterile soils treated with root exudates than those treated with Dicyandiamide (DCD). Root exudates of CR Dhan 310 incubated in non-sterile soil showed similar rate of inhibition as compared to DCD. Sabita showed better inhibition effect (27.27%) 7 days after incubation. Analysis data of 14 days after incubation showed 28.3% inhibition rate by Sabita and CR Dhan 310 against control, whereas DCD was only 18.87% effective. Results from colorimetric assay of nitrite indicated that rice BNI was more effective than DCD after 9 hours of incubation and among the varieties, performance of Sabita was more effective for the first 2-3 hours. These findings point towards identification of BNI responsive Indian rice cultivars and their effective performance in minimizing leaching loss of nitrates and N2O emissions through denitrification.

Keywords: *Rice, Nitrification Inhibition, Root Exudates, Rice BNI*

Biography:

Subhra Parija is an agricultural research graduate with keen interest in the domain of soil fertility and soil microbiology. She has completed her post-graduation in agricultural sciences from Assam Agricultural University, Jorhat, Assam in 2021 and is currently pursuing her doctoral degree in Agriculture (Soil Science) from OUAT, Bhubaneswar. She is conducting her research work on Biological Nitrification Inhibition at ICAR-NRRI, Cuttack under the supervision of Dr. Upendra Kumar, Senior Scientist, Microbiology (CPD). Her work has been recognized by the Department of Science and Technology; Government of Odisha for the award of Biju Pattnaik Research Fellowship for Biotechnology 2023-24.

Research Interest: Soil Microbiology, Soil Fertility, Nitrogen dynamics in soil

E: subhraparija85@gmail.com

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Poster

Genetic divergence studies in maize germplasm (*Zea mays* L.)

Aakaas Dash
Centurion University of Technology & Management, Paralakhemundi, India

Abstract:

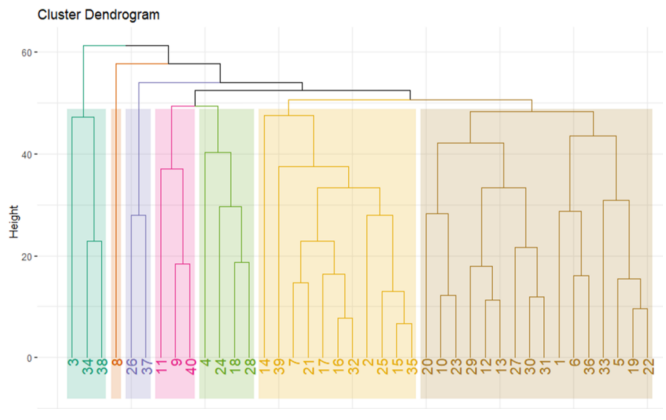
All the 40 inbred lines were tested in randomized block design with three replications at Bagusala College Farm, M. S. Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha during Rabi, 2022. The data was recorded for days to 50% tasseling, days to 50% silking, anthesis-silking interval, days to maturity, plant height, ear height, ear weight, ear length, ear girth, number of kernel rows per ear, number of kernels per row, shelling percentage, 100 kernel weight, protein content, oil content and grain yield per plant. Analysis of variance indicated the existence of significant differences among the genotypes for all the traits studied. Moderate PCV coupled with low GCV was observed for anthesis-silking interval, ear girth and number of kernels per row. High heritability coupled with moderate genetic advance as percent of mean was observed for ear height, protein content and oil content indicating the role of additive genes in governing the inheritance of these traits which could be improved through simple selection. Correlation studies revealed significantly positive association of grain yield per plant with ear length, number of kernel rows per ear, number of kernels per row, 100 kernel weight, ear weight and shelling percentage suggesting that these traits could be used as criteria for the selection of genotypes with high grain yield per plant. Path coefficient analysis revealed a high positive direct contribution of ear weight, number of kernels per row, days to 50% silking and ear girth to the grain yield per plant. Based on the relative magnitude of D2 analysis, the genotypes showed a considerable amount of genetic diversity and the genotypes were grouped into seven clusters. Cluster VII was the largest with 16 genotypes followed by cluster VI comprising 11 genotypes. The maximum inter cluster distance was observed between cluster V and VII.

