



IARI NEWS



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हर कदम, हर उमर
किसानों का हमसाफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch



IARI welcomes Dr. Ch. Srinivasa Rao as Director

Dr. Cherukumalli Srinivasa Rao assumed charge as the 17th Director of the ICAR- Indian Agricultural Research Institute on Dec 26, 2024. Dr. Rao is a globally renowned scientist with extensive expertise in agricultural research and institutional leadership. Prior to joining ICAR-IARI, he held several prestigious positions, excelling as Director, ICAR-National Academy of Agricultural Research Management (NAARM), Hyderabad (2017-2024); Director, ICAR-Central Research Institute for Dryland Agriculture (CRIDA) (2014-17); Project Coordinator, All India Coordinated Research Project on

Dryland Agriculture (AICRPDA), Hyderabad (2013-14) among others. He is a distinguished Fellow of reputed Science Academies of India such as INSA, NASI & NAAS and professional Societies like Indian Society of Soil Science, A.P Academy of Sciences and Telangana Academy of Sciences. During his illustrious career, he has been honored with 48 prestigious National and International awards, including the Rafi Ahmed Kidwai Award for Outstanding Research in Agricultural Sciences, the ICRISAT Millennium Science Award, the Coromandel Plant Nutrition Award by the FAI and the Dr. N.S. Randhawa Memorial Award by NAAS. His exemplary leadership acumen brought accolades to the Institutions he led, with CRIDA (2015) and NAARM (2021) receiving the Sardar Patel Outstanding ICAR Institution Award.

He has published 361 research papers in reputed journals, 56 authored/edited books, 18 copyrights and numerous scientific articles. He has held key responsibilities in various National and International Committees such as Technical Chairman at National Mission for Sustainable Agriculture and National Coordinator of ICAR flagship programme – NICRA, International Dryland Development Commission (IDDC), Cairo, Egypt; Asian Long Term Experimental Network for Agriculture (ALTENA), Japan. He has served as an Expert in the Committee of National Biodiversity Authority. His pivotal contributions as India's Global Climate Change Negotiator at the UNFCCC CoP, IPCC and APN meetings have been appreciated. His recent presentation on the "Biodiversity-Water nexus with Food Security" at the Royal Society of London received widespread acclaim amongst peers.

Under his visionary leadership, ICAR-IARI is committed to advance its mission on "Science-led sustainable and globally competitive agriculture for food, nutrition and livelihood security" for the nation.



From Director's Desk

I am pleased to take charge as the Director of this esteemed Institution and am deeply committed to strengthening its rich legacy while exploring new frontiers of research and innovation. I am optimistic that with our collective efforts we will achieve our shared goals and transform challenges into opportunities for the benefit of farmers and stakeholders. In this quarter, the Institute released many field crop varieties for cultivation across various agro-climatic zones. A high-yielding mustard variety Pusa Mustard 37 was also identified with a higher average yield of 26.0 q/ha. Research achievements include development of climate-smart wheat to address biotic and abiotic stresses, the identification of eco-friendly entomopathogenic fungi for managing woolly aphid infestations in

apples and the identification of superior-quality lines of tomato and cherry tomato. The innovative Pusa Trishool pruning method improved the productivity of the tomatoes. Under SDG 12, aimed at reducing post-harvest losses, research extended the shelf life of strawberries by using edible films derived from mango kernel starch. The waste to wealth generation target led to optimization of a protocol to produce gluconic acid from potato peel waste. Smart agriculture technologies were employed to develop a deep learning-based method for detection of insect damage in cruciferous crops, a RFID-based automatic basin irrigation system and drone-based thermal remote sensing for water stress assessment in wheat. The Graduate School at IARI introduced “Deeksharambh,” an innovative induction program for newly admitted undergraduate and postgraduate students. The Institute also organized several capacity-building programs, high-end workshops and open field days with themes focusing on farmers and industry stakeholders to exchange ideas. Special events were organised to commemorate Technology Day, World Food Day, World Soil Day, Kisan Diwas and Agricultural Education Day, with lectures by eminent speakers. We are proud that the Institute secured commendable externally funded research grants, promoting both national and international collaborations. Under the Lab to Land initiative, patents were filed and renewed, and copyrights were granted for IARI technologies. Numerous training programs, Kisan Goshthis and exhibitions were also organized for farmers and farm women.

I am sure that the information included in the newsletter would be useful to the farmers and the stakeholders. I wish to congratulate all the scientists and staff of publication unit for bringing out the newsletter in time.



Ch. Srinivasa Rao
Director, ICAR-IARI



Plant Genetic Resources for Rust Resistance in Wheat

A triticale x wheat derivative SW288 (T/W17-5) derived from the cross TL2942/HS562 was identified with seedling resistance to 38 leaf rust pathotypes, including the highly virulent 77-5 and 77-9 in Northern India.

Barley Genetic Stocks Developed and Registered

BHS 491 (BBM 880): Developed from a cross HBL704/UPB1008, BHS491 exhibits seedling resistance to all leaf rust and stripe rust pathotypes and adult plant

resistance to both diseases.

BHS 488 (BBM 861): Developed through hybridization of BHS385 and BHS369, it demonstrates seedling resistance to all the pathotypes of leaf rust and is moderately resistant to leaf blight.


BHS 489 (BBM 863): Naked barley germplasm registered with seedling and adult plant resistance to all yellow rust pathotypes and adult plant resistance to leaf rust.

(Patil M, Regional Station Shimla)
(madhu_gen@iari.res.in)

Field crop varieties released across various agroclimatic zones

Crop	Variety	Recommended Zone
Rice	Pusa 1824	National Capital Region of Delhi
Rice	Pusa 2090	National Capital Region of Delhi
Bread Wheat	HI 1665 (Pusa Gehun Sharbati)	Maharashtra, Karnataka and Plains of Tamil Nadu
Durum Wheat	HI 8840 (Pusa Gehun Gaurav)	Maharashtra, Karnataka and plains of Tamil Nadu
Maize	Pusa Popcorn Hybrid – 1 (APCH- 2)	Punjab, Haryana, Delhi, Uttarakhand (Plain), Uttar Pradesh (Western region), Maharashtra, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu
Maize	Pusa Popcorn Hybrid-2 (APCH-3)	Maharashtra, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu
Maize	Pusa Bio fortified Maize Hybrid – 4 (APH-4)	Punjab, Haryana, Delhi, Uttarakhand (Plain), Uttar Pradesh (Western region), Maharashtra, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, Gujarat, Madhya Pradesh, Chhattisgarh, Rajasthan
Maize	Pusa Biofortified Maize Hybrid-5 (APTQH-5)	Punjab, Haryana, Delhi, Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, Odisha, Uttar Pradesh (Eastern region), West Bengal, Maharashtra, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, Gujarat, Madhya Pradesh, Chhattisgarh and Rajasthan
Maize	Pusa HM4 Male Sterile Baby Corn-2 (ABSH4-2)	Bihar, Jharkhand, Odisha, Uttar Pradesh (Eastern region), West Bengal, Maharashtra, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, Gujarat, Madhya Pradesh, Chhattisgarh and Rajasthan
Maize	Pusa Jawahar Hybrid Maize - 3 (AH-8181)	Madhya Pradesh
Maize	Pusa Shalimar Maize Hybrid - 1 (AH-7154)	Jammu and Kashmir
Soybean	Pusa Soybean 21	NCT of Delhi
Lentil	L 4717	Bihar
Lentil	PSL-17	National Capital Region of Delhi
Mung bean	PMS-8	National Capital Region of Delhi
Mung bean	PMD-9	National Capital Region of Delhi
Mung bean	PMD-10	National Capital Region of Delhi
Chickpea	BGD 133	Zones 3 and 8 of Karnataka
Forage Maize	Pusa Forage Maize Hybrid-1 (AFH-7)	Tarai region of Uttarakhand, Punjab, Haryana and Rajasthan
Forage Maize	Pant Forage Maize Hybrid 1 (DFH-2)	Haryana, Punjab, Rajasthan, Uttarakhand, Chhattisgarh, Madhya Pradesh, Maharashtra and Uttar Pradesh

