स्वर्ण जयन्ती

GOLDEN JUBILEE

वार्षिक रिपोर्ट
ANNUAL REPORT
2008-09

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान
(भारतीय कृषि अनुसंधान परिषद)
लाईब्रेरी एवेन्यू, पूसा, नई दिल्ली–110 012

INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE
(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)
LIBRARY AVENUE, PUSA, NEW DELHI – 110 012
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भाकृअनुप
ICAR

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Dr. G.R. Seth	April 1966 – October 1969
Dr. Daroga Singh	November 1969 – May 1971
Dr. M.N. Das (A)	June 1971 – October 1973
Dr. Daroga Singh	November 1973 – September 1981
Dr. Prem Narain	October 1981 – February 1992
Dr. S.K. Raheja (A)	February 1992 – November 1992
Dr. R.K. Pandey (A)	December 1992 – May 1994
Dr. P.N. Bhat (A)	June 1994 – July 1994
Dr. O.P. Kathuria	August 1994 – May 1995
Dr. R.K. Pandey (A)	June 1995 – January 1996
Dr. Bal B.P.S. Goel	January 1996 – October 1997
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Dr. V.K. Bhatia	August 2008 onwards

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Preface

It gives me immense pleasure in bringing out the Annual Report 2008–09 of the Indian Agricultural Statistics Research Institute (IASRI). The Institute made a modest beginning in the year 1930 as a statistical section under ICAR and it grew over time and re-designated as the *Institute of Agricultural Research Statistics* (IARS) on 02 July 1959. The Institute got its present name in the year 1978. It gives me great satisfaction that the Institute is celebrating its Golden Jubilee year and this Annual Report will be released when the Institute will be completing 50 years on July 02, 2009. IASRI is a premier Institute in Agricultural Statistics and Computer Application in the country and has been identified as a Centre of Advanced Studies in Agricultural Statistics and Computer Application. The Institute has made many important and original contributions in the disciplines of Agricultural Statistics and Computer Application and because of its emphasis on applications, it has made its presence felt in the National Agricultural Research System. The Institute is also a repository of information on Agricultural Research Data.

The present report highlights some of the glimpses of the research achievements made, new methodologies developed, significant advisory and consultancy services provided, dissemination of knowledge acquired and human resource development, linkages cultivated/nurtured with various ICAR Institutes, SAUs and other research organizations in India and abroad. The scientists, technical personnel, administrative, finance and other staff of the Institute have put in their best efforts in fulfilling the mandate of the Institute and also in achieving the targets set during the year.

To fulfill objectives and mandate of the Institute, the research was carried out under 50 research projects in the Institute. Out of these 50 projects, 08 projects have been completed and 11 new studies/ projects were initiated during the year.

10 training programmes (Four under Center of Advanced Studies, one Winter School, one under NAIP Project, one for ISS Probationers, one for ICFRE Scientists, one International Training programme at ICARDA, Syria, one study visit of Afghanistan nationals) were organized.

As part of Golden Jubilee Celebrations, several seminars by eminent statisticians and agricultural scientists were organized. The Institute also provided consultancy services to various research studies/projects in NARS.

I am happy to note that some of our colleagues received academic distinctions during the year.

Dr. V.K. Gupta, National Professor elected as Fellow of National Academy of Agricultural Sciences; Dr. V.K. Bhatia was elected as President of International Indian Statistical Associations – India Joint Statistical Meeting 2000–Trust; Dr. Rajender Parsad, National Fellow, elected as member of International Statistical Institute and was invited as Consultant Biometrician at ICARDA, Syria; Dr. Hukum Chandra selected for Cochran-Hansen Prize 2009 by International Association of Survey Statisticians, Sh. K.K. Chaturvedi received Scientist of Year Award from the Society for Recent Development in Agriculture; and Dr Himadri Ghosh received best poster presentation Award from Indian Science Congress Association. Dr. Ranjana Agrawal received the Special Prize for scientific article in Hindi from Central Secretariat Hindi Council. Dr Sushila Kaul received Best Education Performance Award-2007 from Economic and Human Resource Development Association.

The scientists of the Institute were deputed for presentation of their papers in various national/ international conferences. This year two scientists were deputed to present their papers to Vietnam and Nepal. Dr. Raj S. Chikara, University of Houston, USA visited the Institute for a period of 3 months on his sabbatical leave.

