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| <ul style="list-style-type: none"> <li>• Research Achievements</li> <li>• Papers presented/Lectures Delivered</li> <li>• Consultancy/Advisory Services</li> <li>• Copyrights/MOUs</li> </ul> | <ul style="list-style-type: none"> <li>• Panorama of Activities</li> <li>• Participation in Conferences</li> <li>• Awards and Recognitions</li> <li>• Personnel</li> </ul> | <ul style="list-style-type: none"> <li>• Publications</li> <li>• Human Resource Development</li> <li>• Projects Initiated/Completed</li> </ul> |
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## From the Director's desk...

This Newsletter brings to you the key research achievements, awards and recognitions received, training programmes conducted, workshops and conferences organized/ attended, advisory services provided and significant publications of ICAR-IASRI during the period under report.

The Institute has developed (i) WaveFLSTM: Wavelet-based fuzzy LSTM model for forecasting complex time series data; (ii) Methods of construction of semi Latin rectangles; (iii) OptiTanker: Software for Multi-Criteria Decision Making Using TOPSIS; (iv) AIS: AgriImpactSuite for Evaluation of the Economic Impact of Agricultural Technologies (Crop Varieties) and (v) MLDeCNV: A machine-learning approach for accurate detection of copy number variants.

interface Database, MustardFamilyExplorer (Varietal and Molecular Information Bank for the Indian Mustard Family; online server for prediction of enzymes involved in Carbon Fixation pathways; web application for construction of designs for order-of-addition experiments and generation of designs for semi-Latin rectangles.

**Krishi e-Nidanshala:** an assisted service of Kisan Sarathi via Common services Centres (CSC), was launched at pilot scale. Two drones have been procured as part of the project "Agri-Drone" in ICAR to develop smart sampling technique for Crop Cutting Experiments (CCEs) using drone data and develop crop acreage and crop yield estimation methodologies for generating estimates using drone technology. A drone flying event to launch the activity was also organized.

The Institute also celebrated Vigilance Awareness Week; Orientation & welcome program for the newly admitted M.Sc Students; Swachhta Hi Sewa Campaign, Kisan Diwas and National Unity Pledge.

A total of 66 Research Papers, 05 Book Chapters; 01 Popular Articles; 05 R Packages were published and 19 methodologies /databases/web applications received copyrights. Initiated a new research project and 08 research projects were completed. 57 personnel participated in two Hindi Workshop. Two scientists of the Institute received Remote Pilot Certificate (RPC) from the Directorate General of Civil Aviation (DGCA), Government of India, after successfully completing Remote Pilot Training.

The scientists of the Institute brought recognitions by way of serving as Expert Members in various high level committees, presenting research work in prestigious conferences/ workshops.

I earnestly hope that the contents of this Newsletter would be useful and informative to you all. Any constructive comments for better presentation of this newsletter are most welcome.



*Rajender Parsad*

(Rajender Parsad)

## Research Achievements

### WaveFLSTM: Wavelet-based Fuzzy LSTM Model for Forecasting Complex Time Series Data

The forecasting of time series continues to be a prominent area of interest among researchers exploring advanced learning techniques. In recent times, deep recurrent neural networks, particularly long short-term memory (LSTM) models, have demonstrated exceptional forecasting capabilities compared to other neural network architectures. To tackle the fuzzy datasets, fuzzy LSTM (FLSTM) model was developed by incorporating the advantage of the intuitionistic fuzzy logic (IFL). Most of the time series data generated from different fields including agriculture are not only fuzzy, but also exhibit nonlinear and non-stationary characteristics. A novel approach for forecasting complex time series data has been proposed as wavelet-based fuzzy LSTM (WaveFLSTM) model, specifically addressing the challenges posed by fuzzy, nonlinear, and non-stationary characteristics of time series. This model has advantage of denoising through maximal overlap discrete wavelet transform (MODWT) and integrating the advantage of fuzzy logic by means of IFL. The fuzzy relations with LSTM networks are applied to each of the denoised series by using membership and non-membership values through intuitionistic fuzzy c-means technique. The prediction accuracy of proposed WaveFLSTM model is compared with that of LSTM, FLSTM and wavelet LSTM (WaveLSTM) models using monthly wholesale price data of different pulse crops from various markets in India. The percentage gain in accuracy of the proposed model, as compared to LSTM, WaveLSTM, and FLSTM, is found out to be 29%, 20%, and 14% respectively. Besides, the usual accuracy measures, the model confidence sets and technique for order preference by similarity to ideal solution algorithm have also been used.

### Semi Latin Rectangles Layouts

Developed (i) methods for obtaining Semi-Latin-Rectangles (SLR) layouts with a cell size of 3 with an application of SLR designs in maize experiments; (ii) methods of constructing Sliced Orthogonal Latin Hypercube Designs (SOLHD) for equal batch size and unequal batch size and (iii) two methods for constructing Constant block-sum PBIB designs which have more importance in dose-response studies in the case of animal experiments.

### OptiTanker: Software for Multi-Criteria Decision Making using TOPSIS

It is a powerful user-friendly software that helps you rank options based on multiple criteria using the TOPSIS method (available at <https://icar-tech.github.io/optiranker>). When we are evaluating projects, selecting suppliers, or making other decisions, it provides accurate and reliable results quickly and efficiently. Some of the application areas and case studies are

- **Genotype Selection for Crop Breeding:** help in selecting the best genotypes based on multiple traits such as yield, resistance to pests, and tolerance to environmental stress.
- **Crop Selection for Optimal Yield:** The software can rank different crops based on various factors such as soil type, climate, and water availability, aiding in the decision-making process for optimal crop selection.
- **Precision Agriculture:** By evaluating various criteria like soil health, water usage, and environmental factors, it supports precision agriculture to make informed decisions on crop management.
- **Pest and Disease Management:** assist in identifying the best pest or disease management strategies based on their effectiveness, cost, and environmental impact.
- **Agroecological Zone Identification:** The software helps in identifying suitable agroecological zones for specific crops based on environmental and climatic conditions, ensuring better crop adaptation and improved yields.
- **Case Study 1 - Genotype Selection in Rice:** used to evaluate multiple rice genotypes based on their drought resistance, yield, and disease resistance. This allowed for the identification of the most suitable genotype for drought-prone areas.