Crop variety identified

Crop	Variety	Yield Potential	Recommended Zone
Mustard	Pusa Mustard 37 (NPJ 253)	Average seed yield: 26.4 q/ha (Zone-II) and 26.8 q/ha (Zone-III)	AICRP-RM for Zone-II and Zone-III 

Climate Smart Wheat for Abiotic and Biotic Stress Tolerance

To address climatic uncertainties, traits like solid stem with robust pith tissue enhance stem strength, prevent lodging and improve resistance to stem rusts and heat/water stress. Marker-assisted selection and hybridization techniques were employed to develop 137 BC3F8 lines with solid stems and multiple rust and powdery mildew diseases. Popular cultivars were introgressed with rust-resistant genes (*Lr19/Sr25*, *Lr24/Sr24*, *Lr37/Sr38/Yr17*, *Lr47*, *Sr36/Pm6*, *Yr10* and *Yr15*) derived from wild wheat species. These lines were subsequently combined with the solid stem trait sourced from COW-W-1 and DBW 39, validated using GWM 247, a gene-specific microsatellite marker.



Stem-solidness score in lines: 1-hollow pith (0% filled), 2-25% filled, 3-50% filled, 4-75% filled, 5-solid stem (100% filled) DePauw and Read (1982)

(Sivasamy M, Nallathambi P, Maheshwari C U, Jayaprakash P, Vikas VK, Regional Station Wellington)(sivasamy.m@icar.gov.in)

Eco-friendly Management of Woolly Aphid in Apple

For the first time in India, an entomopathogenic fungus *Clonostachys rogersoniana* has been isolated from a beetle and characterized as “*C. rogersoniana* isolate PUSACR01”. This isolate demonstrates an impressive 85% mortality rate in adult female

Promising lines of Tomato and Cherry Tomato

Tomato (Pune Tomato Selection 25)	Cherry Tomato (Pusa Cherry Tomato Hybrid-1)
Short height, early flowering and high yield. Maximum number of large size fruits/plants and low seed content	Notified for protected cultivation in Delhi-NCT
Moderate tolerance to tomato leaf curl	Resistant to tomato leaf curl virus & late blight
Each plant yields on an average 4.0 kg fruits; yield potential 140 tons/ha.	Av. fruit weight :18 g with long shelf life; yield potential of 140 q/1000 m ²
Titrateable Acidity of ripe fruits- 0.20 % and TSS 4.0° Brix	Lycopene content- 85 ppm and TSS 7.5° brix

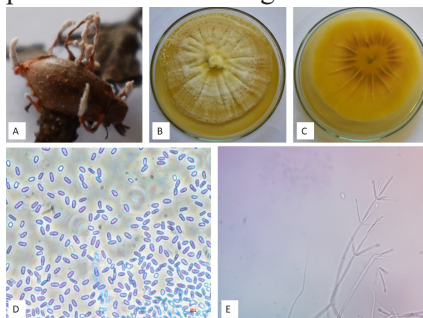


(Khar A, Chandrashekar K, Tripathi S, Saha S, Basavaraj, Regional Station Pune) (anil.khar@icar.gov.in)



(Hussain Z, Division of CPCT) (zakir@iari.res.in)

woolly apple aphids within 11 days, at a concentration of 1×10^7 conidia ml⁻¹, suggesting its potential as a powerful biocontrol agent.

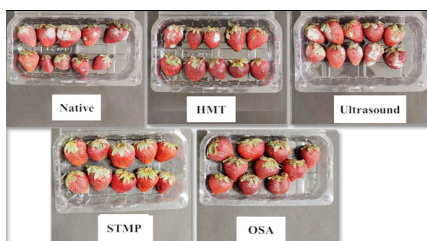


Clonostachys rogersoniana (A)
Insect cadaver infected with entomopathogenic fungi (B&C) Pure colony observed on PDA (D) Conidia (E) Verticillium-like primary conidiophore

(Watpade S and Pal D, Regional Station Shimla) (watpade.santosh@icar.gov.in)

Modified Mango Kernel Starch and Phenols Based Edible Coatings for Shelf-Life Extension of Strawberries

Edible coatings derived from mango kernel starch (MKS) enriched with phenolic extracts offer a sustainable solution for post-harvest fruit preservation. Sodium trimeta phosphate (STMP)-modified MKS films, plasticized with sorbitol and glycerol, demonstrated good film-forming, barrier properties and quality retention in strawberries. These coatings extended shelf life by 18 days, reduced weight loss, and delayed *Botrytis cinerea* infection.



Strawberries coated with MKS film (a) native starch (b) Heat Moisture treated starch (c) Ultrasonicated starch (d) Sodium trimeta phosphate STMP modified (e) Octenyl succinic anlydride, OSA modified starch, after 18 days of cold storage

(Gaur S, Division of Food Science and Post-Harvest Technology) (shalinigaur@iari.res.in)

Pusa Trishool Pruning: A Vertical Production Technique for Tomato and Cherry Tomato in Protected Environments

Four branch/stem pruning methods were evaluated for their effects on yield, profitability, and resource efficiency in the cultivation of tomato (Pusa Rakshit) and cherry tomato (Cherry Tomato-1) under protected environment. The “Pusa Trishool Pruning Method” (branchless triple stem) achieved maximum yield for Pusa Rakshit and Cherry Tomato-1 (196.24 & 107.8 q/1000 m²), net return (₹167.63 & ₹ 433) and B:C ratio (1.50 & 2.28), respectively, outperforming other methods. It optimized sunlight, aeration, and nutrient use, nearly doubling yield and profitability, making it ideal for wider adoption.



