



- Research Achievements
- Papers presented/Lectures Delivered
- Consultancy/Advisory Services
- Personnel
- Panorama of Activities
- Participation in Conferences
- Awards and Recognitions
- Publication
- Human Resource Development
- Project Initiated/Completed

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 developed a step-by-step workflow for processing and analysing the single cell sequencing unique molecular identifier (UMI) data. It has been shown that the zero-inflation associated with UMI data had no or minimal role in clustering, while it had significant effect on identifying differentially expressed genes. A methodology for identification of informative genes by implementing the bootstrap technique along with Support Vector Machine Recursive Feature Elimination and Maximum Relevancy and Minimum Redundancy. An online prediction tool ASRmiRNA has also been developed which would supplement the existing effort for identification of abiotic stress-responsive miRNAs and Pre-miRNAs.

The Institute conducts post graduate teaching in Agricultural Statistics, Computer Application and Bioinformatics and in-service courses for human resource development. Institute is conducting M.Sc. and Ph.D. programmes in Agricultural Statistics since 1964, M.Sc. in Computer Application since 1985-86, Ph.D. in Computer Application since 2013-14, M.Sc. in Bioinformatics since 2011-12 and Ph.D. in Bioinformatics since 2014-15. During the 60th Convocation of PG School, IARI, 33 students (21 M.Sc. and 12 Ph.D.) received their degrees in Agricultural Statistics, Computer Application and Bioinformatics. Through 10 Training programmes on specialized topics including a short course and winter school sponsored by Education Division, ICAR and 02 Hindi Workshops conducted by the Institute, a total of 719 participants were trained.

Institute organized an online international symposium on Data Driven Agriculture and Natural Resource Management – Opportunities and Challenges as an Associate Partner, four webinars to celebrate Bharat ki Azadi Ka Amrut Mahotsav, celebrated National Girl Child Day, National Science Day and International Women Day. The Institute initiated 04 new projects and 03 research projects were completed and received 04 copyrights. A total of 48 Research Papers, 03 Databases and 04 R Packages were published.

The scientists of the Institute brought recognitions to the Institute by way of serving as Expert Members in various high level committees, delivering invited talks in prestigious forums. Several training programmes were conducted in online mode and many lectures have been delivered by the Scientists in various online training programmes.

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

Analysis of scRNA-seq

Described a step-by-step workflow for processing and analysing the scRNA-seq (single cell sequencing) unique molecular identifier (UMI) data jointly with the University of Louisville, USA. Through the statistical analysis, it has been shown that the zero-inflation associated with UMI data had no or minimal role in clustering, while it had significant effect on identifying differentially expressed genes.

Informative Gene Selection

Developed a methodology for informative gene selection, which takes care of the spurious relation by implementing the Bootstrap technique along with Support Vector Machine (SVM) Recursive Feature Elimination (SVM-RFE) and Maximum Relevancy and Minimum Redundancy (MRMR). It has been found that the performance of the developed methodology is better as compared to other existing techniques and select less number of more informative genes.

Online Prediction Tool for Abiotic Stress Responsive miRNAs

Developed an online prediction tool “ASRmiRNA”, which is freely accessible at <http://cabgrid.res.in:8080/asrmirna/>. The proposed approach can supplement the existing effort for identification of abiotic stress-responsive miRNAs and Pre-miRNAs.

Databases Developed: 03

1. **OYVMVTDb** (<http://backlin.cabgrid.res.in/oyvmvtdb/>): Okra (*Abelmoschus esculentus*) Yellow Vein Mosaic Virus Transcriptome Database (in collaboration with ICAR-IARI and ICAR-NIPB)
2. **EqSNPDb** (<http://webtom.cabgrid.res.in/eqsnpdb/>): Equine SNP marker database (in collaboration with ICAR-NRC-on-Equines)
3. **CerealESTdb** (<http://cabgrid.res.in/CerealESTdb/>): an interactive database to provide information on assembled and annotated ESTs from four major crop plants, namely wheat, rice, maize, and sorghum under multiple environmental stresses including cold, heat, drought, and salt stress as well as on the application of ABA. This database will help in providing new solutions to molecular biologists and plant breeders for accelerating their efforts to develop abiotic stress-resistant cultivars without compromising the nutritional quality through introgression and gene pyramiding.

Developed R-packages: 04

1. ‘**eemARIMA**’: EEMD Based Auto Regressive Integrated Moving Average Model available at <https://CRAN.R-project.org/package=eemARIMA>
2. ‘**NBBDesigns**’: Neighbour Balanced Block Designs (NBBDesigns) Version 1.0.0 available at <https://cran.r-project.org/package=NBBDesigns>
3. **mkssd**: Efficient Multi-Level k-Circulant Supersaturated Designs and is available at <https://cran.r-project.org/web/packages/mkssd/index.html>
4. **WaveletRF**: The Wavelet Decomposition followed by Random Forest Regression (RF) models for time series forecasting and is available at

<https://CRAN.R-project.org/package=WaveletRF>

PANORAMA OF ACTIVITIES

National Girl Child Day

- Celebrated National Girl Child Day on January 24, 2022 on the theme **Empowering Girl for Brighter Tomorrow**. This day was initiated by the Ministry of Women and Child Development, Government of India in 2008. The Guest Speaker was Ms Kavita Mathur, Chief People and Organization Officer, Tilegal, Gurugram. 93 participants attended the event. (Conveners: Rajender Parsad, Anshu Bharadwaj, Alka Arora)

राष्ट्रीय बालिका दिवस


 2022
24 January


National Science Day

- To celebrate National Science Day, a Webinar on **Agricultural Supply Chain Visibility using Graph Database Technologies** was organized on February 28, 2022. (Speakers: Sh. Amar Bafna, Managing Director, Accenture India; Sh. Hemanshu Gaur, Associate Director, Accenture India and Sh. Vipin Dubey, Manager, Accenture India). 100+ participants from NARES (Rajender Parsad, Anshu Bharadwaj and Alka Arora)

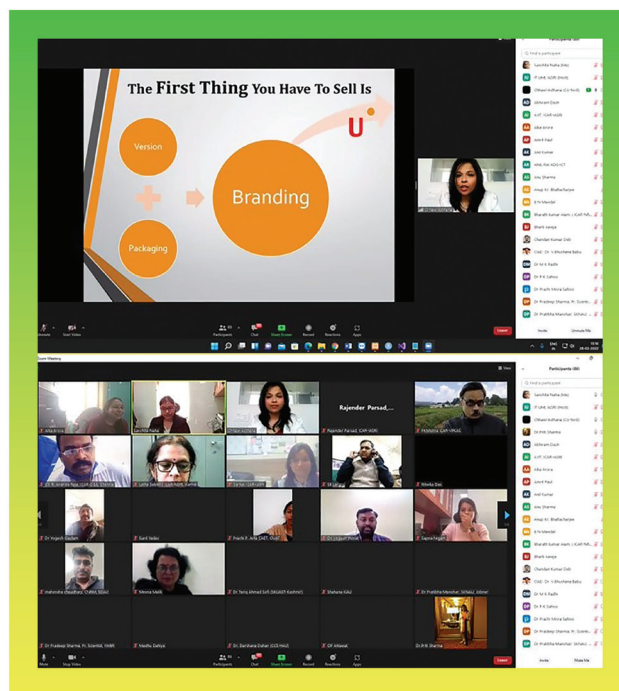
International Women's Day Celebration

- The Institute celebrated International Women's Day on the theme **Gender Equality Today for a Sustainable Tomorrow** on March 08, 2022. A webinar on **Women in Technology lead to Sustainable Future** was delivered by Dr. Swati Kaushal, Modern Work Lead, Education, Microsoft. On this occasion, women staff were felicitated with a green plant. 95 participants from NARES. (Organizer: Rajender Parsad; Conveners: Alka Arora, Anshu Bharadwaj, Sneha Murmu and Bharati Pandey)



