



## Executive Summary

ICAR-Indian Agricultural Statistics Research Institute (ICAR-IASRI) an ISO 9001:2008 certified Institute, is mainly responsible for conducting research and education in Agricultural Statistics and Informatics to bridge the gaps in the existing knowledge. The Institute has used the power of Statistics blended judiciously with Informatics and has contributed significantly in improving the quality of Agricultural Research. The Institute has also been providing education/ training in Agricultural Statistics and Informatics to develop trained manpower in the country. The research and education is used in improving the quality and meeting the challenges of agricultural research in newer emerging areas. The entire campus is Wi-Fi enabled with a high speed internet connection. A landmark for the institute this year is that ICAR-IASRI has been declared as National Level Agency (NLA) under MIDH (Mission for Integrated Development of Horticulture). KRISHI (<http://krishi.icar.gov.in/>) Knowledge based Resources Information Systems Hub for Innovations in agriculture portal has been launched as a centralized data repository system of ICAR. ICAR Data Centre established at ICAR-IASRI acquired the certification for ISO/IEC 20000 and ISO/IEC 27001 for IT- service management and information security legislation respectively.

The Institute has made some outstanding and useful contributions to research in Agricultural Statistics and Informatics. A number of research projects were undertaken in the Institute during this year. Research was carried out under 84 research projects (41 Institute funded, 37 externally funded, 1 National Professor Scheme, 1 National Fellow Scheme and 4 Consultancy Projects) in various thrust areas. Out of these, 37 projects were in collaboration with other

Institutes, 16 projects were completed, 01 project was declared closed and 33 new projects were initiated.

Some salient research achievements are as follows:

- A series of row-column designs partially balanced for adjacent directional spatial indirect effects (neighbour effects) upto order two in four directions has been obtained for even number of treatments with parameters  $v$ ,  $p = v$ ,  $q = v$  and  $m = 1$ . A series of experimental designs balanced for spatial and temporal indirect effects of treatments has been constructed.
- Developed module named webFMC (<http://webfmc.iasri.res.in/>) to generate any combination of symmetric and asymmetric factorial design with minimally changed run sequences.
- Using SAS Macros, a method was developed for obtaining Box-Behnken Design with minimum level changes in the run sequences. General expression for factor-wise change as well as the total change of minimal Box-Behnken Design was derived.
- Developed and implemented an algorithm in R programming language to construct A-optimal balanced treatment incomplete block designs for given parametric combinations. The developed algorithm has been utilized to construct A-optimal BTIB designs in the parametric range of number of test treatments less than or equal to 30, number of blocks less than or equal to 50 and block size less than or equal to 10. An algorithm is developed to obtain A-optimal Group Divisible Treatment (GDT) Designs for comparing several test treatments with a control treatment.