Keywords: Cluster analysis, Genetic diversity, Maize

Table 1: Estimation of variability (GCV and PCV), Heritability and Genetic Advance of 40 genotypes of maize.

Parameters	Range		GCV (%)	PCV (%)	Heritability (%)	GA as % of Mean (5%)
	Minimum	Maximum				
DFA	58.00	65.00	1.31	2.48	27.74	1.42
DFS	60.00	67.40	1.05	2.48	17.95	0.92
ASI	1.80	3.00	7.78	13.98	30.93	8.91
MAT	80.00	95.00	0.60	2.30	6.92	0.33
PH	161.00	210.00	3.30	4.82	47.00	4.67
EH	58.00	89.50	7.74	9.53	65.99	12.96
EW	128.40	201.70	4.45	7.47	35.55	5.47
EL	15.00	22.25	6.52	9.38	48.27	9.33
EG	3.30	6.50	9.51	13.94	46.56	13.37
ROWS	12.00	18.40	6.89	9.28	55.10	10.54
KPR	26.00	42.00	6.44	10.35	38.72	8.26
SHP	56.06	84.06	2.45	5.93	17.19	2.10
100KW	18.77	31.10	6.78	9.11	55.46	10.40
PC	9.65	12.82	6.67	6.93	92.41	13.21
OC	3.65	4.96	7.04	7.30	93.17	14.01
GYP	97.50	150.40	5.50	8.63	40.65	7.23

Image 1: Grouping of the clusters by tocher's method for 40 maize genotypes.



E: dashaakaas@gmail.com

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Poster

Interspecies Cyanobacteria diversity In Azolla and cross inoculation to assess potential for Nitrogen fixation

Kasturee Mohapatra*, Dr Upendra Kumar , Bhabani Mishra , Laxmipriya Dash

ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Azolla is a small free floating water fern and mainly divided into two broad sections namely Euazolla and Rhizosperma. Azolla is known as superorganism due to its symbiotic relationship with cyanobacteria. The main aim of this study was to assess the interspecies cyanobacterial diversity between two contrasting Azolla species and to observe the cyanobionts cross inoculation in Azolla, mainly to explore efficient nitrogen fixing Azolla. Interspecies cyanobacterial diversity was assessed through whole metagenome sequence of two contrasting Azolla (Azolla microphylla and Azolla pinnata). Experiments were also framed to observe the cross-inoculation potential of cyanobionts through morphological, physiological and biochemical approaches in two contrasting Azolla. Illumina Hiseq-whole metagenome sequences-based results showed that A. microphylla and A. pinnata had almost similar cyanobacterial structural diversity in both Azolla species. Our findings also showed the major cyanobionts associated with both Azolla species were Anabaenopsis circularis, Fishcherella, Anabaena sp., different species of Nostoc, Trichormous azollae, Calothrix sp. and most of them belonged to Nostocaceae family. Micrograph study indicated the higher density of cyanobacteria in natural A. microphylla (AM) and A.pinnata (AP), whereas no cyanobionts in cyanobiont free AM (CFAM) and AP (CFAP). Heterocyst frequency (HF) was absent in CFAM and CFAP but cross inoculation of cyanobiont in CFAM (CFAM+BAP) and CFAP (CFAP+BAM) showed presence of heterocyst. Chlorophyll-fluorescence-based Fv/Fm (quantum yield of photosystem II) was significantly higher in AM, AP and cross inoculated BGA in AM (CFAM +BAP) and AP (CFAP+BAM). Treatments of cross inoculation of BGA in Azolla (CFAM+BAP and CFAP+BAM) showed comparatively higher concentration of phycoerythrin. In FTIR analysis, four major functional groups such as alcohol (-OH), alkane (-CH), primary amine (-NH2) and amines (C-N) were present in all samples. Biolog® ecoplate-based carbohydrate utilization was higher in AP, cross inoculated treatments (CFAM+BAP & CFAP+BAM) and CFAP, whereas lower in AM and CFAM. Higher concentration of phycobiliprotein in A. microphylla cross inoculated with BGA isolated from A. pinnata (BAP) indicated the higher abundance of cyanobacteria, possibly would show higher nitrogen fixing ability. Overall, our findings based on morphology, physiology and biochemical parameters assessment, showed that cross-inoculation of cyanobionts in A. microphylla and A. pinnata might be possible