Azadi Ka Amrut Mahotsav Celebrations: Organized 04 Webinars

- **Statistics in Financial Services** by Dr. Venu Madhav Kandala, Director, Investment Management Data Science & Engineering was organized on January 22, 2022. The webinar was attended by 83 Faculty, students and Alumni IASRI and other NARES organizations. (Convener: Rajender Parsad)
- **Creating a Winning Personality** by Ms. Chhawi Asthana, Image Consultant, Soft Skills Trainer & Leadership Development Coach, Chhawi Asthana Imaging Consultancy on February 28, 2022. The webinar was attended by 55+ from NARES. (Conveners: Alka Arora and Rajender Parsad)
- **My Journey through Fields Across Continents** by Dr. Bikas Sinha, Former Member, National Statistical Commission, Government of India and Former Professor, Indian Statistical Institute, Kolkata on March 11, 2022. The webinar was attended by 56 Faculty, students and Alumni IASRI and other NARES organizations. (Conveners: Rajender Parsad and Anshu Bharadwaj)
- **Mega Opportunities in Indian Agriculture** by Mr. Sanjay Vidyarathi, Managing Director and CEO, Agritech Enablers on March 17, 2022. The webinar was attended by 54 Faculty, students and Alumni IASRI and other NARES organizations (Convener: Anshu Bhardwaj)



WORKSHOPS/WEBINARS/SYMPOSIUM/MEETINGS ETC. ORGANIZED

Workshops/Webinars

- Online International symposium on **Data Driven Agriculture and Natural Resource Management – Opportunities and Challenges** an Associate Partner in collaboration with INSAIT during 21-22 January, 2022. The symposium was organized by Indian Society of Agricultural Information Technology (INSAIT). Major themes of the symposium were Data Driven Agriculture, Data Driven Natural Resource Management, Smart Farming Resource Management and High Performance Computing in Agriculture. (Rajender Parsad and Alka Arora)
- Webinar on KRISHI Portal to sensitize colleagues at ICAR- Indian Institute of Pulses Research, Kanpur on February 14, 2022. (Susheel Kumar Sarkar)
- International Workshop on Skill Development through Impact Analysis of Emerging Data with Agricultural Technology in Population Sciences, jointly organized by: Assam Agricultural University in collaboration with ICAR-Indian Agricultural Statistics Research Institute, New Delhi-110012 during March 11-17, 2022. A special session was organized on Skill Development for Youths through Data and Technology for the farmers and students on March 12, 2022. (KK Chaturvedi and Mukesh Kumar)

Meetings

- ICAR-IOMC committee meeting on January 05, 2022. (Chair: Anil Rai, Co-Chair: Rajender Parsad)
- A meeting on Kisan-Sarathi and KISAN 2.0 on January 06, 2022 under the Chairmanship of AS (DARE) and Secretary ICAR. (Anil Rai and Rajender Parsad)



- ICAR ICT Steering Committee Meeting on January 12, 2022 under the Chairmanship of Secretary DARE and DG, ICAR. (Anil Rai)
- Meeting about Kisan-Sarathi 2.0 under the Chairmanship of Honorable Minister of Agriculture and Farmers Welfare on February 22, 2022. (Anil Rai)
- Meeting on Kisan Sarathi under the Chairmanship of Secretary DARE and DG ICAR on March 10, 2022. (Anil Rai and Sanjeev Kuamr)
- Online program of budget webinar strategies for implementation on 'SMART AGRICULTURE': (Sustainable, Modern/Mechanized, Aatmanirbhar, Resilient & Tech Driven Agriculture): Emerging Hi-tech & Digital Agri Ecosystem on February 24, 2022. (Anil Rai)
- Weekly meeting with KVKs/ATARIs on every Friday on regular basis. (Sanjeev Kumar, KK Chaturvedi and Mukesh Kumar)

Seminars Delivered

- A total of 24 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
Scientist	Project Completion	7
	New Project Proposal	2
	Foreign Visit	
Student	General	
	Course	11
	ORW	1
	Thesis	3
Total		24

PUBLICATIONS

Research Papers

1. Arora A, Pal S, Naha S, Marwaha S, Burman RR, Kumar S, Adhiguru P, Poswal RS and Singh AK (2022). E-Governance of skill training programme under Garib Kalyan Rojgar Abhiyaan. *Indian Journal of Agricultural Sciences*, **92(3)**, 388-92. <http://krishi.icar.gov.in/jspui/handle/123456789/70897>
2. Bana RS, Jat GS, Grover M, Bamboriya SD, Singh D, Bansal R, Choudhary AK, Kumar V, Laing AM, Godara S and Bana RC (2022). Foliar nutrient supplementation with micronutrient-embedded fertilizer increases bio-fortification, soil biological activity and productivity of egg plant. *Scientific Reports*, **12(1)**, 1-16.
3. Borgohain A, Sarmah M, Konwar K, Gogoi R, Gogoi BB, Khare P, Paul RK, Handique JG, Malakar H, Deka D, Saikia J and Karak T (2022). Tea pruning litter biochar amendment in soil reduces arsenic, cadmium, and chromium in made tea (*Camellia sinensis* L.) and tea infusion: A safe drink for tea consumers. *Food Chemistry: X*, **13**, 100255.
4. Budhlakoti N, Kushwaha AK, Rai A, Chaturvedi KK, Kumar A, Pradhan AK, Kumar U, Kumar RR, Juliana P, Mishra DC and Kumar S (2022). Genomic selection: A tool for accelerating the efficiency of molecular breeding for development of climate resilient crops. *Frontiers in Genetics*, **13**, 832153. <https://doi.org/10.3389/fgene.2022.832153>
5. Chanda B, Bhowmik A, Jaggi S, Varghese E and Datta A (2022). Cost effective two level factorial run order for agricultural experimentation. *Journal of Community Mobilization and Sustainable Development*, **16(3)**, 668-672. <http://krishi.icar.gov.in/jspui/handle/123456789/69937>
6. Chiru TDG, Sharma N, Padaria RN, Ahmad N, Punitha P and Ramasubramanian V (2021). Effectiveness of public and private extension service organization in delivering advisory services in Meghalaya. *Journal of Community Mobilization and Sustainable Development*, **16(3)**, 681-687.
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8. Gaur A, Jindal Y, Tiwari R, Kumar D, Kaushik D, Singh J, Narwal S, Jaiswal S, Iqbal MA, Angadi UB, Singh G, Rai A, Singh GP and Sheoran S (2022). GWAS to identify novel QTNs for WSC accumulation in wheat peduncle under different water regimes. *Frontiers in Plant Science*, **18**, 825687. <https://www.frontiersin.org/articles/10.3389/fpls.2022.825687/full>, <http://krishi.icar.gov.in/jspui/handle/123456789/70226>
9. Haque A, Marwaha S, Arora A, Paul RK, Hooda KS, Sharma A and Grover M (2021). Image-based identification of maydis leaf blight disease of maize (*Zea mays*) using deep learning. *Indian Journal of Agricultural Sciences*, **91(9)**, 1362-1367. <http://krishi.icar.gov.in/jspui/handle/123456789/69871>
10. Jain R, Nigam S and Santrupth S (2021). Artificial intelligence based models for plant protection. *International Journal of Agriculture, Environment and Sustainability*, **3(1)**, 1-7.
11. Kumar R, Rai A, Ahmad T, Biswas A and Moury PK (2021). Rescaling bootstrap technique for variance estimation in dual frame surveys. *Journal of the Indian Society of Agricultural Statistics*, **75(2)**, 117-125.
12. Kumar RR, Ahuja S, Rai GK, Kumar S, Mishra DC, Kumar SN, Rai A, Singh B, Chinnusamy V and Praveen S (2022). Silicon triggers the signalling molecules and stress-associated genes for alleviating the adverse effect of terminal heat stress in wheat with improved grain-quality. *Acta Physiologiae Plantarum*, **44(3)**, 30. <https://doi.org/10.1007/s11738-022-03365-y>
13. Kumar RR, Jha GK and Praveen KV (2022). Linkage of electricity with agricultural growth and technology factors: An illustration of India's case. *Energies*, **15(7)**, 2422. <https://doi.org/10.3390/en15072422>
14. Kumar S, Bhati J, Saha A, Lal SB, Pandey PK, Mishra DC, Farooqi MS, Kumar A, Chaturvedi KK and Rai A (2022). CerealESTDb: A comprehensive resource for abiotic stress responsive annotated ESTs with predicted genes, gene ontology and metabolic pathways in major cereal crops. *Frontiers in Genetics*, **13**, 842868. <https://doi.org/10.3389/fgene.2022.842868>

