POST CONFERENCE REPORT

AGRI 2023 VISION

2023

International Conference on
Agriculture & Rural Development

January 27-29, 2023, Centurion University, Bhubaneswar

(Organized by the Society for Agricultural Research & Management in association with Centurion University & NISER, Bhubaneswar)

In association with

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Acknowledgement

*The financial assistance received from the Research & Development Fund of **National Bank for Agriculture and Rural Development (NABARD)**, towards the publication of book of abstract is greatly acknowledged.*

NABARD

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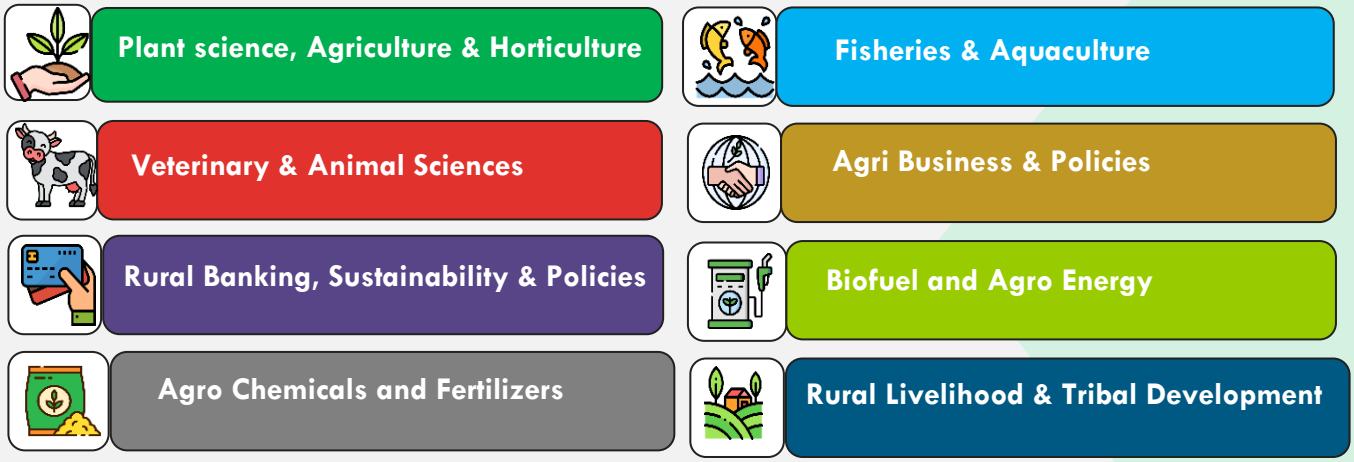
Brief Overview: Agri Vision-2023

International Conference on Agriculture & Rural Development (Agri Vision-2023) has been organized in association with the Centurion University of Technology & Management (CUTM) and The National Institute of Science Education and Research, Bhubaneswar, Odisha, India from **January 27-29, 2023 at Centurion University campus, Bhubaneswar**. The three days program was based on the theme "***Strengthening rural economy through smart and sustainable agriculture***". Various stakeholders of Agriculture sectors such as Agri Scientists, Researchers, Research Scholars, Progressive Farmers, Graduate & Post graduate scholars, Policy makers from nodal agencies, Company representatives have attended this program. The Agri Vision 2023 was comprised of Plenary/Keynote speeches, Oral Sessions, Young Investigator Presentations, Poster presentations, Awards (both Academic, Business & Society's Annual Awards), Stall Exhibitions, Farmer-Expert interactions, and Cultural Programs (Folk Dance/Song) etc.

Sessions covered at Agri Vision 2023

The scope of the conference was covered under major eight sectors of Agriculture. The three days program was running parallelly in hybrid mode (Physically & Virtually) in two breakout sessions. More than 800+ participants globally attended this conference directly/indirectly. We have covered both Academic research, Research innovations, Business aspects, Policy aspects, Practical case studies, Tools and techniques, as well as experience sharing. The sessions (Technical Sessions, Exhibitions, Poster Sessions, e-Poster and Farmer Interaction programs) were streaming live in YouTube as well. The outline of major sessions was as below:



Organizing Committee Members & Supporters

We are thankful to the **Centurion University and NISER, Bhubaneswar**, for collaborating with us and providing scientific, venue, technical and operational support to Organize Agri Vision 2023 smoothly. We acknowledge the unconditional scientific support and guidance of all our Organizing Committee Members of Agri Vision 2023, without whom we would not have been able to execute this conference.

Organizing Committee Members

Prof. Rajeev K Varshney
Murdoch University
Australia

Prof. K.C. Bansal
Secretary, NAAS,
New Delhi
India

Prof. C. Kole
President, Genome India International,
India

Prof. B.C. Tripathy
Jawaharlal Nehru University, New Delhi, India

Dr. J.K. Jena
DDG (Fisheries Science)
ICAR, New Delhi
India

Dr. A.K. Singh
DDG (Hort. Science),
ICAR, New Delhi,
India

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DDG (Animal Science), ICAR,
New Delhi, India

Dr. R.C. Agrawal
DDG (Education),
ICAR, New Delhi,
India

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Director/VC
ICAR-CIFE,
Mumbai, India

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Joint Director, ICAR -CIFE, Mumbai
India

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ICAR-NAARM
Hyderabad, India

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Director, Centre for Himalayan Studies,
University of Delhi, India

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ICAR-CIFA,
Bhubaneswar, India

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Principal Scientist
ICAR-NRRI, Cuttack
India

Dr. A.K. Mukherjee
Principal Scientist
ICAR-NRRI, Cuttack
India

Dr. S.K. Pradhan
ADG (FFC)
ICAR– New Delhi
India

Dr. S.S. Dash
Botanical Survey of India, Kolkata, India

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Principal Scientist
ICAR-CIFA,
Bhubaneswar, India

Dr. G.C. Acharya
Principal Scientist
CHES, ICAR-IIHR,
Bhubaneswar, India

Dr. Ranjit Kumar
Principal Scientist
ICAR-NAARM
Hyderabad, India

Dr. M. Nedunchezhiyan
Principal Scientist
ICAR-CTCRI,
Bhubaneswar, India

Dr. K.D. Tripathi
Scientist, ICAR-NBPGR, New Delhi
India

Prof. Asna Urooj
Prof. University of Mysore, Mysore,
India

Prof. P.K. Mukherjee
Head, NAB Division
BARC, Mumbai
India

Dr. Yashaswi Nayak
Dean, SAS-CUTM
Bhubaneswar, India

Dr. Pushpalatha G.
Prof. Dept. of Plant Biotech, CUTM-Paralakhemundi, India
India

Dr. G. Mahalik
Asso. Prof. Dept. of Botany,
CUTM, Bhubaneswar, India

Dr. Sauren Das
Associate Scientist
ISI– Kolkata,
India

Dr. S. Mahapatra
Former Prof & Head,
ABM, OUAT,
Bhubaneswar, India

Prof. Bijoy K Sahoo
Vice Chancellor
S'O'A University
Bhubaneswar, India

Dr. P.K. Upadhyay
Scientist, ICAR-IARI
New Delhi, India

Dr. R.N. Satpathy
Asst. Prof. Dept of Botany, GM University
Sambalpur, India

Invited Guests

A Special thanks to (not in order) **Shri Bidyut Bihari Swain**, Hon'ble, Secretary, Ministry of Micro, Small & Medium Enterprise, Govt. of India, New Delhi, **Dr. Joykrushna Jena,** DDG (Fisheries), ICAR, New Delhi, **Prof. Rabinarayan Acharya**, Hon'ble, Director General, Central Council for Research in Ayurvedic Sciences, Ministry of AYUSH, Govt. of India, **Dr. Mrutunjaya Mohapatra**, Hon'ble, Director General of Meteorology, Govt. of India, New Delhi, **Prof. Supriya Pattnayak**, Hon'ble Vice Chancellor, Centurion University of Technology & Management, **Prof. Bijoy K. Sahoo**, Hon'ble Vice Chancellor, S'O'A University, Bhubaneswar, **Prof. Prasannajit Mishra**, Dean, Extension Education, Odisha University of Agriculture and Technology, Bhubaneswar, **Dr Yashaswi Nayak**, Dean, SoAS, Centurion University of Technology & Management, and **Dr. S.P. Nanda**, Dean, MSSSA&AS, Centurion University of Technology & Management, Paralakhemundi for joining us Chief Guest and Guest of Honour at Agri Vision -2023.

Jan 27, 2023 — **Day-1**

Prof. Supriya Pattnayak
Hon'ble Vice Chancellor,
Centurion University of
Technology & Management

Dr Yashaswi Nayak
Dean, SoAS, Centurion
University of Technology
& Management

Dr. S.P. Nanda
Dean, MSSSA&AS,
Centurion University of Technology
& Management, Paralakhemundi

Jan 28, 2023 — **Day-2**

Shri Bidyut Bihari Swain
Hon'ble, Secretary, Ministry of Micro, Small
& Medium Enterprise, Govt. of India
New Delhi

Prof. Rabinarayan Acharya
Hon'ble, Director General, Central Council
for Research in Ayurvedic Sciences,
Ministry of AYUSH, Govt. of India

Jan 29, 2023 — **Day-3**

Dr. Mrutunjaya Mohapatra
Hon'ble, Director General of Meteorology
Govt. of India, New Delhi

Dr. Joykrushna Jena
Hon'ble, Deputy Director General
(Fisheries Science) Indian Council
of Agricultural Research, New Delhi

Prof. Bijoy K. Sahoo
Hon'ble Vice Chancellor
S'O'A University
Bhubaneswar

Prof. Prasannajit Mishra
Dean, Extension Education
Odisha University of Agriculture and
Technology, Bhubaneswar

Wish and Greeting Message

A Special thanks to **Dr. Himanshu Pathak**, Hon'ble, DG-ICAR cum Secretary-DARE, Govt of India, **Dr. Mrutyunjay Mohapatra,** DGM, IMD, New Delhi, **Prof. Rabinarayan Acharya**, Hon'ble, Director General, Central Council for Research in Ayurvedic Sciences, Ministry of AYUSH, Govt. of India, **Shri Bidyut Bihari Swain**, Hon'ble, Secretary, Ministry of Micro, Small & Medium Enterprise, Govt. of India, New Delhi**, Prof. Pravat Kumar Roul**, Vice Chancellor, OUAT, Bhubaneswar, **Dr. Vinod Kumar**

Singh, Director, ICAR-CRIDA, Hyderabad, **Dr. Ajit Kumar Shasany**, Director, ICAR-NMPB, New Delhi, **Prof. Mukti K. Mishra**, President, Centurion University, **Shri Mahesh Sahoo**, Hon'ble Member of Parliament, Dhenkanal for their warm wishes and welcome messages.

Participated Organizations

International Speakers

We are thankful to our esteemed international speakers to join us virtually across the globe and address our participants.

Prof. Rajeev K Varshney
Director, Centre for Crop & Food Innovation, Murdoch University, Australia

Dr. Channa S. Prakash
Dean, College of Arts & Sciences, Tuskegee University, Alabama, USA

Dr. Leena Tripathi
Director Eastern Africa Hub International Institute of Tropical Agriculture
Dar es Salaam, Tanzania

Prof. Robert Henry
Director QAAFI,
Professor of Innovation in Agriculture
The University of Queensland
Brisbane, Australia

Prof. Yong Pyo Lim
Professor, Department of Horticulture, Chungnam National University, South Korea

Dr. Abhimanyu Sarkar
Group Leader - Legume Genetics
NIAB, Cambridge, UK

Dr. Madhugiri Nageswara-Rao
Geneticist & Ornamental Project Lead, USDA- Agricultural Research Service, Subtropical Horticulture Research Station, Miami, USA

Dr. Ravishankar Narayana
Research and Development Manager
Fernlea Flowers Ltd, Florida, USA

Delegates & Speakers

800+ Delegates & speakers from the below organizations participated actively (Physically and Virtually) in Agri Vision-2023.