To promote Hindi, a poster presentation of research papers in Hindi was organized at the Institute and awards were distributed for outstanding contributions in preparation of Hindi posters.

This report has been compiled through collective efforts rendered by Heads of Divisions, scientists and other staff of the Institute. I wish to express my sincere appreciation to all of them for their sincere and whole-hearted support and cooperation in carrying out various functions and activities of the Institute.

I wish to express my sincere thanks to all my colleagues in Research Coordination and Management Unit for coordinating various related activities and Hindi Section for Hindi Translation of the required material.

It is expected that the scientists in NARS will be immensely benefitted from the information contained in this publication. I shall look forward to any suggestions and comments on the information contained in this publication, which would prove to be very valuable for our future publications.

VK Bhatia

(VK Bhatia)
Director

Milestones

1930	• Statistical Section created under ICAR
1940	• Activities of the Section increased with appointment of Dr. PV Sukhatme
1945	• Re-organisation of statistical section into statistical branch as a centre for research and training in the field of Agricultural Statistics
1949	• Re-named as Statistical Wing of ICAR
1952	• Activities of Statistical Wing further expanded and diversified with the recommendations of FAO experts, Dr. Frank Yates and Dr. DJ Finney
1955	• Statistical Wing moved to its present campus
1956	• Collaboration with AICRP initiated
1959	• Re-designated as Institute of Agricultural Research Statistics (IARS)
1964	• Installation of IBM 1620 Model-II Electronic Computer
	• Signing of MOU with IARI, New Delhi to start new courses for M.Sc. and Ph.D. degree in Agricultural Statistics
1970	• Status of a full fledged Institute in the ICAR system, headed by Director
1977	• Three storeyed Computer Centre Building inaugurated
	• Installation of third generation computer system, Burroughs B-4700
1978	• Re-named as Indian Agricultural Statistics Research Institute (IASRI)
1983	• Identified as Centre of Advanced Studies in Agricultural Statistics and Computer Applications under the aegis of the United Nations Development Programme (UNDP)
1985–86	• New Course leading to M.Sc. degree in Computer Application in Agriculture, initiated
1989	• Commercialization of SPAR 1
1991	• Burroughs B-4700 system replaced by a Super Mini COSMOS LAN Server
1992	• Administration-cum-Training Block of the Institute was inaugurated
1993–94	• M.Sc. degree in Computer Application in Agriculture changed to M.Sc. (Computer Application)
1995	• Center of Advanced Studies in Agricultural Statistics & Computer Application established by Education Division, ICAR
1996	• Establishment of Remote Sensing & GIS lab with latest software facilities
	• Outside funded projects initiated
1997	• Senior Certificate Course in 'Agricultural Statistics and Computing' revived
	• Establishment of modern computer laboratories
	• First software in India for generation of design along with its randomised layout SPBD release 1.0

1998	• Four Divisions of the Institute re-named as Sample Survey, Design of Experiments, Biometrics and Computer Applications
	• Revolving Fund Scheme on Short Term Training Programs in Information Technology initiated
	• Training programmes in statistics for non-statisticians in National Agricultural Research System initiated
1999	• Strengthening of LAN & Intranet with Fibre optics & UTP cabling
	• Substantial growth in outside funded projects and training programmes
2000	• Two Divisions re-named as Division of Forecasting Techniques and Division of Econometrics
2001	• Data Warehousing activities (INARIS project under NATP) initiated
2002	• Establishment of National Information System on Animal Experiments Laboratory
	• Development of PIMSNET(Project Information Management System on Internet) for NATP
2003	• Establishment of National Information System on Long-term Fertilizer Experiments funded by AP Cess Fund
	• Development of PERMISnet (A software for Online Information on Personnel Management in ICAR System)
	• First indigenously developed software on windows platform released Statistical Package for Factorial Experiments (SPFE) 1.0
2004	• National Information System on Agricultural Education (NISAGENET) Project launched
	• Training Programme for private sector initiated and conducted training programme for E.I. DuPont India Private Limited
	• E-Library Services Initiated
2005	• Statistical Package for Augmented Designs (SPAD) and Statistical Package for Agricultural Research (SPAR) 2.0 released
	• Design Resources Server with an aim to provide E-advisory in NARS initiated
	• Stregthening of Reproductive Lab with colour photocopier
	• Installation of Digital Telephone Exchange
2006	• Organisation of International Conference on Statistics and Informatics in Agricultural Research
2007	• Establishment of Agricultural Bioinformatics Laboratory(ABL)
2008	Software for Survey Data Analysis (SSDA) 1.0 released