- ICAR Research Data Repository for Knowledge Management called KRISHI (Knowledge based Resources Information Systems Hub for Innovations) portal (<http://www.krishi.icar.gov.in>) in agriculture has been launched as a centralized data repository system of ICAR consisting of Technology and Data.
- Indian NARS Statistical Computing Portal is being extensively used throughout NARES and helped the researchers in analyzing their data in an effective manner. Based on the user logged information, the total number of logged in users from Indian NARES during April 01, 2015 - March 31, 2016 are 87,392 which is on an average more than 235 logged in per day.
- A method for construction of first order and second order orthogonal Latin hypercube designs with 3, 4 and 6 factors in any possible number of runs have been developed.
- Strengthened Design Resources Server ([www.iasri.res.in/design](http://www.iasri.res.in/design)) by adding the links on (i) Online generation of Balanced Incomplete Latin square BILS ( $v, r$ ) designs for all values of  $3 < v < 21$  (except  $v = 6, 10, 14, 18$ ) at [www.iasri.res.in/design/BILS\\_Design/Default.aspx](http://www.iasri.res.in/design/BILS_Design/Default.aspx) (ii) Online generation of Row Column Designs with equal replication of each treatments for Factorial Experiments in Two Rows for  $2n$  ( $n < 10$ ) factorial experiments for orthogonal estimation of main effects and two factor interactions ([http://www.iasri.res.in/design/Row\\_Column\\_design\\_OP\\_2\\_rows/Default.aspx](http://www.iasri.res.in/design/Row_Column_design_OP_2_rows/Default.aspx)). It also generates designs with unequal replications in the same parametric range for orthogonal estimation of main effects and two factor interactions. (iii) Bibliography on Response Surface Designs is also made available at [http://www.iasri.res.in/design/Response%20Surface/RS\\_Home.html](http://www.iasri.res.in/design/Response%20Surface/RS_Home.html).
- During April 01, 2015 - March 31, 2016, Design Resources Server has 11,561 page views through 466 cities of 102 countries through Google Analytics.
- For providing e-advisory and e-learning in sample surveys, Sample Survey Resources Server (<http://sample.iasri.res.in/ssrs/>) was strengthened by adding links on bibliography on Non-sampling errors; History of Statistics on Timeline and MAPI (Mobile Assisted Personal Interview) a mobile Application for Android OS.
- To develop composite indicators for agricultural livelihood, methodology has been developed using PCA for construction of Science Culture Index (SCI).
- A model is proposed that captures both the cyclicity as well as volatility phenomena and the methodology for fitting the model is developed. For the volatile datasets which has missing observation, the EM algorithm in conjunction with particle filter was applied to estimate the parameters of Stochastic Volatility (SV) model.
- Under the study on monthly wholesale prices of onion of Mumbai, Nashik, Delhi and Bangalore markets, R and MATLAB software have been used for analyzing the data. The methodology has been extended to the semiparametric approach in which Nadaraya-Watson estimation technique has been applied to obtain the estimator of semiparametric conditional covariance matrix. A new innovative approach using Radial Basis Function (RBF) neural network combined with genetic algorithm has been applied to understand the nature of volatility spillover among the onion markets.
- Under a study entitled Non-parametric Bootstrap Approach for Constructing Prediction Intervals for Non-Linear and Bivariate Time Series Models, one real data set was taken and fitted employing VAR model and the residuals of the fitted model was tested employing MVN test. Bootstrap algorithm for constructing prediction interval in VAR model has been developed. Out of sample forecasting code for ANN is developed in Matlab software.
- Under the FAO funded study, the sampling methodology for estimation of crop area and yield under mixed and continuous cropping, has been developed for different situations prevailing in different countries. This methodology is being field tested in three countries, one each in Asia-Pacific, Africa and Latin America/Caribbean region, i.e. Indonesia, Rwanda and Jamaica respectively. The questionnaires developed for primary data collection have been designed using CAPI designer. In-house server at ICAR-IASRI has been set up and configured for the CAPI software and the data from the field is being uploaded by the Enumerators/Field Investigators of Indonesia to the ICAR-IASRI server dedicated for this purpose.
- The ICAR-IASRI has been declared as National Level Agency (NLA) under MIDH for taking up a study to test the Developed

Alternative Methodology for Estimation of Area and Production of Horticultural Crops: IASRI Component of CHAMAN Project under Mission for Integrated Development of Horticulture (MIDH). Testing and validation of methodology for estimation of area and production of horticultural crops developed by ICAR-IASRI is being carried out in six states of the country.