Keywords: *Azolla, Cyanobacteria, N2 Fixation*

Biography:

Kasturee Mohapatra , Masters in Microbiology , with keen interest in the domain of soil fertility and soil microbiology. She has completed her post-graduation in Odisha University of Agriculture & Technology (OUAT), Bhubaneswar. She had conducted her dissertation work at ICAR-NRRI, Cuttack under the supervision of Dr. Upendra Kumar, Senior Scientist, Microbiology (CPD).

Research Interest: Soil microbiology, Soil fertility, biofertilizer

E: kastureemishra1990@gmail.com

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Poster

Response of root characteristics and yield in groundnut under mid-season drought condition

Preethi B.[1]* and Kavera Biradar[2]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]University of Agricultural Sciences, Dharwad, India

Abstract:

Drought at pegging and pod development stage reduces growth, yield, and seed quality of groundnut (*Arachis hypogaea* L.). Great root system can reduce yield loss under water stress. There is a lack of information on root traits for groundnut genotypes and the relationship between rooting traits and groundnut yield under mid-season drought. The greenhouse experiment in polybags was conducted at Main Agricultural Research Station, Dharwad, Karnataka during Rabi/summer 2021. A randomized complete block design was used with two factorials set-up with three replicates. Factor-A consisted of two water regimes (non-moisture stress and moisture stress from 40 to 75 days after sowing), and factor-B comprised of 15 groundnut genotypes which included stabilized breeding lines and three released varieties as checks (Dh-256, TMV-2 and JL-24). Data were recorded for root traits (root length, root dry weight, root diameter and root volume), and groundnut yield was measured at final harvest. Mid-season drought significantly increased root characteristics, but the magnitude of change was genotype-specific. Yield responses to mid-season drought were not correlated with root traits except root length ($r = 0.46^*$). Some genotypes' root traits seemed to be correlated with yield under mid-season drought. GND-1, GND-3 and GND-13 were highly stable genotypes as indicated by low Drought Susceptibility Index and very high Drought Tolerance Efficiency and showed high root traits, and were statistically on par with the drought tolerant genotype Dh-256 for the pod yield under moisture stress condition. The results suggested that groundnut contained high root characters which maintained yield under mid-season drought.

Keywords: *Arachis hypogaea, drought tolerance, groundnut, pod yield, root traits, drought tolerance index, drought susceptible index*

Biography:

Preethi B. is a doctoral research fellow at IARI-NRRI, Cuttack Hub, The graduate School of IARI. She has completed her post-graduation in Genetics and Plant Breeding (Crop Improvement Division) from University of Agricultural Sciences, Dharwad. Her work focuses on the response of root characteristics and yield in groundnut under mid-season drought condition.

E: bpreethihyr@gmail.com

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Poster

Isolation of bacterial microbiome of False Smut in Rice: Investigating the alterations in the bacterial population of Rice grains following *Ustilaginoidea virens* infection

Femi Francis*[1] and Gururaj Sunkad[2]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]University of Agricultural Sciences, Raichur, India

Abstract:

False smut of rice is an emerging disease causing significant losses in both the quality and quantity of rice production. Despite being a weak pathogen, the unique foliar infecting nature of the fungi poses a major challenge in disease management. Due to the drawbacks of fungicide-based approaches, this study aimed to address disease management by investigating the shift in the bacterial microbiome of rice spikelets post-infection by the pathogen *Ustilaginoidea virens*. The bacterial microbiome associated with the niche of false smut balls was examined using a saline phosphate buffer-based isolation method, resulting in the identification of fifteen bacteria. Molecular characterization revealed a significant alteration in the phyllosphere bacterial population of rice following *U. virens* infection. While the rice phyllosphere is traditionally known for its abundant Pseudomonadota bacteria, our study uncovered a notable presence of bacteria from the Actinomycetota and Bacillota phyla. The reasons behind this shift in population dynamics necessitate further analysis. Understanding the interactions among these microorganisms and their impacts on the plant is an area that requires additional research. The outcomes of such research can pave the way for potential strategies to re-engineer the rice phylloplane, creating an environment less favorable for *U. virens* infection. This information would be valuable for future researchers seeking effective ways to manage false smut in rice production in an effective, eco-friendly, and sustainable manner.