- Mudroch University, Australia
- Tuskegee University, USA
- IITA, Tanzania
- University of Queensland, Australia
- Human Friendly Agricultural Research Institute, Korea
- NIAB, UK
- USDA-ARS, USA
- Fernlea Flowers Ltd, USA
- India Meteorological Department, New Delhi
- National Academy of Agricultural Sciences, New Delhi
- ICAR-NRRI, Cuttack
- ICAR-NBPGR, New Delhi
- ICAR-IARI, New Delhi
- ICAR-CTCRI, Bhubaneswar
- ICAR-CMFRI, Cochin
- ICAR-CIWA, Bhubaneswar
- ICAR-CIFA, Bhubaneswar
- Institute of Life Sciences, Bhubaneswar
- SOA University, Bhubaneswar
- JIS University, Kolkata
- NIT, Agartala
- Manipal Institute of Management, Manipal
- Chitkara University, Chandigarh
- Rythu Sadhikara Samstha, Guntur
- MNIT, Jaipur
- ICAR-CSWRI, Avikanagar
- ICAR-CIFE, Mumbai
- Kaagaja Phula Arts, Bhubaneswar
- Gaumaya Agro Pvt. Ltd, Bargarh
- FROZIT & Ruchi Foodline, Cuttack
- Flowra, Jajpur
- VNSGU, Surat
- IGAU, Raipur
- NABARD Regional Office, Odisha
- IIT, Kanpur
- Tamil Nadu Agricultural University, Coimbatore
- Ravenshaw University, Cuttack
- Botanical Survey of India, Kolkata
- Centurion University
- JNTU, New Delhi
- OUAT, Bhubaneswar
- G.M. University, Sambalpur
- The Farm Enterprise, Odisha
- Botanical Survey of India, Shillong
- ICAR-NIPB, New Delhi
- CCRAS, Ministry of AYUSH, Govt of India
- Ministry of MSME, Govt. of India
- Sharda University, Greater Noida, India
- Genome India International
- Standard BioTools, Singapore
- MPUAT, Udaipur
- TNAU, Coimbatore
- University of Kalyani, Kalyani
- Gujarat Technological University, Ahmedabad
- NMPB, Ministry of AYUSH, New Delhi
- Sarvathobhadram-Organic Society
- Tea Board India, Kolkata
- Annamalai University, Chennai
- Visva-Bharati, Santiniketan
- University of Calcutta, Kolkata
- Mahatma Phule Krishi Vidyapeeth, Rahuri
- GITAM University, Vizag
- University of Agricultural Sciences, Raichur
- RVSKVV, Gwalior
- CSIR-CIMAP, Lucknow
- SKLTSHU, Hyderabad
- SHUATS, Pryagraj

Supporters (Sponsors/Exhibitors/Media Partners)

We are thankful to all our Sponsors/Exhibitors for supporting Agri Vision 2023.

- We are indebted to the **Union Bank of India** for their wholehearted contribution and unconditional support as our **Diamond Sponsor**
- The financial assistance received from the Research & Development Fund of **National Bank for Agriculture and Rural Development (NABARD)**, towards the publication of book of abstract is greatly acknowledged.
- We extend our thanks to the ICAR institutes & other organizations for the stall exhibition at the conference and providing us the speaker/knowledge support.
- Last but not the least, we are thankful to **Centurion University & NISER, Bhubaneswar** for their infrastructure support, our vendors (Printing, Publisher, Catering, Suppliers, Event management agency etc.) and Electronics media and Print Media for wide publicity of Agri Vision-2023.

Sponsors & Exhibitors

Diamond Sponsor

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आन्ध्रा Andhra कार्पोरेशन Corporation

Agri Vision-2023: Awards

We recognized the achievers, extraordinary contributors, young researchers, research scholars, Agri start-ups and other stakeholders at our platform.

Academic Awards

Dr. Sabuj Sahoo Memorial Lifetime Achievement Award

We initiated the **Dr. Sabuj Sahoo Memorial Lifetime Achievement Award** in the loving memory of Dr. Sabuj Sahoo, Former Professor, Dept. of Biotechnology, Utkal University, Odisha who was the founder member of AGRI VISION, whom we lost in COVID-19. This award recognizes the extraordinary contributor in the field of Biotechnology and Agriculture whose research innovations & contributions have impacted the society.

Dr. Sabuj Sahoo Memorial Lifetime Achievement

- **Dr. Mrutyunjay Mohapatra**, DG, IMD
- **Prof. C. Kole**, President, Genome India International
- **Dr. Ajit Kumar Shasany**, Director, ICAR-NIPB

Padma Shri Dr. Ajay Kumar Parida Memorial Lifetime Achievement Award

We have initiated the **Padma Shri Dr. Ajay Ku. Parida Memorial Lifetime Achievement Award** in the loving memory of Dr. Ajay Ku. Parida, Former Director, Institute of Life Sciences, Bhubaneswar, Odisha and Patron of AGRI VISION, whom we lost on 19 July 2022. This award recognizes the outstanding contributors in the field of Life Sciences, Agriculture & Biotechnology, whose innovations have shown a new path to the society.

Padmashri Dr. Ajay Ku. Parida Memorial Lifetime Achievement Award

- **Dr. Trilochan Mohapatra,** Former DG-ICAR cum Secretary DARE, Govt of India, New Delhi
- **Prof. K.C. Bansal**, Secretary, NAAS, New Delhi
- **Dr. Ravishankar C.N**, Director and VC, ICAR-CIFE, Mumbai

Women Researchers' Award

- **Dr. Pankajini Samal,** ICAR-NRRI, Cuttack
- **Dr. A. Suganthi,** Tamil Nadu Agricultural University, Coimbatore

Young Scientist Award

- **Dr. Gobinda Chandra Acharya,** CHES, ICAR-IIHR, Bhubaneswar
- **Dr. Harekrushna Swain,** Botanical Survey of India, ERC, Shillong

Research Wizard Award

- **Rupalin Jena,** ICAR-NRRI, Cuttack
- **Dr. Nagaraju Siddabathula,** Botanical Survey of India, Kolkata
- **Madhavi Prasad,** GITAM University, Visakhapatnam

Science Innovation Award

- **Abhilasha Tripathi,** IIT, Kanpur

Shining Star Award

- **Rageshree Swain,** Ravenshaw University, Cuttack

Young Investigator Award (Oral)

- **Sheerin Bashar,** CUTM, Bhubaneswar
- **Ipsita Priyadarsini Samal,** CUTM, Bhubaneswar
- **Subhanwita Das,** University of Kalyani, Kalyani
- **Dr. D. Pramesh,** University of Agricultural Sciences, Raichur

Best Poster Awards

- **Rinky Resma Panda,** ICAR-IARI, New Delhi
- **Dr. Suwarna Ramdas Garudkar,** Mahatma Phule Krishi Vidyapeeth, Rahuri
- **Vytla Sravya,** CUTM, Paralakhemundi
- **Anam Nawaz,** CUTM, Paralakhemundi
- **Mitrabinda Panda,** Institute of Life Sciences, Bhubaneswar
- **Sandhya Suranjika,** Institute of Life Sciences, Bhubaneswar
- **Pratikshya Mohanty,** CUTM, Bhubaneswar
- **Sanjib Kumar Mohanty,** CUTM, Bhubaneswar

Business Awards

The SARM Business Awards at Agri Vision is introduced to recognize the Agri innovators, Agri Entrepreneurs who have created job opportunity for others and develop products or services for which the society is getting benefitted. They have created a path for others to live their life.

Market Bee Award

- **Mr. Harshit Godha,** Founder, Indo Israel Avocado

Krushak Bandu Award

- **Sarvathobhadram Organics,** Peringottukara, Kerala

Agri Start-Up Award

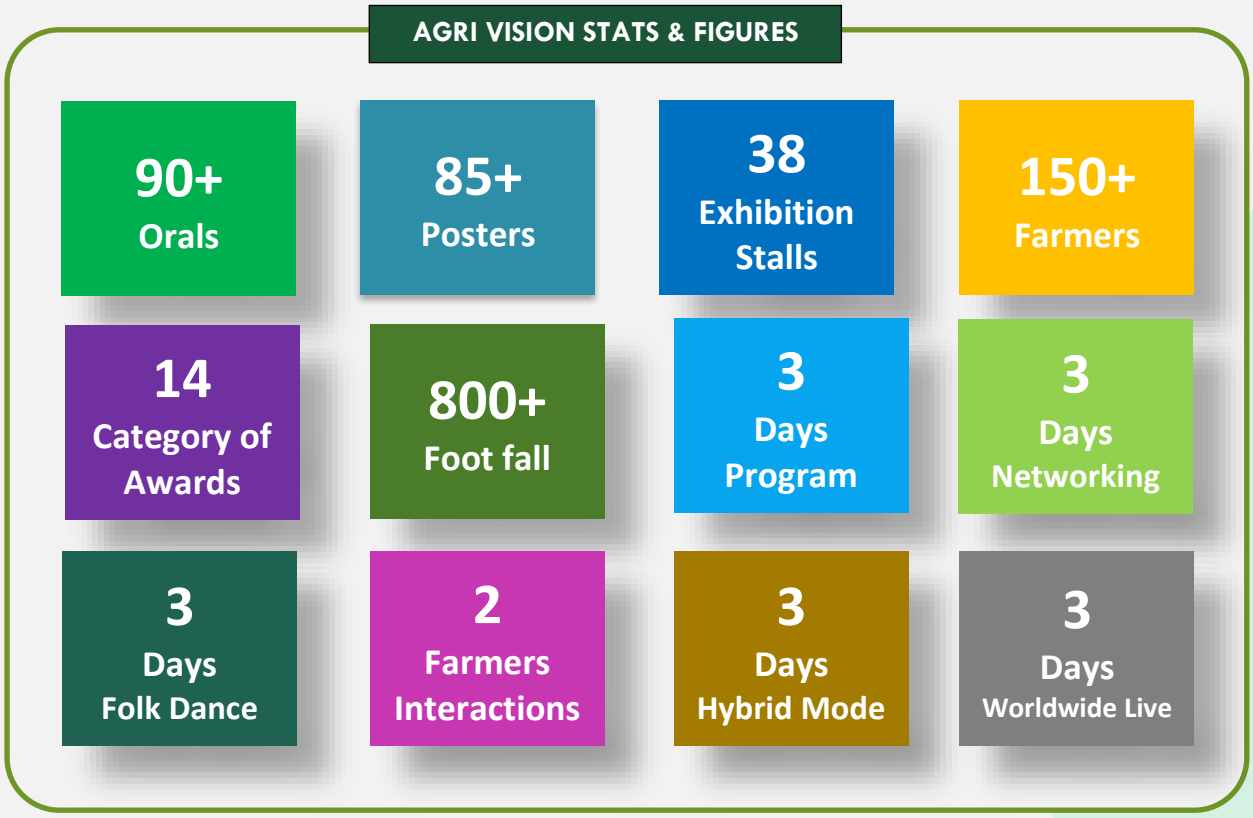
- **Way Cool Foods,** Chennai, Tamil Nadu

Business Innovator Award (International & National)

- **EOS Data Analytics Inc.**, Mountain View, CA, USA
- **SATPALDA,** Ghaziabad, Uttar Pradesh, India

Women Entrepreneur Award

- **Mrs. Rashmi Sahoo**, Founder, FROZIT & Director, Ruchi
- **Ms. Baishakhee**, Founder, Flowra
- **Mrs. Sushree S. Priyadarshini,** Founder, Kaagajaphula Arts
- **Mrs. Durga Priyadarshini**, MD, Gaumya Agro Pvt. Ltd



Farmer to Expert Interaction

We have organized a special interactive session where representatives from Industries/ ICAR Institutes and Research Organizations such as National Medicinal Plant Board, Coconut Development Board, CTCRI, CIWA, CHES, CIBA, CMFRI, KRIBHCO, CIFA, CIBA, NRRI etc. interacted face to face with 150+ progressive farmers from across Odisha and 250+ Agriculture students. Farmers and students asked various questions, put forward their problem statements and the expert provided the answer or solutions to their problems. We ran the session for 6+ hours and was the most attractive part of the three days long program. A special thanks to Mr. Sudhanshu Ranjan, Founder, The Farm Enterprise,

Cuttack for sharing his life changing experience/success story after attending Agri Vision 2021 and deliver a talk on Integrated Farming and Livestock farming.

Gallery

All the photographs, selected Videos , and live streaming clips, will be available under the "Gallery "section of the Agri Vision-2023 website.