- **Case Study 2 - Crop Selection for Climate Change Adaptation:** In areas affected by climate change, it helps farmers select crops based on climate resilience, soil fertility, and water requirements, ensuring better crop productivity and sustainability.
- **Case Study 3 - Multi-Criteria Decision Making for Fertilizer Use:** used to rank different fertilizer options based on their effectiveness, cost, environmental impact, and ease of use, providing farmers with optimal choices for improving crop growth.

### AIS: AgriImpactSuite for Evaluation of the Economic Impact of Agricultural Technologies (Crop Varieties)

- **Estimation of Adoption Rate:** Calculates the adoption rate of a particular agricultural practice or technology over time, based on factors like the initial adoption rate, present adoption rate, maximum adoption rate, and year of inception of the technology.
- **Estimation of Economic Surplus:** Computes economic benefits (surplus) based on factors such as base year price & quantity, yield change, cost change, and elasticity of supply and demand. It provides the option to estimate the consumer surplus, producer surplus, and total economic surplus generated from technology adoption.
- **Risk Reduction Benefit:** Assesses how implementing certain agricultural practices could reduce risk, using parameters like the relative risk aversion coefficient and coefficients of variation under control and improved conditions.
- **Poverty Reduction Effect:** Estimates the impact of agricultural improvements on poverty reduction in a specific area. It factors in parameters such as the agricultural GDP (AgGDP), elasticity of poverty, and the number of poor people in the domain area.

The screenshot displays the AgriImpactSuite software interface with the following modules and input fields:

- Estimation Adoption Rate:**
  - Initial Adoption Rate (%): 0.0001
  - Present Adoption Rate (%): 1.5
  - Max. Adoption Rate (%): 32.0
  - Year of Inception: 2018
  - Year of Present Rate: 2024
  - Last Year for Estimation: 2048
  - Rate Adjustment: -0.000
- Estimation Economic Surplus:**
  - Base Year Price (Rs/tonne): 1715
  - Base Quantity (tonne): 69910000
  - Exogenous Growth Rate: 0.1
  - Expected Yield Change: 0.16
  - Expected Cost Change: 0.05
  - Probability of success: 1.0
  - Supply Elasticity (absolute value): 0.644
  - Demand Elasticity (absolute value): 1.433
  - Depreciation Rate: 1.0
- Risk Reduction Benefit:**
  - Relative Risk Aversion Coefficient: 1.77
  - Coefficient of Variation (Control): 20
  - Coefficient of Variation (Improved): 20
- Poverty Reduction Effect:**
  - AgGDP of Domain area (Million): 700000
  - Elasticity of Poverty: 0.43
  - No. of poor people in Domain area (Million): 20

Another important sub-module of AgriImpactSuite software is PARC: Present-year Adoption Rate Calculator which is designed to calculate the adoption rate of a specific agricultural technology or intervention for the present year. It helps in estimating how agricultural technologies (such as improved seed varieties) are adopted in a given region over time. It also calculates the present-year adoption rate of agricultural technology based on various inputs like seed rate, multiplication factor, and crop area. It allows users to input data, calculate the rate, and save results for analysis.

### MLDeCNV: A Machine-Learning Approach for Accurate Detection of Copy Number Variants

**Developed** MLDeCNV, a new machinelearning framework for accurate CNV detection from next-generation sequencing (NGS) data. Existing CNV detection algorithms frequently fail to detect small CNVs or areas with low read depth, resulting in incomplete detection. MLDeCNV overcomes these limitations by incorporating 32 NGS-derived features and fusion of predictions from several CNV detection tools, which are confirmed by PCR and aCGH

### R-Packages Developed: 05

- **minFactorial:** All Possible Minimally Changed Factorial Run Orders(<https://cran.r-project.org/web/packages/minFactorial/index.html>). Factorial designs with minimum changes in factors level may be preferred for such situations as these minimally changed run orders will minimize the cost of the experiments. This package is used to construct all possible minimally changed factorial run orders for different experimental set ups along with different statistical criteria to measure the performance of these designs.



- **hrtfFMC**: Half Replicate of Two-Level Factorial Run Order with Minimum Level Changes (<https://cran.r-project.org/web/packages/hrtfFMC/index.html>). It is used to construct run sequences with minimum changes for half replicate of two level factorial run order. It save time and resources by minimizing the number of changes in levels of individual factor and therefore the total number of changes. Due to restricted randomization the minimally changed run sequences of half replicate of two level factorial run order will be affected by trend effect. The output also provides the Trend Factor value of the run order. Trend factor value will lies between 0 to 1. Higher the values, lesser the influence of trend effects on the run order.
- **GenomicSig**: Computation of Genomic Signatures (<https://cran.r-project.org/package=GenomicSig>). Genomic signatures represent unique features within a species' DNA, enabling the differentiation of species and offering broad applications across various fields. This package provides essential tools for calculating these specific signatures, streamlining the process for researchers and offering a comprehensive and time-saving solution for genomic analysis.
- **OPTeCD**: Optimal Partial Tetra-Allele Cross Designs. version 1.0.0 (<https://CRAN.R-project.org/package=OPTeCD>).
- **SudokuDesigns**: Sudoku as an Experimental Design. Version 1.1.0 (<https://CRAN.R-project.org/package=SudokuDesigns>).

