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INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE (ICAR), LIBRARY AVENUE, PUSA, NEW DELHI- 110 012



From Director's Desk

This Newsletter highlights some of the salient research and training achievements made and other significant activities performed during the period under report.

Design Resources Server has been strengthened by uploading a link on Block Designs with Factorial Structure.

For the experimental situations wherein experimental units are used for a series of tasks one after another in the experimental conditions whose levels are difficult to change, two classes of nested designs involving sequences of treatments with same number of experimental periods and units have been obtained.

A method of construction of second order rotatable response surface designs in the presence of neighbour effects has been developed.

Estimators of both domain and population totals for an item of interest were developed under two-phase sampling where the domain identity was realized, but the item response was not necessarily available from a phase I sampled unit.

An approximately unbiased estimator of the variance of ratio estimator under the two-phase sampling has been developed.

A β -version of Statistical Package for Animal Breeding (SPAB 2.1) has been developed.

Five workshops on Design of Experiments, Applications of Small Area Estimation Techniques, Expert Systems in Agriculture, Remote Sensing and GIS for Decision Support in Agriculture and Statistical and Computational Issues on Genomics were organised as part of Golden Jubilee celebrations of the Institute.

A customised training programme on Data Analysis with Statistical Tools sponsored by Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India was organized.

A bulletin on Design Resources Server and 11 research papers were published.

The Institute participated in number of meetings / conferences / symposia/workshops etc.

It is hoped that the contents of this document would be informative and useful for scientists in NARS. Any suggestions for improving the contents of the newsletter further, would be highly appreciated.

VK Bhatia
(VK BHATIA)

IN THIS ISSUE

- Research Achievements
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निदेशक की कलम से . . .

समाचार पत्र के इस अंक में प्रतिवेदनाधीन अवधि के दौरान प्रमुख अनुसंधानिक एवं प्रशिक्षण संबंधी उपलब्धियों और संस्थान की अन्य महत्वपूर्ण गतिविधियों पर प्रकाश डाला गया है।

डिज़ाइन रिसोर्सेज सर्वर को, बहुउपादानाय संरचना सहित ब्लॉक अभिकल्पनाओं का लिंक अद्यतन करके, सुदृढ़ किया गया।

परीक्षात्मक दशाओं जिनमें, परीक्षात्मक इकाईयों का प्रयोग एक के बाद एक कार्यों की श्रृंखला के लिए होता है एवं जिसकी परीक्षात्मक परिस्थितियों में बार-बार परिवर्तन सम्भव न हो के लिए एक समान परीक्षात्मक अवधियों एवं इकाईयों की संख्या वाले ट्रीटमेंट्स के सीक्वेन्स सहित नीडित अभिकल्पनाओं की दो श्रेणियाँ प्राप्त की गयीं।

प्रतिवेशी प्रभावों की उपस्थिति में द्वितीय आर्डर रोटेटेबल रिस्पांस सर्फेस अभिकल्पनाएँ तैयार करने की एक विधि विकसित की गयी।

द्विचरणीय प्रतिचयन के अन्तर्गत जहाँ डोमेन की विशिष्टता अनुभव की गयी परन्तु चरण एक की प्रतिदर्श इकाई से आईटम रिस्पांस आवश्यक रूप से उपलब्ध नहीं था, अध्ययनाधीन रुचि की एक मद के लिए डोमेन योग एवं समष्टि योग, दोनों के आकलक विकसित किये गये।

द्वि-स्तरीय प्रतिचयन के अन्तर्गत अनुपातिक आकलक के प्रसरण का सन्निकट अनभिन्नत आकलक विकसित किया गया।

पशु प्रजनन हेतु सांख्यिकीय पैकेज (एस.पी.ए.बी. 2.1) का β -वर्जन विकसित किया गया।

संस्थान के स्वर्ण जयन्ती वर्ष समारोह के उपलक्ष्य में परीक्षात्मक अभिकल्पनाएँ, लघु क्षेत्र आकलन तकनीकों का अनुप्रयोग, कृषि में विशेषज्ञ तंत्र, कृषि में डिसीजन सपोर्ट के लिए सुदूर संवेदन एवं भौगोलिक सूचना तंत्र तथा जीनोमिक्स में सांख्यिकीय एवं संगणात्मक तकनीकों पर पाँच कार्यशालाएँ आयोजित की गयीं।