PS: https://agrivision.in/gallery-agrivision/

Scientific Abstracts

All the session abstracts of Agri Vision 2023 have been published in the website with ISBN No. along with previous Agri Vision series abstracts.
Ps: https://agrivision.in/conference-abstracts/

Knowledge Partner: Journal of Agricultural Research & Management

All the submitted abstract (the proceeding book) will be published in this journal (Official Journal of the Society) as a special issue. The journal is an Open Access journal and can be accessed online at: https://sarm.in/agri-journal/

We welcome experts to join in our Editorial Board and Reviewer Panel. We are calling for first issue and the articles can be submitted at: https://sarm.in/agri-journal/submit-manuscript/

List of Issues/Discussions/Action Points Emerged from Agri Vision-2023

List of issues/discussions/action points emerged from the Conference (Major):

Day-01 (27 Jan 2023)

The day one program started with the opening/introductory remark of Er. Dibyanshu Prasad Das, Secretary, SARM followed by Special session of **NABARD** (**Shri D.P. Dash**, *AGM, Odisha Regional Office, Bhubaneswar*), Technical presentations (Main Hall) by International and National experts, Parallel sessions (Oral Presentation) under Young Researcher Forum, Stall Exhibition, Networking, Official inauguration in the evening, along with cultural program (Folk dance, Song & Music).

A list of issues/action points emerging from the conference noted as below:

1. NABARD initiatives for Agriculture & Rural Development
Shri D.P. Dash, AGM, Odisha RO, NABARD, Bhubaneswar

Shri. Dash has briefed about various initiatives of NABARD for Agriculture & Rural Development. Briefed about potential credit plans & development initiatives, Refinance support and policies, Institution building supports to cooperatives RRBs, Support to build rural infrastructure, about Kishan Credit cards and how NABARD is promoting FPOs. Under development initiatives dis used on financial inclusion programs, Watersheds, Tribal development projects, Climate resilience agriculture and related projects, support and consulting activities in Technology transfer, Research studies, Skill and entrepreneurship development. Discussed on NABARD's New paradigms for Farmer's welfare that includes enhancement of average income of farmers, access to social security systems, how to enhance living standard of farmers including food production and food security etc.

2. Application of Genomics to the sustainable use of plant biodiversity for food & energy
Prof. Robert Henry, The University of Queensland, Australia

Prof. Henry's focus was on plant genome analysis contributes biological understanding which is the key to genetic improvement. Plant biodiversity is a key resource supporting food and energy security. Conserving and capturing more plant diversity is a key to ensuring greater food security. Advances in DNA sequencing are facilitating the rapid characterization of this diversity and use in the development of new crops. Plants also represent a source of renewable carbon for use in replacing fossil carbon for applications that cannot be addressed with other technologies. This presentation discussed on advances in the technologies to support the path to balanced and sustainable use of plant genetic resources. Special focus on selection and utilization of plant biodiversity towards food security, reducing climate change impact using plants (Engineering plants to replace fossil carbon) etc. Here he has discussed some examples such as rice (future reinvention to meet the needs), Climate resilience agriculture system in Rice, saving wild verities, Selection of Sorghum verities, Germplasm resequencing in Mango for better verities and preserve the existing, Genomic application for better traits of Coffee, and other crops such as Millet, Soyabean, Pigeon pea, Mung bean, Grape, Banana, Macadamia, Citrus, and Eucalypts etc.

3. Next-Gen Agriculture: Vision & mission

Prof. Chittaranjan Kole, President, Genome India International

Prof. Kole has discussed on the alarming challenges the global Agriculture system is facing today. Strategy to augment food production in future i.e. about 9.7 billion population by 2050 including additional 12-15% to neutralize the adverse effect of climate change and global warming on crop production. It is also expected to provide bioactive phytomedicines to prevent and cure enormous people with incidences of chronic and fatal diseases, specifically cancer (estimated at ~ 24 million by 2035) and diabetes (estimated at ~366 million by 2030). International society is becoming more and more dependent on nutritionally rich crops to combat malnutrition that is affecting about 820 million people. A daily consumption of about 100 million barrel of fossil fuel is adding to the dependence on crops as a source of bioenergy. Most importantly, agriculture is expected to play the pivotal role in mitigating and remediation of environmental pollution. At the end of the day future agriculture has vision of addressing FHNEE (food, health, nutrition, energy and environment) security by providing higher quantity but better quality of the F7: food, feed, fuel, fiber, furniture, f(ph)ytomedicine and f(phy)toremediation. But sharp decrease in per capita arable land from 0.42ha to 0.19ha during 1960 to 2050 invokes for exploration of novel agricultural concepts and strategies. Adoption of innovative strategies including precision, digital, smart, urban, vertical, protected and marine farming has to be researched and implemented following the I3 (Innovation-Incubation-Implementation) approach as one of the potential missions.

4. Towards climate change resilient agriculture: Genetic manipulation of Carbonic anhydrase

Prof. B.C. Tripathy, JNTU, New Delhi

Prof. Tripathy has discussed on strategy for crop improvement; genetically transform C3 plants to make them C4 type. His focus was on method to improve photosynthesis in C3 crops, such as rice and wheat, is to transfer efficient C4 characters to them. Here, cytosolic carbonic anhydrase (CA: βCA3) of the C4 *Flaveria bidentis* (Fb) was overexpressed under the control of 35 S promoter in Arabidopsis thaliana, a C3 plant, to enhance its photosynthetic efficiency. Overexpression of CA resulted in a better supply of the substrate HCO3- for the endogenous phosphoenolpyruvate carboxylase in the cytosol of the overexpressers, and increased its activity for generating malate that feeds into the tricarboxylic acid cycle. This provided additional carbon skeleton for increased synthesis of amino acids aspartate, asparagine, glutamate, and glutamine. Increased amino acids contributed to higher protein content in the transgenics. Furthermore, expression of FbβCA3 in Arabidopsis led to a better growth due to expression of several genes leading to higher chlorophyll content, electron transport, and photosynthetic carbon assimilation in the transformants. Enhanced CO2 assimilation resulted in increased sugar and starch content, and plant dry weight. In addition, lower stomatal conductance, reduced transpiration rate, and higher water-use efficiency.

5. Potential genome editing for sustainable agriculture

Dr. Leena Tripathi, Director, Eastern Africa Hub, IITA, Nairobi, Kenya

Dr. Leena has translated her views on the need of new genome editing technology for sustainable agriculture. Here Banana and Plantain has been considered as case study. She explained that how the sustainable intensification of agriculture is essential for accomplishing food and nutritional security and addressing the rising concerns of climate change. The urgent need to close the yield gap in staple crops and enhance food production to feed the growing population. More efficient approaches for producing food are needed to meet the increasing demand for food. She has stated that the full potential of new

breeding tools such as genome editing needs to be exploited in addition to conventional technologies. Clustered regularly interspaced short palindromic repeats/CRISPR-associated protein (CRISPR/Cas)-based genome editing has rapidly become the most prevalent genetic engineering approach for developing improved crop varieties because of its simplicity, efficiency, specificity, and easy to use. Genome editing improves crop variety by modifying its endogenous genome free of any foreign gene. Hence, genome-edited crops with no foreign gene integration are not regulated as genetically modified organisms in several countries. Researchers are using CRISPR/Cas-based genome editing to improve several staple crops for biotic and abiotic stress resistance and improved nutritional quality. There is a need to create an enabling environment with science-based regulatory guidelines to release and adopt the products developed using CRISPR/Cas9-mediated genome editing.

6. Advances in Agri-biotechnology for national food security (With special reference to climate change)

Prof. K.C. Bansal, Secretary, NAAS, New Delhi

Prof. Bansal has put a light on challenges the current Indian agriculture system is facing (Climate change, shrinking of natural resources like land & water, increasing biotic & abiotic stress factors, challenges in sustainability agricultural production etc.). Opportunities of development; increase efficiency of yield and land use, developing insect, disease and drought resistance plant, improving nutrition, help and educate farmers to adopt to climate change, Adaptation strategies to climate change, Transgenic crop development (crop examples), and use of Genome editing strategies for food security, policies, legal and social implications.

7. High-Throughput qPCR for plant and animal genomic applications

Shri Ganesh Babu, Standard BioTools, Singapore

Shri Babu has discussed on the difficulty in implementing solutions such as genotyping, genotyping by high-marker-density analysis at scale has been in finding platforms that are cost-effective, easy to implement and scalable and that provide flexible panel design so they can be used for any species (Plant & Animal) or application type. He has explained the applicatrions of Standard BioTools™, with its X9™ Real-Time PCR System, offers a cost-effective, high throughput, automated solution for all aspects of the Agri Genomics workflow, from pathogen detection to marker-assisted breeding practices and microbiome research.

8. Developing an orphan legume for protein nutritional security in the 21st century

Dr. Abhimanyu Sarkar, Group Leader – Legume Genetic, NIAB, UK

As per his opinion, the world population is projected to increase by a nearly a third from current levels (8 billion to 9.8 billion) in less than 30 years (2050), most of it in developing countries. India is projected to become the world's most populous country this year. Protein availability is probably the most critical limitation in achieving adequate human nutritional/food security. Soil degradation and nitrogen availability are critical limiting factors in agricultural production, while climate change is already impacting yield sustainability. Legumes, with their high protein content and ability to fix nitrogen by symbiosis, offer potential solutions to these problems. Hence, there is a need to develop climate-smart legume varieties that are appropriate for local agro-climatic conditions. Recent research on grasspea (Lathyrus sativus), a hardy legume, is presented as an example on the use of genomics, speed breeding, gene editing and other molecular techniques to develop a so-called orphan (neglected) legume for agriculture in the 21st century.

9. Shelf-life of different processed tea: An estimation of their antioxidant potentialities.

Dr. Sauren Das, Indian Statistical Institute, Barrackpore

Owing to its health-benefit properties, past few decades' tea has attracted much attention to the health- conscious people and demand for quality tea production has increased a lot. Therefore, tea research conquers a front-line issue to the tea growers, business houses and as well as scientific world. Tea leaves comprises several naturally occurring phytochemicals which are all attributed to commendable antioxidant properties. Antioxidants are evidencing to be essential as it deactivates free radicals (freely evolved during different metabolic activities), if persist unattended in cells over time, causes destruction of cellular elements, such as lipids, proteins and DNA molecules, ultimately leading to some chronic disease and/or cellular necrosis.

Shelf-life studies play an important role as tea is a consumable product and reinforce brand value of the tea. This study would be beneficial to consumers, manufacturers and are equally significant for supporting the regulatory body towards the labelling of the packaged product with an expiry date by "best before use" and perform much vital role in the assurance of product quality towards end-users' after packaging. Based on growing stages of the harvested leaves and diverse processing practises the major tea types i.e. black, green, white and oolong types of teas are produced. They have their own diverse taste, odour and colour due to presence of unique constituents those are conserved during the processing techniques. In order to determine the shelf-life of four types of pro- cessed (packaged) teas, 15 antioxidant parameters have been assessed and temporal data of each parameter have been generated at 30 days interval for one year.

10. Exploring the impact of vermicomposting on soil health and growth of Triticum aestivum L. under organic farming system

Dr. Sagarika Parida, Associate Prof. Centurion University, Bhubaneswar

As per her view and recent statistics, consumer's demand on organic product is increasing rapidly. Her presentation focuses on integrating organic farming particularly the use of organic compost in promoting soil health and wheat crop growth. As per her study, vermi-compost and cow dung compost was applied to observe its impact on the growth of wheat (Triticum aestivum L.) crop under pot experiments. Pot containing normal soil was taken as control, soil: cow dung (2:1) and vermi-compost was applied in different proportions of soil and vermicompost (S: V) in 1:1, 2:1 and 4:1 ratio to evaluate the vegetative crop growth. For wheat crop, application of vermicompost (S: V with 2:1) in soil showed better re- sult on crop growth than the cow dung compost (S: C with 2:1). Mineral contents of leaf were also analyzed by X-Ray Fluorescence (XRF) study and detected more in the leaves of wheat plant raised in S: V with (2:1) than the S:C (2:1) pots. Organic farming system can be used for superior nutritional qualities in comparison to con- ventional system.