### Database/Webservers developed

**GARUD (Genetically Aggregated Rice User-interface Database)**: Developed in association with ICAR-NIPB as a comprehensive online repository dedicated to Indian rice varieties, providing essential information on released rice (1200+ varieties) types along with extensive genomic data. It serves as a valuable resource for researchers, farmers, and policymakers to explore the genetic diversity and characteristics of Indian rice. With data supporting crop improvement and innovation, GARUD aids in enhancing agricultural practices and food security. The repository is managed by the ICAR-National Institute for Plant Biotechnology, New Delhi and is available at <https://rice-garud.icar-web.com/>

**DeepCFixEC**: Online server for prediction of enzymes involved in Carbon Fixation pathways. It is available at <http://iasri-bird.icar.gov.in/DeepCFixEC>

**DOOFA**: Web application named DOOFA for construction of designs for order-of-addition experiments and is available at <https://drs.icar.gov.in/DooFA/Home.html>

## Panorama of Activities

### Vigilance Awareness Week

Institute organized the Vigilance Awareness Week (October 28-November 03 2024) on the theme “सत्यनिष्ठा की संस्कृति से राष्ट्र की समृद्धि” (Culture of integrity for Nation's Prosperity). Dr. Rajender Parsad, Director ICAR-IASRI administered Integrity pledge to all employees on October 28, 2024. The Institute employees were also encouraged to take the e-pledge of integrity. Many of the employees took



the e-pledge of integrity. During the week an online quiz was organised on 30<sup>th</sup> November 2024. Scientists and other staff members of the institute participated in the quiz.



### **Orientation and Welcome program for the newly admitted M.Sc Students**

Ten students (Agricultural Statistics-4, Bio-Informatics-3, Computer Applications-3) have joined in different courses at ICAR-IASRI. The Programme was organised as part of the Deeksharambh programme of Graduate School, ICAR-IARI.





## Swachhta Hi Sewa Campaign

Swachhata Pakhwada was organized during December 16-31, 2024. Swachhata pledge was taken on December 16, 2024 at the photo shoot point. Discussions were held on water saving and re-use wherever possible, efficient and effective use of electricity, single use plastic free campus, contribute significantly to environmental pollution. During Swachhata Pakhwada following other activities were performed by ICAR-IASRI Staff/Students and Contractual staff:



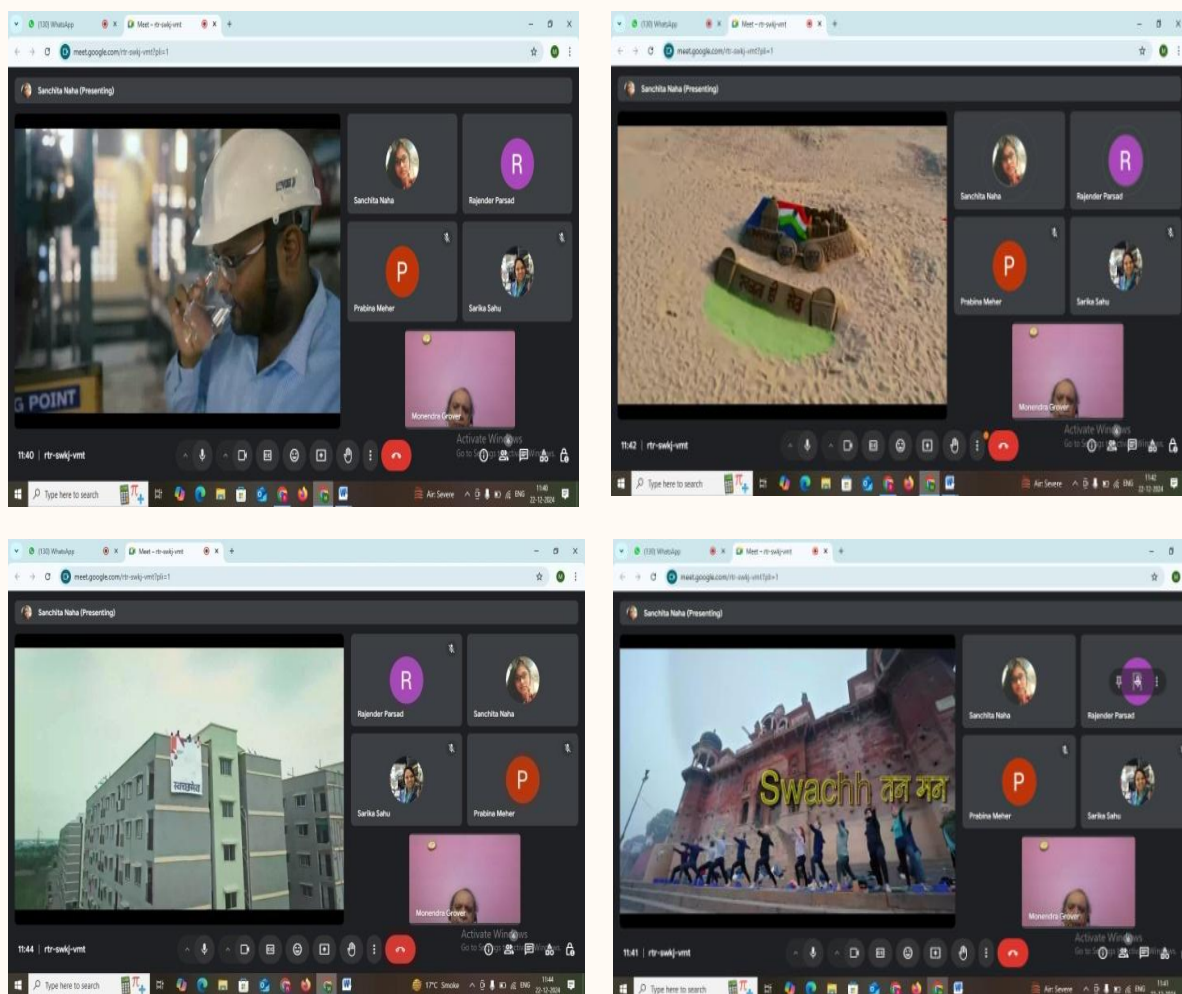
Cleanliness and Sanitation drives in residential colony near IASRI campus; cleaning awareness in vicinity of IASRI Campus; Promoting green drive focusing on the care and maintenance of all plants and trees across the campus. The residents of the colony were counselled on cleaning of their premises and surroundings. Staff members were requested to perform cleaning in their respective residential



colonies and nearby market places. Video shows on the following topics were organized: (i) Swachhamev Jayate! - Anthem for Swachhata Hi Seva (SHS) 2024 'Swabhav Swachhata - Sanskaar Swachhata' (ii) Water Conservation: How the water conservation can be carried out in arid and hot region; (iii) भारत का प्लास्टिक अपशिष्ट संकट और "इको इंडिया: क्या "प्लास्टिक: इको इंडिया और कचरे से उत्पन्न ईंधन जीवाश्म ईंधन की जगह ले सकता है और ऊर्जा जरूरतों को पूरा कर सकता है?" (iv) Documentary film on Swachh Bharat Mission Grammeen. The Institute campus was maintained as clean and green campus.