- Under the pilot study "Developing State Level estimates of Crop Area and Production on the Basis of sample Sizes Recommended by Professor Vaidyanathan Committee Report", sampling methodology has been developed. Mobile Assisted Personal Interviewing (MAPI) software has been developed for the data collection. Implementation of MAPI software in Uttar Pradesh State has been initiated.
- The estimates of wastage ratios for seed, feed and total production in respect of major food grains viz. paddy, wheat, maize, bajra, jowar, ragi and barley has been computed. It indicates that over-all ratios have gone down by 4.5% approximately as compared to the ratios (12.5%) used since long for estimating the total availability of food grains for human consumption in the country. These ratios are of immense use for planning and formulation of future policies by the policy makers for the economic development of the country.
- Under two stage sampling design, with assumption that the auxiliary variable is inversely related to study variable, three different calibration approach based product type estimators for estimation of population total along with their approximate variance and the Yates-Grundy form of estimate of variance have been developed. Usual product estimators for estimation of population total under all cases in two stage sampling design were compared with the proposed calibration approach based product type estimator. On the basis of the correlation coefficient between study and auxiliary variable, criteria of superiority of the proposed calibration based product type estimators with respect to usual product estimators of population total have been obtained. Further, the variance and estimate of variance of the product type calibration estimators have been developed considering equal probability without replacement design (SRSWOR) at different stages and phases of sampling.
- Under a study, Development of Innovative Approaches for Small Area Estimation of Crop Yield, Socio-economic and Food Insecurity Parameter, a bias-corrected predictor for small area quantities under log transformed Fay Herriot model has been developed. The empirical results based on simulation studies show that the proposed predictor has smaller bias and better efficiency as compared to the alternative predictor.
- The process for Testing and Validation of Alternative Methodology Developed by ICAR-IASRI for Estimation of Area and Production of Horticultural Crops in Madhya Pradesh and Haryana States has been initiated.
- Regarding Robust and Efficient Small Area Estimation Methods for Agricultural and Socio-Economic Surveys and their Application in Indo-Gangetic Plain, geographically weighted regression concept is considered to extend the area level version of GLMM to take into account the spatial nonstationarity and then to use it in small area estimation. The proposed NSEP provides efficient estimates for small areas as compared to existing methods when spatial nonstationarity is present in the data. Proposed small area estimation method is also applied to obtain reliable estimates of proportion of poor households at district level in the State of Uttar Pradesh. Subsequently, a poverty map for State of Uttar Pradesh is produced which provides important information for analysis of spatial distribution of poverty in the State.
- An operating manual entitled "Operating Manual for implementation of alternative sampling methodology for estimation of cotton production using double sampling approach" for implementation of the newly developed methodology in cotton growing states of the country was prepared. The official estimates of cotton production from 2015-2016 may be released using the newly developed alternative methodology.
- Agricultural Research Data Book (ARDB) 2015, which is the eighteenth in the series, has been published.
- In the study Modelling and Forecasting of Time-Series with Long Memory Processes, it is found that both the returns as well as squared return spot price series data are stationary. By applying the GPH tests for testing long memory to the

return and squared returns of the spot prices of gram, it was observed that for the return series, the test showed no evidence of LM patterns; as the null hypothesis of no persistence was not rejected. The result for squared return was different from that of the returns. Indeed, long memory property was found to be highly significant for the squared returns.