11. In-silico prediction of hub genes and pathways related to osmotic tolerance in Arabidopsis thaliana

Dr. Raghunath Satpathy, Gangadhar Meher University, Sambalpur

Dr. Satpathy has explained the Bioinformatic approach of gene and pathway prediction. Deciphering the mechanisms underlying plant responses to abiotic stress is critical for improving plant stress resistanceThe gene regulation process in response to osmotic stress are known at the level of transcription; however, little is known about their interaction pattern and mechanism. This work is an in-silico approach to identify the hub genes associated with the osmotic balance in the plant. To perform the analysis, the raw gene expression profiles (ID: GSE132978) of *Arabidopsis thaliana* plant was

considered. A total of 297 differentially expressed genes (199 up regulated genes; 98 down regulated genes) were obtained by analysing the gene expression data. Further analysis resulted the genes such as NUDT7, CBP60G, WRKY33, TCH3, SYP122, and SOBIR1 as the hub genes from the network analysis by Cytoscape 3.9.1 tool.

12. Eco toxicity studies for Indian honeybees foraging in moringa & Mango

Dr. A Suganthi, Tamil Nadu Agricultural University, Coimbatore

The aim of her study was to assess the lethal effect of insecticides applied on mango and moringa crop to Indian honey bees, Apis cerana indica, their impact on colony performance and the assessment of risk to bees. LC50 and LD50 of insecticides recommended /applied on mango and moringa crop was determined by oral feeding and topical application. Field experiments were conducted by placing Honey bee (Apis cerana indica) colonies in moringa field and mango orchard treated with insecticides, to study the impact of insecticides on colony population, brood and food reserves, to quantify the insecticide residues and to assess the risk of oral and contact exposure. A simple multi-residue method for analysis of 22 analytes in bee was developed using Liquid Chromatography-Mass Spectrometry-Mass Spectrometry. The results demonstrated that neonicotinoid insecticides, fipronil and chlorantraniliprole can pose significant risks to Indian bees with lethal and sub lethal effects. Future investigations are needed on the likeli- hood of sublethal effects under field conditions. The findings will be helpful in fitting the best insecticide crop amalgamations to maximise the benefits from honey bees in moringa and mango crop.

13. Response of rice cultivars to moisture stress

Dr. P. Sanghamitra, ICAR-NRRI, Cuttack

She has highlighted the need of improved verities of rice with respect to moisture stress and selection of proper genotype that will help farmers to improve their productivity. As recommended, identifying promising genotypes at seed germination stage will help in breeding drought tolerant cultivars which can sustain the productivity by ensuring optimum plant stand in the field. Sixty rice genotypes were screened to study the variability in responses to drought stress conditions at seed germination stage. Seed quality traits such as seed germination, speed of germination, seedling length, seed vigour index ,drought tolerance index were estimated. After analysis of various stress factors, lowest reduction in seed quality traits was observed in the genotype Magra with higher drought tolerance index and found that Magra could suitably be used for breeding varieties that can withstand moisture stress at germination stage.

14. Molecular Dissection of Sheath Blight Tolerance in Rice (Oryza sativa L.)

Dr. Pankajini Samal, ICAR-NRRI, Cuttack

She focused on screening and selection of improved Rice verities towards the sheath blight disease of the crop. Rice sheath blight (ShB) disease, caused by the fungal pathogen Rhizoctonia solani (Kuhn) AG1-IA, is one of the devastating diseases and causes severe yield loss all over the world. No complete resistant germplasm is reported till now, and as a result, the progress in resistance breeding is not up to the satisfaction. In this study, a new ShB tolerant rice genotype CR 1014 has been identified out of 200

rice genotypes screened against a virulent strain of R. solani. Further, CR 1014 has been used for both transcriptomics and proteomics study to understand the mechanism underlying resistance against sheath blight disease. The result showed that the ability to upregulate genes for glycosyl hydrolase, secondary metabolite biosynthesis, cytoskeleton and membrane integrity, the glycolytic pathway, and maintaining photosynthesis make CR 1014 a superior performer in resisting the ShB pathogen. The observation could be utilized to devise strategies to manage the disease better and also the genotype can be used in resistance breeding for developing ShB resistant variety.

Young Researcher forum:

Excluding the major expert sessions, to encourage the Young scholars we have framed the young researcher forum where the scholars presented their view points, review papers, research works and ideas in front of larger audience and jury members. Outline of the topics presented in this forum were:

- Rice straw biochar-based slow-release fertilizers (Abhilasha Tripathi, IIT-Kanpur)
- tegrated Farming Systems in Udaipur District of Rajasthan: A Case study (Akansha Yadav, MPUAT, Udaipur)
- Deciphering the regulation of nutritive value and abiotic stress response in Moringa Oleifera through genomic approach (P Sushree Shyamli, ILS, Bhubaneswar)
- PolyC stretch in utrophin-A 5'UTR retains the transcript in the nucleus (Subhanwita Das, Univerity of Kalyani).
- Mangrove algae: A one pot platform for cellulosic waste recycling and biodiesel precursor lipid generation (Shrestha Debnath, JIS University, Kolkata)
- Isolation and characterization of phosphate solubilizing bacterial inoculants to improve soil fertility and Plant growth (Palash G, JIS University, Kolkata)
- Utilization of Different Models to Predict Tea Crop Yield: A Critical Review (Sagar Aditya, NIT Agartala)
- Application of lignocellulolytic bacterial consortia on jute crop waste processing and valorization (Somnath Das, JIS University, Kolkata)
- Organic Agriculture in India: A review (Roshan Raj Bhujel, MIM-MIHE, Manipal)
- Review on the study of disparate leaf diseases and analysis of the methodologies used in leaf disease detection (Muskan Dixit, Chitkara University, Chandigarh)
- Special variability using GIS for soil properties in an Alfisol (Rahul Adhikary, Centurion University, Paralakhemundi)
- Agriculture 4.0 - a fourth revolution of agriculture through plasma - the fourth state of matter: Review of recent development, challenges & future scope (Harsh K Shastri, GTU, Ahamadabad).

Day-02 (28 Jan 2023)

The day two program started with the Plenary presentation of Prof. Channapatna S. Prakash, Dean School of Arts & Science, Tuskegee University, Alamba, USA followed by the technical speakers (both International & National), Networking, Exhibition, Poster presentation (80+), Meeting & Cultural program (Folk dance and music) including award distribution.

A list of issues/action points emerging from the conference noted as below:

15. Genome editing for "Genome editing for building greater climate resilience of Indian farming"

Prof. Channapatna S. Prakash, Dean School of Arts & Science, Tuskegee University, USA

Prof. Prakash has highlighted how genome editing could be used to improve the climate resilience of farm- ing in India, how to develop improve traits of rice that could survive in high temperature and drought condition. His focus was on CRISPR is among the most promising gene editing tools that can be employed to develop nutritionally rich crops with reduced toxins, enhanced tolerance to diseases and pests, and increased climate resilience. This technology could be most useful in particularly regions of India that are prone to drought or that are experiencing more extreme weather patterns as a result of climate change. Also highlighted how genome editing holds great promise for Indian crops such as millets and pulses that are al- ready climate resilient but suffer from poor productivity or quality issues. He discussed on policymaker engagement and public education are critical for fostering genome editing technology in India. Here, we can draw from their experience dealing with the GMO controversy over the past three decades. He drew the attention how scientific community with the help of social media and knowledge sharing platforms can educate the society to enhance societal understanding and acceptance of new crop varieties developed through new breeding techniques.

16. Role of germplasm repositories in crop improvement, production, and protection

Dr. Madhugiri Nageswara-Rao, The USDA-ARS, Miami, USA

Dr. Rao has highlighted the role of Germplasm repositories in species conservation, crop improvement and food security. Germplasm repositories are the greatest critical component of species conservation and food security worldwide. They provide baseline materials for both basic and applied research work. They also make unique contributions to climatic research, food crop and nutrition improvement, and provide national-international species protection networking opportunities as well as public engagement. The USDA-ARS National Plant Germplasm System (NPGS) is a major source of global plant germplasm repositories with accessions represent- ing crop-wild relatives, trait-selective landraces, and native, threatened, rare, endangered, and endemic plant species. There are more than 500,000 accessions of distinct varieties of plants in the NPGS's Germplasm Resources Information Network database representing more than 10,000 species of plants. The mission of the NPGS is to support agricultural production by acquiring, conserving, characterizing, documenting, and effectively distributing crop germplasm. As an example, this presentation discusses consolidated efforts, challenges, and research opportunities in meeting the above mission in one of the prime clonal repository areas at the Subtropical Horticulture Research Station in Miami, Florida.

17. Development of sustainable essential oil extraction clusters in strengthening the rural economy of India

Dr. Ajit K. Shasany, Director, ICAR-NMPB, New Delhi

Dr. Shasany led Aroma Mission of CSIR to improve the livelihood of farmers and entrepreneurs through aromatic plant cultivation and value addition. He has shared his experience on developing 39 essential oil clusters in Odisha and the economic analysis how farmers are getting benefitted economically. The branding, packaging, extraction and other technical support provided by the Government and how it will help to generate income from waste lands. He has also enlightened the improvement of these plants at molecular level using various methodologies and how to use the improved verities for higher yielding. He has explained the economic benefit analysis with some common plants that is well known to each and every farmer.

18. Importance of Medicinal Plant in strengthening rural economy and role of NMPB

Prof. Tanuja M Naseri, CEO, NMPB-Ministry of AYUSH, Govt of India, New Delhi

Prof. Naseri has highlighted that 70%+ workforce living in rural India and strengthening them economically will bring prosperity to the nation as rural economy share closely about 50% of the national income. She spoke on how with Ministry of Rural Development, NMPB has introduced Medicinal plant and its components to rural India through various schemes such as Deendayal scheme, MNAREGA etc. She focused on how Medicinal plants can be introduced as a part of the integrating farming, utilization of waste lands during non-harvesting seasons, forward and backward linkage of medicinal plants along with regular crops will help the farmers to generate additional income for their livelihood development. She put special focus on various policies, Government initiatives and how to translate the mission in ground level and role of Agri educators in making it fruitful.

19. Agriculture to Agribusiness

Dr. Samarendra Mahapatra, Former Prof. & Head of Dept .of ABM, OUAT, Bhubaneswar

Dr. Mahapatra focus was more on how the traditional agriculture can be shifted towards sustainable, commercial, profitable agriculture linked with agribusiness. He explained the economic activities in the area of agri-inputs, agri-production, agri-logistics & Supply chain,agri-processing, agri-financing, agri-food marketing etc. Agribusiness principles relates to managerial functions i.e.planning ,organising, directing and controlling of agricultural inputs and outputs both in public and private sector. Agribusiness links agriculture to industry & manufacturing sector. Emerging areas of agribusiness development taking place in high value agriculture and allied areas as fruits, vegetables, floriculture dairy, poultry, fishery, meat and egg etc.

20. Case study: Sarvathobhadram-Organic Farmers' cooperative unites people and environment to promote food and nutrient security as well as improved livelihood and income

Dr. Sreeni K.R., Sarvathobhadram-Organic Society, Avanangattil Kalari, Kerla

He explained how a cooperative society "Sarvathobhadram-Organic–Farmers Cooperative" was helpful in supporting small and marginal farmers in customizing, adapting, and tailoring the system to their specific requirements. The Farmers Club, which has 50 members, was founded in May 2020 to create additional cash while also encouraging farmers to shift to or- ganic farming using System of Rice Intensification (SRI). The club's mission is to ensure food security, livelihood, and entrepreneurship in the Anthikad Block Panchayat. The project addressed climate change and resilience, collaborating with government departments and utilizing convergence to maximize the schemes accessible to farmers in panchayath. The transformation was sluggish initially, but it accelerated over time, indicating that farmers have variable levels of satisfaction based on a variety of circumstances. Very young rice seedlings are planted singly in a grid pattern in the System of Rice Intensification (SRI), a management strategy for irrigated rice production. Also explained how they have developed watershed management system and reutilized salt and waste water as back feeding for rice crops. He has also explained on societies action plan in implementing SDG13 on climate action for enhanced resilience and the capacity to adapt local solutions. Then also explained the market linking strategy to empower village farmers.

21. Integrated tea research for Darjeeling tea industry – Present status and roadmap for future

Dr. Biswajit Bera., Former Director (Research), Tea Board of India, Kolkata

He has discussed the evolution and a century old history of Darjeeling's tea industry and its journey from local to international market. He explained how the R&D activities at each level from field to factory, marketing to promotion "an integrated coordinated approach" has helped to achieve it and how it can be a case study for other crops as well. He has explained the economic analysis of current situation and formulating roadmap for future tea research, some of the areas like protection of Darjeeling tea GI (Geographical Indication), critical analysis for ongoing work, in depth review of research for avoiding duplication of efforts, participatory approach of tea research and multidisciplinary/international collaboration etc. It was a case study of India to show how a traditional crop can be preserved for future and to create a huge Industry that is revolving and reshaping with the need of the hour, a true sustainable agri system.