### Launch of Krishi e-Nidanshala

Assisted service of Kisan Sarathi via Common services Centres (CSC), Kisan Sarathi: Pilot Launch of Kisan Sarathi: Krishi e-Nidanshala (A joint initiative of Indian Council of Agricultural Research, Digital India Corporation and Common Service Centers) was launched at pilot scale by Dr. Udham Singh Gautam, DDG Extension, ICAR in the presence of Dr. Anil Rai, ADG ICT, ICAR and Dr. Rajender Parsad, Director, ICAR-IASRI on December 19th, 2024. The highlights of the Krishi e-Nidanshala: (i) Kisan Sarathi Services is now available at nearest Common Service Centre through

**Pilot Launch of Kisan Sarathi: Krishi e-Nidanshala**  
Joint initiative of Indian Council of Agricultural Research (ICAR), Digital India Corporation (DIC) and Common Service Centers (CSC)

By  
**Dr. Udham Singh Gautam (DDG Extension, ICAR)**  
In Presence of:  
Dr. Anil Rai (ADG ICT, ICAR)  
Dr. Rajender Parsad (Director, ICAR-IASRI)

- ❖ Kisan Sarathi Services is now available at nearest Common Service Centre through Krishi e-Nidanshala.
- ❖ Helps farmers to get expert guidance and timely response for farming and livestock queries from KVKs.
- ❖ With this initiative, farmers can benefit with personalised advice in their local language.
- ❖ The platform brings expert guidance to your doorstep.

Logos: Kisan Sarathi, ICAR, Digital India, CSC, Ministry of Electronics & Information Technology, Government of India.

Krishi e-Nidanshala; (ii) Helps farmers to get expert guidance and timely response for farming and livestock queries from KVKs; (iii) With this initiative, farmers can benefit with personalised advice in their local language and (iv) The platform brings expert guidance to your doorstep.



## Drone Flying and Launch

“Drone Flying and Launch” event was organized on December 20, 2024, procured as part of the project “Agri-Drone in ICAR: ICAR-IASRI Component”. Dr. R. C. Agrawal, DDG (Agricultural Education), inaugurated the event and Dr. Rajender Parsad, Director, ICAR-IASRI presided over the event. The objectives of the study are to develop smart sampling technique for Crop Cutting Experiments (CCEs) using drone data and develop crop acreage and crop yield estimation methodologies for generating estimates using drone technology.



## Kisan Diwas Celebrations

- Kisan Diwas was celebrated online on December 23, 2024. Director, ICAR-IASRI inaugurated the celebrations and explained the importance of Celebrating Kisan Diwas on the Birthday of Late Choudhary Charan Singh, Former Prime Minister of India. In 2001, the Government of India announced December 23 (his birthday) to be celebrated as National Farmer's Day to honour Chaudhary Charan Singh's and Lal Bahadur Shastri's contributions for the welfare of farming community. Director, ICAR-IASRI welcomed the farmers (i) Sh. Sumer Singh; (ii) Sh. Satish Kumar from Kaur Village, Delhi; (iii) Sh. Ashok; (iv) Surender Singh; (v) Sh. Yuvraj Singh Pushkar; (vi) Ersad Malki; (vii) Jia Bhim Singh and (viii) Sh.





Dinesh Kumar from Mumraj Pur, Buland Shahar. The farmers while expressing their views lauded the efforts of ICAR scientists and also stressed the need for further improvement in the farmer research community interaction.

### Seminars Delivered

A total of 32 seminars on different areas of Agricultural Statistics, Computer Application and Bioinformatics which include presentations on new project proposals, salient findings of the completed research projects and Training undertaken at International level by the Scientists, Course/ Thesis/ ORW Seminars of students of M.Sc. and Ph.D. disciplines of Agricultural Statistics, Computer Application and Bioinformatics. The category-wise break-up is given below.

Category	Type of Seminar	Number
<b>Scientist</b>	Project Completion	12
	New Project Proposal	0
	Foreign Visit	03
	General	0
<b>Student</b>	Course	10
	ORW	5
	Thesis	2
	Guest Seminar	0
<b>Total</b>		<b>32</b>

Samarth Godara guided (i) Mr. Sumeet, Department of Bioinformatics, Centre for Post Graduate Studies, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, for his (link unavailable) thesis entitled "Gene-wise Analysis of Viral Genomes: Trends and Variations in GC Content with a Novel Graphical Tool for Gene-Specific Calculation" during his four-month internship at ICAR-IASRI, New Delhi;