Pusa Trishool Pruning Method in cherry tomato (A) and Overview of Tomato (B) with the pruned crop

(Singh A K, CPCT) (awanisingh@iari.res.in)

Efficient Smart Surface and Pressurized Irrigation System

A smart RFID-based automatic basin irrigation system, developed in collaboration with IASRI and NePPA, can operate without internet connectivity making it ideal for remote areas. Another automatic sub-surface drip system was developed with > 95% water efficiency, 35-40% water saving, 40-50% nutrient saving, 25% yield increase, B:C ratio of 1.85 and



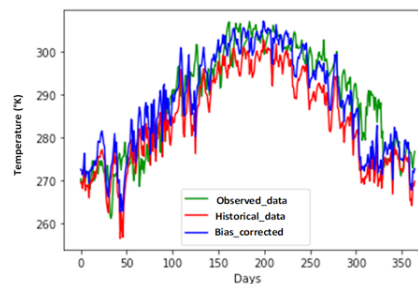
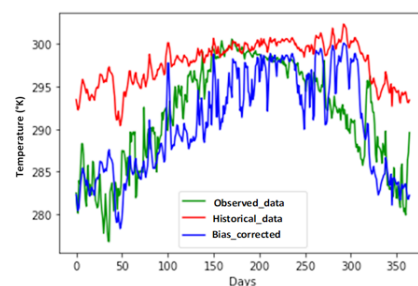
Automated sub-surface drip irrigation system

reduced labor costs.

(Sudhishri S and Pramanik M, Water Technology Centre) (susama@iari.res.in)

Analysis of Agricultural Seasonal Climate Scenarios with Global Climate Model (GCM)

The 21 GCM historical simulated data for daily maximum and minimum temperatures and rainfall were analyzed for bias relative to Indian Meteorological Department (IMD) gridded data during 1980–2014. The analysis revealed a cold bias in the northern latitudes and a hot bias in the southern latitudes of India. Bias correction was performed using the quantile mapping method and the corrected data were used to adjust future climate projections for 2015–2100 under Shared Socioeconomic Pathway (SSP) and Representative Concentration Pathway (RCP) combinations of 2–2.4, 3–7.0, and 5–8.5.

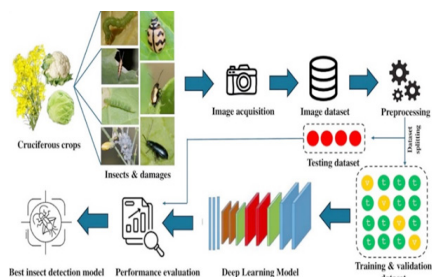


Global climate model data bias for historical temperatures and bias corrected ones

(Kumar S N, Division of Environmental Science) (nareshkumar@iari.res.in)

Development of Deep Learning-based Detection of Insect Damage in Cruciferous Crops

A deep learning approach using YOLOv5I-based single-stage object detection model for the identification of agriculturally important insects of crucifers and some of their damage symptoms was developed. Using 2,730 annotated images captured from various fields, YOLOv5I's "large" variant (YOLOv5I) achieved an accuracy of 99.5%, precision of 92.0%, recall of 83.0%, and F1-Score of 0.873. It highlights the effectiveness of deep learning for insect detection and suggests its integration with mobile apps for real-time pest management solutions for farmers.

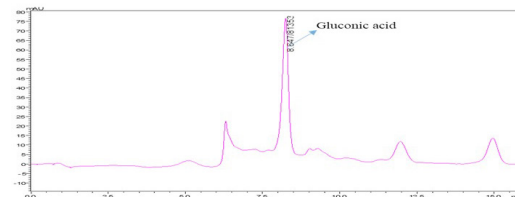
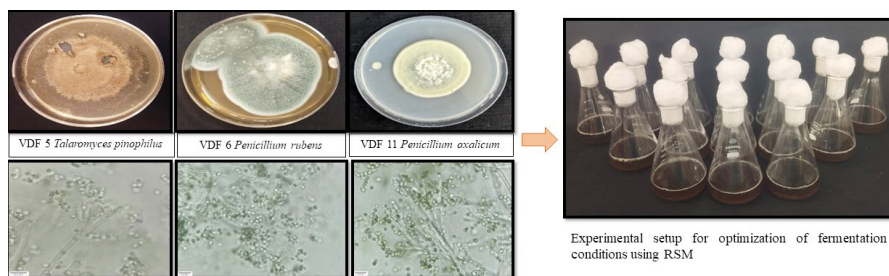


YOLOv5I-based detection model for identification of insects in crucifers

(Shashank P R, Division of Entomology) (shashank@icar.gov.in)

Gluconic Acid Production from Potato Waste

Gluconic acid, a mild organic acid with diverse applications in food, pharmaceutical, chemical industries, was produced using agro-industrial potato waste. Among 30 isolates (15- fungi 15- bacteria), fungal strains *Talaromyces pinophilus*, *Penicillium rubens*, and *P. oxalicum* were selected for consortium development as they produced higher amounts



Optimization of fermentation conditions using potato peel waste and scale up of gluconic acid production

Optimisation of production of gluconic acid from potato peel waste

of gluconic acid compared to bacteria. Optimized fermentation conditions—pH 6.0, 30°C, 12 days, with 3% potato peel powder and 4% methanol on day 3—yielded 63.03 g/L gluconic acid.

(Shukla L, Division of Microbiology) (livleen@iari.res.in)

Drone-Based Thermal Remote Sensing of Water Stress

Drone-mounted thermal imaging was employed to assess water stress by measuring key indicators of crop water status such as canopy temperature, relative leaf water content (RWC), stomatal conductance (G_s) and transpiration rate (T_r). The Simplified Crop Water Stress Index (CWSIsi) showed strong correlations with RWC, G_s and T_r and negative correlations with

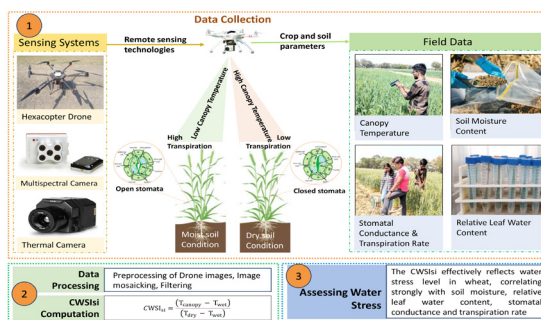
soil moisture, RWC, G_s , T_r and yield. Thus, drone-based thermal sensing has a wide potential for large-scale, real-time water management in wheat.