15. Kumar V, Sharma A, Lal SB, Chaturvedi KK, Farooqi MS, Mishra DC, Sonkusale L and Kumar R (2022). Comparative analysis of genome browser for visualization of genetic variants. *The Pharma Innovation Journal*, **11(3)**, 384-388.
16. Kumara PN, Sharma PK, Munshi AD, Behera TK, Bhatia R, Kumari K, Singh J, Bhattacharya RC, Jaiswal S, Iquebal MA, Arora A, Rai A, Kumar D and Dey SS (2022). Fruit transcriptional profiling of the contrasting genotypes for shelf life reveals the key candidate genes and molecular pathways regulating post-harvest biology in cucumber. *Genomics*, **14(2)**. <https://www.sciencedirect.com/science/article/pii/S0888754322000180>
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21. Meher PK, Begam S, Sahu TK, Gupta A, Kumar A, Kumar U, Rao AR, Singh KP and Dhankher OP (2022). ASRmiRNA: Abiotic stress-responsive miRNA prediction in plants by using machine learning algorithms with pseudo K-tuple nucleotide compositional features. *International Journal of Molecular Sciences*, **23(3)**, 1612.
22. Meher PK, Dash S, Sahu TK, Satpathy S and Pradhan SK (2022). GIpred: a computational tool for prediction of GIGANTEA proteins using machine learning algorithm. *Physiology and Molecular Biology of Plants*, **28(1)**, 01-16.
23. Mishra DC, Arora D, Budhlakoti N, Solanke AU, Mithra S, Kumar A, Pandey PS, Srivastava S, Kumar S, Farooqi MS, Lal SB, Rai A and Chaturvedi KK (2022). Identification of potential cytokinin responsive key genes in rice treated with Trans-Zeatin through systems biology approach. *Frontiers in Genetics*, **12**, 780599. <https://doi.org/10.3389/fgene.2021.780599>
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25. Nayan V, Singh K, Iquebal MA, Jaiswal S, Bhardwaj A, Singh C, Bhatia T, Kumar S, Singh R, Swaroop MN, Kumar R, Phulia SK, Bharadwaj A, Kumar D, Datta TK and Rai A (2022). Genome-wide DNA methylation and its effect on gene expression during subclinical mastitis in water buffalo. *Frontiers in Genetics*, **13**, 828292. <https://www.frontiersin.org/articles/10.3389/fgene.2022.828292/full>, <https://krishi.icar.gov.in/jspui/handle/123456789/70367>
26. Patel S, Rathore SS, Shekhawat K, Jangir R, Singh RK, Babu S and Iquebal MA (2022). Varietal diversification for enhanced productivity and profitability under diverse production systems. *Indian Journal of Agricultural Sciences*, **92(1)**, 144-146.
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- rows and columns. *Journal of the Indian Society of Agricultural Statistics*, **75(1)**, 13-18.
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Book Chapters

- Das S and Maity A (2022). Utility of Network Biology Approaches to understand Aluminum stress in Soybean. *Soybean Improvement: Physiological, Molecular and Genetic Perspectives*. Eds. S H Wani, N R Sofi, M A Bhat, F Lin. Springer Publication, Cham; 1st ed. Pp. 109-124. https://doi.org/10.1007/978-3-031-12232-3_5

Popular Articles

- Krishnan M and Ramasubramanian V (2021). Financing and technology options for fish business startups in North East India. In Seminar proceedings of **Agribusiness potential of North East region with special reference to Tripura** Eds. Debabrata Lahiri, S. S. Burark and T. Satyanarayana, organized by Indian Society of Agricultural Marketing at College of Fisheries, Tripura, 43-52.
- Singh DP, Prabha R, Maurya S, Reddy YS and Singh M (2022). Approaches in Omics Data Generation and Analysis using Bioinformatics Resources, Tools and Techniques. In Compendium for Winter School on **Underexploited Vegetables: Unexplored Treasure Trove for Food, Nutritional and Economic Security**, 02-22 February, 2022. Published by ICAR-IIVR.

PAPERS PRESENTED/LECTURES DELIVERED

Paper presented /Invited talk delivered in Conferences

- First International Symposium on **Cereals for Food Security and Climate Resilience** organized during January 18-20, 2022, through Online mode from ICAR-IIWBR, Karnal, India.
 - Sapna Nigam. Artificial intelligence based wheat stem rust identification and severity estimation. (Online poster presentation)
- Online International Symposium on **Data Driven Agriculture and Natural Resource Management – Opportunities and Challenges** organized by Indian Society of Agricultural Information Technology and Associate Partners ICAR-IASRI, New Delhi; ICAR-NBSSLUP, Nagpur and ICAR-NIAP, New Delhi during January 21-22, 2022
 - Rajender Parsad. Research Data Management in ICAR. (Invited Talk)
 - Alka Arora. Computer vision approaches for plant phenotype parameter determination.(Invited Talk)
 - Anil Rai. Data driven agriculture for natural resource management: agricultural bioinformatics perspective (Lead Talk)
- National e-Conference on **Mathematical Sciences for Applied and Agricultural Research** organized by