## PUBLICATIONS

### Research Papers

1. Agashe NW, Varghese, C, Mohd, H (2024). Mating-environmental designs for breeding trials using bi-hierarchical incomplete block designs. *Current Science*, **127(10)**, 1246-1251. <http://krishi.icar.gov.in/jspui/handle/123456789/84381>
2. Ahlawat OP, Khippal A, Venkatesh K, Chhokar RS, Gill SC, Kashyap PL, Kharub AS, Kumar L, Kumar N, Sharma A, Kumari K, Sheoran S and Singh G (2024). Impact of different tillage and residue retention practices on soil nutrients, microbial community composition and grain yield of malt barley. *Journal of Soil Science and Plant Nutrition*, **24**, 7651-7668. <https://doi.org/10.1007/s42729-024-02065-5>
3. Ajmal S, Venkatesh P, Singh A, Praveen KV, Renjini VR, Jha GK, Sharma DK and Sangeeth, V (2024). What factors determine the economic value of wetland agroecosystem services in developing countries? A meta-regression approach. *Wetlands Ecology and Management*, **33(9)**. <https://doi.org/10.1007/s11273-024-10016-1>
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5. Aravind KS, Vashisth A, Krishnan P, Kundu M, Prasad S, Meena MC, Lama A, Das P and Das B (2024). Development of multistage crop yield estimation model using machine learning and deep learning techniques. *International Journal of Biometeorology*, **69**, 499-515. <https://doi.org/10.1007/s00484-024-02829-9>
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10. Bedi P, Gole P and Marwaha S (2024). PDSE-Lite: lightweight framework for plant disease severity estimation based on Convolutional Autoencoder and Few-Shot Learning. *Frontiers in Plant Science*, **14**, 1319894.
11. Bhardwaj R, Gayacharan, Gawade BH, Pathania P, Talukdar A, Kumar P, Khan S and Singh GP (2024). Identification of heat-tolerant mungbean genotypes through morpho-physiological evaluation and key gene expression analysis. *Frontiers in Genetics*, **15**, 1482956. <https://doi.org/10.3389/fgene.2024.1482956>
12. Bijarnia A, Tatarwal JP, Gupta AK, Bijrania AL, Yadav RK, Ram B, Kumawat R, Choudhary M, Kumar R and Singh D (2024). Alleviating summer heat stress in cowpea-baby corn intercropping with stress-reducing chemicals and fertility variations. *Scientific Reports*, **14(1)**, 3020. <https://doi.org/10.1038/s41598-024-52862-2>
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### Book Chapters

1. Banerjee R, Rangappa MG, Das R, Ahmad T, Sahu PK, Sangannavar PA and Sivaprasad V (2024). The Application of Biostatistical Techniques in Silkworm Breeding and Improvement. In *Biotechnology for Silkworm Crop Enhancement: Tools and Applications*, pp. 239-256. Eds. Raviraj V Suresh, Soumen Saha, Khasru Alam. Springer Nature Singapore.
2. Nigam S, Jain R, Singh VK, Jain S, Marwaha S and Arora A (2024). Implementing Artificial Intelligence in Wheat Disease Identification: A Mobile Application Approach. In *Diseases of Field Crops: Diagnostics and Management*, pp. 169-185. Eds. Vaibhav Kumar Singh, Jameel Akhtar, Krishna Pratab Singh. Springer Nature Singapore.
3. Islam SN, Marwaha S, Deb CK and Haque MA (2024). Role of ICT and Artificial Intelligence in Disease Diagnosis, Forecast, and Management. In *Diseases of Field Crops: Diagnostics and Management*, pp. 399-418. Eds. Vaibhav Kumar Singh, Jameel Akhtar, Krishna Pratab Singh. Springer Nature Singapore.
4. Ahmed B, Das P, Banerjee R, Singh S and Bharti (2024). Data Analytics Methods: A Hands-on Approach for Precision Agriculture. In *Artificial Intelligence for Precision Agriculture*. Eds. Pethuru Raj, N Gayathri, G. Jaspher Willsie Kathrine. Taylor and Francis group. ISBN 9781032462349; <https://doi.org/10.1201/9781003504900>
5. Sharma NK, Anand A, Budhlakoti N, Mishra DC and Jha GK (2024). Artificial Intelligence and Machine Learning for Rice Improvement. In: *Climate-Smart Rice Breeding*. {Eds.} A. Singh, S.K. Singh and J. Shrestha, pp. 273-300. Springer, Singapore. [https://doi.org/10.1007/978-981-97-7098-4\\_11](https://doi.org/10.1007/978-981-97-7098-4_11)

### Popular Articles

- Chaurasia HS, Shanmugam N, Sharma K, Arora A and Murmu S (2024). AI Revolution in Cotton Processing. *Krishi Science – eMagazine for Agricultural Sciences*, 5(12), 59-63.

## PAPERS PRESENTED/LECTURES DELIVERED

### Paper presented /Invited talk delivered in Conferences

- 3<sup>rd</sup> International Conference on Climate-Smart Nutri-Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024) held during November 06-08, 2024 at ICAR-Central Institute for Women in Agriculture, Bhubaneswar in Hybrid Mode.
  - Shashi Dahiya\*, Akash, Pratibha Joshi, Sudeep Marwaha, Chandan Kumar Deb, Ramasubramanian V. Decision support system for assessment of agricultural activities using physiological and postural analysis.
- 11<sup>th</sup> International Electronic Conference on Sensors and Applications, November 26–28, 2024 at MDPI: Basel, Switzerland.
  - Samarth Godara. Robosim: design, implementation, and applications of a line follower robot simulator.
- 84<sup>th</sup> Annual Conference of Agricultural Economics organized by Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, Puducherry between 11-13 November, 2024.
  - Biswajit Mondal, Jaiprakash Bisen\*, RP Saha, Sudipta Paul, Nitiprasad Jabhulkar, GAK Kumar, Ankita Kandpal and Rajni Jain. An innovative approach to estimate varietal adoption through breeder seed statistics.
- IISA-2024 conference, organized by the International Indian Statistical Association (IISA) at Cochin University of Science and Technology, Kochi, India during 27-31 December 2024.
  - Cini Varghese. Analysis of non-crisp data derived from designed experiments.
  - Anindita Datta. Symmetric ordering factorial experiments.
  - Mohd Harun. Product Optimization through unified DoE and ML techniques.
  - Neethu RS. Space filling designs based on optimal covariate designs.