भारत सरकार, सांख्यिकी एवं कार्यक्रम कार्यान्वयन मंत्रालय के केन्द्रीय सांख्यिकीय संगठन द्वारा प्रायोजित 'डाटा एनालिसिस विद स्टैटिस्टिकल टूल्स' विषय पर एक कस्टमाइज्ड प्रशिक्षण कार्यक्रम आयोजित किया गया।

डिज़ाइन रिसोर्सेज सर्वर पर एक बुलेटिन तथा 11 शोध-पत्र प्रकाशित किये गये।

संस्थान द्वारा अनेक बैठकों/सम्मेलनों/संगोष्ठियों/कार्यशालाओं इत्यादि में भी प्रतिभागिता की गयी। आशा है कि इस अंक की विषय वस्तु राष्ट्रीय कृषि अनुसंधान प्रणाली के वैज्ञानिकों के लिए सूचनाप्रद एवं उपयोगी होगी। समाचार पत्र की विषय वस्तु में सुधार लाने हेतु आपके सुझावों का स्वागत है।

(विजय कुमार भाटिया)

RESEARCH ACHIEVEMENTS

- Design Resources Server has been strengthened by uploading the following:
 - On the link *Analysis of Data*, steps and syntax for (i) fitting non-linear models using SAS and SPSS on the sub-link *Non-Linear Models*, and (ii) performing cluster analysis for dimension reduction of the data using SAS and SPSS on the sub-link *Cluster Analysis*.
 - On the link *Design for Factorial Experiments*, a sub-link on *Block Designs with Factorial Structure* giving a bibliography on the subject as well as catalogue of three factor designs having orthogonal factorial structure with balance and permitting estimation of main effects with full efficiency and two factor interactions with controlled efficiency has been uploaded.
- In the experimental situations, wherein experimental units are required to perform a series of tasks one after another under various experimental conditions such as different types of lighting or temperature or equipments, it is difficult to change the experimental conditions. Each subject is required to perform all assigned tasks under one set of conditions during one session. The conditions are altered from one session to another. This has a resemblance with nested structure with experimental conditions treated as levels of first factor (bigger set) and different tasks treated as levels of nested factor (smaller set). For such experimental situations, two classes of nested designs involving sequences of treatments with same number of experimental periods and units have been obtained. The precision of estimation of direct and residual effects is more with the design having more number of levels of the nested factor.
- Conditions have been derived for the estimation of coefficients of second-order response surface model for the experimental situation in which the experimental units, i.e., plots experience the neighbor effects from immediate left and right neighboring plots assuming the plots to be placed adjacent linearly with no gaps. A method of constructing rotatable designs for fitting second-order response surface in the presence of neighbor effects has been developed.
- Estimators of both domain and population totals for an item of interest were developed under two-phase sampling where the domain identity was realized, but the item response was not necessarily available from a phase I sampled unit. The optimality of sampling design was studied considering the probability of item response, the cost of phase I versus phase II sampling, and the item variability in the domains. Through numerical evaluations using a simulation study, the proposed estimators are shown

to be more efficient than an already available estimator.

- The concept of multiple objective functions has been proposed for minimization of sampling variance of the Yates-Grundy form of the Horvitz-Thompson estimator in an optimal controlled nearest proportional to size sampling scheme. It has been shown empirically that the true sample variance of the proposed procedure compared favorably with that of the existing optimal controlled and uncontrolled high entropy selection procedures.
- An approximately unbiased estimator of the variance of the ratio estimator under the two-phase sampling which is more efficient than the existing estimators under a super population model with intercept, has been developed.
- A study on price volatility and integration in spot and futures market of gram indicated unidirectional Granger causality from future to spot markets. The volatility of future market is greater than the spot market volatility. The distribution of spot prices is comparatively more skewed than future prices. The occurrence of unit roots in spot and futures price data indicates that shocks are having permanent or long lasting effect. There is instantaneous transmission of price signals between the markets and the futures prices of one day lag influence spot prices.
- A β -version of Statistical Package for Animal Breeding (SPAB 2.1) has been developed. The package is quite useful for animal breeders for estimation of genetic parameters and for formulating sound breeding strategies and selection processes. This is a modified version of SPAB 2.0 which became functional in 2006. The new programs added in SPAB2.1 are:

- Simulation of sib data
 - Bootstrapping for estimation of standard error of genetic parameters
 - Skillings and Mack non-parametric test.
- All the available programs have been grouped into 11 modules.