Department of Mathematics & Statistics, College of Basic Sciences & Humanities, CCSHAU, Hisar on February 22, 2022

- Kaustav Aditya*. Feasibility of renewable energy system in tea estates - A survey in North East India.
 - Anindita Datta*, Seema Jaggi, Cini Varghese, Eldho Varghese, Arpan Bhowmik, and Mohd. Harun. Generalized row-column designs balanced for spatial indirect effects: construction and generation (Virtual mode).
 - Satyam Verma, Arpan Bhowmik*, Seema Jaggi, Eldho Varghese, Cini Varghese and Anindita Datta. Trend free constant block Sum PBIB designs using Magic Square (Virtual mode).
 - Hemavathi, M.*, Eldho Varghese, Shashi Sekhar and Arpan Bhowmik. Sequential response surface designs: Experimentation order considerations.
- 24th Annual Conference of the Society of Statistics Computer and Applications on **Recent Advances in Statistical Theory and Applications** (RASTA-2022) organized at ICAR-National Academy of Agricultural Research Management Hyderabad during February 23-27, 2022
 - Vinayaka*, Rajender Parsad, B.N. Mandal and Sukanta Dash. Partially balanced nested block designs for making test treatments-control treatment comparisons. (Young Researcher Invited Session).
 - Cini Varghese*, Vinay Kumar LN, Mohd Harun, Seema Jaggi and Eldho Varghese. Partially replicated designs for breeding trials. (Invited talk)
 - Vinay Kumar L.N.*, Cini Varghese, Seema Jaggi and Mohd. Harun. A series of two replicate resolvable PBIB(3) designs in blocks of unequal sizes. (Young Researchers Invited talk)
 - Sukanta Dash*, Kushal Kumar Yadav, B.N. Mandal, Rajender Parsad and Anil Kumar. Row-Column designs for two level factorial experiments. (Invited talk)
 - Aditya K*, Guha S and Das P (2021). Food and nutrition in indo gangetic plain region-a disaggregate level analysis. (Invited Talk)
 - Md. Ashraful Haque*, Sudeep Marwaha, Alka Arora, Chandan Kumar Deb. Recognition of disease severity levels of crops using deep learning techniques.
 - Soumen Pal. E-governance of Krishi KalyanAbhiyan through Krishi Vigyan Kendra Knowledge Network.
 - Ramasubramanian V. Genetic algorithm based classification tree modelling in agricultural ergonomics. (Invited Talk)
 - Ramasubramanian V, Avinash G and Appaji P Naik*. Unravelling hidden markov models for data applications.
 - Shashi Dahiya. Publication recommendation system for scientific and academic community in agriculture. (Invited talk)
 - Anshu Bharadwaj. Leveraging the digital technologies to achieve sustainable agriculture.
 - Alka Arora. Agricultural University Ranking System(AURS): e Initiative.
 - RK Paul. Wavelet decomposition and forecasting agricultural commodity prices.
 - Amrit Kumar Paul*, Himadri Shekhar Roy and Ranjit Kumar Paul. Estimation of heritability using half-sib model under correlated errors.
 - S.B. Lal. Data management challenges in cloud computing.
 - K.K. Chaturvedi. Role of big data in agriculture.
 - D.C. Mishra. Trait associated genes prediction: some insights.
 - Kaustav Aditya. Food and nutrition in Indo Gangetic Plain Region-A disaggregate level analysis. (Young Researcher Invited Talk)
 - Sayantani Karmakar*, Cini Varghese, Seema Jaggi and Mohd. Harun. 2-part incomplete block designs on February 26, 2022. (Young Researchers Invited talk:)
 - International Conference on **Statistics and Data Science: Theory and Practice for Progress and Prosperity** (ICSDS-2021) in conjunction with 41st annual convention of Indian Society of Probability and Statistics (ISPS) during March 11-13, 2022 (online mode):
 - B.N. Mandal*, Rajender Parsad and Sukanta Dash. Algorithmic construction of efficient designs for order-of-addition experiments.
 - Ranjit Kumar Paul. Deep learning techniques for forecasting agricultural commodity prices.
 - Ankita, Susheel Kumar Sarkar* and Shashi Shekhar. Variance component testing for continuous data from nested unbalanced designs.

- P.K. Meher. Genomic prediction using Bayesian and BLUP alphabets: a comparative analysis.
 - Sukanta Dash*, B.N. Mandal, Rajender Parsad and Anil Kumar. Row column designs for two level fractional factorial experiments.
 - Kanchan Sinha. A comparative study of statistical, machine and deep learning approaches for prediction of onion prices in India.
 - Rajeev Ranjan Kumar. Extreme learning machine based hybrid model for agricultural price volatility forecasting in the presence of structural breaks.
 - Mrinmoy Ray. A hybrid model combining VMD and TDWNN for time series forecasting.
 - Prakash Kumar. Develop a rank based composite index for assessing high yielding stable crop varieties.
 - Anindita Datta*, Seema Jaggi, Cini Varghese, Eldho Varghese and Arpan Bhowmik. Web generation of generalized row-column designs (webGRC).
 - UK Pradhan. miRbiom: Machine-Learning on Bayesian causal nets of RBP-miRNA interactions successfully predicts miRNA profiles.
 - Kaushal Kumar Yadav*, Sukanta Dash, B.N. Mandal and Rajender Parsad and Anil Kumar. Constructions of three associate constant block-sum PBIB designs.
 - P.B. Katore*, B.N. Mandal, Rajender Parsad and Sukanta Dash. Position balanced block designs for sensory studies and consumer experiments.
 - Bijoy Chanda, Arpan Bhowmik*, Seema Jaggi, Eldho Varghese, and Anindita Datta. Trend resistant cost efficient minimally changed factorial run orders involving hard-to-change factors.
- International Workshop on **Skill Development through Impact Analysis of Emerging Data with Agricultural Technology in Population Sciences** organized by Department of Agricultural Statistics and Department of Agricultural Engineering, Assam Agricultural University in Collaboration with ICAR-Indian Agricultural Statistics Research Institute during March 11-17, 2022.
 - Alka Arora. KVK Portal.
 - Anshu Bharadwaj. Digital initiatives for AUs under NAHEP Comp-II.
 - Shashi Dahiya. Digital Agriculture.
 - KK Chaturvedi. KISAN Sarathi. Webinar on **Use of AI and ICT in Agriculture Information Access and Dissemination** organized by Centre for Development of Advanced Computing, Noida in association with CDAC Kolkata, Bihar Animal Science University Patna, and Birsa Agriculture University (BAU), Ranchi on March 14, 2022.
 - Alka Arora. Mobile App in agriculture information dissemination.
 - **First Indian Fisheries Outlook- 2022 Conference** organized during March 22-24, 2022 at ICAR-CIFRI, Barrackpore.
 - C. Lloyd Chrispin*, P.S. Ananthan, V. Ramasubramanian, T. Velumani, P. Muthuvinayagam, Preetha Panikkar, S. Agnes Daney Angela and E. Suresh. Fisheries and its management in Krishnagiri reservoir in a session on fisheries extension, governance and policies.
 - National webinar on **Frontier Areas of Plant, Microbe and Environmental Research** organised by Department of Botany, Dayalbagh Educational Institute, Agra, U.P. on March 24, 2022 (online).
 - D.C. Mishra. Bioinformatics and its application in agriculture: Some insights.
 - Workshop on **Geoportal Building Interoperability Infrastructure and Applications** organized by ICAR-NBSS&LUP, Nagpur on March 30, 2022.
 - Anshu Bharadwaj. Overview of KRISHI Portal.