Vision

Statistics and ICT for enriching the quality of Agricultural Research

Mission

Undertake research, education and training in Agricultural Statistics and Computer Applications for Agricultural Research

Mandate

- To undertake basic, applied adaptive, strategic and anticipatory research in Agricultural Statistics and related fields and use these researches in meeting challenges and improving quality of agricultural research.
- To conduct post-graduate teaching and in-service, customized and sponsored training courses in Agricultural Statistics and Computer Applications at National and International level so as to be a leading centre of excellence in Human Resource Development.
- To provide methodological support in strengthening National Agricultural Statistics System by establishing linkages with State departments of agriculture and allied fields, other research institutions, industry, etc.
- To lead in development of Agricultural Knowledge Management and Information System for National Agricultural Research System.
- To provide advisory and consultancy services for strengthening the National Agricultural Research System and undertaking sponsored research and consultancy for National and International organizations.

विशिष्ट सारांश

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान (भा.कृ.सां.अ.सं.) की स्थापना सन् 1959 में कृषि सांख्यिकी अनुसंधान संस्थान के रूप में हुई तभी से यह संस्थान कृषि सांख्यिकी में अनुसंधान के साथ-साथ शिक्षण/प्रशिक्षण करने का महत्वपूर्ण दायित्व निभा रहा है । सूचना प्रौद्योगिकी के क्षेत्र में हो रही प्रगति के दृष्टिगत इस संस्थान ने स्वयं को कृषि अनुसंधान की वर्तमान आवश्यकताओं के अनुरूप ढाल लिया है । इस परिवर्तित परिवेश में, संस्थान को सौंपे गये कार्य हैं - सांख्यिकी में मौलिक, अनुप्रयुक्त और अनुकूली शोध करना, कृषि सांख्यिकी एवं संगणक अनुप्रयोग में स्नातकोत्तर एवं सेवाकालीन प्रशिक्षण पाठ्यक्रम चलाना, परामर्श सेवाएँ प्रदान करना, अनुसंधान हेतु कृषि सांख्यिकी में सूचना कोष के रूप में कार्य करना, कृषि सांख्यिकी एवं संगणक अनुप्रयोग में श्रेष्ठ शिक्षा व प्रशिक्षण के एक उच्च अध्ययन केन्द्र के रूप में संस्थान को विकसित करना, भारतीय कृषि अनुसंधान परिषद् के अन्य संस्थानों एवं राज्य कृषि विश्वविद्यालयों (रा.कृ.वि.), राज्य कृषि/पशुपालन विभागों के साथ सम्पर्क बढ़ाना, राष्ट्रीय कृषि सांख्यिकी प्रणाली को विकसित करने एवं सुदृढ़ बनाने में सहायता करना तथा इन विषयों में राष्ट्रीय एवं अन्तरराष्ट्रीय संगठनों के द्वारा प्रायोजित अनुसंधान करना और प्रशिक्षण प्रदान करना ।

इस वर्ष संस्थान के विभिन्न प्रभागों - प्रतिदर्श सर्वेक्षण, परीक्षण अभिकल्पना, जैवमिति, पूर्वानुमान तकनीक, अर्थमिति एवं संगणक अनुप्रयोग में अनेक अनुसंधान परियोजनाएँ चलायी गयीं । संस्थान में विभिन्न महत्व वाले क्षेत्रों में कुल 50 अनुसंधान परियोजनाओं के अन्तर्गत अनुसंधान कार्य किया गया जिनमें से 40 परियोजनाएँ सस्थान द्वारा, 01 ए.पी. सेस फ़ॅन्ड द्वारा, 06 बाह्य एजेन्सियों द्वारा वित्त पोषित थीं तथा 03 परियोजनाएँ अन्य संस्थानों के सहयोग से चलायी गयीं । इस वर्ष कुल 08 परियोजनाएँ पूर्ण की गयीं तथा 11 नयी परियोजनाएँ आरम्भ की गयीं।