VISIT ABROAD

- Dr. VK Bhatia attended ISO/TC 69 technical committee meeting as an Indian Delegate of Technical Committee MSD-3 of Bureau of Indian Standards at Kuala Lumpur, Malaysia during 13-19 June 2009.
- Dr. Rajender Parsad was invited as Consultant with the Computer and Biometrics Services Unit, ICARDA, Syria to conduct a training programme on Experimental design and data analysis for CAC Staff at Tashkent during 01-05 June 2009.
- Dr. AK Vasisht visited University of Arizona, Tucson, USA on a study visit under the project V-Page of NAIP during 25 March to 24 May 2009.
- Dr. AK Vasisht, attended USDA-ERS workshop held at Washington DC, USA during 09-10 June 2009 and presented the paper entitled Contract design and trading bans on Indian futures contracts (AK Vasisht and Roger A. Dahlgran).
- Dr. Hukum Chandra attended Small Area Estimation (SAE 2009) conference held at Elche, Spain during 29 June to 01 July 2009 and presented an invited paper entitled Small area estimation of proportions in business surveys.

HONOURS/AWARDS

- Dr. Hukum Chandra received Cochran-Hansen Prize 2009 from International Association of Survey Statisticians.

WORKSHOPS ORGANISED

As part of Golden Jubilee celebrations of the Institute the following workshops were organised

- Workshop on Design of Experiments was organized jointly by National Professor Research Unit, National Fellow Research Unit and Division of Design of Experiments on 29 April 2009. Dr. Rajender Parsad was Convener and Dr. Krishan Lal was Co-Convener of the workshop. The workshop was inaugurated by Dr. AK Singh, DDG (NRM), ICAR and Dr. MM Pandey, DDG



- Application of Sanders correction and calculation of repeatability
- Estimation of heritability for threshold traits
- Recurrent selection and reciprocal recurrent selection
- Genetic advance in closed and open nucleus breeding schemes
- Testing the homogeneity of variance-covariance matrices (Likelihood ratio test)
- D-square analysis (Oblique axis and Iterative mini-max)



(Engg.) was the Guest of Honour for the Inaugural Session. Dr. A Subba Rao, Director, IISS, Bhopal; Dr. AK Dixit, Head, Division of Agricultural Chemicals, IARI, New Delhi; Dr. Madhuban Gopal, National Fellow, Division of Agricultural Chemicals, IARI participated in the workshop along with other eminent statisticians and experimenters from ICAR Institutes and SAUs. Dr. HS Gaur, Dean and Joint Director (Education), IARI, New Delhi delivered the Valedictory Address.

- Workshop on Applications of Small Area Estimation Techniques was organised on 18 May 2009. Dr. UC Sud was the Convener and Dr. Hukum Chandra was the Co-Convener of the workshop. Dr. Pronab Sen, Chief Statistician and Secretary, Ministry of Statistics and Programme Implementation, Government of India inaugurated the workshop. Dr. Padam Singh, Former Additional Director General, ICMR and Member National Statistical Commission was the Chairman and Dr. MM Pandey, DDG (Engg.), ICAR was the Guest of Honour for the Inaugural Session.
- Workshop on Expert Systems in Agriculture was organised on 12 June 2009. Dr. Sudeep was the Convener of the workshop. Agricultural scientists who are the domain experts and the computer scientists involved in developing expert systems from NARS attended the workshop. Dr. KD Kokate, DDG (Agril. Extn.), ICAR inaugurated the workshop.



- Workshop on Remote Sensing and GIS for Decision Support in Agriculture was organised on 18 June 2009. Dr. Anil Rai was the Convener of the workshop. Dr. AK Singh, DDG (NRM), ICAR inaugurated the workshop.