- Four web servers viz., *dSSpred* (<http://cabgrid.res.in:8080/sspred>), *PreDOSS* (<http://cabgrid.res.in:8080/predoss>), *HSplICE* (<http://cabgrid.res.in:8080/hsplice>) and *MalDOSS* (<http://cabgrid.res.in:8080/maldoss>) have been developed for the prediction of donor splice sites. The developed web servers will be of great help for the biological community for easy prediction of donor splice sites.
- The stability measure based on rank for selecting stable genotype has been developed by using rank sum (RS) of different genotype on the basis of rank of absolute interaction residual and variance of each genotype among the environment on the basis of interaction residual among all environments. Linear combination of stability ranks realized from RS and  $S_i^{(2)}$  is proposed as a new stability measure and is denoted as rank based stability index  $RSI = (r_{RS} + r_{Si^{(2)}})/2$ , where  $r_{RS}$  is stability rank based on rank sum measure and  $r_{Si^{(2)}}$  is stability rank based on variance.
- An attempt has been made to reparametrize the autoregressive coefficient to ensure the stationarity in the data. The additive genetic variance covariance matrix has been constructed and the estimates of fixed and random effects and their variances have also been derived. The computer program has been developed to calculate the numerator relationship matrix and for estimation of variance components in Linear Mixed effect Model (LMM) in presence of both correlated random effects and error.
- For the selection of informative genes under particular stress condition, a gene selection technique has been proposed based on bootstrapping and support vector machine with recursive feature elimination (SVM-RFE). The gene ontology enrichment analysis of the selected genes revealed the underlying cellular mechanism of AI stress response in soybean. For the identification of hub genes (highly interacting genes) in the genetic network, a resampling based technique was proposed. The performance of the proposed technique was compared with the existing technique and the results showed that former identified a less number of hubs as compared to latter, which are in accordance with the scale free property of biological networks. For rice and soybean crops, various hub genes and unique hub genes were also identified.
- Gene expression data of Arabidopsis and Rice for different stresses viz. bacteria, salinity, cold and drought was collected from NCBI GEO database. The raw data was pre-processed using RMA algorithm. A gene selection approach, Boot-MRMR was proposed by incorporating bootstrap in MRMR procedure.
- SAS codes for data generation as well as heritability estimation for different correlation structure of errors (AR(1) and AR(2)) in case of half sib and full sib models have been developed. It is noticed that in the presence of fixed effect, MSE values increases for increasing correlation value and decreases with increase in sample size.
- A unidirectional causality has been observed between gross domestic product (GDP) and agricultural exports. This indicates that growth in agricultural exports has contributed to the overall and agricultural growth in India. This study has suggested that Indian trade policy environment needs to be made more favourable for attracting foreign buyers and making Indian exports competitive globally.
- Propensity Score Matching (PSM) method has been used to estimate the average treatment effect of crop insurance on farm output. Probit model has been employed to estimate the propensity scores. Most of the insured farmers were found among the borrowers who had borrowed credits from bank. The impact of insurance on farm output was found positive and highly significant. Therefore, there is need to enhance the flow of crop insurance to reduce or cover the risk factor in the production practices. An attempt is also being made to compute Total Factor Productivity (TFP) at district level in India using stochastic production function in panel data.
- Literature survey of iterative and analytical solution of stochastic differential equations



(SDE) has been carried out. It has been found that conditional distribution of solution of SDE with additive noise is Gaussian whose conditional distribution is homogeneous. Attempt has been made to obtain linear SDE with non-homogeneous transition probabilities.

- Genes and promoters which are common across genotypes under specific stress, can serve as robust candidates for crop improvement. Metadata analysis of rice R genes from 11 different *Oryza* species has been standardized.
- In order to identify regulatory elements, miRNAs in buffalo has been identified using *in-silico* approach. Total six miRNAs and their target genes along with their structure have been identified based on Expressed Sequence Tag (EST) data.
- The novel-heat stress responsive genes have been identified, transcriptome data analysis has been done. This will be useful for understanding of stem reserve mobilization, photosynthetic heat tolerance and heat tolerance in grain development. The heat responsive candidate gene based SSR markers have also been identified which may be useful in mapping QTLs for heat stress tolerance in wheat.
- A database of coreset germplasm of 375 wheat coreset varieties and 192 AVT (Advance Varietal Trial) along with 38 DUS feature data has been developed. Also for SNP based variety differentiation, SNP data has been generated using 35K affymatrix chip.
- Availability of whole genome sequence and *in silico* approaches has revolutionised the bulk marker discovery. The world's first wheat whole genome marker discovery and database, WHMDB (<http://webapp.cabgrid.res.in/whmdb/>) with 476K markers unified in a common platform using MySQL, Apache and PHP has been reported. The embedded markers and corresponding location information can be selected on desired chromosome and location/ interval based primers can be generated using Primer3 core, integrated at the backend. A miRNA prediction tool using wheat coding sequence has been developed. The target of these miRNA can also be predicted.
- First whole genome putative microsatellite DNA marker database (<http://webapp.cabgrid.res.in/sbmdb/>) of sugarbeet for bioenergy and industrial applications has been developed. It was listed as one of the Salient Achievements for the year 2015 of Indian Council of Agricultural Research.
- The transcriptome profile of two fish species i.e. *Labeo rohita* and *Labeo bata* has been done through experiment to understand the higher utilization of glucose in *Labeo bata*.
- A legume viral database has been developed. Public domain databases were used to mine viral sequences. A total of 2574 viral sequence of legume crop has been mined which were having 1835 partial, 737 full genome and 2 genomic RNA to create database of legume virus. It was found that among 2574 genes, 515 genes are reported from India and rest 2059 from other countries.
- For whole genome sequencing of Rohu fish, data were generated using three chemistry *viz.* Roche 454 GS FLX (4.45 GB, 8 runs), IonTorrent (0.83 GB, single run) and Illumina (Miseq 67.98 GB and Nextseq: 142.5 GB). For genomic resources/marker discovery, a total of 512916 SSRs were mined from draft assembled genome and a database is created. For whole genome sequencing of Magur fish, data were generated using three chemistry *viz.* Roche 454 GS FLX (2.47 GB, 4 runs), IonTorrent (0.64 GB, single run) and Illumina (Miseq and Hiseq: 453.88 GB). Using CLC Genomics workbench software, *de novo* assembly has been completed. In order to achieve objective of genomic resources/marker discovery, a total of 702739 SSRs were mined from draft assembled genome and a database has been developed.
- Hormone Regulatory Relationship between TF's and their Target under Combined Salt, Drought and Heat stress has been studied. This provides an insight into hidden crosstalk's and the influence of three hormones i.e. ABA, GA and Auxin, under combined drought and salt stress within plant. It was observed that this hormone governing network has particular topological properties in transcriptional regulatory networks and relates to certain regulatory mechanisms in gene regulation.
- A user-friendly, menu driven, interactive and web-based database named as CerealESTDb has been developed. This database contains assembled and annotated ESTs of rice, wheat, sorghum and maize induced under cold, heat,