कुछ प्रमुख अनुसंधानिक उपलब्धियाँ इस प्रकार हैं:

- वांछित दक्षता सहित सम-संख्यक रनों के लिए संतुलित तथा विषम संख्यक रनों के लिए लगभग संतुलित द्वि-स्तरीय सुपरसेचुरेटेड अभिकल्पनाएँ (SSDs) तैयार करने के लिए कॉलमवार निर्देशांक विनिमय एवं प्रतिस्थापन एल्गोरिथ्म विकसित की गयी । बहु-स्तरीय सुपरसेचुरेटेड अभिकल्पनाएँ प्राप्त करने के लिए निर्देशांक विनिमय एल्गोरिथम में पुनवृतित वैब की अवधारणा का समावेश किया गया ।
- गहन संगणक सहयोगी सर्च के माध्यम से संतुलित एवं असंतुलित मिश्रित स्तरीय सुपरसेचुरेटेड अभिकल्पनाएँ प्राप्त करने के लिए कॉलम निर्देशांकों के विनिमय एवं प्रतिस्थापन पर आधारित एक एल्गोरिथ्म विकसित किया गया । असममिति के कारण विनिमय एवं प्रतिस्थापन इस तरह संशोधित किया गया है कि स्तर असमान होने पर भी अभिकल्पना में दो कारकों के स्तर की युगलतः उपस्थिति सम्बन्धित स्तरों की उपस्थिति की आवृति के प्रति अनुपातिक हो । मिश्रित स्तरीय सुपरसेचुरेटेड अभिकल्पनाओं का एक कैटलॉग तैयार किया गया है।
- संतुलन सहित आर्थोगोनल बहुउपादानीय ट्रीटमेन्ट संरचना (ओ.एफ.एस.) वाली ब्लॉक अभिकल्पनाएँ तैयार करने की एक विधि प्राप्त की गयी है जिसमें समस्त मुख्य प्रभाव संतुलित हैं अर्थात इन्हें पूर्ण दक्षता के साथ आकलित किया गया है । ओ.एफ.एस. तथा संतुलन वाले तीन उपादानों वाले परीक्षणों के लिए अभिकल्पनाओं का एक कैटलॉग तैयार किया गया ।
- खाद्य संसाधान परीक्षणों में उपयोगी पूर्ण/अपूर्ण बहु-अनुक्रिया परीक्षणों के लिए कुछ संघटकों के युगपत-इष्टतमीकरण के लिए एक प्रक्रिया विकसित की गयी है ।
- सन्तुलित अपूर्ण ब्लॉक अभिकल्पनाओं, जो व्यापक रूप से डिग्री एक तथा/अथवा डिग्री k (ब्लॉक आकार) के प्रति प्रतिरोधी है, की पहचान कर सूचीबद्ध किया गया ।
- परीक्षण उपचारों - नियंत्रित उपचार तुलनाएँ करने के लिए प्रतिवेशी संतुलित ब्लॉक अभिकल्पनाएँ प्राप्त की गयीं । लुप्त प्रेक्षणों के प्रति रॉबस्ट प्रतिवेशी संतुलित ब्लॉक अभिकल्पनाओं की पहचान कर सूचीबद्ध किया गया ।
- डिज़ाइन रिसोर्सेज सर्वर पर मिश्रणों के परीक्षणों, परस्पर लाम्बिक लेटिन स्कवेयर्स तथा लाम्बिक अरेज का ऑन-लाइन जनरेशन, बहुउपादानीय पूर्ण यादृच्छिकीकृत अभिकल्पनाओं एवं बहुउपादानीय यादृच्छिकीकृत पूर्ण ब्लॉक अभिकल्पनाओं का ऑन-लाइन जनरेशन के लिंक देकर सुदृढ़ बनाया गया है।