22. Root & tuber crops for entrepreneurship development

Dr. M. Nedunchezhiyan., Principal Scientist, ICAR-CTCRI, Bhubaneswar

Tuber crops are most important food crop after cereals and grain legumes. The tropical 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 in- dustry. 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. Tuber crops are important sources of starch after cereals. Cassa- va and sweet potato are the most important among the tuber crops. Cassava starch finds application in array of indus- trial 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.

Some of the High Yielding Tuber Crops Varieties developed by CTCRI

Cassava

- H-165, Sree Visakham, Sree Prakash, Sree Vijaya, Sree Athulya, Sree Rekha, Sree Padmanabha

Cassava

- Sree Kanaka, Sree Arun, Sree Vardhini, Sree Bhadra, Gouri, H-41, Kalinga, Sourin

Crop production Technologies: Cassava & Sweet potato

Cassava: Fertilizer recommendation

- High yielding varieties of 10 - 11 months duration yielding 30-35T/Ha
- Farmyard manure 12.5T/Ha. 100:50:100 Kg NPK / Ha.
- High yielding varieties of 6-7 months duration yielding 25-30T/Ha
- Farmyard manure 12.5T/Ha.;75:50:75 Kg NPK / Ha.
- Local varieties (20-25 T/Ha)
- Farmyard manure 12.5T/Ha.;50:25:50 Kg NPK / Ha.

Irrigation schedule

Supplementary irrigation at IW:CPE (Irrigationwater/Cumulative pan evaporation) ratio of 0.70 during drought spell was beneficial in maximising productivity.

Intercropping

Short duration legumes like bunchy varieties of groundnut and vegetable cowpea are found ideal. Intercrop is dibbled while cassava is planted.

Rice-Cassava crop sequence

First crop rice (June to Sept) is raised as rainfed crop. Then short duration cassava is grown. This is practised when there is no assured source of irrigation. Cassava is harvested in April

Shoot number

Retain only two shoots in opposite direction by removing the excess ones at 30 days after planting along with intercultural operations.

Intercultural operations

First intercultural operation at 30-45 days after planting and the second one at one month after the first intercultural operation followed by earthing up.

Rapid test for Cyanogen determination

(For mainland of 1 ha nursery area of 5 gm Picric acid and 25 gm Sodium carbonate are dissolved in 1 litre of water. Filter paper is dipped into it. Then it is air-dried. Then it is cut into 2x20 cm strips. 1gm tuber is crushed in 25 ml water and put into 500 ml conical flask. Strip is hung from the stopper of the flask. Keep it overnight. Colour develops in the paper. Based on intensity of colour, content of HCN can be determined. Strip is cut into pieces and dipped in conical flask with 60 ml water. This is estimated calorimetrically by using green filter (625 nm wave length)

Sweet Potato: Special Practices

- **Upland condition**
  Planting: In the main field during June-July and in the nursery during March to May.
- When there is no other source of irrigation this is the only possible method.

- **Lowland condition**

Planting: during Jan- Feb, after the secondcrop of rice or after the harvest of tobacco. This helps to utilise the residual moisture after the second crop of rice and the organic matter and compost left by tobacco. Vine cuttings of 20 -30 cm length from the middle and top of the vines are planted in the field. Spacing in the mainfield is 60X20 cm. Plant population is 83000 / ha. Farmyard manure @ 5 T / Ha. NPK @50:25:50 Kg / ha.

Value Addition Technologies:

Functional pasta from Cassava:

Features

Protein- enriched sweet potato pasta Whey protein enriched pasta – Rich in immunoglobulin and lactoferrin, which promote the growth of beneficial bacteria (microbiota)

Defatted soy flour enriched pasta – Rich in isoflavones which protects against hormone-related disorders such as breast cancer and prostate cancers.

Fish powder enriched pasta – Rich in omega-3- fatty acids

Orange fleshed sweet potato pasta • High carotene retention – anti-oxidant properties • High protein content • Excellent cooking and textural properties. • Low glycemic index: Progressive starch digestibility over a period of 2hours. Enriched cassava pasta • Carotene enriched cassava pasta - anti-oxidant properties • Curcumin enriched cassava pasta - anti-inflammatory effects and antioxidant. • Chlorophyll enriched cassava pasta - wound healing, hormonal balance, deodorizing and detoxification of the body and promotes digestive health. • Betanin enriched cassava pasta - anti-oxidant properties.

Extruded Products From Cassava

- **Features**
  - At present no cassava extruded products are available in the market.
  - Extrusion of cassava gives a high expanded product with a bland taste. Cassava extrudates are totally oil free and hence has much dietetic value.
  - Cassava flour is a cheap raw material at the cassava growing belts.

Baked Products from Casava Flours:

At ICAR-CTCRI, gluten free cookies were prepared by replacing wheat flour up to 50% - 60% along with other ingredients like rice flour, tapioca flour, sweet potato flour, taro flour and sorghum flour. The cookies are available in various shapes and sensory quality is acceptable to the consumers.Gluten-free breads were prepared by substituting wheat with 50% sweet potato flour or 30% taro flour with acceptable sensory quality.

Starch Based Solid Adhesives from Cassava:

The product is pure white in colour, quite viscous and possesses excellent tack. It can be easily applied as it is free flowing. It can be used to paste different surfaces like ceramic-ceramic, wood-wood, glass-wood, cardboard-cardboard etc. The pasted materials possess good moisture resistance, but if dipped in water, they tend to separate. It can be used as an adhesive in various applications.

Fried Snacks Food from Tuber Flour:

Cassava Pakkavada: This is a hot snack food having good texture and taste made out of cassava flour. The other ingredients include maida, bengal gram flour, salt, chilli powder, asafoetida, baking soda and oil. The ingredients are thoroughly mixed and made into dough with hot water (50°C), proofed for 1h and then extruded through hand extruder having flat rectangular holes, into hot oil.

Cassava Sweet Fries: This is a sweet snack food made out of cassava flour, maida, baking soda and oil. The ingredients are mixed well and made into dough with hot water (50°C). The dough after proofing for 1h is hand extruded through die having round holes, into hot oil. The fried product is then coated with sugar by dipping for a few minutes in sugar syrup having thick consistency.

Cassava Nutrichips: This is a high protein snack food made out of cassava flour by mixing with other ingredients like maida, groundnut paste, egg, salt, sugar, sesame, coconut milk, baking soda and oil. After mixing the ingredients, hot water is added and mixed to form smooth dough. The dough after proofing is made into small balls which are then spread into sheets of 0.2cm thickness. This is then cut into dimon shape using a sharp knife and deep fried in oil.

Cassava crisps: This is a soft and good textured crispy snack food made from cassava flour, maida, rice flour, bengal gram flour, salt, baking soda, turmeric powder and oil. The dough made with hot water is proofed for 1h and then extruded through the small pore size die having round holes. The deep fried material is mixed with fried nuts, curry leaves etc. before packing.

Other products include: Cassava nutrichips (without egg), Cassava salty dimons, Cassava hot sticks, Cassava salty fries, Cassava sweet dimons etc. for which also formulations are available.

Cassava Chips with Improved Colour & texture:

Fried cassava chips presently available in the market are often too hard to bite and bear no comparison with potato chips. This leads to poor acceptability of the product and lower price.

Research at ICAR-CTCRI has shown that excellent quality fried chips can be made from cassava tubers, by soaking the chips in acetic acid-brine solution for 1 h, parboiling for 5 min, surface drying and deep frying in oil. This facilitates in the removal of excess starch and sugars from the cassava slices, with the result that light yellow crispy chips can be obtained, having soft mouth feel and good texture.

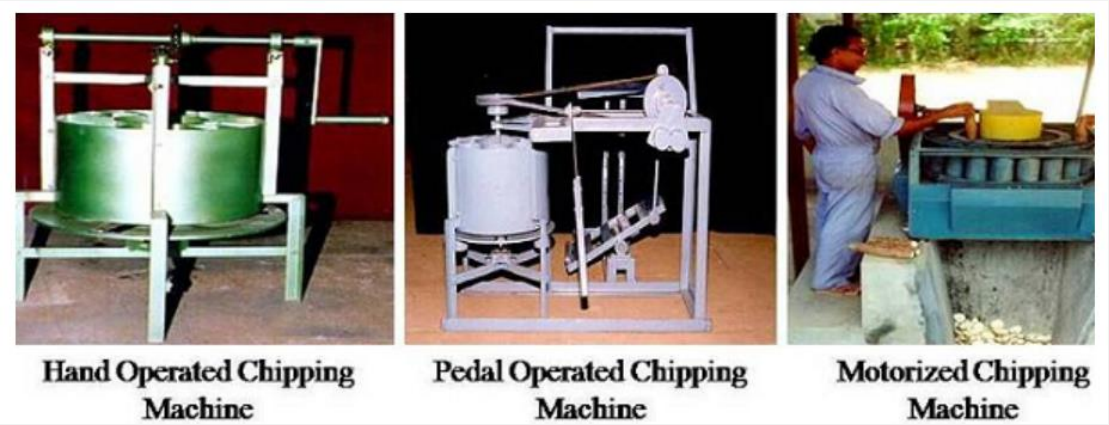
Products from Sweet Potato:

Sweet potato (Ipomoea batatas Lam.) is cultivated throughout the tropics and warm temperate regions of the world for its starchy roots, which can provide nutrition, besides energy. A number of novel food products with functional value are being developed worldwide. Sweet potato tubers with their low glycaemic index have additional value as a food for diabetics. There are a range of primary food products that could be made from sweet potato like chips, flakes, frozen products, French fries, puree etc., while it is also the raw materials for a host of secondary products like noodles, sugar syrups, alcohol, pasta etc. Sweet potato based composite flours have been used in many countries for making small baked goods like cakes, cookies, biscuits, doughnuts etc. Sweet potatoes are consumed at home level, mainly after cooking, baking or converting into fried chips. The roots are often converted to canned or pureed form, to enhance the shelf life.

Engineering/Technology services by CTCRI:

ICAR-CTCRI has developed three types of cassava chipping machines.

- **Hand-operated chipping machine**: Capital cost of the machine is approximately Rs 17850/-.
- **Pedal operated chipping machine**: Cost is approximately Rs 25000/-
- **Motorized chipping machine**:



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23. Impact of climate change on agriculture: Mitigation and adaptation strategies for food security

Prof. R. Raman, Director, CNF&SA, Annamalai University, Chennai

Prof. Raman believes that most agriculture scientists believe that high temperatures and droughts caused by climate change will depress crop yields in many developing countries in coming decades. Global climate changes are caused by increasing atmospheric concentration of carbon dioxide and other trace gases. Climate change affects agriculture and food production in complex ways. It affects food production directly through changed agro-ecological conditions and indirectly by affecting growth and distribution of incomes, and thus demand for agricultural produce especially in the developing world. Developing countries are more vulnerable to climate change because most of the peoples depend on agriculture for their livelihood. Thus, for farmers struggling under the burden of cultivating land under the ever-present threat of drought, floods, and mid-season dry spells. Land degradation, water scarcity such problems associated with climate change will have to be answered more frequently. Climate change will directly affect the agriculture in tropical countries and the mean temperature is around 40^0C. These high temperatures could completely destroy crops if they coincide with flowering period. Climate related disaster have brought widespread misery and huge economic losses to many countries, it adversely affecting the food security, agriculture, water resources, public health and biodiversity. Agriculture of any kind is strongly influenced by the availability of water. Climate change will modify rainfall, evaporation, and runoff and soil moisture storage.

Effective utilization of natural resources with due care and adopting integrated crop production technologies can increase productivity of agricultural crops. To mitigate the effects, the following crop management strategies are recommend to overcome the impact of climate change i.e. alternate cropping, planting date adjustment, irrigation and fertilizer optimization, cover crop, zero tillage, mulching practices and use of slow release fertilizers . Diversity farming is the single most important modern technology to achieve food security in a changing climate. There is abundant scientific evidence that crop biodiversity has an important role to play in the adaptation to our changing environment. These technologies are more concern for improvement in nutrition, food security, food safety, and local environment with the economics of the local communities.