- Boyina Devi Priyanka. Designs for multi-session sensory trials in the presence of assessor constraints.
- Ashish Gupta\*, BN Mandal, Rajender Parsad, Cini Varghese. Construction of minimal balanced and minimal strongly balanced crossover designs.
- Eleventh International Triennial Calcutta Symposium on Probability and Statistics during December 27-30, 2024.
  - Ankita, Susheel Kumar Sarkar\*, Shashi Shekhar. Variance components testing for continuous data from nested unbalanced designs.
  - Anushaka Garg\*, Anindita Datta, Rajender Parsad. Designing Factorial Experiments involving order of addition effects with some components.
  - Ranjit Paul\*, Prakash Kumar, HS Roy and Md Yeasin. Wavelet based Deep Learning Models for Time Series Forecasting. (Invited Talk)
  - Das P, Shrama A, Sharma SK, Adhikary T. Deep learning based yield forecasting in horticulture: a case study of apple.
  - Achal Lama. Dirichlet regression model for forewarning jute semilooper infestation using weather variables.
  - Kaustav Aditya. Model assisted estimators under two stage sampling design in the presence of unit non-response.
- Tenth International Conference on Statistics for the Twenty-First Century (ICSTC 2024), University of Kerala, December 13-16, 2024.
  - Kaustav Aditya. calibration estimator of the finite population total under two stage sampling design using deterministic response mechanism for nonresponse.
  - Rahul Banerjee. Integrating data from multiple surveys for robust estimation of population total: a novel approach using m-estimation.
  - Bharti. Calibration Estimator in dual frame surveys under two-stage sampling when auxiliary information is available at cluster level.
- 4<sup>th</sup> International Conference on Emerging Electronics and Automation, NIT Silchar, December 9-11, 2024.
  - Akshay Dheeraj. Hybrid CNN-LSTM model for Indian medicinal plant classification.
- 7<sup>th</sup> International Conference on Recent Trends in Image Processing & Pattern Recognition (RTIP2R), Indian Institute of Information Technology, Bhopal, India, December 19-20, 2024.
  - Sapna Nigam. Automated weed classification using attention-embedded ConvNeXtV2 architecture.
- 2<sup>nd</sup> National Genetic Congress 2024 was organized by Indian Society of Genetics and Plant Breeding held at IARI, New Delhi during December 11-13, 2024.
  - Rajkaran Tripathi\*, Vaidurya Pratap Sahi, Sandeep Nalla, Nidhi Pandey, Jai Chand Rana, Satish Kumar Yadav, Mohd Harun, Gyanendra Pratap Singh. Application of AMMI model to analyze the stability and G×E interaction of buckwheat genotypes in the agro-climatic region of Prayagraj. (Poster Presentation)

(\*denotes who has presented the paper)

### Lecture Delivered (Outside institute)

- ‘Significance of Experimental Designs and Web Resources’ at Lady Sri Ram College, University of Delhi, Delhi on October 17, 2024. (Rajender Parsad)
- ‘Exploring Market Potential of Makhana: Trends and Opportunities’ at the National Seminar cum Exhibition on Makhana and Allied Aquatic Crops-2024, Research Centre for Makhana, Darbhanga on October 17, 2024. (G.K. Jha)
- ‘AI: From Buzzword to Reality’ at the National Seminar on 'Role of Artificial Intelligence in Education & Society', Guru Nanak Girls Khalsa College, Yamuna Nagar on October 23, 2024. (Anu Sharma)

## PARTICIPATION

### International Conference/ Workshop/Symposium etc.

International Conference IISA-2024 organized by International Indian Statistical Association (IISA) at Cochin University of Science and Technology, Kochi, India during December 27-31, 2024. (Cini Varghese, Anindita Datta, Mohd Harun)

- Fourth International Conference on Emerging Electronics and Automation organized at NIT Silchar during December 09-11, 2024. (Akshay Dheeraj)
- Seventh International Conference on Recent Trends in Image Processing & Pattern Recognition (RTIP2R) organized at Indian Institute of Information Technology, Bhopal during December 19-20, 2024. (Sapna Nigam)
- Eleventh International Triennial Calcutta Symposium on “Probability and Statistics” during December 27-30, 2024. (Susheel Kumar Sarkar, Pankaj Das, Kaustav Aditya, Soumen Pal, Achal Lama)
- Tenth International Conference on Statistics for the Twenty-First Century (ICSTC 2024) organized by International Statistics Fraternity (ISF) in collaboration with Department of Statistics, University of Kerala from December 13-16, 2024. (Bharti, Kaustav Aditya)

### National Conference/ Workshop/ Seminar/ Symposia/Training/Foundation Course/ Annual Day/ Lectures, etc.

- IP Awareness/Training program under the National Intellectual Property Awareness Mission on October 18, 2024, conducted by the Intellectual Property Office, India. (Samarth Godara)
- 84<sup>th</sup> Annual Conference of Agricultural Economics organized by Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, Puducherry between November 11-13, 2024. (Jaiprakash Bisen)
- India Digital Agriculture Conference 2024 organized at The Park Hotel, Sansad Marg, New Delhi on October 11, 2024. (Alka Arora)
- National Seminar cum Exhibition on Makhana and Allied Aquatic Crops – 2024 at Research Centre for Makhana, Darbhanga on October 17, 2024. (Girish Kumar Jha)
- 52<sup>nd</sup> Foundation Day- 2024 of Agricultural Scientists Recruitment Board on November 07, 2024. (Rajender Parsad)
- 20<sup>th</sup> Foundation Day of Protection of Plant Varieties and Farmers’ Rights Authority, Ministry of Agriculture & Farmers’ Welfare, Government of India organized at NASC, New Delhi on November 11, 2024. (Rajender Parsad)
- Training Programme on “Preventive Vigilance for ICAR Officers” organized by ICAR-NAARM, Hyderabad, during November 06-08, 2024. (Anshu Bharadwaj)
- VAJRA Mapping Drone Training conducted by Aero360 of Dronix Technologies Pvt. Ltd., Chennai from November 06-12, 2024. (Tauqueer Ahmad, Prachi Misra Sahoo, Ankur Biswas, Pankaj Das, Bharti, Rahul Banerjee, Deepak Singh)
- 32<sup>nd</sup> Annual Conference of Agricultural Economics Research Association (AERA) organized in collaboration with IGKV, Raipur and ICAR-NIBSM, Raipur during December 11-13, 2024. (Girish Kumar Jha)
- National Conference on ‘Digital Agriculture Empowering Indian Farming’ organized by ICAR and NAAS at NASC during December 17-18, 2024. (Rajender Parsad, Sudeep, Alka Arora, S.B. Lal, Shashi Dahiya, Chandan Kr. Deb, Samarth Godara)
- Training cum workshop on Drone Technology & its Applications in Agriculture conducted by ICAR-Indian Institute of Water Management (ICAR-IIWM), Bhubaneswar and Indian Agricultural