(Ranjan R, Dhara S, Sahoo R N, Pramanik M, Mukherjee J and Kumar M, Division of Agricultural Physics) (rajeevranjan@iari.res.in)



Deeksharambh: Student Induction Program 2024

“Deeksharambh: Student Induction Program 2024” for the newly admitted postgraduate and undergraduate students at IARI and its hubs, was organised from October 15-28, 2024. The orientation program aimed to assist students in beginning their academic journey while acquainting them with the legacy, resources and regulations of IARI. Dr. Anupama Singh, Joint Director (Education) & Dean, ICAR-IARI introduced the structured fortnightly program, designed to provide a strong academic foundation



Drone based thermal imaging for real time assessment of water stress

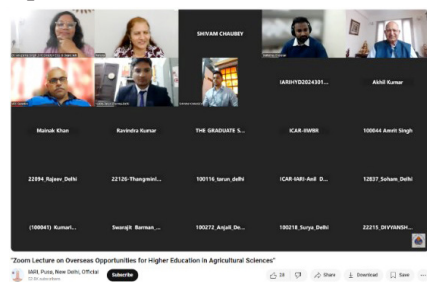
alongside opportunities in sports, cultural and social activities. Dr. R.C. Agrawal, DDG (Agril. Education), ICAR, highlighted the key aspects of ‘NEP-2020 - An opportunity for inclusive learning’. Dr. T.R. Sharma, DDG (Crop Science) and Director & VC (Addl. Charge), ICAR-IARI, New Delhi, emphasized the “Mantra for Success,” comprising the 3 D’s (Dedication, Devotion, Determination), 3 H’s (Honesty, Humility, Hardwork), and 3 S’s (Sincerity, Sensitivity, Sense of Belongingness).



Release of publication by the dignitaries at Deeksharambh Induction Program

Brainstorming Session

The Post Graduate School Student’s Union (PGSSU) of IARI organized an online brainstorming session on November 17, 2024 on “Overseas Opportunities for Higher Education in Agricultural Sciences”. Ms. Renuka Vallarapu, Senior Management Analyst at Seattle University, USA, spoke on “Beyond Borders: Navigating Study Abroad Options for Indian Graduates”,

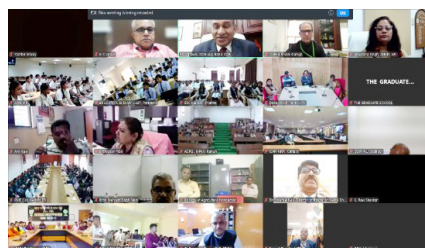


Participants at the brainstorming session

while Mr. Dattatray G. Bhalekar, Ph.D. Scholar at Washington State University, USA, shared insights on “Mastering the Path to Higher Education in the USA: Tips and Strategies”.

Agricultural Education Day

ICAR-IARI, New Delhi celebrated Agricultural Education Day virtually on December 03, 2024 marking the birth anniversary of Dr. Rajendra Prasad, the first President of India. Dr. R.C. Agrawal, Deputy Director General (Agricultural Education), ICAR, delivered a lecture on “Preparing Youths for ‘Viksit Bharat’ through Agricultural Higher Education”. The ICAR documentary on “Cultivating Futures in Agriculture: a promising path ahead” was screened for the audience. Other commemorative activities included a quiz for NCR school students, a Field Day for children at the Nehru Experimental Centre, Pusa and an awareness program organized by the Agricultural Extension Division at a government school in Amarpur, Palwal district. KVK, Shikohpur, Gurugram also organized an event



Agricultural Education Day held through online and offline Programs

at Government Middle School, Tripari, to guide the students about the ventures related to agriculture education.

Introduction of a New Foundation Course on Entrepreneurship Development

Under the IARI Student to Start-up Scheme, ICAR-IARI launched a Foundation Course on Entrepreneurship Development for undergraduate students (3rd Year) with a credit structure of 1 Theory + 2 Practical. The course focuses on agripreneurship and blending theoretical knowledge with practical experience to build essential entrepreneurial skills.

Book launch by Prof. Glenn Denning, Former DG, ICRAF

The IARI Alumni Association hosted a book launch of “Universal Food Security” by Prof. Glenn Denning, former Director General of ICRAF, alongside a lecture by the author on “Universal Food Security: A Global Perspective with Implications for India”.



Dignitaries at the book launch event



Field Day

A field day was organised by Division of Genetics on November 06, 2024 to demonstrate herbicide-tolerant rice lines, dwarf pigeonpea varieties, and improved breeding materials for moong bean, soybean,

and nutritionally enriched maize. The participants explored diverse pipeline hybrids and trait-specific mapping populations of various crops.



Field day of new variety of Pigeon pea, Pant Arhar 421 organized by KVK Shikohpur, Gurugram at village Raiseena on October 10, 2024, to showcase the features of new variety.



Field Day on brinjal and chilli was organized by Division of Vegetable Science in collaboration with ZTM & BPD on October 25, 2024 for live demonstration of varieties/hybrids of brinjal (26) and chilli (7) to farmers and visitors from 11 seed companies.



Field day on Chrysanthemum was organised by Division of Floriculture and Landscaping on December 16, 2024 to demonstrate the IARI varieties namely Pusa Centenary, Pusa Sona, Pusa Chitraksha, Pusa Lohit, Pusa Kesari, Pusa Shwet, Pusa Arunodaya and Pusa Aditya to the students, flower traders, floriculturists and nurserymen.



Field day on Integrated Farming System for enhancing productivity, profitability with lesser

environmental footprints was organized by Division of Agronomy alongwith NRM school of IARI on October 10, 2024 to strengthen collaboration with Industry.



Field days were organized under TSP scheme of ICAR-IARI for tribal farmers on October 30, 2024 in village Alipur, Bejupada tehsil and on November 02, 2024 in village Agla Bas of Mandawar, district Dausa, Rajasthan to apprise them on soil health management for enhancing productivity and profitability.



Seed Distribution Programmes

ICAR-IARI, Regional Station, Indore, conducted the “PUSA Wheat Seed Distribution” Programme from October 09-29, 2024, to enhance wheat productivity nationwide. Farmers received seeds of high-yielding, climate-resilient, bio-fortified, and disease-resistant varieties like HI 1650, HI 1655, HI 1665, HI 8830, and HI 8840. Division of Agricultural Extension also organized three NICRA Farmers’-Scientist interaction programs in project villages of Uttar Pradesh, Madhya Pradesh and Haryana from November 05-08, 2024 where 842 farmers participated, receiving IARI-improved wheat varieties and Kitchen Garden kits for front-line demonstrations in NICRA-adopted villages.