- Workshop on Statistical and Computational Issues on Genomics was organized on 22 June 2009. Dr. AR Rao was the Convener and Dr. AK Paul was the Co-convener for

the workshop. Dr. S Prakash Tiwari, DDG (Education), ICAR inaugurated the workshop.



HUMAN RESOURCE DEVELOPMENT

- A training programme on Data Analysis with Statistical Tools sponsored by Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India was organized for 23 ISS Probationers of XXIX batch during 13 April–08 May 2009. The training programme was inaugurated by Dr. MM Pandey, DDG (Engg.), ICAR. The training programme aimed at familiarizing the participants with the advances in data analytical techniques for drawing statistically valid inferences from data and to acquaint the participants with the use of statistical packages for data analysis and provide a hands on experience. Entire course contents was structured in the following broad headings viz. Computer Usage and Statistical Software Packages; Statistical Methods and Statistical Inference; Design of Experiments; Multivariate Analytical Techniques; Statistical Modelling and Forecasting Techniques; Sample Surveys and Other Useful Statistical Techniques such as Spatial Statistical Analysis, Remote Sensing and GIS, Data Mining, Artificial Neural Networks, etc. The course material was distributed to the participants in the beginning of the training programme in the form of reference manual in two volumes. Dr. Pronab Sen, Chief Statistician and Secretary, Ministry of Statistics and Programme Implementation, Government of India was the Chief Guest in the Valedictory Function. He distributed the certificates to the participants along with a copy of E-manual. Dr. Rajender Parsad was the Course Director and Dr. Krishan Lal was the Course Co-Director for this training programme.



- A two days training-cum-workshop was organized at DWR, Karnal during 12-13 May 2009 as a part of the project Strengthening, Refining and Implementation of Expert System on Wheat Crop Management.
- Brainstorming session on Future Technological Needs in Genetics and Plant Breeding for Sustainable Agriculture was organised on 15 May 2009 under V-Page project at Division of Genetics and Plant Breeding, IARI, New Delhi.
- A one week training programme on Experimental Designs and Data Analysis for the CAC Staff at Tashkent was conducted during 01-05 June 2009. Dr. Rajender Parsad was the Course Director and was invited as Consultant Biometrician with the Computer and Biometrics Services Unit, ICARDA, Syria. Sh. Khaled-EI-Shamma from ICARDA, Syria acted as Course Co-Director. There were 8 participants in this training programme who were research staff of International Water Management Institute, International Potato Center and International Center for Agricultural Research in Dry Areas at Tashkent Office.



- A two days travel training cum-workshop on Research Methodology was organized at ANGRAU, Hyderabad on 16-17 June 2009 sensitizing the scientists and students of ANGRAU on the advances in design of experiments and analysis of experimental data. This workshop was attended by 93 participants. Dr. VK Gupta, Dr. Rajender Parsad, Dr. LM Bhar and Sh. OP Khanduri were the core faculty for this workshop. Major issues that came up were (i) How to compare two watersheds of 100 ha each with untreated and treated water sheds? (ii) How to compare 2 treatments like organic farming and existing farming practices using non-replicated field scale experiments with large plot size? (iii) How to design experiments for drip and sprinkler irrigation systems? (iv) How to handle large variation in both directions of experimental plots due to soil depth, elevation under rainfed conditions?

LECTURES DELIVERED

- Dr. VK Bhatia, Director, IASRI delivered a lecture on Functions of IASRI on 23 April

2009 during a workshop funded by Swiss Agency for Development and Co-operation Bern (IDC) and a lecture on SPSS on 09 May 2009 at IIFT, New Delhi to four faculty members from Vietnam University of Foreign Trade, Hanoi.

PARTICIPATION OF INSTITUTE

Participation in Meetings

- Meeting of Round Table on Global Economic Slow Down and Indian Agriculture on 24 April 2009 at IARI, New Delhi.
- Meeting of the Editorial Board of Annals of Agricultural Research, the Journal of the Indian Society of Agricultural Sciences on 10 June 2009 at Division of Agronomy, IARI, New Delhi.
- Meeting of the Empowered Committee on 03 June 2009 at CSO, Sardar Patel Bhavan, New Delhi.
- Foundation Day of NAAS and lecture of Prof. Sukhdeo Throat, Chairman, UGC on Higher Education and XI Plan Approach and Strategies during 04-05 June 2009 at NASC Complex, New Delhi.