Research Institute (ICAR-IARI), New Delhi during December 02-03, 2024. (Ankur Biswas, DPankaj Das)

## HUMAN RESOURCE DEVELOPMENT

### Training Programmes/Workshops Organized: (Participants)

S.No.	Title	Venue	Period	No. of Participants
	हिन्दी कार्यशाला			
1	परीक्षण अभिकल्पना के अनुप्रयोग (संयोजक: मो. हारून और अनिदिता दत्ता)	भा.कृ.अनु.प- भा.कृ.सां.अ.सं, नई दिल्ली	दिसम्बर 19, 2024	23
2	भारतीय संविधान (संयोजक: संजय बोकोलिया और विशाल लखनपाल)	भा.कृ.अनु.प- भा.कृ.सां.अ.सं, नई दिल्ली	दिसम्बर 24, 2024	34

## CONSULTANCY/ADVISORY SERVICES PROVIDED

- Mohd Harun advised Dr. Meraj Alam Ansari, Senior Scientist, ICAR-IIFSR, Modipuram, regarding analysis of Lentil data obtained via an experiment conducted under split-split plot design set-up, including data diagnosis, suitable transformation, ANOVA, and post-hoc analyses.
- Samarth Godara advised (i) Mr. Dera Vikas Reddy, M.Tech. (Student), Agricultural Engineering, ICAR-IARI, New Delhi on developing convolutional neural network models for image-based adulteration detection in saffron; (ii) Mr. Arindam Banerjee, Ph.D. student, Agricultural Extension, ICAR-IARI, New Delhi Ramakrishna Mission Vivekananda Educational and Research Institute, regarding the application of logistic regression for the analysis of Livelihood Assets and strategies and (iii) Ms. Nandita Mondal, Ph.D. student, Agricultural Physics, ICAR-IARI, New Delhi to develop a web-based application for calculation of Eco System services based on user input.
- Sneha Murmu advised (i) Ms. Priya, Ph.D. Student, ICAR-NBPGR and (ii) Ms. Mehulee, Ph.D. student, Division of Plant Pathology, ICAR-IARI, New Delhi regarding protein-ligand interaction study.
- Pankaj Das advised Dr. Trina Adhikary, Assistant Professor of Fruit Science at PAU, Ludhiana, in formulating a sampling plan for her research on dragon fruit.
- Kaustav Aditya advised Ms. Sweetie Mukherjee, Ph.D. (Ag. Extension), on Random forest and CART analysis of ordinal data.
- Med Ram Verma analyzed data of Initial Varietal Trial (IVT) conducted under the AICRP on Soybean for the year 2024-25 of ICAR-Indian Institute of Soybean Research, Indore.

## AWARDS AND RECOGNITIONS

### Awards

### Recognitions

### Rajender Parsad

- Received Certificate of Appreciation for developing the ASRB-Online Application & Scorecard Information System on the 52<sup>nd</sup> Foundation Day- 2024 of Agricultural Scientists Recruitment Board on November 07, 2024.
- Panelist in the Panel Discussion on Capacity Building and Hand Holding organized on December 17, 2024 in the National Conference on 'Digital Agriculture Empowering Indian Farming' organized by ICAR and NAAS at NASC during December 17-18, 2024.

- Coordinator in the Discussion on Digital Agriculture by Professional Society on December 18, 2024 in the National Conference on 'Digital Agriculture Empowering Indian Farming' organized by ICAR and NAAS at NASC during December 17-18, 2024.

### **Ankur Biswas and Pankaj Das**

- Remote Pilot Certificate (RPC) from the Directorate General of Civil Aviation (DGCA), Government of India, after successfully completing Remote Pilot Training at the RPTO, Fore Institute of Drone Technology and Research (FIDTR), Foundation for Organisational Research and Education, Gurugram during September 23-27, 2025.

## **PROJECTS/ SCHEMES/ PROGRAMME/ CENSUS/ SAMPLE SURVEYS/ EVALUATION STUDIES/ SOFTWARE DEVELOPED/ INITIATED/ COMPLETED**

### **Initiated**

1. Development of artificial intelligence/machine learning models for generating yield estimates of crops covered under "Comprehensive Scheme for Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL 2.0), (Funded by Ministry of Agriculture and Farmers Welfare, Govt. of India) w.e.f. October 01, 2024. (Anshu Bharadwaj, Mrinmoy Ray, Achal Lama, Md. Ashraful Haque)

### **Completed**

1. Development of computational pipeline(s) for identification, characterization and functional analysis of ncRNAs in agriculturally important species on October 17, 2024. (Sarika Sahu, Ratna Prabha (till 09.03.2023), Soumya Sharma, (since 20.10.2023))
2. An effective approach for combining time series and deep learning models on October 20, 2024. (Md. Yeasin, Ranjit Kumar Paul)
3. A regression type estimator in dual frame surveys under two-stage sampling on October 31, 2024. (Bharti, Kaustav Aditya, Deepak Singh, Rahul Banerjee)
4. Efficient designs for double cross experiments under fixed/mixed effects model on November 10, 2024. (Md. Harun, Cini Varghese; ICAR-DPR: L. Leslie Leo; ICAR-IARI: Mallikarjuna M.G)
5. Development of machine learning models and Bayesian network for discovery of Nucleic acid-binding protein and their application in disease/pest surveillance on November 24, 2024. (Upendra Kumar Pradhan, Samarendra Das (till 02.04.2022), Prabina Kumar Meher, Sanchita Naha (since 06.12.2022))
6. Statistical approaches for analysis of zero-inflated and over-dispersed counts data and their in single cell studies on November 24, 2024. (Samarendra Das (till 02.04.2022 as PI), Upendra Kumar Pradhan (since 03.04.2022 as PI), Upendra Kumar Pradhan (till 02.04.2022 as Co-PI), Sudhir Srivastava, Prakash Kumar, ICAR/DFMD: Samarendra Das (since 13.09.2022 as Co-PI).
7. Development of robust estimator by integrating data from different surveys on November 27, 2024. (Rahul Banerjee, Pankaj Das, Raju Kumar, Ankur Biswas)
8. Development of artificial intelligence integrated big-data based system for automatic query-response generation and analysis of Indian farmers' queries on December 08, 2024. (ICAR-IASRI: Samarth Godara, Madhu, Sanchita Naha; ICAR-IARI: J.P.S. Dabas)