(* denotes who has presented the paper)

Lecture Delivered (Outside institute)

- One lecture on **R Package for Data Analysis** on 19.01.2022 in Winter School Biofortification of staple food crops through conventional and molecular approaches organized by CCS Haryana Agricultural University, Hisar, during January 03-23, 2022. (PK Meher)
- Training programme on Advanced Statistical Techniques for Data Analysis using R organized by ICAR- Indian

Institute of Rice Research in association with Society for Advancement of Rice Research Hyderabad during 03-15 January 2022.

- Four lectures on (i) **Principal Component Analysis**; (ii) **Factor Analysis**; (iii) **Discriminant Analysis** (iv) **Cluster Analysis** on 05.01.2022. (Susheel Kumar Sarkar)
- One lecture on **Nonlinear Growth Models** on 05.01.2022. (Mrinmoy Roy)
- One lecture on **ARCH Family of Models** on 13.01.2022. (Achal Lama)
- One lecture on **LASSO Regression** on 04.01.2022. (Bishal Gurung)
- One lecture (online) on **Biostatistics–Experimental Design and Testing of Hypotheses** in a High-End Workshop (KAARYASHALA) under “Accelerate Vigyan” scheme, SERB, Govt. of India organized by ICAR-National Research Centre on Meat, Hyderabad during 4-13 January, 2022. (Arpan Bhowmik)
- One lecture (online) on **Basics of R Programming** in a training programme for 4th and 5th year BVSc & AH students under Institute Development Plan in GADVASU, Ludhiana on January 12, 2022. (B.N. Mandal)
- Training programme on Analysis of Experimental Data using R organized by NAARM, Hyderabad during January 17-22, 2022.
 - One lecture on **Statistical Tests of Significance** on 18.01.2022. (Ramasubramanian V.)
 - One lecture on **Basic Designs and Factorial Experiments** on 19.01.2022. (Anindita Datta)
- Two lectures on (i) **Nonparametric Tests** on 21.01.2022 and (ii) **Regression analysis** on 23.01.2022 in International Workshop on Advance Statistical Data Analysis using SPSS, organized by Science Tech Institute, Lucknow during January 21-27, 2022. (R.K.Paul)
- Training programme on Artificial Intelligence and Machine Learning organized under IDP-NAHEP at Institutional Development Plan, GADVASU, Ludhiana during January 24-28, 2022.
 - One lecture on **Support Vector Machines Greetings** on 27.01.2022. (R.K. Paul)
 - One lecture on **Decision Trees versus Random Forest Design: Advantages and Limitations in Machine Learning** on 28.01.2022. (PK Meher)
 - One lecture on **Artificial Neural Network: Concept and Application** on 25.01.2022. (Mrinmoy Ray)
 - One lecture on **Machine Learning: Concepts and Applications** on 11.01.2022. (Ramasubramanian V.)
 - One lecture on **K means Clustering Vs Hierarchical Clustering: Pros and Cons** on 24.01.2022. (Arpan Bhowmik)
- One lecture on **Machine Learning versus Statistical Modelling: Conceptual and Practical Differences** on 08.02.2022 in the IDP (NAHEP) training programme on Artificial Intelligence for students – Module 3: Diving deep into the Concept of Machine Learning organized by GADVASU, Ludhiana during February 08-11, 2022. (Ramasubramanian V.)
- Vocational course on **IT Tools in Improving Learning and Research Efficacy of Students** sponsored by Institutional Development Plan (IDP), NAHEP during February 01-07, 2022 and held at Sher-E-Kashmir University of Agricultural Sciences & Technology, Jammu.
 - One lecture on **Development of Mobile Applications and hands** on training 02.02.2022. (Soumen Pal)
 - One lecture on **AI Application in Image Analysis: Case Study in Phenomic Parameter Estimation** on 04.02.2022. (Alka Arora)
 - One lecture on **GeoAI: A Way of Spatial Thinking and Analytics** on 05.02.2022. (Anshu Bharadwaj)
- One lecture on **Approaches for Techniques/Application in Transcriptomics and Genomic Data Analysis** on 08.02.2022 in the Winter School on Underexploited Vegetables: Unexplored Treasure Trove for Food, Nutritional and Economic Security organized at ICAR-IIVR during February 02-22, 2022. (Ratna Prabha)
- One lecture on **Discriminant Analysis** on 10.02.2022 in Winter School on Analytical Techniques for Decision Making in Agriculture in virtual mode organized by ICAR-National Institute of Agricultural Economics and Policy Research (NIAP) during February 05-25, 2022. (Susheel Kumar Sarkar)
- One Webinar on **Data, online learning and Statistical computing Resources** organized by Maharana Pratap University of Agricultural and Tehnology, Udaipur on 15 February, 2022. 750+ participants attended the webinar. (Rajender Parsad)
- Winter School on **Analytical Techniques for Decision Making in Agriculture** during February 05-February 26,