Keywords: *Microbiome, False Smut, Molecular characterization, 16S rRNA sequencing*

Biography:

Femi Francis is a doctoral research fellow at IARI-NRRI, Cuttack Hub, The graduate School of IARI. She has completed her post graduation in Plant Pathology (Crop Protection Division) from University of Agricultural Sciences, Raichur. She is a UGC JRF awardee. Her work focuses on the pathogen *Ustilaginoidea virens* and its management in an ecofriendly and sustainable approach.

Research Interest: Plant Pathology, Population dynamics, Molecular host-pathogen interaction

E: femifrancis16@gmail.com

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Poster

Effect of Maize biochar on soil fertility & growth, yield and mineral composition of Green gram (*Vigna radiata* L.) grown in alluvial soil

Anweshita Nayak[1] and Y.V. Singh[2]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]Institute of Agricultural Sciences, Banaras Hindu University, Varanasi , India

Abstract:

Biochar is gaining huge popularity in improving soil quality, fertility and stimulating plant growth these days. It improves nutrients retention capacity, microbial growth, enzymatic activities and CEC of the soil. To study this, a pot experiment was conducted to study the effect of Maize biochar on Green gram (*Vigna radiata* L.) during 2022-2023 in the Net House, Department of Soil Science & Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India. The experiment was carried out in a Completely Randomized Block design with three replications consisting of seven treatments involving different doses of biochar (10, 20 and 30t ha-1 maize biochar) and inclusion of 10t ha-1 dried cowdung. Among all treatments, the soil application of Maize biochar @ 30t ha-1 with cowdung @10t ha-1 significantly increased the growth, yield, nutrient uptake of mung and soil fertility as well. It recorded the highest plant height at (62.33 cm), number of leaves per plant (21.30), highest chlorophyll content in SPAD meter, highest number of branches per plant (8.26), number of nodes per plant (7.86), most pods per plant (13.33), longest pod (6.33 cm), maximum seeds per pod (10.86) and highest test weight (38.60 g) and required the least days to 1st flowering (38.33 days). It also contributed to the highest seed yield (1.95 t ha-1), harvest index (34.42%), highest nitrogen (3.64%), phosphorus(1.06%) and potassium (1.01%) content in seed, highest protein content (23.73%), highest total nutrient uptake. Soil fertility was improved on application of biochar. The organic carbon (1.22%), nitrogen (301.66 kg ha-1), phosphorus (53.93 kg ha-1), potassium (296.06 kg ha-1), sulphur (32.13 kg ha-1) and available micronutrients (Fe, Mn, Cu, Zn) also reported the highest for T6. The soil enzymatic activities (dehydrogenase, urease, alkaline phosphatase) also boosted up in post harvest soil treated with maize biochar + cowdung. In this era of chemical fertilizers, biochar can act as a soil amendment, as it has the potential to improve the soil quality and yield in a sustainable, affordable, and environmentally friendly manner.

Keywords: Green gram, Maize biochar, dried cowdung, enzymes, protein, chlorophyll

Biography:

Anweshita Nayak is currently pursuing her Ph.D. in Soil Science from IARI- NRRI, Cuttack Hub. She has completed her M.Sc. (Ag) in Soil Science & Agricultural Chemistry from Institute of Agricultural Sciences, BHU, Varanasi. She did her B.Sc. (Ag) from Orissa University of Agriculture & Technology (OUAT).