- ऐसी परीक्षणात्मक परिस्थितियों के लिए जिनमें विभिन्न समयावधियों में दो या दो से अधिक कारकों, जैसे - उर्वरकों के प्रकार, उवर्रक एवं पीड़कनाशी स्प्रे, उर्वरक एवं सिंचाई फीड एवं दवाईयाँ, दो या दो से आधिक प्रकार के फीड्स इत्यादि के अनुक्रिया प्रभावों को मापने की आवश्यकता होती है, उपचार कॉम्बीनेशन्स के फर्स्ट आर्डर अवशेष प्रभावों के लिए सन्तुलित दो या दो से अधिक अन्योन्यक्रिया कारकों के उपचार के सीक्वेन्स वाली अभिकल्पनाओं की श्रेणी तैयार की गयी है तथा उपचारों के कन्ट्रास्टों के प्रसरण सहित इन अभिकल्पनाओं के प्राचलों की एक सूची तैयार की गयी है ।
- परीक्षणात्मक परिस्थितियाँ जिसमें परीक्षणात्मक इकाइयाँ विभिन्न सत्रों के दौरान विभिन्न अवधियों में उपचारों के सीक्वेन्स से इस प्रकार प्रभावित होती हैं कि एक सत्र से दूसरे सत्र में दशाएँ बदल जाती हैं के लिए उपचारों के सीक्वेन्स वाली नेस्टेड अभिकल्पनाओं की एक श्रेणी प्राप्त की गयी ।
- प्रोसेस चरों सहित मिश्रित अभिकल्पनाएँ तैयार करने के लिए प्रोजेक्शन पद्धति का उपयोग किया गया ।
- मशरुम के उत्पादन के आकलन के लिए पद्धति विकसित करने हेतु मार्गदर्शी अध्ययन के अन्तर्गत स्तरित द्वि-स्तरीय यादृच्छिक प्रतिचयन के माध्यम से प्राप्त आँकड़ों से मशरुम की उत्पादकता 4.46 कि. ग्रा./ट्रे आकलित की गयी जिसमें 1.2 प्रतिशत मानक त्रुटि थी । पूर्ण आकलन के आधार पर मशरुम की उत्पादकता 4.94 कि.ग्रा./ट्रे पायी गयी । मानक त्रुटि का परिमाण तथा दो आकलों की निकटता यह दर्शाती है कि मशरुम के उत्पादन के आकलन के लिए यादृच्छिक प्रतिदर्श सर्वेक्षण आधारित अप्रोच उपयुक्त है ।
- जिला/राज्य स्तर पर विभिन्न प्राचलों, जैसे- कृष्य क्रियाओं, संसाधनों एवं ऊर्जा उपयोग सहित अन्य गतिविधियों, के आकलन के लिए न्यूनतम प्रसरण रैखिक अनभिनत आकलकों (MVLUEs) को अन्तिम रूप दिया गया । खरीफ एवं रबी मौसम के दौरान मौसम सम्बन्धी विचरण एवं कृष्य क्रियाओं व संसाधनों की औसत के आकलन के लिए भी MVLUEs विकसित किये गये हैं । डेयरी के अधीन भूमि, खेती एवं सम्बद्ध कृषि के अधीन भूमि, परिवारों के पास कुल भूमि तथा सिंचाई के अधीन भूमि जैसे विभिन्न लक्षणों के प्राचलों के लिए MVLUEs प्राप्त किये गये ।
- कृषीय उपस्करों एवं मशीनरी के स्तर एवं प्रोजेक्शन आकलकों पर अध्ययन के अन्तर्गत जिलावार मशीनरी सूचक, जैसे - कुल पावर (एनिमेट एवं इनएनिमेट स्रोत की पावर को मिलाकर) के प्रति मकैनिकल पावर का अनुपात प्राप्त किये गये । मशीनरी सूचक एवं औसत खाद्यान्न के बीच समूह-वार सहसम्बन्ध प्राप्त किया गया । विभिन्न माडलों के उपयोग वाली कृषीय मशीनरी के प्रोजेक्शन आकलन भी प्राप्त किये गये ।
- पंजाब राज्य के 120 चयनित मछली पालक किसानों के समाजार्थिक विश्लेषण से पता चला कि बड़े फार्मों में मछली पालन में शुद्ध लाभ-लागत अनुपात 0.62 था जो यह दर्शाता है कि बड़े फार्मों पर किये गये निवेश का प्रति रुपये प्रतिदाय बहुत अच्छा था जबकि छोटी श्रेणी के फार्मों में यह केवल 0.31 था । यह भी देखा गया कि प्रेक्षित एवं सीमांत उत्पाद के बीच का 96 प्रतिशत का अन्तर मछली पालकों के नियंत्रण में संसाधनों के अदक्ष उपयोग के कारण था ।
- उत्तर प्रदेश में जिला तथा क्षेत्रीय, दोनों स्तरों पर, आलू की उपज के पूर्वानुमान के लिए मौसम प्राचलों पर आधारित सम्बन्धित क्षेत्र के विभिन्न जिलों के आँकड़ों को पूल करके मॉडल विकसित किये गये । निर्धारण गुणाँक एवं वर्ग के प्रागुक्त अवशिष्ट योग (PRESS) के आधार पर मॉडलों का कार्यनिष्पादन आँका गया । अधिकाँश स्थितियों में मॉडलों के निर्धारण गुणाँक अत्यन्त ही सार्थक थे तथा PRESS का मान कम था जिससे मॉडलों के उचित रूप से फिटिंग का संकेत मिलता है । जटिल बहुपद पर आधारित मॉडलों की तुलना में मौसम सूचकांक आधारित समाश्रयण मॉडलों से पूर्वानुमान अधिक परिशुद्ध पाये गये ।
- विविक्तकर फलन तकनीक, प्रमुख घटक विश्लेषण एवं मौसम सम्बन्धी सूचकांक आधारित अप्रोच के उपयोग से जिला स्तर पर चावल एवं गन्ने की उपज के पूर्वानुमान के लिए मॉडल विकसित किये गये । विविक्तकर फलन तकनीक के माध्यम से विकसित पूर्वानुमान मॉडल, प्रमुख घटक विश्लेषण एवं मौसम सम्बन्धी सूचकांकों पर आधारित मॉडलों से बेहतर पाया गया ।
- स्टॉकास्टिक प्रोसेस मॉडलिंग तथा विविक्त अरैखिक काल श्रृंखला अप्रोच के माधयम से पूर्वानुमान के लिए तीन आपरेटर्स, चयन, क्रॉसओवर एवं म्यूटेशन का उपयोग किया गया ।