- 2022 organized by ICAR-National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi.
- Two lectures on (i) **Regression Analysis: Linear, Logit, Probit** on 12.02.2022; (ii) **Marginal effects in logit model** on 16.02.2022. (Ramasubramanian V.)
 - One lecture on **Cluster Analysis using R**. (Alka Arora)
 - One lecture on **Discriminant Analysis** on 10.02.2022. (Susheel Kumar Sarkar)
 - One lecture on **Time series and Panel Regression** on 16.02.2022. (Ranjit Paul)
 - One lecture on **Overview of Bio-informatics: Opportunities and Challenges** on 15.02.2022. (Anu Sharma)
 - One lecture on **QGIS: Making Thematic Maps** on 25.02.2022. (Anshu Bharadwaj)
 - One lecture on **Basics of Analytical Software: R** on 08.02.2022. (Soumen Pal)
 - One lecture on **Principal Component Analysis**. (Arpan Bhowmik)
 - One lecture on **Exploratory Data analysis and Tests of significance** on 07.02.2022. (Rahul Banerjee)
- One lecture on **Conceiving both Teaching and Research** on 22.02.2022 was delivered in Five days on-Line Faculty Development Programme under GURU-DAKSHTA Faculty Induction Programme on Advances in Research, Professional Development and Academic Leadership organized at Amity University. (Monendra Grover)
 - One lecture on **Training Management Information System for ICAR(TMIS)** on 22.02.2022 was delivered in the Online training programme for the HRD Nodal officers of ICAR institutes organized by ICAR-NAARM during February 21-23, 2022. (Shashi Dahiya)
 - One lecture on **Extreme Learning Machine: Concept and Applications** on 01.03.2022 was delivered in the Module 4: Intelligent Systems: Adding New Dimensions to Animal Sciences of the training on Artificial Intelligence for Students organized by the Institutional Development Plan (IDP), Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana during March 28-02, 2022. (Rajeev Ranjan Kumar)
 - One lecture on **Introduction to Data Analysis** was delivered on 20.02.2022 in National Workshop on Tools and Software for Data Analytics organized by Department of Food Technology, Guru Jambheshwar University of Science & Technology, Hisar during February 28-March 04, 2022. (Bishal Gurung)
 - Online Training Programme on **Holistic Development of Students** sponsored by NAHEP and held at JNKVV, Jabalpur
 - One lecture on **Computer Skills in Agriculture** on 16.03.2022. (Soumen Pal)
 - One lecture on **Orientation of Artificial Intelligence in Agricultural Science** on 14.03.2022. (Alka Arora)
 - Two lectures on (i) **Descriptive Statistics** and (ii) **Testing of Hypothesis** were delivered 17.03.2022 on to Graduate and Post-Graduate students from College of Basic Sciences & Humanities, Department of Microbiology, PAU, Ludhiana. (Susheel Kumar Sarkar)
 - One lecture as an Expert Speaker from ICAR on **Food Loss Measurement in India: A Sample Survey Approach Developed by ICAR-IASRI** was delivered on 31.03.2022 in Session-3 entitled Climate and Nutrition Considerations in Urban Food Systems under the theme Innovative solutions to mitigate Food Loss and Waste and enhance Food Safety in the World Bank-FAO Knowledge Session Series organized by World Bank (Tauqueer Ahmad)
 - ICFRE-Tropical Forest Research Institute (TFRI), MoEFCC, GOI, Jabalpur, MP under ICFRE-HRD Sponsored Short Term Training on Advance Training in Molecular Biology Techniques and Its Application during March 21-25, 2022.
 - One lecture on **Transcriptome Analysis using NGS Data** on 25.03.2022 (Sarika)
 - One lecture on **Marker Discovery using NGS Data** on 25.03.2022 (M.A. Iquebal)
 - One lecture on **Multivariate Techniques** was delivered on 24.03.2023 to the participants of online National Workshop on Applications of Statistical Tools in Data Analysis organised by Department of Statistics, Central University of Haryana, Mahendergarh, Haryana during March 21-25, 2022. (D.C. Mishra)

PARTICIPATION

International Conference/ Workshop/Symposium etc.

- Online First International Symposium on **Cereals for Food Security and Climate Resilience** organized online

during January 18-20, 2022. (Sapna Nigam)

- International Symposium on **Data Driven Agriculture and Natural Resource Management – Opportunities and Challenges** organized by Indian Society of Agricultural Information Technology (INSAIT) during January 21-22, 2022. (Alka Arora, Ranjit Paul, Shashi Dahiya, Md. Yeasin, Sanchita Naha, Sapna Nigam, Soumen Pal, Md. Ashraful Haque)
- Online International Conference on **Statistics and Data Science: Theory and Practice for Progress and Prosperity** organized jointly by Department of Statistics, University College of Science, Osmania University, Hyderabad and Indian Society of Probability and Statistics during 11-13 March, 2022. (Susheel Sarkar, Ranjit Paul, B.N. Mandal, Sukanta Dash, Arpan Bhowmik, Sunil Kumar Yadav, U.K. Pradhan, Mrinmoy Ray, Rajeev Ranjan Kumar, Prakash Kumar and Anindita Datta)

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

- Two international webinars on (i) **Multi-omics technologies and study design** and (ii) **Data integration and interpretation to unveil novel insights** organized by Front Line Genomics Limited during January 18, 25, 2022 respectively. (PK Meher, UK Pradhan)
- Online Hindi Workshop on **कृषि में जैविक डेटा विश्लेषण के लिए सांख्यिकी और कम्प्यूटेशनल विधियाँ** organized by Division of Agricultural Bioinformatics during 27-29 January 2022. (Sarika Sahu, Rahul Banerjee, Prakash Kumar, Pankaj Das and Bharti)
- National Symposium on **Recent trends in phytopathology to address emerging challenges for achieving food security** organized by ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, Uttarakhand during 21-22 February, 2022. (Prakash Kumar)
- National e-Conference on **Mathematical Sciences for Applied and Agricultural Research** organized by Department of Mathematics & Statistics, College of Basic Sciences & Humanities, CCSHAU, Hisar on 22 February, 2022. (Arpan Bhowmik, Anindita Datta)
- Pre-Conference Workshop on **Reader-Focused Writing in the Quantitative Sciences** conducted by Prof. Jyotimoy Sarkar, Indiana University-Purdue University, Indianapolis, USA on February 22, 2022. (prior to SSCA conference). (Ramasubramanian V., Anshu Bharadwaj, B.N. Mandal)
- National Webinar on **Agrophysics for Smart Agriculture** organized by Agro-physics Society at NASC, New Delhi on February 22, 2022. (Anil Rai)
- Webinar on **Use of AI and ICT in agriculture Information Access and Dissemination** organized by Centre for Development of Advanced Computing, Noida in association with C-DAC Kolkata, Bihar Animal Science University Patna, and Birsa Agriculture University (BAU), Ranchi on March 14, 2022. (Anil Rai, Alka Arora, Sapna Nigam)
- Webinar on **DGQI** organized by NITI Aayog on March 15, 2022. (Anil Rai and Rajender Parsad)
- National Workshop on **Agricultural Education in Private Universities in India: Let's Listen to Stakeholders** organized by NAARM, Hyderabad and ICAR-IASRI at KAB-II on March 25, 2022. (Sudeep, Alka Arora, Anshu Bharadwaj)
- Online Hindi Workshop on **कृषि शिक्षण एवं प्रशिक्षण में संगणक अनुप्रयोग** at ICAR-IASRI on March 26, 2022. (Sudeep, Chandan Kumar Deb, Md. Ashraful Haque, Sanchita Naha, Madhu, Sapna Nigam, Neeraj Budhlakoti and Sudhir Srivastava)
- Webinar **Single-cell analysis of organoid models and stem cells in various applications** organized by 10X Genomics on March 30, 2022. (Samarendra Das, UK Pradhan)

Meetings

- Expert Committee Meeting of Niti Aayog Chaired by Professor Ramesh Chand for State Performance Indicators on 17.01.2022. (Rajender Parsad)
- Sub Committee Meeting on Yield estimation using technology under the working group constituted to examine Alternate Risk Management Mechanisms under PMFBY as Member, Sub Committee, organized by MNCFC, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare on 14.03.2022 at ICAR-IASRI, New Delhi. (Tauqueer Ahmad)

HUMAN RESOURCE DEVELOPMENT

Training Programmes/Workshops Organized: 12(719 participants)