Seed distribution conducted by IARI under different programmes

Training Programs

Training	Salient Features
	<ul style="list-style-type: none"> • KVK Shikohpur, Gurugram organized a training programme on “Integrated Pest Management in Cotton” at village Maujabad on October 01, 2024. • Participants: 32
<ul style="list-style-type: none"> • Division of Seed Science and Technology organized a farmers’ training programme on “Improved Cultivation of Rabi Crops” on October 10, 2024 at Jewar, Gautam Budh Nagar, Uttar Pradesh. • Participants: 500 	
	<ul style="list-style-type: none"> • CATAT organized two days training programme on <i>Rabi</i> crops from October 14-15, 2024. • Participants: 20
<ul style="list-style-type: none"> • ZTM & BPD Unit and Division of Microbiology, ICAR-IARI, New Delhi organized five days training program on “Skill Development in Biofertilizer Application and Compost Technology” from October 14-18, 2024 • Participants: 25 	
	<ul style="list-style-type: none"> • Division of Seed Science and Technology organized a Farmers’ Training- cum- seed distribution program held on October 16, 2024 at Regional Station, Karnal, ICAR-IARI. • Participants: 1000

- KVK Shikohpur, Gurugram organized one day training on “Metabolic Disorders in Cattle & their Management” at village Shikohpur on October 21, 2024.
- Participants: 21



- KVK Shikohpur, Gurugram organized two days training programme on “Group Dynamics of SHGs and Farmers’ Organizations” from October 22-23, 2024.
- Participants: 20

- Division of Environmental Science organized 21-days workshop on “Capacity Building on Simulation Modelling and Climate Change Research Towards Knowledge Based Agriculture” for the students under NMSHE-TF-Agriculture project from November 19-December 09, 2024.
- Participants: 46



- The Division of Plant Physiology hosted “Beyond the Books: One day Hands-On Workshop in Plant Biology” for school students on November 27, 2024 under SERB - Social and Scientific Responsibility initiative.
- Participants: 06

- Division of Floriculture and Landscaping organized one training programme on “Technical Education & Skill Development through Practical Exposure in Floriculture” for ITI’s of UT Ladakh” from December 01 - 15, 2024 .
- Participants: 15





- Water Technology centre organized one-day training on “Efficient Water Management Technologies in Agriculture” for newly recruited Junior Engineers from the WALMI training centre, Okhla, New Delhi on December 05, 2024.
- Participants: 30

- The Division of Soil Science and Agricultural Chemistry, ICAR- IARI, New Delhi organised “21st Advanced Level Training on Soil Testing, Plant Analysis and Water Quality Assessment” from December 10-30, 2024.
- Participants: 07



- Division of Agricultural Physics in collaboration with ICAR-IIWM, Bhubaneswar and ICAR-NePPA organized two days training-cum-workshop on “Drone Technology and Its Applications in Agriculture” at ICAR-IIWM, Bhubaneswar from December 02-03, 2024.
- Participants: 60

Mission/Special Programmes

Technology Day and Industry Meet of NRM School

Technology Day & Industry Meet of Natural Resource Management School, ICAR-IARI, New Delhi was organized on October 10, 2024, at WTC Auditorium. Dr. P.S. Brahmanand, PD, WTC presented key NRM technologies, followed by an address from Dr. C. Viswanathan, Joint Director (R), emphasizing industry collaboration for technology adoption. Participants visited various divisions showcasing innovations like STFR Meter, advanced farm machinery, integrated farming systems and UAV-based crop monitoring.



Technology Day organised by NRM School

World Food Day 2024

A two-day event was organized on October 15-16, 2024 by the Division of Food Science and Post harvest Technology at the NRL Auditorium with Dr. P.K. Singh, Agriculture Commissioner, Dr T.R. Sharma, DDG (Crop science) and Dr Ranjit Singh, Joint Secretary, Ministry of Food Processing Industries as esteemed guests. Industry experts, including Mr.

Shubham Chaturvedi (Country Delight) and Ms. Manisha Mehta (Nutriboss Pvt. Ltd.) delivered talks. Two technical publications were also released during the event. KVK, Shikohpur, Gurugram also celebrated the day on October 16, 2024, in village Baghanki. Farmers and farm women were informed about the Day’s significance and urged participants to prevent food wastage and shared strategies to minimize waste.



Release of technical bulletins on World Food Day

World Soil Day 2024

World Soil Day under the theme “Caring for Soils: Measure, Monitor, Manage” was celebrated by the Division of Soil Science and Agricultural Chemistry, ICAR-IARI, New Delhi, in collaboration with the Delhi Chapter of the Indian Society of Soil Science on December 5, 2024. Dr. Ch. Srinivasa Rao, Director, ICAR-NAARM, Hyderabad, delivered a lecture on the theme. Lecture by Dr. P.S. Brahmanand, PD (WTC) highlighted the importance of soil health and societal responsibility.

A Farmers’ Field Day in Aligarh, Uttar Pradesh was also organized with the participation of over 300 farmers and 50 students, with experts discussing soil management practices. SBI officials presented financial schemes for agriculture, and an awareness rally was held in Ganeshpur village. At KVK, Gurugram, an awareness program emphasized soil testing, balanced fertilizer use, and organic amendments, with soil health cards distributed to participants.



Event held to commemorate World Soil Day

Kisan Diwas

Kisan Diwas was organised at KVK Shikohpur, Gurugram on December 23, 2024. The program covered awareness on soil and water sample collection, cost reduction in

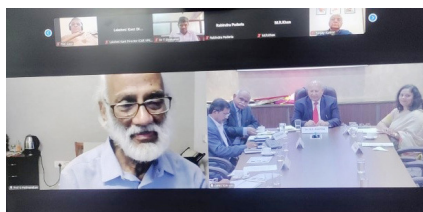
cultivation, recycling farm waste to enrich soil organic matter, and insect-pest control. Farmers were also educated on natural farming techniques.



Kisan Diwas program at KVK, Shikohpur, Gurugram

First Foundation Day Lecture of IARI Alumni Association

The IARI Alumni Association (IAA) organized its First Foundation Day Lecture on December 02, 2024 through virtual mode. Prof. Govindarajan Padmanaban, Former Director of Indian Institute of Science (IISc), Bengaluru delivered the lecture on “60+ Years of Science at IISc” offering a glimpse into the evolution of scientific research and its impact on society. The function was presided over by Dr. R.S. Paroda, Chairman, TAAS, New Delhi & President, IARI Alumni Association and Former Secretary, DARE & DG (ICAR).



IAA Foundation day lecture delivered by Prof. Govindarajan Padmanaban in online mode

Kisan Goshthi

Kisan Goshthi on Nutrition Security for Women Empowerment

The Division of Agricultural Extension, ICAR-IARI organized

extension activities at Dadhota village, Palwal district, Haryana under the Farmer FIRST project and Sangel village of Nuh district, Haryana on October 24, 2024 and October 30, 2024, respectively. The event themed “Nutrition Security for Women Empowerment,” promoted vegetable cultivation techniques to support nutrition security and empower women farmers. Practical skills for home gardening were demonstrated, focusing on sustainable practices and a variety of vegetables suitable for kitchen gardens. Participants received vegetable seeds and kitchen garden kits with instructions for immediate implementation.



Distribution of kitchen garden kits to farmers

Kisan Goshthi on Unnat Bharat Abhiyan

KVK Shikohpur, Gurugram organized a Kisan goshthi on “Awareness of Unnat Bharat Abhiyan” in collaboration with ICAR-IARI, New Delhi and IIT, Delhi on October 28, 2024 which was attended by 164 participants from various fields. Dr. P. K. Singh, Project Director from IIT Delhi,

outlined the programme's aims and objectives, while Dr. R. N. Padaria, Joint Director Extension, ICAR-IARI, discussed initiatives in the agriculture sector. Speakers highlighted climate-resilient technologies, entrepreneurship development, and schemes from various departments.