Research Interest: Organic farming, soil amendments, Bio fertilizers, soil fertility

E: nayakanweshita2@gmail.com

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Poster

Assessment of major available nutrients status in alkali soils of Sultanpur district of eastern Uttar Pradesh

Arvind Yadav[1]*, Surendra Singh[2], Sandeep Kumar[3] and Avaneesh Kumar[4]

[1]ICAR-National Rice Research Institute, Cuttack, India

[2]Banaras Hindu University, Varanasi , India

[3]ICAR- National Bureau of Soil Survey & Land Use Planning, Regional Centre, Jorhat, India

[4]National Dairy Research Institute, Karnal, India

Abstract:

India, comprising 2.4% of the world's geographical area, sustains 17% of the global human population and 15% of livestock with only 2% forest area and 4% water. From 1950–51 to 2016– 17, net sown area and cropping intensity rose by 18.01% and 27.16%. Salinity-induced land degradation poses a significant threat to food security in the developing world. Globally, 810 million ha (Mha) are affected, with India having 6.74 Mha suffering from salt accumulation, including 3.78 Mha of sodic soils and 2.96 Mha of saline soils. Currently, 25% of groundwater is salinity- or sodicity- contaminated, and projections suggest an increase to 11.7 million ha in India by 2025. Assessing soil fertility through physicochemical properties and mapping is crucial for developing location- specific technologies.

Hence, a comprehensive study was undertaken to evaluate and map the fertility status of sodic soils of Kadipur region, Sultanpur, Uttar Pradesh. Through a combination of reconnaissance surveys a total of 56 sampling locations were identified. Based on the analytical results, the study area was categorized into low, medium, and high fertility classes. These fertility classes were then employed for assessing the fertility status and creating a comprehensive soil fertility map.

The soil samples exhibited a range of all the parameters, like *p*H varied from 7.45 to 10.54, indicating alkaline to strongly alkaline conditions, with an average *p*H of 8.97. Electrical conductivity varied from 0.15 to 4.38 dS/m, with an average of 0.89 dS/m. Soil organic carbon content ranged from 0.1% to 1.4%, averaging at 0.549%. Available nitrogen content showed a low range (12.54 to 301.06 kg/ha), with an average of 85.33 kg/ha. Available phosphorus content ranged from 8.64 to 48.32 kg/ha, averaging at 31.050 kg/ha. Available potassium content spanned from 83.27 to 397.88 kg/ha, with a mean of 178.30 kg/ha. Exchangeable calcium and magnesium levels averaged at 11.43 and 4.84 meq/100 g soil, respectively. Available sulfur content varied from 7.44 to 85.09 mg/kg, with a mean of 29.95 mg/kg. The nutrient index indicated medium fertility levels for phosphorus, potassium, and sulfur, while nitrogen levels were categorized as low.

Mechanized irrigation intensification, coupled with poor management, caused soil salinity and sodicity. Insufficient organic matter and inorganic fertilizer usage further degraded soil fertility. Therefore, it is recommended lower mechanized irrigation, enhance water management, and integrated organic and inorganic fertilizers for sustainable agriculture.

Keyword: Food security, Indo-Gangetic Plain (IGP), Soil Fertility, Intensification, Nutrient Index, Integrated, Sodic Soils, Sustainable Agriculture.

E: arvindy2510@gmail.com

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Poster

Success story of rice-specific endophytic diazotrophic *Azotobacter chroococcum* Avi2 liquid formulation (NRRI-EndoN): A unique example of translational research from lab to land

Laxmipriya Dash*,Rikina Choudhury, Bhabani Mishra, Subhra Parija, Kasturee Mohapatra, Upendra Kumar
ICAR-National Rice Research Institute, Cuttack, India

Abstract:

Nitrogen (N) is deprived in most of the world's soil which would directly hamper the sustainability of crop production. More than 50% of exogenous applied N-fertilizer is lost in agricultural field, causes negative impacts on soil environment thereby affecting its yield and N-use efficiency. Nitrogen fixing microbes are one of the possible alternatives of chemical N-fertilizer; however, potentiality of these microbes is really a question at field level mainly due to environmental constraints. Endophytes are less prone to environmental factors, therefore, *Azotobacter chroococcum* Avi2 (NRRI-EndoN), a native endophytic diazotrophic has been explored as a potential diazotrophs for rice crop. NRRI EndoN was isolated from Swarna root and its endophytic nature has been proved through FRET-based technique. Further, *in vitro* and *in vivo* analyses of NRRI-EndoN were done in rice to prove its diazotrophic efficacy. Finally, a liquid formulation of NRRI-EndoN, having shelf life of more than one year was developed which had been certified by Government laboratory as per FCO guidelines. Moreover, this technology was validated in 30 different locations across three Indian states, revealed that it can save ~ 25% of chemical-N fertilizer besides increasing 8-10% of rice yield. A couple of entrepreneurs are approached for MoU agreement for licensing and this could be accomplished within this year. Overall, development of this technology is one of the best example of translational research from lab to land as it could help to reduce the burden of urea subsidy of Indian government *vis à vis* could enhance the farmers' income.

Keywords: Nirogen fixation, Rice, Endophytic, Formulation

Biography:

Laxmipriya Dash is currently working as a Young Professional-I at ICAR-NRRI, Cuttack under the supervision of Dr. Upendra Kumar, Senior Scientist, Microbiology (Crop Production Division). She has completed her post graduation in Microbiology from OUAT, Bhubaneswar. Her work focuses on biological nitrogen fixation using potential microbes to enhance the rice yield.

Research Interest: Agricultural microbiology, Biological Nitrogen fixation, Biofertilizer technology

E: laxmipriyadash002@gmail.com

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Poster

Characterization of grain amino acid content of diversifying rice germplasm

Shuvendu Shekhar Mohapatra[1,2], Sucharita Satapathy[1], Arabinda Mahanty[1], Totan Adak[1], Krishnendu Chattopadhyay[1]

[1]ICAR-National Rice Research Institute, Cuttack, India

[2]Berhampur University, Berhampur, India

Abstract:

Cultivation of rice plays an important role in the country's economy. India being the second largest country in the world in rice production accounting to 43 mha of planted area which is 22% of world's rice production. Rice is the staple food crop providing 21% of global human per capita energy and 15% of per capita protein. But rice grain generally contains 6-7% protein, lowest among all the cereals i.e., wheat (12 %), and maize (9 %). However, rice protein is considered to be the best among all other cereal proteins due to the presence of good essential amino acid composition and higher digestibility. In this study More than 200 rice germplasm accessions with diverse ecology were collected from the gene bank of ICAR-NRRI and planted in an experimental plot. Morphological characters like Days to 50% flowering, Plant height (cm), Number of tillers, Number of panicles per hill, Panicle length (cm), and 100-grain weight (g) were recorded on 2 plants per line. On the basis of the data generated statistical analysis was carried out and 100 best performing genotypes were selected for further study. The GPC was estimated using micro kjeldahl method and a NIRS model was calibrated for scanning of samples ranging (4.89-13.78). The GAA estimated through HPLC of all 17 amino acids by calculating the peak area with respect to the standard peak area shows great variation, the range of variation for all these amino acids are HIS (1.960-0.002), SER (1.118-0.015), ARG (1.153-0.0125), GLY (1.015-0.003), ASP (1.307-0.007), GLU (2.392-0.035), THR(1.936-0.003), ALA (2.081-0.012), PRO (0.896-0.002), CYS (1.328-0.008), LYS (0.981-0.015), TRY (2.814-0.003), MET (1.874-0.001), VAL (0.921-0.001), ILEU (0.996-0.031), LEU (1.351-0.001), PHE (1.721-0.003) and the total recovery of amino acid content with respect to the total protein content of these 100 genotypes shows significant. From this study few elite genotypes having superior amino acid content were identified and could be used for further varietal improvement.