drought, salinity stress as well as on application of ABA. This will also provide information about genes, ontology and corresponding pathways related to these ESTs.

- An efficient algorithm has been developed for comparing protein structure using Elastic Shape Analysis (ESA) in which the sequence of 3D coordinates of atoms of protein structures has been used as parameterised curve supplemented by addition of auxiliary information based on side-chain properties.
  - The graph theory based approach has been proposed to compare the protein 3-D structures. The proposed algorithm has been implemented in MATLAB. MATLAB programs have been written for reading PDB files, selecting model and chain in the given PDB files, building graph adjacency and distance matrix, partitioning of the graph using spectral & MCL clustering techniques, building binary 2D structure matrix and superimposing the matrices.
  - For Development of 16s rDNA Rumen Microbes Specific Database, Phylogenetic tree has been generated with selected microbes sequence data. The database has been developed. BLAST database has also been created to search microbes by sequence. BLAST database has been placed at the shared folder in the ASHOKA cluster.
  - In order to resolve mango genome assembly issues due to highly heterozygous genome of Amarpali, PacBio based NGS data with longer read lengths of >3.5 kb using P4C2 and P5C3 chemistries with 70X genome coverage were generated. This is World's first Mango Genome Draft assembly of *Network Project on Transgenics in crops*.
  - The reports under project entitled. National Information System on Agricultural Education Network (NISAGENET) have been made accessible to Google Chrome as well as Mozilla Firefox Browsers. A mobile app for accessing NISAGENET reports has been developed and is made accessible from NISAGENET website.
  - Academic Management System CIFE (AMS-CIFE), a web enabled system and second system in line with Management System: PG School ICAR-IARI has been launched. The system will enhance the overall efficiency of the academic system and facilitate e-learning for the students.
- It is accessible online at <http://amscife.icar.gov.in> from ICAR Data Center at ICAR-IASRI.
- An online knowledge base system for disease identification in tobacco (Tobacco Agridaksh) has been developed using Agridaksh tool to provide global accessing of all information on various diseases of tobacco and their symptoms. This system is useful to enhance the efficiency of farmers, agricultural extension personnel, development agencies for crop management and to increase the crop yield. It determines the best strategy for disease management, identification and diagnosis.
  - Implementation of ICAR-ERP solution was completed in all 109 Institutes (ICAR Headquarter, ASRB, Institutes-99, and ZPDs-8) and knowledge enhancement sessions on ICAR-ERP were organized. To facilitate the trainings, User Manuals, Short Manuals related to Process and Video Tutorials have been developed and made available on the project web site (<http://www.iasri.res.in/misfms>). Policy/ Process has been designed for creation of e-mail id and hosting of websites/applications.
  - A software has been developed for analysis & monitoring of storage losses in food grains. The software is to facilitate reporting of data collected from godowns for four commodities at the periodic level starting from storage to liquidation based on moisture parameters recorded on sample taken from the stack, weather conditions, infestation status etc. This is standalone software to be used by the identified 20 AICRP-PHT Centres and has the feature of export utility to send the updated data to AICRP-PHT Ludhiana. It also has an import utility to import the data in central database for further analysis.
  - Phenomics computation facility has been created for storing the image data, developing the models for analysis of the image data, hosting the solutions developed. It allows users to store experiment data files (digital images, pdf, excel, doc file etc.) online with corresponding meta-data and share data collections with the user community. The GUI of Multimedia Data Management System has been strengthened with additional reports. A Non-destructive approach for Leaf Area estimation through image analysis has been developed. This help users in finding out the leaf area of a rice plant in pot condition by uploading its photograph on