Participants at Unnat Bharat Abhiyan Kisan Goshthi

CAPACITY BUILDING

DBT AISRF Meeting

Department of Biotechnology, Government of India funded Indo-Australian Collaborative Programme Round 11 entitled “Functional genomics of chickpea to enhance drought tolerance” was launched on December 30, 2024 at the ICAR-IARI. Led by ICRISAT with ICAR-IARI and NABI, the project focuses on chickpea functional genomics to enhance drought tolerance. It aims to develop a pangenome, gene-linked proteomic and metabolomic datasets, and new genetic markers for breeding programs, incorporating information from earlier phases to advance drought-resilient chickpea research.



Launch event of Indo- Australian Collaborative Programme (Round 11)

Workshop on Climate Resilient Agriculture in India: Opportunities and Challenges

The Division of Agricultural Extension in collaboration with IARI-NICRA and Climate Trends Organization conducted a Farmers' Scientist interaction workshop on “Climate Resilient Agriculture in India and its opportunities and challenges” on October 22, 2024 which was attended by 80 farmers and development stakeholders. The program emphasized climate change impacts on agriculture, promoting climate-resilient crops, adaptive cultivation practices, and diversification of horticultural crops.



Workshop on Climate Resilient Agriculture in India

One Day Workshop on IARI SDG Strategy: A Strength-based Approach

The Graduate School organized a workshop entitled ‘IARI SDG Strategy: A strength-based approach based on research, FWCI and citescorers’ on November 18, 2024 under the guidance of Dr. Jen Dollin, Director, Sustainability Education and Partnerships, Western Sydney University (WSU), Australia in hybrid mode.



Delegates at National Scientists Interaction Seminar

National Brainstorming Workshop

A National Brainstorming Workshop entitled ‘Mission Mausam: Forecast to Field (Techniques and Targets for Amrit Kaal)’ was jointly organized by the Association of Agrometeorologists and Division of Agricultural Physics, ICAR-IARI during November 27- 28, 2024. Dr Mrutyunjay Mohapatra, Director General of Meteorology, Indian Meteorological Department, GOI highlighted the seamless translation of weather forecasts into actionable on-farm strategies.



Dignitaries during the brainstorming workshop

Hindi Workshop

Hindi section, ICAR-IARI organized a one-day Hindi Workshop on the “Official Language Policy and Implementation” on December 13, 2024 for the newly appointed Assistants.

National Scientists Interaction Seminar

The Division of Agronomy, in collaboration with OCP Support Services Pvt. Ltd., Gurugram,

and OCP Group, Morocco, organized a seminar on “Sustainable Soil Health Management with Special Reference to Phosphorus Management” on December 19, 2024, in New Delhi, which was attended by 60 Indian

and 9 Moroccan delegates. The event was inaugurated by Padma Shri Dr. Arvind Kumar, who emphasized on phosphorus management and strengthening research-industry collaborations for sustainable agriculture.

Workshop - cum - Competition

Division of Soil Science and Agricultural Chemistry, ICAR-IARI, New Delhi and the Delhi Chapter of the Indian Society of Soil Science jointly organized Workshop-cum-Competition on “Exploring the Colours of Natural Soil Painting: A Hands-on Experience with Earth’s Palette” on December 04, 2024. The students learnt the use of different soils as medium for coloring the painting.



Paintings with soil as a medium

MISCELLANEOUS

Research Grants

Externally Funded Projects Sanctioned and Implemented (>10 lakhs)

Project Title	Amount (In Lakhs)	Duration	Funding Agency	Principal Investigator
Exploring the untapped potential of an ancient species of wheat, <i>Triticum sphaerococcum</i> for abiotic stress and nutritional quality traits through genome wide association studies	20.93	October 07, 2024-October 06, 2027	SERB-CRG-ANRF	Dr. Kiran B Gaikwad, S, Division of Genetics
Unravelling the Candidate genomic regions regulating multi-flowering in cultivated lentil (<i>Lens culinaris</i> L.) through RNA-Seq and QTL -Seq approaches using a RIL population	41.42	October 15, 2024-October 14, 2027	SERB-CRG-ANRF	Dr. Gyan Prakash Mishra, Head, Division of Seed Science & Technology
Mapping and fine mapping of genomic regions associated with dry root disease resistance in chickpea	37.09	October 29, 2024-October 28, 2027	SERB-CRG-ANRF	Dr. B S Patil, Incharge, IARI, Regional Station Dharwad
Exploring of iron and zinc efficient and tolerant genotypes of finger millet (<i>Eleusine coracana</i> L.) and root morphological traits and genotypic variability under diverse nutrient management practices	35.97	December 16, 2024- December 15, 2027	SERB-ANRF	Dr. Vijay Singh Meena, S, IARI, Regional Station, Pusa, Bihar

High Resolution mapping of cleistogamous trait for ensuring genetic purity in pigeon pea (<i>Cajanus cajan</i> (Millisp.) cultivars	86.82	October 03, 2024- October 02, 2027	DBT	Dr. Kumar Durgesh, SS, Division of Genetics
Quantification of greenhouse gas emission from Mulberry cultivation for inventory estimation	54.08	October 10, 2024- October 09, 2026	Central Silk Board, Mysore- CSRTI	Dr. Arti Bhatia, PS, Division of Environment Science
Assessment of the efficacy of different bio-stimulants for improving seedling vigour and management of yellow mosaic disease in mungbean	10.81	October 18, 2024- April 17, 2025	Central Council for Research in Homeopathy (CCRH)	Dr. Ruchi Bansal, SS, Division of Plant Physiology, IARI
Exploring bio-stimulating potential of inorganic and organic substances for early seed invigoration and management of iron deficiency (at seedling stage) in rice	11.06	November 04, 2024- May 03, 2025	Central Council for Research in Homeopathy (CCRH)	Dr. Vijay Paul, PS, Division of Plant Physiology
Simulation modelling system for crop yield prediction in India (FASAL 2.0)	155.76	November 14, 2024-November 13, 2025	Department of Economics and Statistic (DES), MAF&W	Dr. Vinay Kumar Sehgal, PS as Project coordinator and PI-Dr. Rajkumar Dhakar, S, Division of Agricultural Physics
Development of multimedia-based pedagogy models and modules for agricultural extension and education	25.36	November 12, 2024-July 31, 2027	NASF, ICAR	Dr. Girijesh Singh Mahra, Scientist, Division of Agricultural Extension
All India Network Project on Emerging Pests (AINP-EP)	761	December 03, 2024- March 31, 2026	ICAR	Dr. V.K. Baranwal, Network coordinator; PI-Dr. Susheel Kumar Sharma, SS, Division of Plant Pathology
Quantifying Rice Greenhouse Gas Emissions (Queri): Impact of Water Management and Sowing Techniques in Telangana and Punjab, India	25.01	December 15, 2024- December 31, 2026	Mitti Agri Carbon India Private Limited	Dr. Arti Bhatia, PS, Division of Environment Science
Elevating bio-availability and potash use efficiency using mycorrhizal formulation in maize-wheat cropping system	49.94	October 15, 2024- October 15, 2027	Indian Potash Limited	Dr. Seema Sangwan, PS, Division of Microbiology
Studies on Response of SEFA Fertilizer on Crop Growth, Yield and Crop Economics of Tomato and Capsicum under Protected and Open Conditions	40.85	November 26, 2024- November 25, 2026	Anglo American Crop Nutrient India Private Limited	Dr. Awani Kumar Singh, PS, Centre for protected Cultivation Technology
Eco-friendly and sustainable management of important diseases of mustard and paddy using <i>Trichoderma asper Ellum</i> under-hot humid conditions	20.00	December 19, 2024- December 18, 2026	Mahamaya Life sciences Private Limited	Dr. Lakshman Prasad, PS, Division of Plant Pathology