Participation in Conferences/Seminar/Trainings etc.

- An International Conference on Climate Change: Law, Policy and Governance on 19 June 2009 which was organized by Jindal Global Law School of O.P. Jindal Global University in collaboration with the Chapman University School of Law, USA and the UCLA School of Law, USA at the India Habitat Centre, New Delhi.
- A National Seminar on Prioritization of Interventions in Rainfed Areas for Sustainable Livelihoods during 23-24 April 2009 at NASC Complex, New Delhi.
- A 21 days Training Programme on Entrepreneurship Development under Sustainable Farming System held from 25 May to 14 June 2009 at ICAR Research Complex for NEH Region, Sikkim Centre, Tadong, Gangtok.

COMPUTING FACILITIES

Wide Area Network

- Internet services have been provided to the users and the website of IASRI is being updated regularly. This site has been visited 253694 times since 01 April 2008 and 619780 times since 05 September 2003.

SEMINARS DELIVERED

- Seminars in different areas of Agricultural Statistics and Computer Application were delivered. These seminars include presentations of salient findings of the completed research projects by the scientists, thesis/course seminars of students of M.Sc. and Ph.D. (Agricultural Statistics) and M.Sc. (Computer Application).

The details of Seminars Delivered

| Category | | Number |
|--------------|--------|-----------|
| Student | Course | 07 |
| Student | Thesis | 05 |
| Scientist | | 01 |
| Guest | | 04 |
| Total | | 17 |

Dr. VK Sharma, Dr. Murari Singh and Dr. KC Raut were invited to deliver seminars as a part of the celebrations for the Golden Jubilee Year of the Institute. Dr. RC Agarwal was invited to deliver a Guest seminar.

PUBLICATIONS

Research Papers

- Arnab, R and Sud, UC (2009). A note on variance estimation of ratio estimate in two phase sampling. *Model Asst. Statist. Appl.*, **4**, 1-10.
- Bhardwaj, SP and Vasisht, AK (2009). Price volatility and integration in spot and future markets. *Ind. J. Agril. Mktg.*, **23(1)**, 46-57.
- Jain, Rajni, Arora, Alka and Raju, SS (2009). A novel adoption index of selected agricultural technologies: Linkages with infrastructure and productivity. *Agril. Eco. Res. Rev.*, **22 (January-June)**, 109-120.
- Kaul, Sushila and Ram, Ghasi (2009). An assessment of impact of climate change on rice production in India. *Agril. Situation in India*, **65(6)**, 413-415.
- Prabhakaran, VT and Rao, AR (2008). A new approach to the estimation of variance of sample heritability from full-sib analysis. *J. Ind. Soc. Agril. Statist.*, **62(3)**, 208-213.
- Sarika, Jaggi, Seema and Sharma, VK (2009). Second order response surface model with neighbour effects. *Comm. Statist. Theory Methods*, **38**, 1393-1403.
- Sharma, Anu, Varghese, Cini and Rao, AR (2009). Software for the analysis of repeated measurements designs. *Ind. J. Anim. Sci.*, **79(4)**, 445-448.
- Sivaramane N, Singh, DR and Arya, Prawin (2009). An econometric analysis of household demand of major vegetables in India. *Ind. J. Agric. Mktg.*, **23(1)**, 66-76.
- Upadhyaya, Shuchita, Arora, Alka and Jain, Rajni (2009). Reduct driven pattern extraction from clusters. *Int. J. Comp. Intell. Sys.*, **2(1)**, 10-16.
- कुमार, अनिल, कुमार, प्रमोद, सिंह, रविन्द्र एवं तोमर, आर एस (2008). असेसमेंट ऑफ सस्टेनेबल नैट रिटर्न इन पर्लमिलैट-व्हीट सीक्वेंस. भारतीय कृषि अनुसंधान पत्रिका, **23(2)**, 73-80.
- कुमार, प्रमोद, कुमार, अनिल, तोमर, आर एस एवं सिंह, रविन्द्र (2008). स्टैटिस्टिकल इवैल्यूशन ऑफ डिफरेंट राईस वैरायटिस् बेसड क्रॉप सीक्वेंस थ्रू इन्टेंसीफीकेशन एण्ड डाइवर्सिफीकेशन भारतीय कृषि अनुसंधान पत्रिका, **23(2)**, 81-90.