the online system. A mobile application for this purpose is also developed to enable user in uploading photographs from mobile as per the instructions and estimating leaf area.

- The Expert System on Dog Health (ESDH) has been developed. It provides symptom based diagnosis of 48 dog diseases. The database was created using IndexedDB and modules were developed using JSON, CSS3 and Javascript.
- An efficient methodology has been developed for comparing protein structure using Elastic Shape Analysis (ESA) in which the sequence of 3D coordinates atoms of protein structures has been used as parameterised curve which is supplemented by addition of auxiliary information based on side-chain properties. This curve is represented by a special function called Square Root Velocity Function (SRVF). Source codes for different functions have been developed in R. Also, user friendly web-based application called ProtSComp has been developed using Algorithm for Protein Structure Comparison that can be accessed freely by the users.

The Institute has regularly organized the meetings of Research Advisory Committee (RAC), Institute Management Committee (IMC) and Institute Research Committee (IRC).

Scientists of the Institute have published 139 research papers in National and International refereed Journals along with 27 popular articles/short communications, 1 pocket diary, 2 books, 39 book chapters, 4 papers in conference proceedings and 46 project reports/technical bulletins/monograph/reference manuals/brochures. Besides, 13 Workshop documents/ database/e-manuals/e-resources/e-learning portal were also developed.

During the year, 24 training programmes were organized in which 532 participants were imparted training. Brief account of the trainings organised is as below.

- Four 21 days training programme under Centre of Advanced Faculty Training (CAFT) were organised on Application of Computer Algorithms and Statistical Software Packages in Agriculture; Advances for Technological Enhancement in Agricultural Research; Computational Tools and Techniques for Molecular Data Analysis in Agriculture; and Recent Advances in Statistical Genetics and Genomics.
- Eight Resource Generation training programs were conducted on Integrated Sample Survey

Methodology; Sample Survey and Sampling Design; Data Analysis and Interpretation; Field Data Collection under the Study "Improving Methods for Estimating Crop Area, Yield and Production under Mixed, Repeated and Continuous Cropping"; Crop Cutting Experiments Technique; Use of Models in Crop Yield Estimation and Small Area Estimation Techniques and Applications sponsored by Ministry of Agriculture, Government of India; DES, Deptt. of Planning, Govt. of UP; MoSPI, Govt. of India; FAO; Skymet Weather Services Private Ltd., Noida; and three by NSSTA, CSO, MOS&PI, GOI, New Delhi.

- Twelve other training programmes, one sponsored by Education Division, ICAR on Designing and Analysis of Experiments for the Technical Personnel of ICAR; one by PG School, IARI, New Delhi on Experimental Data Analysis for Ph.D. Students from various disciplines of PG School, IARI and ten project based programs by the Institute were organized.