Evaluation of Calcium Magnesium Carbonate on Growth, Yield and Productivity in Okra Crop	13.61	Ex-post facto- November 30, 2024	Oceana Minerals Asia-Pacific PTE Ltd	Dr. Awani Kumar Singh, PS, Centre for Protected Cultivation Technology
Demonstration of the efficacy of FOM and LFOM on crop productivity and soil health under different cropping systems	11.80	October 23, 2024- October 22, 2025	Verbio India Private Limited	Dr. M. C. Meena, SS, Division of Soil Science and Agricultural Chemistry
Evaluation, outreach and up-scaling of fermented organic manures for sustainably enhancing productivity and reducing environmental footprints of predominant cropping systems in India	4086.68	November 25, 2024 as per Signed MoU to November 24, 2029	Maruti Suzuki India Limited	Dr. Sanjay Singh Rathore, Head, Division of Agronomy

Technology Commercialization

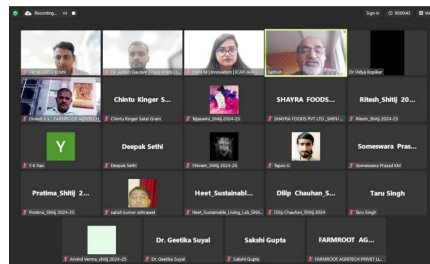
Under the Lab to Land Initiative, from October to December 2024, 15 technologies developed by ICAR-IARI were commercialized to 47 industry partners. The Unit processed the following patents/copyrights:

Name of Innovation	Division	Status
Variable Height Real Time Cutting & Plucking Force Measurement Device for Fruits and Vegetables	Agricultural Engineering	Patent Filed
Cumin Harvester	Agricultural Engineering	Patent Filed
Algorithm on Maturity Detection of Tomatoes	Agricultural Engineering	Copyright Filed
Android based mobile application software pusa n doctor	Agricultural Engineering	Copyright granted

INCUBATION ACTIVITIES

SHITIJ 2024

Phase 2 of SHITIJ 2024, a year-long incubation program for early-stage startups, began on October 21, 2024. The four-month primer included sessions on pitch deck creation, funding, branding, compliance, design thinking, IPR,



Participant in SHITIJ 2024

and business strategy. Participants gained practical knowledge about government schemes, startup registration, and MSME processes, equipping them with essential tools for entrepreneurial success.

Agripreneurship Development Program

ZTM&BPD Unit and Division of Microbiology, ICAR-IARI conducted an Agripreneurship Development Program (ADP) on skill development in biofertilizer application & compost technology from October 14-18, 2024. The objective of the training was to popularize application of biofertilizers for

crop production and impart training on compost technology for rapid biodegradation of agri-residues.



Agripreneurship Development Program on skill development in biofertilizer and compost technology

SAMARTH 2024-25

PUSA Krishi, ZTM-BPD, ICAR-IARI organized SAMARTH 2024-25 workshop on “Nurturing the Indian Agri-Startup



Workshop on “Nurturing the Indian Agri Startup Ecosystem” at NASC Complex

Ecosystem” on November 06-07, 2024, at the NASC Complex in New Delhi.

The two-day event provided a comprehensive platform for collaborative discussions and in-depth insights into critical areas of the agri-startup ecosystem, including enhancing market access, exploring new funding avenues and building impactful stakeholder partnerships.

Startup-Farmers Meet

The Startup-Farmers Meet/ Demo Day was successfully held on December 17, 2024 at the RuTAGe Smart Village Centre (RVSC), at Chalis Gaon Vikash Parikshan, Mandaura, Sonapat, Haryana. The event connected Pusa Krishi startups with 60-70 farmers, demonstrating innovative agricultural products and solutions to bridge the gap between innovation and practice.



Farmer participation at Startup Farmer’s Meet

Corporate Membership

In this quarter, 33 new industry partners were enrolled and the membership of 97 existing partners was renewed.

AWARDS AND HONOURS

- Dr. Y S Shivay, Professor, Division of Agronomy was awarded FAI Plant Nutrition Award–2024 for development of integrated site-specific nutrient management prescriptions in rice-based cropping system.
- Dr. Akriti Sharma, Scientist,

Division of Agricultural Economics received R T Doshi award for best oral presentation on 32nd Annual Conference of Agricultural Economics Research Association during December 11- 13, 2024.

- Dr. P.R. Shashank, Senior Scientist, Division of Entomology was awarded

National Academy of Agricultural Sciences Associateship 2025.

- Dr. Satish Lande, Senior Scientist, Division of Agricultural Engineering received “ISAE Distinguished Service Award-2024” in the discipline of Farm Machinery and Power in the 58th Annual Convention of ISAE held at VNKV, Parbhani, Maharashtra.
- Dr. Debasis Golui, Scientist, Division of Soil Science & Agricultural Chemistry received Young Investigator Meeting Award and ISES Conference Award by International Society of Exposure Science, Canada in October 2024.
- Dr. Indu Chopra, Senior Scientist, Division of SS & AC, received best oral lecturer in Hindi (2023-24) from ICAR-IARI during under *Sarvshresth Hindi Vyakhyan Puraskar Yojana*.
- Dr. Renjini V R, Scientist, Division of Agricultural Economics, received N A Mujumdar award for the best paper oral presentation in the 84th Annual Conference of Indian Society of Agricultural Economics, from November 11-13, 2024, at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, Puducherry and also received Uma Lele Mentorship award, 2024, by Agricultural & Applied Economics Association (AAEA) & Agricultural Economics Research Association.