A view of Guest Seminar on Golden Jubilee Year of the Institute

Saleable Technologies

- Statistical Package for Factorial Experiments (SPFE 1.0)
- Statistical Package for Agricultural Research (SPAR 2.0)
- Statistical Package for Augmented Designs (SPAD)
- Statistical Package for Block Designs (SPBD 1.0)
- Statistical Package for Animal Breeding (SPAB)
- Software for Survey Data Analysis (SSDA 1.0)



Dr. VK Gupta, ICAR National Professor receiving the Fellowship of National Academy of Agricultural Sciences Award from Dr. Mangala Rai, Secretary DARE & DG, ICAR

Bulletin

- Parsad, Rajender and Gupta, VK (2009). Design Resources Server. *IASRI, New Delhi*.

CONSULTANCY/ADVISORY SERVICES

- Dr. Deo Pandey, Scientist (Plant Breeding), Department of Plant Breeding & Genetics, CSKHPKV, Palampur was advised on the analysis of data pertaining to an experiment conducted to evaluate 48 varieties of rice using an α -design with parameters $v = 48$, $b = 18$, $r = 3$, $k = 8$. The data were collected on 17 characters namely Days to 50% flowering, Days to maturity, Plant height at maturity (cm), Total tillers/plant at maturity, Effective tillers/plant at maturity, Panicle length, Spikelets/panicle, Grains/panicle, Grain yield/plant (g), 1000-grain weight (g), Protein content (%), Amylase content (%), Gel consistency (mm), Grain length, Grain breadth, Length breadth ratio and Gelatinization temperature. He was advised on analysis of variance, pairwise comparison of genotypes, estimation of genotypic variances and genotypic correlation, estimation of heritability coefficient, genetic advance, divergence analysis, path analysis and phenotypic correlations.
- Dr. R Madhusudhana, Senior Scientist (Plant Breeding), MAS Lab, Project Directorate of Sorghum Research, Rajendranagar, Hyderabad was advised on the analysis of data pertaining to an experiment conducted with 175 RILs in two *rabi* and two *kharif* seasons in three replications.

- Sh. OV Ramana, Technical Officer at National Research Centre on Sorghum, Hyderabad advised on how to perform Principal component analysis and Cluster analysis using SPSS. The use of Design Resources server and the working of SPAR 2.0 was also explained to him.

PERSONNEL

Congratulations on your Appointment

| Name | Designation | Effective Date |
|---------------------|-------------|----------------|
| Dr. Rajender Parsad | Head(DE) | 29-04-2009 |
| Sh. Vishal Acharya | AF&AO | 02-06-2009 |

Congratulations on your Promotion

| Name | Promoted to | Effective Date |
|------------------------|---------------|----------------|
| Dr. Hukum Chandra | Sr. Scientist | 07-09-2007 |
| Dr. Anil Kumar | Sr. Scientist | 17-12-2007 |
| Dr. Praveen Arya | Sr. Scientist | 26-08-2008 |
| Dr. Sudeep | Sr. Scientist | 27-10-2008 |
| Smt. Alka Arora | Scientist(SG) | 27-11-2008 |
| Sh. Sivramane N. | Scientist(SS) | 03-12-2007 |
| Sh. BN Chakravarti | T-7-8 | 01-01-2008 |
| Smt. Sushma Gupta | AAO | 06-05-2009 |
| Smt. Kiran Rani Oberoi | AAO | 06-05-2009 |
| Sh. Nika Ram Rana | AAO | 24-06-2009 |

Wish you Happy and Healthy Retired Life

| Name | Designation | Effective Date |
|-------------------|-----------------|----------------|
| Sh. KB Shah | AAO | 30-04-2009 |
| Sh. Mohan Lal | T-7-8 | 31-05-2009 |
| Sh. Narayan Singh | Manager Canteen | 30-06-2009 |

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