24. Impact Innovations to improve rice crop health for sustainable small-holder farming

Dr. Deo Mishra, Bayer Crop Science, Hyderabad, India

Dr. Mishra briefed that around the world, it is estimated that there are about 500 million farms less than two hectares in size. These smallholder farms operate on ~12% of the world's agricultural land and produce around 80% of the food that is consumed in Asia and sub-Saharan Africa, parts of the world where food security and stable income are still inadequate. Rice is a crop that fulfills the caloric needs of half of the world population and most of them comes from these regions. Rice farming community faces a lot of challenges during crop cultivation including many biotic and abiotic stresses that cause huge economic loss annually. Among them brown plant hopper, bacterial leaf blight and submergence are most devastating stresses accounting ~20% annual loss of rice production. With the aim of having in-built protection in rice against these stresses, we developed rice hybrids by incorporating native traits for strong resistance/tolerance to help smallholder rice farmers by protecting their yield in a sustainable way. We explored pathogen variability based on population genomics and identified effective genetics for resistance/tolerance for target traits and then integrated them to develop multi-trait rice hybrids suitable for target geographies. Developed cultivars vigorously tested and deployed in Asia and are providing big relief to small-holder rice farming. With these innovations we are confident of delighting our farming community and making significant contribution towards realizing our vision "Health for All, Hunger for None".

25. Simultaneous presence of Sub1 and SK locus - a prerequisite for future submergence resilient rice

Dr. Narottam Dey, Visva-Bharati, Santiniketan

In his talk, he has focused on the submerged varieties of Rice for climate resilient agriculture and how to plan for the future for all odd. Considering the significance of this area of research an attempt was taken to identify the rice lines showing their simultaneous presence and combinatorial effect under flash flood followed by deep water submergence. A total of 10 rice lines from lowland rice field of South Bengal and Assam were experimented physio-biochemically under variable submergence. The rice lines showing differential presence of Sub1 and SK were subjected for sequence diversity in which they were detected with a number allelic form for the studied loci. Additionally in order to develop functional signature inform of miRNA linked molecular marker linked with SK loci (as Sub1 linked marker is already developed) a bioinformatics pipeline was developed followed by validation on a rice line (var. Kumrogarh) showing both types of growth under flash flood and deep-water sub- mergence. Two miRNAs (osa-MIR1319b and osa-MIR1439) which target two ERFs (SK1 and SK2) located on 12th rice chromosome involved in escaping mode of adaptation in tall type rice were studied in details. The predicted binding sequences were aligned with their respective miRNAs to find out the most probable binding region showing higher base conservation. Secondary structure of the studied miRNAs was analysed for the mini- mum free energy to determine structure-function relationship of the miRNAs with target loci (SK). The bioinfor- matically predicted putative miRNAs were validated for their binding with the target sequences through qRT- PCR based expression analysis of both the miRNAs and respective target sequences in a selected indigenous semi deep rice line (var. Kumrogarh) carrying both the components of SK loci linked with elongated growth un- der submergence. The experiment conducted in this study construct a basic framework for miRNA regulated snorkelling type elongation in rice during

prolonged deep submergence along with availability of both the loci for development submergence resilient rice lines for future.

26. Genetic modification strategies to develop transgenic pigeon pea events for pod borer resistance

Dr. Dipankar Chakraborti, University of Calcutta, Kolkata

His talk was about the pathogenic resistant pigeon pea development strategies through genetic modification. With the growing population and to fulfil nutrition demand, production of high yielding pigeon pea (Cajanus cajan (L.) Millsp.) has gained priority perticularly in developing countries. The pod borer Helicoverpa armigera causes extensive damage and severe economic loss of pigeon pea every year. Lack of genetic resources and unsuccessful conventional breeding strategies are main hindrances to combat the insect attack through classical approaches. His study was designed to develop novel Agrobacterium – mediated transformation strategies in pigeon pea. These strategies improved the Agrobacterium – mediated transformation frequency. Cry expressing pod borer resistant transgenic pigeon pea events were developed using these methods and analysed up to T3 generation. Constitutive promoter was more effective than tissue specific promoter to exhibit desired larval mortality of cry gene. In selected cry expressing pigeon pea events, crossing based Cre/lox recombination was implemented to eliminate selection marker gene nptII. In subsequent generations, transgenic pigeon pea events devoid of nptII and cre genes were identified and these events exhibited 80-100% H. armigera larval mortality. Development of such Cry toxin expressing plants would greatly support the sustainable transgenic development program for pod borer resistance in pigeon pea.

27. Genetic Legume green manuring inhibit veterinary antibiotics uptake and accumulation by different vegetable crops

Dr. Saranya Kuppusamy, University of Calcutta, Kolkata

In her talk she has raised the issues of antibiotic contamination of food crops and the biological method to reduce the antibiotic contamination of food crops using organic (environmentally friendly). Veterinary antibiotics like tetracyclines and sulfonamides are frequently detected in arable lands and they can potentially contaminate food crops. It is thus of greater importance to identify strategies to reduce food crops uptake of antibiotics. The use of organic matter such as green manure/cover crop is especially environmentally friendly rather than chemical fertilizers and is recommended for sustainable agriculture. Previous studies have reported the effect of green manures on weed control, soil chemical/ biological properties, crop growth and yield. However, the impact of green manure on plants grown in the antibiotic-contaminated soil is not available. In India, legume- and non-legume based green manures which are an important NPK source is widely used in sustainable agriculture. For the first time, using pot culture experiments (Antibiotics concentrations: 1,5 and 20 mg/kg; Crops: Tomato, Radish and Spinach; Treatments: NPK, Compost, Sunhemp and Dain- cha), they found that application of green manures, especially sunhemp followed by daincha could effectively enhance biodegradation (>95%) and thereby reduce antibiotics (Model antibiotics: sulfamethoxazole) availability for plant uptake in soil. Indeed, incorporation of green manures in soil prior to cropping had large impact on the soil microbial growth and activity, affecting the subsequent fate of antibiotics and no impact was observed on crop growth. Further, antibiotics were highly accumulated in root crops compared to leaf or fruit crop. Hence, it is

concluded that utilization of green manures and cultivation of leaf crops are the viable strategies for safer crop production in antibiotic contaminated soils.

28. Genetic RNAi toxicity assays confirmed HvSar1 to be a novel molecular target for Henosepilachna vigintioctopunctata control

Dr. Satyabrata Nanda, CUTM, Bhubaneswar

His focus was on the molecular target (RNAi) to control pests using biopesticides. In his study, one of the COPII genes, HvSar1 was selected to investigate the RNA interference (RNAi)-mediated silencing effects on the solanaceous crop pest Hadda beetle or potato ladybird (Henosepilachna vigintioctopunctata). To administrate the double-stranded (ds) RNA targeting HvSar1, the dietary RNAi or oral feeding technique was implemented. The RNAi results revealed that silencing of HvSar1 had a significant lethal effect on the 1st and 3rd instars of H. vigintioctopunctata. Additionally, the oral feedings of the bacterially-expressed dsHvSar1 resulted in high mortality and impaired the feedings in the larvae and adults of the Hadda beetles. More importantly, the use of dsHvSar1 onto the phylogenetically closely related species Propylaea japonica for evaluating the non-target effects ensured its safety and specificity. In P. japonica, administration of the dsRNAs caused no transcriptional or organismal adverse effects. Moreover, the findings of this study suggest that HvSar1 could be used as a promising molecular target for the RNAi-biopesticide-mediated control of Hadda beetle.

29. Many paths to one goal: Identifying integrated rice root phenotypic and anatomical traits for diverse water stress environments

Dr. Madhusmita Barik, CUTM, Bhubaneswar

Her effort was to identify improved phnotypes that can be used in breeding programs to develop a better variety of rice capable of withstand water stress environment. Water stress is a major source of yield loss in rice (Oryza sativa L.) production and cultivars that maintain yield under water stress across environments and water stress scenarios are urgently needed. Root phenotypic traits directly affect water interception and uptake, so plants with root systems optimized for water uptake under water stress would likely exhibit reduced grain yield loss. Deeper nodal roots with smaller root diameter and/ or reduced aerenchyma and that transport water efficiently through smaller diameter metaxylem vessels may be beneficial during water stress. The study was done on 20 genotypes to findout the best genotype that can be chosen for breeding programs. Among the genotypes, the aerenchyma cell formation was lowest in AMPI and AC 42997 helping to enhanced water uptake efficiency under stress compared to IR-64 (susceptible check). These results reflect how some root morphological and anatomical traits work in concert as integrated phenotypes to influence the performance of plant under water stress. Multiple integrated root phenotypes are therefore recommended to be selected in breeding programs for improving rice yield across diverse environments and water stress scenarios.

30. Economic Grasses of India: An overview

Dr. Nagaraju Siddabathula, CUTM, Bhubaneswar

It was an informative session on the economic importance of various grass related crops with respect to Indian economy and society and why we need to preserve it and its implication in future a s a molecular tool to develop better traits. As per his report, the family Poaceae is the largest family in the Indian flora, being represented by about 1760 taxa (309 Genera) followed by Leguminosae 1292 taxa (176 Genera), Orchidaceae 1270 taxa (155 Genera), Asteraceae 1171 taxa (193 Genera), Rubiaceae 635 taxa (101 Genera) and Cyperaceae 609 taxa (32 Genera) respectively. Among 1760 taxa, 425 taxa (108 Genera) are endemic to India. The primary needs of mankind are food, clothing and shelter. However, grasses are an important source of food for human beings (cereals, essential oils, flavoring agents, millets and sugar) and animals (seeds and fodder). All cereals and millets are rich in starch, contain vitamins A, B and C and minerals. About 300 taxa of grasses are recorded as in economic use in any form. Among the important food crops of India, cereals take up about 60% of the total area under cultivation, pulses about 18% and oil-yielding plants about 8%. Other than the food, they also have an economic, ecological and medicinal significance. Conservation of the gene pool of wild relatives of edible grasses is very important for breeding programs and genetic engineering for increasing populations. India harbours many types of grasslands, which are the ideal habitats for various species of plants and animals.

Young Researcher forum:

Outline of the topics presented in this forum were:

- Diversity, Distribution and Phytochemical Analysis of selected species of Hypericum in Meghalaya (**Harekrushna Swain**, BSI-ERC, Shillong)
- ntioxidant activity, phytochemical composition, and gene-specific molecular phylogeny of plant species in the Cactaceae family Sheerin Bashar (**CUTM**, Bhubaneswar)
- Allelopathic effect of aqueous extract of Mikania micrantha Kunth on seed germination and seedling growth of Macrotyloma uniflorum Lam. (**Ipsita Priyadarsini Samal**, CUTM, Bhubaneswar)
- Effect of postharvest treatments on custard apple (Annona Squamosa L.) (**Sujata Chhatria**, Dept of Agriculture, Govt of Odisha).
- Suplimentation of Drumstick (Moringa Olifera) leaf meal as a herbal growth promoter on growth performance of broilers (**Pranjali Bhaudas Meshram**, MPKV, Rahuri)
- Studies on Preparation and Sensory evaluation of turmeric incorporated paneer (**Chetan Chougale**, MPKV, Rahuri)
- Selection of sex-limited breeds of cocoon colour of silkworm, Bombyx mori L. for field trials based on nutritional indices Madhavi Prasad K, (**GITAM University**, Vizag)
- Transcriptome Analysis of Thermotolerant Bivoltine Silkworm Breeds of Bombyx mori L Prashant N Bavachikar (**GITAM University**, Vizag)
- Seed biopriming of endophytic fungi isolated from wild rice enhances growth promotion and disease resistance in rice crop (**Rupalin Jena**, ICAR-NRRI, Cuttack)
- Moderate disease resistance in rice cultivars enhances the bio-efficacy of fungicides against blast disease (**D. Pramesh**, UAS, Raichur)

- Rhizosphere: Role of Rhizodeposits in Plant- Plant/Microbe interactions (**Mondam Muni Raja,** Rythu Sadhikara Samstha, Guntur)

31. Liquid bio-fertilizers from KRIBHCO (Product information)

Due to the toxicity and other environmental and biological hazards, now total agricultural system is shifting towards biofertilizers & Biopesticides. By seeing the future, KRIBHCO has developed multiple Liquid Bio-fertilizer products with tested results as below: In coming years, bio-fertilizer will be a game changer.

