ICAR-IASRI

AT A GLANCE

90 — Years of service to the nation → Agricultural Statistics

55 → Computer Applications

10 → Agricultural Bioinformatics

ICAR-Indian Agricultural Statistics Research Institute
Library Avenue, Pusa
New Delhi-110 012

https://iasri.icar.gov.in

Introduction and Background

ICAR-Indian Agricultural Statistics Research Institute (IASRI) is a pioneer Institute of Indian Council of Agricultural Research (ICAR) undertaking research, teaching and training in Agricultural Statistics, Computer Applications and Bioinformatics. Ever since its inception in 1930, as a small Statistical Section of the then Imperial Council of Agricultural Research, the Institute has grown in stature and made its presence felt both nationally and internationally. ICAR-IASRI conducts basic, applied, adaptive, strategic and anticipatory research in Agricultural Statistics, Computer Applications, Bioinformatics and related fields and uses these researches in meeting challenges and improving quality of agricultural research in the country. The Institute also conducts post graduate and in-service teaching, customized and sponsored training courses in Agriculture Statistics and Informatics at National and International level so as to be a leading centre of excellence in Human Resource Development. ICAR-IASRI provides methodological support in strengthening National Agricultural Statistics System and has established linkages with State Departments of Agriculture and allied fields, other Research Institutions, Industry, etc. It leads in development of Agricultural Knowledge Management Systems for National Agricultural Research and Education System (NARES). It provides advisory and consultancy services for strengthening the NARES and undertaking sponsored research and consultancy for National and International organizations.

There are six Divisions in ICAR-IASRI viz. Division of Sample Surveys, Design of Experiments, Computer Applications, Centre for Agricultural Bioinformatics, Statistical Genetics and Forecasting & Agricultural Systems Modeling.

Mandate

- To undertake research, education and training in agricultural statistics, computer applications and bioinformatics for agriculture research

- To provide advisory/consultancy services/ methodological support and computational solutions to NARES/NASS (National Agricultural Research and Education System/ National Agricultural Statistics System)

Vision

- Statistics and Informatics for enriching the quality of Agricultural Research

Mission

- To undertake research, education and training in Agricultural Statistics, Computer Applications and Bioinformatics for Agricultural Research

Goal

- To conduct research, education and training in Agricultural Statistics and Informatics

Achievements

Statistical Methodologies Developed, Accepted and Adopted by International Organizations

- Methodology for crop yield estimation using Crop Cutting Experiment (CCE) which was quickly adopted as the standard method recommended by the Food and Agriculture Organization of the United Nations (FAO), Rome, Italy to estimate crop production and is widely adopted by many African and Latin American countries also.

- Sampling methodology for estimation of post-harvest losses of horticultural crops (fruits and vegetables), livestock (meat and milk) and fish, field tested in Mexico, Zambia, Nepal and Thailand and accepted by FAO and UN member countries.

- Sampling methodology for estimating crop area, yield and production under mixed, repeated and continuous cropping, field tested in Indonesia, Rwanda and Jamaica and accepted by FAO.

- Sampling methodology for estimation of private food grains stock at farmer level, accepted by FAO.

Statistical Methodologies Developed and Adopted by National Organizations

- Integrated sampling methodology for estimation of harvest and post-harvest losses of major crops and commodities, adopted in conducting two national surveys on harvest and post-harvest losses in India.

- Alternative sampling methodology for estimation of area and production of horticultural crops accepted by MoA&FW, Govt. of India and adopted in Haryana State.

- Integrated methodology for crop acreage estimation in North-Eastern Hilly regions based on Remote Sensing, GIS and Ground Survey, adopted in Meghalaya, Tripura and other North-Eastern states.

- Sampling methodology for estimation of cotton production using double sampling approach, accepted by MoA&FW, Govt. of India and adopted in all major cotton growing states of the country.

- Appropriate sampling methodologies for identifying constraints in the adoption of high yielding varieties and evaluating the impact of Green Revolution.

- Sampling methodology for integrated sample surveys for livestock products, fish catch both from marine and inland sources, cost of production of crops as well as livestock products and adopted in all the states of the country.

- Methodology for obtaining estimates of slum population of different cities in India, adopted by Ministry of Housing and Urban Poverty Alleviation, Govt. of India.

- Methodology for producing district level poverty mapping adopted at state level.

- Experimental designs which helped in navigating from varietal trials to varieties and package of practices, translating varieties into enhanced crop production, by harnessing and detecting technologies and identifying conditions that optimize the response.

- Designs for single factor experiments which include variance balanced, efficiency balanced, and partially efficiency balanced designs; designs for multi-response experiments; crossover designs; designs with nested structures; neighbor balanced designs; optimality and robustness aspects of designs.

- Designs for multi-factor experiments which include confounded designs for symmetrical and asymmetrical factorials; block designs with factorial structure; response surface designs, mixture experiments for single and multi-factor experiments; Orthogonal main effect plans; orthogonal arrays; supersaturated designs.

- Designs for bioassays; microarray experiments and agroforestry experiments.