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S.No.	Name	Registration Number	Received Date	Authors
1.	ASRmiRNA: web server for prediction of abiotic stress-responsive miRNAs and Pre-miRNAs in plants.	SW-18737/2024	13.11.2024	P.K. Meher, Tanmaya Kumar Sahu, Ajit and A.R. Rao
2.	CNN_FunBar: ITS sequence based fungi Taxonomic classification tool.	SW-18590/2024	13.11.2024	Ritwika Das, Anil Rai, DC Mishra, Anu Sharma and Bibek Saha
3.	SVM-Root: Computational Tool for Identification of Root-associated proteins.	SW-18583/2024	13.11.2024	PK Meher, TK Sahu, UK Pradhan and Ajit
4.	mLoc-mRNA: a web server for predicting multiple sub-cellular localizations of mRNAs	SW-18757/2024	13.11.2024	PK Meher and AR Rao
5.	AcrCasPPI: Anti-CRISPR and CRISPR-Cas Protein-Protein Interaction Prediction Tool	SW-19805/2024	12.12.2024	Sneha Murmu, Himanshushekhar Chaurasia, AR Rao, Anil Rai and Sunil Archak
6.	AVR-AgDb: A plant-based antiviral repository to minimize detrimental for ongoing and next pandemic	SW-19817/2024	12.12.2024	Sarika, SK Dutta, Tilak Chandra, Bibek Saha, UB Angadi, MA Iquebal, Anil Rai, Dinesh Kumar
9.	BufAMPdb: Buffalo Antimicrobial Peptide Database	SW-19584/2024	12.12.2024	Aamir Khan, Kalpana Singh, Ajay Verma, Sarika, Varij Nayan, UB Angadi, TK Datta, Anil Rai, Dinesh Kumar, MA Iquebal
10.	BufAMPpred: Deep Learning AMP Prediction Server for Buffalo	SW-19815/2024	12.12.2024	Aamir Khan, Kalpana Singh, Ajay Verma, Sarika, Varij Nayan, UB Angadi, TK Datta, Anil Rai, Dinesh Kumar and MA Iquebal
11.	DeepAProt: Abiotic stress Protein classification tool using Deep Learning in cereal	SW-19586/2024	12.12.2024	Bulbul Ahmed, Ashraful Haque, MA Iquebal, Sarika, Anil Rai, UB Angadi, Dinesh Kumar
12.	EqCNVDb: Equine CNV Database	SW-19585/2024	12.12.2024	NK Sharma, Prashant Singh, Bibek Saha, Anuradha Bhardwaj, MA Iquebal, Yash Pal,

				Varij Nayan, Sarika, SK Giri, RA Legha, UB Angadi, TK Bhattacharya, Anil Rai and Dinesh Kumar
13.	GB5mCPred: 5mC Prediction Server	SW-19587/2024	12.12.2024	Dipro Sinha, Tanwy Dasmandal, Md. Yeasin, DC Mishra, Anil Rai and Sunil Archak
14.	Design and development of web based software for gene expression atlas of Kadaknath Chicken (KadakExpress)	SW-19784/2024	12.12.2024	SB Lal, Md. Samir Farooqi, DC Mishra, Sudhir Srivastava, GK Jha, Reena Arora, Rekha Sharma, Sonika Ahlawat, Jyotika Bhati
15.	KRISHI-BAAT: Bibliometric Author Analysis Tool	SW-19804/2024	12.12.2024	Sakshi Rawat, KK Chaturvedi, Md. Samir Farooqi, Ramasubramanian V., Anu Sharma and Soumen Pal
16.	miRNAloc: a web server for predicting subcellular localizations of miRNAs	SW-19650/2024	12.12.2024	PK Meher and AR Rao
17.	NutTraitDatabase	SW-19787/2024	12.12.2024	Soumya Sharma, Sarika Sahu and Sunil Archak
18.	PlantPathoPPI: Plant-Pathogen Protein-Protein Interaction Prediction Tool	SW-19816/2024	12.12.2024	Sneha Murmu Himanshushekhar Chaurasia, AR Rao, Anil Rai, Sarika, Anshu Bharadwaj, Rajbir Yadav and Sunil Archak
19.	Software for SNP resources of buffalo	SW-19788/2024	12.12.2024	KKChaturvedi, DC Mishra, Sunita Yadav, Poonam Sikka, A. Jerome, SS Paul, AR Rao, Neeraj Budhlakoti, Jyotika Bhati, KP Singh, AK Balhara, I. Singh and Anil Rai



## PERSONAL

### Congratulations on your Promotion/ New Assignment/ New Joining:

Name	Designation	Effective date
Sh. Vishal Lakhanpal	AAO	01.10.2024 (after being relieved from deputation to National Commission of Minorities)
Ms. Charu, Sh. Apoorv Tomar, Ms. Shipra	Assistant	16.10.2024 (New joining)
Sh. Ashish	Assistant	18.10.2024 (New joining)
Sh. Sandeep	Assistant	25.11.2024 (New joining)
Sh. Fabian Minz	AAO	19.12.2024 , Promotion
Sh. Praveen Mangal	Senior Technical Assistant	12.09.2023, Promotion
Sh. Nitin Joshi	Senior Technical Assistant	20.09.2023, Promotion
Smt. Shreya	Senior Technical Assistant	29.09.2023, Promotion
Sh. Manish Kumar	Senior Technical Assistant	16.11.2023, Promotion
Smt. Rinku Verma	Senior Technical Assistant	08.01.2024, Promotion
Sh. Anil Kumar Sidharth	FAO	30.12.2024, Joining

### Wish you a Happy Retired Life

Name	Designation	Effective date
Smt. Laxmi Devi	Private Secretary	30.10.2024

### Transfer/ Resignation/Deputation

Name	Designation	Effective date
Sh. Manish	Assistant	18.11.2024, Resignation

**Compiled by:**

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