The activities relating to Post Graduate teaching programmes of the Institute were undertaken in collaboration with PG School, ICAR-IARI. During the year, a total of 24 students {3 Ph.D. (Agricultural Statistics), 8 M.Sc. (Agricultural Statistics), 8 M.Sc. (Computer Application) and 5 M.Sc. (Bioinformatics)} completed their degrees. 32 students {9 Ph.D. (Agricultural Statistics), 7 M.Sc. (Agricultural Statistics), 4 Ph.D. (Computer Application), 5 M.Sc. (Computer Application), 3 Ph.D. (Bioinformatics) and 4 M.Sc. (Bioinformatics)} were admitted. A Senior Certificate Course in Agricultural Statistics and Computing was also organized.

Dr. UC Sud and Dr. Tauqueer Ahmad visited FAO, Rome to attend Expert meeting on Improving methods for estimating area, yield and production under mixed and continuous cropping and Improving methods on estimating post harvest losses held at Food and Agriculture Organization (FAO) Headquarter, Rome, Italy; Jakarta, Indonesia; NISR, Kigali, Rwanda and Kingston, Jamaica as Resource Person for imparting training to enumerators and supervisors for primary data collection and to supervise live data collection under the project "Research on improving methods for estimating crop area, yield and production under mixed, repeated and continuous cropping". Dr. Hukum Chandra visited Sri Lanka as International Consultant, for short term FAO consultancy under Global Strategy to Improve Agricultural and Rural Statistics in Sri Lanka; Daejeon, Republic of Korea for attending the Regional Workshop on "Statistical

Literacy”; Rio De Janeiro, Brazil to attend the 60th International Statistics Institute World Statistics Congress 2015 as Invited speaker; Japan to attend Regional Workshop on Training of Trainers for Official Statistics and Second Expert Group Meeting of the Network for the Coordination of Statistical Training in Asia and the Pacific. Dr. Hukum Chandra and Dr. Man Singh visited Jakarta, Indonesia for supervision of data collection work under the Food and Agriculture Organization of United Nations funded project entitled “Research on improving methods for estimating crop area, yield and production under mixed, repeated and continuous cropping”.

Four seminars were delivered by Guest Speakers Prof. Bikash Sinha, Former Member National Statistical Commission and Professor, Indian Statistical Institute, Kolkata on Into the mysterious world of  $p$  the bernoulli parameter; Dr. Dulal K. Bhowmick, Director, BRC, University of Illinois, USA on Statistical methodologies in neuro-connectivity analysis using fMRI data in autism; Dr. Balgobin Nandram, Professor of Statistics, Worcester Polytechnic Institute, USA on "My association with USDA's NASS" and SPSS Team on "Demonstration on SPSS software along with SPSS Online Training for Govt. Officials". One seminar was delivered by Vigilance Officer of the Institute.

Scientists of the Institute have brought laurels to the Institute by receiving awards from different agencies. Dr. Hukum Chandra received National Award in Statistics 2014-15 from the Ministry of Statistics and Programme Implementation, Government of India. Dr. Seema Jaggi received the INSA Teacher Award 2015; Dr. A.R. Rao was awarded NAAS-fellowship; Dr. Alka Arora received Active participation Award Women Member 2014-15 from Computer Society of India; Dr. Sarika received the Distinguished Scientist Award in recognition of her meritorious and outstanding scientific contribution in the field of Bioinformatics; Dr. MA Iquebal received Individual Award as Young Scientist Award in recognition of his outstanding scientific contribution in the field of Bioinformatics. Dr. Ranjit Kumar Paul and Dr. MA Iquebal received Young Scientist Award of the Society for Application of Statistics in Agriculture and Allied Sciences (SASAA). Dr. Sarika and Dr. MA Iquebal received Team Award. Dr. Arpan Bhowmik received Dr. GR Seth Memorial Young Scientist Award. Dr. Dinesh Kumar received the Distinguished Scientist Award of the Society for Bioinformatics and Biological Sciences. Dr. Eldho Varghese and Dr. Arpan Bhowmik were awarded Krishi Vigyan Gaurav Honorary Title. Smt. Suman Khanna received ICAR Cash Award/Certificate of Distinction 2014 for Administrative Category.



# ORGANOGRAM

RESEARCH ADVISORY COMMITTEE ↔ **DIRECTOR** ↔ INSTITUTE MANAGEMENT COMMITTEE