- The methodology developed for forecasting based on weather variables and agricultural inputs used by Space Application Centre, Ahmedabad, to obtain the forecast of wheat yield at national level with only 3% deviation from the observed one.

Methodologies Developed

- Analytical techniques based on mixed effects models for the analysis of data generated from Farmers Participatory Trials for resource conservation agriculture have been used by Rice-Wheat consortium for Indo-Gangetic plains.

- Procedures for estimation of genetic parameters; construction of selection indices; studying GxE interactions; progeny testing and sire evaluations; detection of QTLs, classification of genotypes using molecular marker data.

- The modification in the procedure of estimation of genetic parameters for incorporating the effect of unbalanced-ness, presence of outliers, aberrant observations and non-normality of data.

- Procedures for studying genotype environment and QTL environments interactions for the analysis of data generated from crop improvement programmes.

- Construction of selection indices, progeny testing and sire evaluation for animal improvement programmes.

- Significant contributions in developing models for pre-harvest forecasting of crop yields using data on weather parameters; agricultural inputs; plant characters and farmers.

- Methodologies for forewarning important pests and diseases of different crops to enable the farmers to use plant protection measures judiciously and save cost on unnecessary sprays.

- Forecasting of volatile data through non-linear time series models for forecasting onion price, marine products export, lac export, etc.; forecasting of India's marine fish production using Wavelet methodology.

- Methodology of small area estimation for skewed data suitable for agricultural, income and expenditure surveys.

- Methodology for spatial non-stationarity in small area estimation under area level model.

- Innovative approaches for small area estimation of crop yield, socio-economic and food insecurity parameters.

- Methodology of sample size determination for estimation of area and production of food grain crops.

- Methodology for estimation of seed, feed and wastage ratios of major food grains.

Online Statistical Resources

Statistical computing & resources hubs

- Indian NARS Statistical Computing Portal
- Design Resources Server
- Sample Survey Resources Server
- Information System on Designed Experiments
- Integrated Sample Survey Solutions for Major Livestock Products

Statistical Packages

- Statistical Package for Balanced Incomplete Block Designs (SPBD)
- Statistical Package for Factorial Experiments (SPFE)
- Statistical Package for Augmented Designs (SPAD)
- Software for Survey Data Analysis (SSDA)
- Statistical Package for Animal Breeding (SPAB)
- Statistical Package for Agricultural Research (SPAR)

CABin: Centre for Agricultural Bioinformatics

- National Agricultural Biocomputing Portal
- Sequence Submission Portal
- Advanced Super Computing Hub for Omics Knowledge in Agriculture

Online Digital Informatics Resources

Information dissemination portals

- KRISHI-Portal (ICAR Research Data Repository for Knowledge Management)
- KVK-portal (Krishi-Vigyan-Kendra-Knowledge-Network)
- Farmers First Portal
- e-Krishi Shikha (UG level e-courses)
- NAHEP-eLearning Portal
- KVC-ALUNET

Management/Expert Systems

- Academic Management System (AMS) **(implemented in 21 AUs)**
- NISAGENET
- AgriDaksh
- Mushroom-AgriDaksh
- Expert-System-Wheat
- Expert-System-Seed-Spices
- e-Platform-Seed-Spices

E-governance Applications

- E-Office (A Digital Workplace solution)
- ICAR-ERP (Enterprises Resources Planning) (Modules for Financial, Project, Material, Payroll & HR Management)
- MIS-FMS Dashboard
- ICAR-PMIS (Personal Management Information System)
- ICAR-PIMS (Project Information and Management System)
- CBP-Vortal (Capacity Building Training by Education Div., ICAR)
- Education Portal (Strengthening and Development of Higher Agricultural Education in India)
- Management System for Post Graduate School (PG-MS)
- Training Management Information System (TMIS)
- Foreign Visit Management System (FVMS)
- ICAR-Portal and Institute Information Management System
- NAHEP-Grievances Redressal Management System
- DARE DBT Portal
- HYPM (Half-Yearly-Progress-Monitoring)
- Online Recruitment Management System for IASRI
- Online Accreditation Management System for NAEAB
- Online Agriculture Universities Ranking System

Initiation of Computational facilities in ICAR-IASRI

The institute has rich legacy of computing starting from 1965 with **IBM-1620 Data Processing System** to **Burroughs B4700 Mainframe Computer** (1983) to **Personal Computer** (1991) and to **Pentium** (1997) to **RISC Server** (2002) and to **supercomputing** (2013), to **Data Centre** (2014) and presently **Artificial Intelligence** (AI) and **Cloud Computing & Disaster Recovery Centre** (2020)

ICAR National Facilities: Strengthening, Maintenance and Updating

ASHOKA

- A **National Agricultural Bioinformatics Grid (NABG)**, the first supercomputing hub for Indian Agriculture i.e. **Advanced Supercomputing Hub for OMICS Knowledge in Agriculture – ASHOKA** is built in a state-of-art Data Centre and out of nine super-computers of this grid, two super-computers ranked at **11th and 24th in the list of top super-computers of India**. A National Bio-Computing Portal has been launched through which authenticated users will be able to perform their biological data analysis. Also, a **Genome Submission Portal** is developed to assist our researchers for submission of their genomic data sets obtained through experimentations.