1. Phosphate Solubilizing Bio fertilizer (PSB)

It produce organic acids which help in dissolving soil phosphorus as well as applied phosphatic fertilizer in soil and make easy uptake by crop plants. In addition PSB also produce growth regulators which are beneficial to crop growth and strength. PSB can solubilize native soil phosphorus to the extent of two bags of SSP in case of high/medium phosphorus soils. The response further increases when organic contents of soil are improved through application of compost.

2. Liquid Consortia (NPK)

P & K components of NPK Liquid Bio Fertilizers produce organic acids which help in dissolving insoluble soil phosphorous & potash as well as applied NPK/DAP/ Single Super Phosphate (SSP)/ Muriate of Potash (MOP) etc. fertilizers in soil and make their uptake easy by crop plants. It encourages early root development & helps plant cell formation, consequently increases resistance towards diseases. Also ensure the developments of flowers, seeds & fruits in the crops. N components of NPK LBF fixes atmospheric nitrogen and provide nutrition to crop plants. In addition NPK Liquid Bio Fertilizers also produce growth regulators & biological active substance like vitamins & hormones which are beneficial to crop growth & strength. It also restricts the leaching of potassium & nitrogen in soil & reduced phosphorous fixation by 70-80% in the soil. Inoculation with NPK Liquid Bio Fertilizers helps augment minimum 10-12 kg N, 8-10 kg P205 & 6-8 kg K20 per acre/year. The response further increases when soil organic matter contents are improved with application of compost.

1. Acetobacter

Nitrogen is the major plant food which amounts to more than half of the total plant nutrients taken up by the crop. Acetobacter are entophytic bacteria can fix Nitrogen in many crops especially in roots, stems and leaves of Sugarcane crop. 500 ml of Acetobacter liquid Bio fertilizer contains 5 thousand crore

bacteria which establish miniscule urea plants in roots, stems and leaves in Sugar cane crop when applied in one acre field. Each acre applied with 500 ml Acetobacter Liquid Bio fertilizer can add nitrogen equivalent to 2-3 bags of urea. The response further increase when soil organic matter are improved through application of compost.

2. Azospirillum

These are associative symbiotic soil bacteriawhich can fix Nitrogen in any soil and crop but preferred high moisture-living crops like paddy/jute except legume crop. 500 ml of Azospirillum Liquid Bio fertilizer contains 5 thousand crore bacteria which establish miniscule urea plants when applied in one acre field. Each acre applied with 500 ml Azospirillum Liquid Bio fertilizer can add nitrogen equivalent to one bag of urea. The response further increases when soil organic matter contents are improved through application of compost.

3. Azotobacter

These are free-living soil bacteria which can fix Nitrogen in any soil and crop but preferred for vegetables, fruits and field crops expect legumes/ high moisture-living crops like paddy and jute. 500 ml of Azotobacter Liquid Bio fertilizer contains 5 thousand crore bacteria which establish miniscule urea plants when applied in one acre field. Each acre applied with 500 ml Azotobacter Liquid Bio fertilizer can add nitrogen equivalent to one bag of urea. The response further increases when soil organic matter contents are improved through application of compost.

4. Rhizobium

Rhizobium Liquid Bio-Fertilizer are selected natural symbiotic soil bacteria which help in fixation of Nitrogen in legume crops. These bacteria when applied as per directions in the sown legume crop, make nodules on roots of the plants. 500 ml of Rhizobium Liquid Bio fertilizer contains 5 thousand crore bacteria. Each bacteria establishes one miniscule biological urea plant in the shape of root-nodule. Each acre applied with 500 ml Rhizobium Liquid Bio fertilizer can add nitrogen equivalent to one bag of urea. The response further increases when soil organic matter contents are improved through application of compost.

5. Potash Mobilizing Bacteria (KMB)

Potash is an important macro-nutrient required by crop for quality produce. It encourage early root development. Potash Mobilizing Liquid Bio-Fertilizer(KMB) produce organic acids which help in dissolving soil potash as well as applied potassium fertilizers in soil and make easy uptake by crop plants. Inoculation of K solubilize helps to augment 6-8 kg K per acre. In addition KMB also produce growth regulators which are beneficial to crop growth, strength and increase yield by 20-30%. This also keeps soil biologically active & maintain soil health. The response further increases when soil organic matter contents are improved through application of compost.

6. Zinc Solubilizing Bacteria (ZSB)

Zinc is becoming 4th important plant nutrient after N P K in the Indian soils & affects the nutritional quality as well as crop yield. Requirement of zinc in plant tissues is relatively in small concentration (5-100 mg/kg). Zinc Solubilizing Liquid Bio-Fertilizer (ZSB) produce organic acids which help in dissolving insoluble soil zinc salts as well as applied zinc fertilizers in soil and make easy uptake by crop plants & it also influence the bio-availability of zinc to plants, keep soil biologically active & maintain soil health. ZSB can solubilize native soil zinc and helps to augment 1-2 kg Zn per acre. The response further increases when soil organic matter contents are improved through application of compost.

Day-03 (29 Jan 2023)

The day three program started with the Plenary presentation of Dr. Ravishankar Narayana, Fernlea Flowers Ltd, Florida, USA followed by the technical speakers (both International & National), Networking, Exhibition, Meeting & Cultural program (Folk dance and music) including award distribution.

A list of issues/action points emerging from the conference noted as below:

32. i-Farming: Managing Crop Production in the Digital Era

Dr. Ravishankar Narayana, Fernlea Flowers Ltd, Florida, USA

Dr. Narayana's focus was on digital agriculture i.e. using advanced web interface tools, internet, digital technologies and application a revolution can be brought on the traditional agriculture. As explained by him, to increase productivity and reducing the corresponding cost, numerous corporations around the world have focused their efforts and investments to offer newer versions of seeds, fertilizers, irrigation supplies, and machineries for advanced farming and crop management. The recent innovations in virtual farming have resulted in development of applications that would assist growers in reaching out to consultant firms for optimal farming practices. Moreover, literature compiled in worldwide web is readily available to establish trends in farming, or to improve productivity by taking advantage of available technology. Advanced and smart ma- chineries enable growers to improve work efficiency either in croplands or chicken, meat and dairy farms. Mobile electronic devices and innovations in information technology (IT) such as soil and crop sensors, mobile applications, big data analytics, agricultural robots, closed ecological systems, precision agriculture tools, smart power systems, geological position systems (GPS) provide great impact on farming.

Many of these new technologies leverage improved artificial intelligence algorithms to solve problems that were too hard to be tackled just few years ago. Such algorithms allow the development of improved Decision Support Systems which may process large amounts of data in real time and supply the much-needed ad- vice to the growers. To extract such data, artificially intelligent machines can now infer meaningful information from different raw data inputs such as graphics in a level that is comparable to a human expert, thanks to re- cent break throughs in machine learning research. Better tools for data analysis and decision making will im- prove farming outcomes and reduce labour costs.
With the same token, manufacturers producing farm technology and resources (e.g., seeds, fertilizers, pesticides, etc.) are reengineering products to increase plant's tolerance to drought, rate and speed of growth, and enhancing the shelf life. Precision Livestock Farming (PLF) systems (e.g., precision feeding systems, precision milking robots, stable and farm management systems) use advanced technologies that are assisting growers to collect livestock biometrics data for sustainable agriculture practices leading to an increase in corresponding income. Lastly, the farmers are also seeking the best storage methods and technologies to increase the durability of fresh products.

Overall, digital technology is trans- forming plant production in both developing and developed countries. In particular, while developed countries gain great advantages of these technologies, developing and underdeveloped countries are using these tech- nologies for better, faster, and cheaper products/services which would increase farmer productivity provide gains in poverty reduction, nutrition, education, and sustainable income. It was more about a digitally connected world for a collaborative and cooperated agri system.

34. Genomics-assisted breeding: success stories in legume crops

Prof. Rajeev K. Varshney, Director Centre for Crop & Food Innovation, Mudroch University, Australia

Prof. Varshney has discussed on the role of genomics in devolving new and improved crop varieties to meet the growing food & nutritional demands. He has explained how they have improved the existing varieties for example; Wheat for Heat resistance, Nutrient used efficiency, Drought and frost resistance. Legumes/ Pulses for drought tolerance, Heat tolerance, Herbicide tolerance with enhanced protein content. For horticultural crops; enhanced fruit productivity, increase fruit size, enhanced pest resistance, enhanced fruit quality and teste, and biosecurity. He has also explained the modern genomic tools that are used such as; Genome sequencing & analysis, Computational genomics, Trait discovery, Genetic engineering and Gene editing etc including capacity building like; linkages with industry & international partners, and capacity building for international agriculture. With emphasis on pulses, he has discussed Sequencing & phenotyping technologies for understanding genomic variations, how they used various genotyping platforms like SSR, DArT, KAPar, GBS, 56K SNPs array, WGRs, 10 SNP Panel, and 2000 SNPs array. Also explained how they have trained breeders in genome assisted breeding programs (India, Africa & South America). He has shown the improved varieties that they have developed Groundnut (Gimar 4 & Gimar 5), Foliar disease resistant varieties (DBG 3, DBG 4, ICGV 15003, ICGV 15017, ICGV 15014) released in India and Ghana, Pigeonpea new varieties (GS-1, GRG 152) with resistance to Fusarium wilt, and sterility mosaic disease, released in India etc. Also, he has covered the rapid delivery plans from production to marketing.

33. Smart and Eco-friendly Agriculture for enhancing the rural economy

Dr. Prakash Chandra Jena, Sr. Scientist, ICAR-NRRI, Cuttack

He has discussed various approaches on how to develop sustainable agriculture system for enhanced rural economy. He analysed various factor affecting the rural economy ranging from Social issues to technical and Environmental factors. He explained how various policies led by central government is supporting smart agriculture and implementation channels like (Govt. extension services, FPOs, SHGs, NGOs and their role), Village knowledge centre (VKCs) etc. He has shared the ideas about how technology ad web/mobile platforms can be used etc.

35. Transformation of agri-food systems in India

Dr. Trilochan Mohapatra, Former DG, ICAR cum Secretary DARE, Govt of India

Dr. Mohapatra has presented some statistical figures about the overall agriculture scenario of India, contribution of Agriculture to Indian GDP, how rural economy is linked with agriculture, and how the agriculture contribution to GDP declines in developed economy including developing economy when growth in other spheres of GDP increases. As per the statistic in more developed economy the GDP contribution of agriculture is less. As per his view though in coming future the contribution of agriculture sector to GDP will decrease but the demand of food and nutrition will keep on increasing. Here the biggest challenge is agriculture population is decreasing but the demand of food is increasing. Hence need to develop a integrated channel to meet the future needs. He has explained various way how we can transform the whole agriculture sector to meet future's food and nutrition demand. He explained about the vital role of policies, social innovation, and agri education system tackle the future needs.

36. Understanding flowering time control as means of agriculture productivity

Dr. Kishore CS Panigrahi, Associate prof, NISER, Bhubaneswar

Traditional farming in India uses conventional methods of burning of remaining paddy straws after the harvest of rice during November and December. This is a unique time of the year when the combination of cold, dew and may also be fog is possible creating an unique ambience for transformation of the burnt product on the soil. The probability of formation of Nano-particles of various compounds that may have higher physiological activity in modulating plant growth and productivity has been predicted. Towards this objective, the primary emphasis has been given to carbon. Here he has discussed and presented some of our recent findings that Carbon-nano particles effect the productivity and plant development by compromising with light and thermal sensing mechanism in both model plants namely, Arabidopsis thaliana and *Oryza sativa (Rice)*.

37. A new paradigm of future Agriculture: Human friendly Agriculture

Prof. Yong Pyo Lim, Human Friendly Agricultural Research Institute, Korea

Prof. Lim has covered three aspects 1. Paradigm of Human-friendly Agriculture, 2. Nutraceutical crops research, 3. Nutraceutical products. As explained Recent advances in agricultural practices have led to environmental issues resulting to serious problem in human health. To overcome these issues, eco-friendly agriculture can be considered as a tool for agricultural production. As the economy in human's life is increasing, the demand for improving human health and quality of life is also parallelly increasing. To meet these demands, a new paradigm of agricultural production models need to be developed. The future agricultural model should ultimately be developed into a new system of paradigms covering breeding, cultivation, and food supply to personalized medicine. He has termed this model as " human-friendly agriculture". As per his opinion, 'Human-friendly agriculture' is a personalized agriculture based on individual's biological and genetic information. This system should include an optimized breeding system for a specific cultivar that can produce high amount of health promoting metabolites (nutritional components). Robotic plant factories and automated precision farming systems may be able to produce crops with enriched targeted nutritional components. Target-oriented agricultural products will be supported by the new food system as the concept of personalized food. He believes that "human-friendly agriculture" including personalized varieties, cultivational practices, and nutritionally enriched agricultural food products, will achieve to improve healthy and happy life. He has also covered Multi-omics approaches to improve traditional food plants including the use of Genome editing.