E: krishnenducrri@gmail.com

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Poster

Characterization of grain amino acid content of diversifying rice germplasm

Shuvendu Shekhar Mohapatra[1,2], Sucharita Satapathy[1], Arabinda Mahanty[1], Totan Adak[1], Krishnendu Chattopadhyay[1]

[1]ICAR-National Rice Research Institute, Cuttack, India

[2]Berhampur University, Berhampur, India

Abstract:

Cultivation of rice plays an important role in the country's economy. India being the second largest country in the world in rice production accounting to 43 mha of planted area which is 22% of world's rice production. Rice is the staple food crop providing 21% of global human per capita energy and 15% of per capita protein. But rice grain generally contains 6-7% protein, lowest among all the cereals i.e., wheat (12 %), and maize (9 %). However, rice protein is considered to be the best among all other cereal proteins due to the presence of good essential amino acid composition and higher digestibility. In this study More than 200 rice germplasm accessions with diverse ecology were collected from the gene bank of ICAR-NRRI and planted in an experimental plot. Morphological characters like Days to 50% flowering, Plant height (cm), Number of tillers, Number of panicles per hill, Panicle length (cm), and 100-grain weight (g) were recorded on 2 plants per line. On the basis of the data generated statistical analysis was carried out and 100 best performing genotypes were selected for further study. The GPC was estimated using micro kjeldahl method and a NIRS model was calibrated for scanning of samples ranging (4.89-13.78). The GAA estimated through HPLC of all 17 amino acids by calculating the peak area with respect to the standard peak area shows great variation, the range of variation for all these amino acids are HIS (1.960-0.002), SER (1.118-0.015), ARG (1.153-0.0125), GLY (1.015-0.003), ASP (1.307-0.007), GLU (2.392-0.035), THR(1.936-0.003), ALA (2.081-0.012), PRO (0.896-0.002), CYS (1.328-0.008), LYS (0.981-0.015), TRY (2.814-0.003), MET (1.874-0.001), VAL (0.921-0.001), ILEU (0.996-0.031), LEU (1.351-0.001), PHE (1.721-0.003) and the total recovery of amino acid content with respect to the total protein content of these 100 genotypes shows significant. From this study few elite genotypes having superior amino acid content were identified and could be used for further varietal improvement.

E: krishnenducrri@gmail.com

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Poster

Screening of chickpea genotypes against rust caused by *Uromyces ciceris-arietini*

Shantha K N[1], Kalappanavar I.K[2], Gurupad Balol[1], Vijaykumar A. G[1]
[1]ICAR-National Rice Research Institute, Cuttack, India
[2]University of Agricultural Sciences, Dharwad, India

Abstract:

The major constraints in production of chickpea includes both biotic and abiotic factors. Among the biotic factors, diseases contribute for more yield loss which include rust caused by *Uromyces ciceris-arietini*. Chickpea rust epidemic starts late in the season so yield components are usually little affected by the infection. But early infections result into extra yield losses. As chickpea rust is appearing in severe form in current days in northern parts of Karnataka, the prevailing study was undertaken on screening of chickpea genotypes agnist rust. The present investigation aims to find source of resistance and tolerance in chickpea agnist rust disease. The reaction of 109 chickpea genotypes against rust under natural epiphytotic field condition, out of which, none of them were found to be immune, resistant and moderately resistant to rust. However, nine genotypes viz., ICC 3761, ICC 4182, ICC 6579, ICC 7255, ICC 7308, ICC 9862, ICC 12654, ICC 12726 and ICC 12824 were showed the moderately susceptible (slow rusters) reaction and sixteen genotypes were susceptible (7 grade). Remaining genotypes were found to be highly susceptible (9 grade). Moderately susceptible genotypes could be considered as a source of partial resistance against rust and may delay the onset of disease. The outcomes also necessitate to sourcing resistance against rust outside the host genera or create artificially.

Keywords: Uromyces ciceris-arietini, chickpea, chickpea rust

Biography:

Shantha K N is currently studying in Ph.D. Plant Pathology (Crop protection division) at IARI- NRRI, Cuttack. She has completed her Post graduation in Plant Pathology from University of Agricultural Sciences, Dharwad.

Research Interest: Fungal-Molecular biology, Host-Pathogen interaction, Integrated disease management

E: knshantha3@gmail.com

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भाकृअनुप-राष्ट्रीय चावल अनुसंधान संस्थान, कटक

Society for Agricultural Research & Management

Das Villa, Jobra Majhi Sahi, College Square

Cuttack– 753003, Odisha, India

www.sarm.in | contact@sarm.in

www.agrivision.in | contact@agrivision.in

+91 90780 37929

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@sarmodisha +91 90780 37929