ICAR Data Centre

- **ICAR DATA CENTRE:** is providing IT services efficiently to DARE, KVK, ICAR and its institutes, since Sept, 2014. The facilities are built in a state-of-art Data Centre, equipped with industry standard **960 Cores Compute, 6224 GB RAM, 400 TB Storage**, Software, Application, Tools and other related technologies. There are more than 21,000 e-Mail boxes and more than 200 Portals / Websites/Applications. The listed DNS, Portals, Websites, Modules, Systems and Applications are being maintained and hosted at ICAR-DC.

- **ARTIFICIAL INTELLIGENCE:** To pace with the emerging technologies and to provide computational solutions to NARES/NASS, Artificial Intelligence (AI) resources have been built in ICAR-DC at the institute having **240 Core, 17 Tesla V100 GPU, 84070 CUDA Core, 10880 Tensor Cores, 21 TB SSD, 1280 GB RAM** having bundle of latest AI /Deep learning software / tools kits.

- **CLOUD COMPUTING & DISASTER RECOVERY CENTRE:** For meeting the services and infrastructure need of Digital Agriculture, ICAR-Data Center has been strengthened with cloud computing along with its Disaster Recovery Center at NAARM Hyderabad to enhance the quality, availability and accessibility of e-governance, research, extension and education in the field of agriculture in India.

Bioinformatics Resources developed

- **Microsatellite Databases:** Rice-ISM-ILP, Wheat - TaSSR, Goat - GoSatDB, Chickpea-ISM-ILP, Banana - BanSatdb, Sugarbeet – SBMdb, Buffalo - BuffSatdb, Tomato – TomSatDb, Vignasp. - VigSatDb, Pigeonpea - PipeMicroDb, Gingelley - GinMicroSatdb

- **Transcriptome Databases:** Fish – LrSATDb, Coconut - CnTDb, Wheat - WDRotDb, Vigna mungo – VmTDb, Small Cardamom – SCMVTdb

- **SNP Databases:** MangoSP – MiSNPdb, BuffaloSNP - SNPRDb

- **Other Databases:** Onion – OGR, Pearl Millet-PMTDb, Legume Crops – LeviDb, Livestock Epigenetic - EDIL, Cluster Bean – CbLncRNADb, Halophile Protein – HProtDB, Wheat-Variety-Identification-VISta

Mobile Apps developed

- Animal Reproduction app
- Pig Farming app
- Landly Pig app
- Artificial Insemination app
- Dairy Manager app
- Vaccination Guide app
- Pig Ration app
- Waste Management app
- Veterinary Clinical app
- Zoonoose app
- Technologies and Services app
- ICAR Technologies app
- KVK app
- MAPI app
- Farmers First Program app
- VISta app

Teaching And Training

The Institute conducts post graduate teaching and in-service courses in Agricultural Statistics, Computer Application and Bioinformatics for Human Resource Development. Institute is conducting M.Sc. and Ph.D. programs 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 in collaboration with the Post Graduate School of Indian Agricultural Research Institute (IARI), New Delhi. Students of ICAR-IASRI are occupying prestigious positions in different organizations/ Institutes/Universities.

Training is an important component of IASRI which are very popular and in high demand. Trainings are being conducted on regular basis on advanced topics in Agricultural Statistics and Informatics at the Institute under Centre of Advanced Faculty Training (CAFT), Summer School /Winter School, Human Resource Management (HRM) and customized National/ International Training. Senior Certificate Course in Agricultural Statistics and Computing is also being conducted on regular basis for the benefit of research workers engaged in handling statistical data collection, processing, interpretation and employed in research Institute of the Council, State Agricultural Universities and State Government Departments, etc. & foreign countries including SAARC countries.

Copyrights
The Institute has 50+ copyrights to its credit.

Agricultural Research Data Book

Agricultural research provides a vital input for planned growth and sustainable development of agriculture in the country. Information pertaining to agricultural research, education and related aspects available from different sources is scattered over various types of published and unpublished records. The Agricultural Research Data Book (ARDB) 2020, which is twenty-second in the series, is an attempt to put together main components/ indicators of such information. The Data Book comprising of 177 tables, is organized, for the purpose of convenience of the users into 10 sections.

Landmarks

The Institute has been serving the nation through the discipline of agricultural statistics for last 90 years (since 1930 with the initiation of Statistical Section of the Imperial Council of Agriculture Research), the discipline of Computer Applications in Agriculture for last 55 years (since 1965 with the installation of ICAR's first computing facility-IBM-1620 Data Processing System at IASRI), and the discipline of Agricultural Bioinformatics for last 10 years (since 2010 with the establishment of NABG-National Agricultural Bioinformatics Grid at IASRI).

Tauqueer Ahmad
Director
ICAR-IASRI
Email: director.iasri@icar.gov.in
Tel: 011-25841479
Fax: 011-25841564