38. Optimization of an efficient protoplast isolation and tranfection procedure for validation of different Cas9/gRNAs in Rice

Dr. Subhasis Karmakar, ICAR-NRRI, Cuttack

His focus was on the urgent need for new breeding technologies for Rice which can rapidly breed crops suitable for climate change. They found CRISPR/Cas system which can create genetic diversity for breeding in an unparalleled way in a single generation. Multiplex CRISPR-Cass system allows simultaneous targeting of more than one locus in a single event, enabling modifications of multiple traits either for gene function study or crop improvements. They have developed a new procedure that describes highly efficient protoplast isolation from rice, transfection using PEG (polyethylene glycol), and validating the accessibility of sgRNA into target plant genomic loci. In their protocol, the transfection efficiency of isolated protoplast was counted as high as 81%. Using protoplast system, they have

targeted genes related to C4 photosynthesis (OsPEPC, OsPPDK, OsME, and OsCA), circadian clock (OsCCAI), and disease susceptibility gene (OsSWEET14). The polycistronic tRNA-gRNA system was used for CRISPR multiplexing. They have selected two guides for each of targeted genes, driven by OsU3 promoter. The assembled product was cloned into vectors harboring Cas9 expression cassette. After protoplast transfection, gDNA was isolated and target regions were amplified using specific primers. Successful editing was confirmed through sanger sequencing of the amplified products. This high efficiency protocol of rice protoplast isolation and transfection will facilitate CRISPR mediated gene editing by testing guide RNA cleavage efficiency rapidly before going for final stable transformation. The isolation and transfection method can also be used for protoplast regeneration.

39. Proposal: National Rural Rood and Artisan Parks Project Complex

Dr. Myalavarapu Subbarao, Retd. Deputy Director of Agriculture, Andhra Pradesh

Outline of his project proposal is as below:

- It is aimed to facilitate post-harvest management of small and marginal farmers produces.
- The complex is proposed to cover 25 acres of uncultivable waste lands covering 6-7 villages and 16,000-17,000 acres of cultivable agriculture land at the cost of Rs. 25 crore, with storages, platforms, processing, value addition etc. requirements on no cost basis.
- Throughout the nation it is proposed to have 50,000 numbers of complexes.
- The main composition of the complex is to accommodate warehouses, cold storages, thrashing, winnowing and grading etc. platforms.
- Also to cover 200-300 cattle sheds for accommodating milch animals, tractors, storage for fodder, agri- culture implements, gober has production, scientific farm yard manure production and milk and milk products production etc. of 5 to 7 cents size.
- Food processing units, certification like fssia, natural and organic products enabling exports etc.
- To provide facilities to artisans to promote local indigenous production of farm implements etc. and occu- pational castes to have self employment.
- To cover the entire block with 'simarouba' to produce vegetable edible oil trees of 1 lakh numbers ave- nue plantation gives 65% of edible oil which is better than palm oil, ground nut oil, sun flower oil etc. whose cultivation is cheap soil requirements are also very easy that is saline and alkali soils with rainfall range 500mm – 2000mm. The balance of 35% remains after oil extraction is to increase natural fertili- ty of cultivated soils by using the oil cakes. Also for climate mitigation with greenery.
- The total area of the project 25 acres about 20 acres are under permanent structure construction. The terrace of the constructed structures are proposed for solar energy production. The produced energy will be sufficient to cover 10,000 habitations or 6-7 villages besides utilizing the requirement in the com- plex.
- Flower, vegetable and fruit produced also have place in the farmer rythu bazaar sheds. It encourages local production on large scale and invites traders to come to the farmer for business from far places like Delhi, Mumbai, Bangalore, Bhopal, Chennai etc. metros also.
- As was available to AP mee-seva kendras to replace with f-seva (farmers) kendras to meet credit, crop insurance, crop damage, crop coverage areas etc. to eliminate the farmer movement to urban areas and save time of the farmers to be on the farm to have next crop also and increase the on-farm man working days.

- It helps in increased crop intensity by clearing the first crop field in 10-15 days time and to take up sec- ond crop by utilizing irrigation facilities, micro irrigation etc. there by farmer income as well as national grass domestic production is increased.
- National foreign exchange savings will be 50% in cases of chemical fertilizers, edible oils, petrol, diesel, gas, lubricants due to the simarouba avenue plantation.
- Simarouba avenue plantation helps in greening and carbon-dioxide reduction, carbon foot prints and water foot print to meet the targets fixed by the internal fora.
- Hydro, thermal and atomic power dependence will be reduced to 50% due to solar energy production.
- Exodus to the urban areas and urban agglomeration for under utilization of man power will be reduced with crop intensity, food processing units etc.
- Local employment with crop intensity and food processing units will double the man working days.
- The capital investment by the Government of India towards GDP growth will have great effect in capital growth, per capita income as well as national GDP growth on a long term, on the lines of railways, national highways, sea ports, air ports, etc. These infrastructures will also be accessible to small and marginal farmers in shape of trade and commerce which are hither to be used by the traders, large size exporters etc. as a service sector organization.
- Complex facilitates collaborated exports also. There by the national export will double.
- Highlight of the project, last but not the least is the farmer will be selling his produce at his door-step/ storage points.
- The returns in the complex through the out-gate charge to the trader, purchaser @ Rs. 0.10 per Kg. of the product that goes out there by the farmer is not charged and the trader is charged.
- It results in reducing the pressure on MSP (Minimum Support Price), MRP (Maximum Retail Price), CPI (Consumer Price Index orienting to the Dearness allowance of the Central and State Governments etc.). "
- The total process can be managed by an estate officer, the group management at RDO level with 15-18 complexes with the coordinator support, necessary technical advice by the Agri. MBA candidates, at the district level and state level, supported by a team of technical people and lead by the Agri. MBAs from IIMS, senior IIM Agri. MBAs at the centre.
- The site selection done through the NRSA (National Remote Sensing Agency) using Satellite Imageries since no crop or any other agricultural activity will be there in the complex but for the simarouba planta- tion, degraded soils with 5.0 pH to 8.2 pH. Only soil requirement is red murrum in the soil depth is the pre- requisite. There by the pressure on cultivated area will not be there and also the human activity in the area facilitates economic viability in and around 200 acres in the degraded lands.

He can be contacted at: subbaraoddartd@gmail.com

Other important titles:

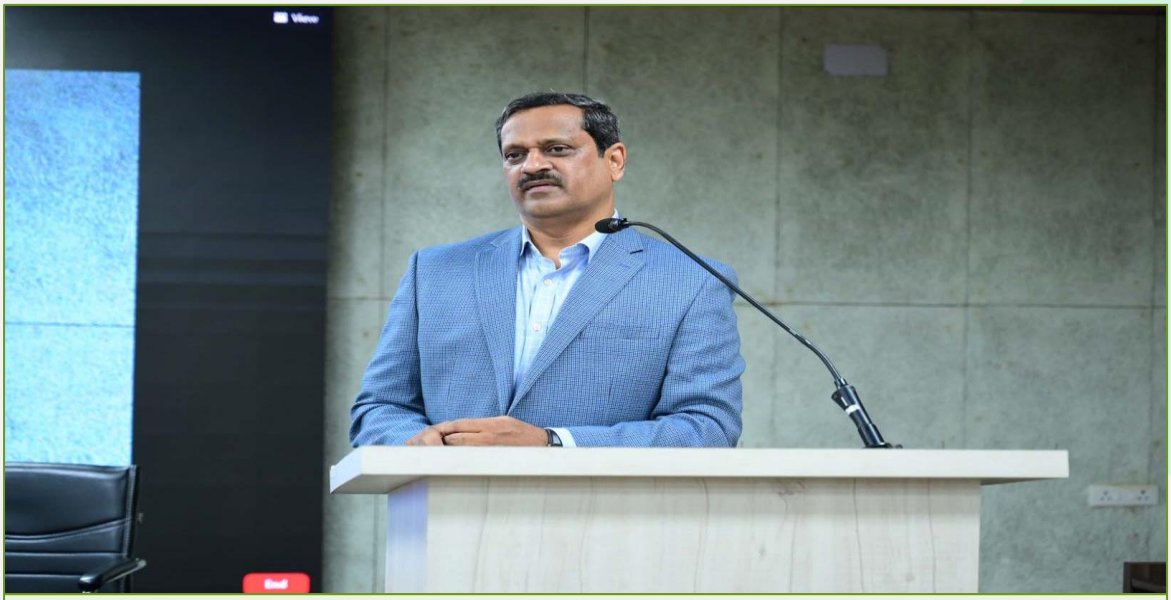
Including the above few other important titles presented as below:

- Studies on algae based Single Cell Protein isolated from Kangsaboti River, West Bengal: A potential nutritional food supplement (**Dr. Dipankar Ghosh**, JIS University, Kolkata)
- Synthesis of silica nanoparticle from Paddy straw using hydrolysis process (Dr. Surajit Ghosh Malaviya National Institute of Technology, Jaipur).

- Effect of introgression of prolific Booroola gene (FecBBB) on thermal tolerance of Avishaan rams in semi-arid subtropical region (**Dr. Vijay Kumar ICAR-CSWRI,** Avikanagar, India)
- Pond sediment amended with Potassium enriched biochar enhances shrimp growth (**Dr. Vidya Shree Bhart**i, ICAR CIFE, Mumbai)
- Expression and activity of pepsin, trypsin and chymotrypsin during larval development of the striped murrel (Channa striata) (**Dr. Rakhi Kumari,** ICAR-CIFA, Bhubaneswar).
- The effects of high salinity on plasma steroid levels in common carp (Cyprinus carpio) (**Dr. Iffat Jahan,** Centurion University of Technology and Management, Paralakhemundi)
- Transcriptional regulation underlying the responses to fungal infection in tea plant, (**Dr. Anjan Hazra,** University of Calcutta, Kolkata).
- Experience sharing: Gaumaya Paints: Innovative colors from cow dung (**Ms. Durga Priyadarshini,** Founder, Gaumaya Agro Pvt. Ltd).

Conference Activities:

Inauguration of Agri Vision-2023 and Exhibition by Prof. Supriya Pattanayak, Vice Chancellor, Centurion University in presence of other guests and dignitaries.



Shri DP Dash, AGM, NABARD R.O. Bhubaneswar, during his speech at Agri Vision 2023

Guests in front of the Agri Vision Exhibition Area

Shri DP Dash, AGM, NABARD R.O., and Prof Supriya Pattanayak at Agri Vision 2023

Dignitaries at the Cultural Stage during the meeting before the Cultural program


Next-Gen Agriculture
Visions and Missions
Prof. C. Kole


Towards Climate Change
Resilient Agriculture
Genetic Manipulation of Carbonic
Anhydrase
B C Tripathy


Advances in Agri-biotechnology for National Food Se
(with special reference to climate change)
K C Bansal
Secretary
National Academy of Agricultural Sciences,
Centurion


EVERY
STANDARD
Centurion
UNIVERSITY


Centurion
UNIVERSITY


Centurion
University

Er. Dibyanshu Prasad Das, Secretary, SARM felicitating Shri B.B. Swain, Hon'ble Secretary, Ministry of Micro, Small & Medium Enterprise, Govt. of India, New Delhi during Day-2 of Agri Vision 2023


KVIC
Khadi


en Entrepreneur Award


Centurion
UNIVERSITY


Centurion
UNIVERSITY


CANNED TUNA
fishture


Farm made feed
ICAR/CIFA PRODUCTS

Welcome to Agri Vision-2024

With the successful completion of Agri Vision-2023, we are going to host **Agri Vision-2024** in January 2024 at Bhubaneswar.

Very soon we are going to announce the **Agri Vision-2024** at: http://www.agrivision.in/

Thanks Note:

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Society for Agricultural Research & Management

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