S.No	Title	Venue	Period	No. of Participants
1	Metagenomic Data Analysis (Coordinators: Rajender Parsad, Anil Rai, Anu Sharma, Mohammad Samir Farooqi)	ICAR-IASRI, New Delhi (Online)	January 19-24, 2022	56
2	Statistical and Computational Methods for Biological Data Analysis in Agriculture (Coordinators: Sudhir Srivastava, U.B. Angadi and Sneha Murmu)	ICAR-IASRI, New Delhi (Online)	January 27-29, 2022	15
3	Short Course on Statistical Development for Data Analytics in Agricultural Experimentation <i>Sponsored by Education Division, ICAR</i> (Coordinators: Arpan Bhowmik, Susheel Kumar Sarkar and Anindita Datta)	ICAR-IASRI, New Delhi (Online)	January 27-February 05, 2022	27
4	Winter School on Artificial Intelligence in Agriculture <i>Sponsored by Education Division, ICAR</i> (Coordinators: Sudeep, Alka Arora and Anshu Bharadwaj)	ICAR-IASRI, New Delhi (Online)	February 15-March 07, 2022	47
5	QTL analysis and genome-wide association studies (Coordinators: MA Iquebal, Sarika and UB Angadi)	ICAR-IASRI, New Delhi (Online)	February 15-24, 2022	133
6	Prediction of non coding RNA (Coordinators: Anil Rai, Monendra Grover and S.B. Lal)	ICAR-IASRI, New Delhi (online)	February 16-18, 2022	25
7	Price Forecasting of Agricultural Commodities (Coordinators: Ranjit Kumar Paul)	ICAR-IASRI, New Delhi (online)	February 21-March 02, 2022	40
8	Cyber Security for ICAR Technical Personnel HRM (Coordinators: Mukesh Kumar and KK Chaturvedi)	ICAR-IASRI, New Delhi (online)	March 02-07, 2022	19
9	Statistics and Informatics in experimental Data Management & Analysis (Coordinators: Sudeep, Sanjeev Kumar, Soumen Pal and Anindita Datta)	ICAR-IASRI, New Delhi (online)	March 14-21, 2022	208

10	Genome-Wide Association Studies and its Application In Agriculture (Coordinators: Sarika and MA Iquebal)	ICAR-IASRI, New Delhi (online)	March 15-24, 2022	110
हिन्दी कार्यशाला				
11	कृषि में जैविक डेटा विश्लेषण के लिए सांख्यिकीय और कम्प्यूटेशनल विधियां (संयोजक: सुधीर श्रीवास्तव एवं यू बी अंगड़ी)	भाकृअनुप-भा.कृ.सां. अ.सं., नई दिल्ली (ऑनलाइन)	जनवरी 27-29, 2022	19
12	कृषि शिक्षण एवं प्रशिक्षण में संगणक अनुप्रयोग (संयोजक: राशि दहिया एवं समर्थ गोदारा)	भाकृअनुप-भा.कृ.सां. अ.सं., नई दिल्ली (ऑनलाइन)	मार्च 26, 2022	20

Training Programmes Attended

- Online Training Programme on **Geo-Spatial Analysis using QGIS & R** organized by ICAR-NAARM, Hyderabad during February 14-19, 2022. (Soumen Pal, Shashi Dahiya, Bharti and Md. Yeasin)
- Online training programme on **QTL analysis and genome-wide association studies** organized by Division of Agricultural Bioinformatics, ICAR-IASRI, New Delhi under DBT funded project during February 15-24, 2022. (Sneha Murmu)
- Winter School on **Artificial Intelligence in Agriculture** organized by ICAR-IASRI in Online mode during February 15- March 07, 2022. (Ratna Prabha)
- Winter School on **Application of Remote Sensing and GIS in Land Resource Management for Sustainable Agriculture Programme** organized by ICAR-National Bureau of Soil Survey and Land Use Planning, Regional Centre, Kolkata from March 02-21, 2022. (Md Yeasin)
- Online training on **Big Data Analytics** under Futute Skills PRIME project by the Ministry of Electronics and Information Technology (MeitY), GoI organized by C-DAC, Noida during March 21-25, 2022. (Sneha Murmu, Soumya Sharma and Ritwika Das)

Students Passed Out

- 33 Students {M.Sc. 21 (Agricultural Statistics: 9; Computer Application: 7; Bioinformatics: 3); Ph.D. 12 (Agricultural Statistics: 5; Computer Application: 4; Bioinformatics: 3)} received degrees during 60th Convocation of PG School, IARI on February 11, 2022
- 03 students completed Senior Certificate Course both modules.

CONSULTANCY/ADVISORY SERVICES PROVIDED

- **Prakash Kumar** advised Dr. Kanupriya, Scientist, ICAR-IIHR, Bangalore (Karnataka) for analyzing the morphological, biochemical and molecular diversity in Indian Bael (Aegle marmelos) plant data.
- **Samarendra Das** advised (i) Dr. Anirudha Maity, Scientist, ICAR-Central Agroforestry Research Institute, Jhansi on the use of proper statistical tests for experimental data analysis; (ii) Ms. Aanchal Malhotra, Ph.D. Scholar, University of Louisville, USA regarding analysis of miRNA data and for preparing her dissertation research synopsis..
- **Bishal Gurung** advised (i) Dr. Angel Yvonne Lyngdoh, Scientist at ICAR-IARI, New Delhi on the use of Principal Component Analysis and cluster analysis for her data on 57 genotypes on biochemical properties; (ii) Mrs. Chimey Tenzin Yangchen, MSc student on the use of the Kaiser-Meyer-Olkin (KMO) index of sampling adequacy and the Bartlett Test of Sphericity for her multivariate data to be conducted using the Clinical Learning Environment Inventory (CLEI) tool; (iii) Ms. Yashaswini SN on the use of factorial completely randomised design for her M.Tech. research work.
- **MA Iquebal** advised (i) Dr. SS Dey, Senior Scientist, IARI regarding QTL-seq data analysis in Bitter Gourd; (ii)

- Dr. Shrawan Singh, Senior Scientist, IARI regarding QTL-seq data analysis in Brassica sp.
- **Sarika** advised (i) Dr. Reeta Bhatia, Senior Scientist, IARI regarding genomic data generation for Marigold; (ii) Dr. Amlendu Ghosh, Senior Scientist, IARI regarding metagenomic data analysis in Thips.
 - **Rahul Banerjee** advised Mr. Arjun Singh, Scientist, ICAR-NRC Banana, Tiruchirapalli, Tamil Nadu in conducting Nonlinear Growth Curve analysis.
 - **Ramasubramanian V.** advised (i) Dr. Chandra K.P., Principal Scientist, ICAR-CPCRI, Kasaragod on sampling strategy to be adopted for field survey based estimate for conversion of number of nuts/ha to tonnes/ ha in case of coconut as the nut size varies depending on geographical regions, varieties, seasons, etc on February 09, 2022; (ii) Ms. Chindu Chandran, Ph.D. Scholar, University School of Environment Management, GGS Indraprastha University, Delhi on using weighted linear combination scores to prioritize factors affecting tourism based on frequency counts of experts' Likert scale responses on February 21, 2022; (iii) Sh. M. Karthikeyan, Scientist, Bangalore Centre of CIFRI, Barrackpore on Non-applicability of (the less usual practice of) reporting AIC for Neural Network models in his Ph.D. research work on March 08, 2022.
 - **Bharti** advised (i) Ms. Smriti Bansal and Sh. Ajay Rattan, Research Scholars Dr. Yashwant Singh Parmar University of Horticulture & Forestry, Nauni, Solan, Himachal Pradesh on construction of strata boundaries; (ii) Dr. Chetan Kumar Jangid, Scientist, ICAR-NRCSS, Ajmer on principal component analysis.
 - **Rajeev Ranjan Kumar** advised Dr. Pawanjeet, Scientist, ICAR-RCER, Patna on the trend analysis of rainfall in the Eastern India using R software.
 - **UK Pradhan** advised Dr. R.K. Chahota, professor, CSKHPAU, Palampur on Genome-wide association studies in horse gram (*Macrotyloma uniflorum*) for 18 different amino acid (Nutritional mapping) of 93 diverse germplasm lines which contain ~3lakh SNP marker data by population diversity analysis, Linkage disequilibrium also performed the association analysis using R-software for each trait using GLM, MLM, MLMM, Blink, Farm CPU and CMLM model.
 - **Deepak Singh** advised Dr. Meenakshi Grover, Principal Scientist, Division of Microbiology, IARI, New Delhi for data analysis i.e. ANOVA, PCA, and GGE biplot analyses for multi-environment trials conducted for three years at Jodhpur and Delhi Locations.
 - **Pankaj Das** advised Mr. Dilip Kumar, Scientist, ICAR-NIAP, New Delhi in data analysis and fitting LSTSM model.
 - **Anil Kumar and Mohd Harun** advised Ms. Aruna Kumari Andy, from Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS) Allahabad regarding the techniques of oneway ANOVA followed by post hoc tests, analysis of split-split plot design experiment and randomized complete block design for the analysis of data generated through greenhouse pot experiment design including two PGPR bacteria, three Heavy Metals with three Concentrations each in triplicates conducted to study the Heavy Metal influence on Crop growth, how are PGPR helping in metal alleviation, which of the both PGPRs better influence plant growth and comparison of HMs and PGPRs influences during Different DAS of plant growth.