Publications with NAAS rating >10.0

- Baral K, Shivay Y S, Prasanna R, Kumar D, Srinivasarao C, Mandi S, Nayak S and Reddy K S. 2024. Optimising nitrogen use efficiency of prilled urea through integrated use of nano-ZnO and green manuring for better productivity, quality and nutritional status of Basmati rice crop. *Frontiers in Sustainable Food Systems* 8. doi:10.3389/fsufs.
- Barman A, Pooniya V, Zhiipao R R, Biswakarma N, Kumar D, Das T K, Shivay Y S, Rathore S S, Das K, Babu S, Saikia N and Bhatia A. 2024. Integrated crop management for long-term sustainability of maize-wheat rotation focusing on productivity, energy and carbon footprints. *Energy* 311. doi: 10.1016/j.energy.2024.133304.
- Das S, Bhati V, Dewangan B P, Gangal A, Mishra G P, Dikshit H K and Pawar P A M. 2024. Combining Fourier-transform infrared spectroscopy and multivariate analysis for chemotyping of cell wall composition in Mungbean (*Vigna radiata* (L.) Wiczek). *Plant Methods* 20.
- Gouda MR and Subramanian S. 2024. Decoding the genomic terrain: functional insights into 14 chemosensory proteins in whitefly *Bemisia tabaci* Asia II-1. *Scientific Reports* 14. doi:10.1038/s41598-024-77998-z.
- Gouda MR, Naga KC, Nebapure S M, and Subramanian S. 2024. Unravelling the genomic landscape reveals the presence of six novel odorant-binding proteins in whitefly *Bemisia tabaci* Asia II-1. *International Journal of Biological Macromolecules* 279. doi: 10.1016/j.ijbiomac.2024.135140.
- Ishwarya Lakshmi K S, Dhillon M K, Mukri G, Mahendra K R, Gowtham K V, and Tanwar A K. 2024. Induced biochemical variations in maize parental lines affect the life table and age-specific reproductive potential of *Spodoptera frugiperda* (JE Smith). *Frontiers in Plant Science* 15. doi: 10.3389/fpls.2024.1517848.
- Jha G K, Velayudhan P K, Bhatia A, Laishram C, Kumar D, Begho T, and Eory V. 2024. Transitioning towards sustainable agriculture: analysing the factors and impact of adopting multiple sustainable inputs by paddy farmers in India. *Frontiers in Sustainable Food Systems* 8. doi: 10.3389/fsufs.2024.1447936.
- Kala S, Jawle C, Pande M A, Agarwal A, Kant K, Mishra B K, Singh, M K and Takhur L K. 2024. Glycerol-silica/chitosan conjugated self-assembled nano-flower framework for *Herstellung thompsoni* delivery with effectiveness in natural settings: Optimization and pilot scale production. *International Journal of Biological Macromolecules* 283. doi: 10.1016/j.ijbiomac.2024.137476.
- Msango K, Gouda M R, Ramakrishnan B, Kumar A and Subramanian S. 2024. Variation and functional profile of gut bacteria in the scarab beetle, *Anomala dimidiata*, under a cellulose-enriched microenvironment. *Scientific Reports* 14. doi:10.1038/s41598-024-73417-.
- Nivedha R M, Bhardwaj A, Prasanna R, Bavana N, Kokila V, Nishanth S, Rudra S G, Singh A K, Reddy K S and Shivay Y S. 2024. Enhancing fruit quality and yield in tomato through cyanobacterium mediated nutrient-fertilization. *Biocatalysis and Agricultural Biotechnology* 61. 103344. doi: 10.1016/j.bcab.2024.103344.
- Raghavendra K J, Kumara T M, Gowda C, Kandpal A, Bhat S, Amrutha T, Shivaswamy G P, Nithyashree M L and Ravisankar N. 2024. A meta-analysis on economic performance of organic vis-à-vis conventional farming in India. *Clean Technologies and Environmental Policy* 1-12. doi:10.1007/s10098-024-03053-0.
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- Ramya S, Kour B, Sudheer K, Kumar M B and Ramakrishnan B. 2024. Seed Priming Alters the Microbial Community Composition in Seedlings of Rice (*Oryza sativa* L.). *Journal of Plant Growth Regulation* 1-14. doi: 10.1007/s00344-024-11534-1.
 - Saha P, Das T K, Sen S, Govindasamy P, Singh R, Raj R, Mahanta D, Meena M C, Bhatia A, Shukla L, Dey A and Sharma T. 2024. The interplay between external residue addition, and soil organic carbon dynamics and mineralization kinetics: Experiences from a 12-year-old conservation agriculture. *Journal of Environmental Management* 371. doi: 10.1016/j.jenvman.
 - Sathee L, Barman D, Adavi S B, Jha S K, and Chinnusamy V. 2024. Nitrogen at the crossroads of light: Integration of light signalling and plant nitrogen metabolism. *Journal of Experimental Botany* erae 437. doi: 10.1093/jxb/erae437.
 - Sharma N, Vittal H, Dubey A K, Sharma R M, Singh S K, Sharma N, Singh N, Khandelwal A, Gupta D K, Mishra G P, Meena M C, Pandey R and Singh N K. 2024. Physiological and molecular insights into the alternate bearing in mango (*Mangifera indica* L.) using next-generation sequencing approaches. *Journal of Experimental Botany* erae 403. doi: 10.1093/jxb/erae403.
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 - Thenappan D P, Pandey R, Hada A, Jaiswal D K, Chinnusamy V, Bhattacharya R and Annapurna K. 2024. Physiological Basis of Plant Growth Promotion in Rice by Rhizosphere and Endosphere Associated *Streptomyces* Isolates from India. *Rice* 17. doi: 10.1186/s12284-024-00732-w.

Signing of MOU between ICAR-IARI, New Delhi and Maruti Suzuki India Limited

A MoU was signed between Division of Agronomy, ICAR-IARI, New Delhi and Maruti Suzuki India Limited for a CSR project worth ₹41 crore titled “Evaluation, outreach, and up-scaling of fermented organic manures for sustainably enhancing productivity and reducing environmental footprints of predominant cropping systems in India”. The project aims to evaluate the effects of enriched fermented organic manures (FOM) on productivity, profitability, soil health, and environmental sustainability across five states and 56 districts. It also seeks to quantify carbon credits and establish a Centre of Excellence for Organic Farming at ICAR-IARI.



National & International Visits at IARI



Visit of Ohio State University Delegation to IARI, New Delhi on October 18, 2024



Visit of German Delegation led by Ms Bettina Stark-Watzinger –Minister, Federal Ministry of Education and Research (BMBF), Germany to IARI, New Delhi on October 24, 2024



Visit from SSIFS for the trainee diplomats of Rwanda, Libya and South Sudan to ICAR-IARI, New Delhi on December 16, 2024



Visit of Prof. Rattan Lal, World Food Prize Laureate and Padma Shri Awardee on December 11, 2024.



Visit of Media delegation from East & Southern Africa to IARI, New Delhi on December 16, 2024



Visit of Shri Surya Pratap Shahi, Agriculture Minister, Uttar Pradesh at IARI on December 29, 2024

Published quarterly by the Publication Unit on behalf of the Director, ICAR- Indian Agricultural Research Institute (IARI), New Delhi-11 0012, and printed at M. S. Printers, C-108/1 Back Side, Naraina Industrial Area, Phase-1, New Delhi-110028, Tel.: 011-45104606