AWARDS AND RECOGNITIONS

Award

Ramasubramanian V.

- **Dr. Anamitra Saha prize** conferred on the paper entitled "Surge Pricing and Catch – Income Sustainability Paradox in Marine Fisheries in Maharashtra" by Dinesh Singh Naorem, Nilesh Pawar, V.R. Kiresur, N. Sivaramane, V. Ramasubramanian and M. Krishnan published in the July-September 2020 issue of Indian Journal of Agricultural Economics has been adjudged as the best among the articles published in the three regular issues of the Journal in the year 2020.

Bishal Gurung

- Research profile won the **Scientist Award** in the International Scientist Awards on Engineering, Science and Medicine.

Anindita Datta

- Received **Best Paper Presentation Award** for the paper 'Satyam Verma, Arpan Bhowmik, Seema Jaggi, Eldho

Varghese, Cini Varghese and Anindita Datta. Trend Free Constant Block Sum PBIB Designs using Magic Square' in the National E-conference on Mathematical Sciences for Applied and Agricultural Research on February 22, 2022 at Department of Mathematics & Statistics COBS&H, CCS Haryana Agricultural University Hisar.

Recognitions

Rajender Parsad

- **Chairman**, Dr. M.N. Das Memorial Young Scientist Award session during 24th National Conference organized jointly with ICAR-National Academy of Agricultural Research Management and Society of Statistics, Computer and Application during February 23-27, 2022 (session held on 25.02.2022)
- **Co-Chairman**, Hukum Chandra Memorial Session during 24th National Conference organized jointly with ICAR-National Academy of Agricultural Research Management and Society of Statistics, Computer and Application during February 23-27, 2022 (session held on 25.02.2022)
- **Co-Chairman**, Lalmohan Bhar Memorial Session during 24th National Conference organized jointly with ICAR-National Academy of Agricultural Research Management and Society of Statistics, Computer and Application during February 23-27, 2022 (session held on 26.02.2022)
- **Organizer** for Keynote Address and Dr. M.N. Das Memorial Lecture during 24th National Conference organized jointly with ICAR-National Academy of Agricultural Research Management and Society of Statistics, Computer and Application organized during February 23-27, 2022.

Anil Rai

- **Chairman**, Technical Session International Symposium on Data Driven Agriculture and Natural Resource Management-Opportunities and Challenges organized by Indian Society of Agricultural Information Technology (INSAIT) during January 21-22, 2022.

Tauqueer Ahmad

- **Expert Speaker** for Food Loss Measurement in India: A Sample Survey Approach developed by ICAR-IASRI for Session-3, Climate and Nutrition Considerations in Urban Food Systems on 31 March, 2022 in the World Bank-FAO Knowledge Session Series to be held between March 17 and April 14, 2022.

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

Initiated:

1. Production system agribusiness and institutions. Component 3: Market Information System w.e.f. January 22, 2022 in collaboration with ICAR-NIAP (Funded by NIAP). (ICAR-IASRI: **Ranjit Kumar Paul**, Md. Yeasin, A.K. Paul, Ajit and Purushottam Sharma from lead centre ICAR-NIAP)
2. Improving seed health and storage system in collaboration with IISS Kusmaur, Mau (Funded by IISS) w.e.f. January 25, 2022. (ICAR-IASRI: **Sunil Kumar** and from lead centre ICAR-Indian Institute of Seed Science: Arvind Nath Singh)
3. AI and Machine Learning for supply forecasts in collaboration with ICAR-NIAP (Funded by NIAP) w.e.f. March 03, 2022. (ICAR-IASRI: **Anshu Bharadwaj**, Sapna Nigam and from lead Centre ICAR-NIAP: Rajni Jain, Dilip Kumar, Abimanyu Jhahria)
4. Development of an intelligent system for determining pig live weight in collaboration with ICAR-IVRI w.e.f. March 21, 2022. (ICAR-IASRI: **Chandan K. Deb**, AshrafulHaque, Samarth Godara and from lead centre ICAR-IVRI: Ayon Tarafdar, Triveni Dutt, Gyanendra K. Gaur, Rupasi Tiwari, Anuj Chauhan, Mukesh Singh)

Completed:

1. Detection of outliers in presence of masking and imputation of data when auxiliary variables are available in sample surveys completed on January 22, 2022. (Raju Kumar, Ankur Biswas, Lal Mohan Bhar, Deepak Singh)
2. Feasibility study for developing renewable energy system for tea plantation in Assam. Under research collaboration between ICAR and IIT Delhi (Extramural Fund) completed on March 03, 2022. (ICAR-IASRI: Hukum Chandra

(till 26.04.2021), Kaustav Aditya (since 27.04.2021), Pradeep Basak (till 30.11.2020), Vandita Kumari (till 16.10.2021), Raju Kumar (since 21.08.2021), Deepak Singh (since 23.11.2021)

3. Enhanced Classification and Regression Tree (CART) models for forecasting in Agriculture completed on March 31, 2022. (Ramasubramanian V., Mrinmoy Ray, WasiAlam)

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S.No.	Name	Registration Number	Received Date
1	VmTDB: Vigna mungo Transcriptome database	SW-15268/2022	24.03.2022
2	Flexible length B-Cell Epitope Prediction for FMDV (FlexiBef)	SW-14069/2021	28.03.2022
3	PlantSSRDb: Unifying easy FDRs and SSR-FDMs Database	SW-15266/2022	28.03.2022
4	Levidb: Genomics of Virus in Legume Crops	SW-15267/2022	28.03.2022

PERSONAL

Wish you a Happy Retired Life

Name	Designation	Effective date
Smt. Laxmi Devi	S.S.S.	31.01.2022
Sh. Satyavir Singh	U.D.C.	31.03.2022



Azadi Ka Amrit Mahotsav

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