- वर्षा वितरण तथा वर्षा आधारित फसल बीमा पर अध्ययन में व्यापक लम्बदा वितरण (GLD) के प्राचलों के आकलन के लिए मैथड ऑफ़ मूवमेन्ट्स तथा मैथड आफ़ मैक्सिमम लाइकलीहुड का उपयोग किया गया ।
- चावल जीनोम के फलनक घटकों में एस.एन.पी. के संगणनात्मक विश्लेषण के लिए फलनक घटकों के जिनोमिक निर्देशांक प्राप्त कर डाटाबेस में स्टोर किये गये । कृषि जैवसूचना प्रयोगशाला (ABL) के लिए एक वेब पेज विकसित किया गया है जिसमें जैवसूचना टूल्स, लोकल ब्लास्ट (BLAST) इत्यादि में लिंक्स उपलब्ध कराये गये हैं । सीक्वेन्स संरेखण तथा BLAST रिपोर्ट के निष्पंदन के लिए *BioPerl* तथा *.cgi* सिक्रप्टस लिखी गयी । SNPs एवं उनके निकटवर्ती सीक्वेन्सेज को एकत्रित कर, उन्हें तैयार किये गये डाटाबेस को सुदृढ़ बनाने के लिए उपयुक्त फारमेट में प्रोसेस किया जाता हैं । क्वेरी सीक्वेन्स तथा डाटाबेस सीक्बेन्स के बीच समरूपता के ब्लॉकों का पता तथा परिमाण लगाने के लिए ऑन-लाइन लोकल BLAST विकसित किया गया है ।
- आनुवंशिक सहसम्बन्ध के आकलन पर आनुभविक अन्वेषणों पर अध्ययन के अन्तर्गत यह पाया गया कि आनुवंशिक सहसम्बन्ध के आकलक आमतौर पर अभिनत हैं तथा प्रतिदर्श के आकार के बढ़ने से अभिनति में पर्याप्त गिरावट आती है जबकि दो सहसम्बन्धित विशेषकों की वंशागतित्व में वृद्धि होने से इससे पर्याप्त वृद्धि होती है । नकारात्मक आनुवंशिक सहसम्बन्ध वाली जनसंख्या से तैयार किये गये प्रतिदर्श से आनुवंशिक सहसम्बन्ध के आकलन अतिमूल्यांकित किये गये हैं तथा सकारात्मक आनुंवशिक सहसम्बन्ध की तुलना में उनकी अभिनति काफी अधिक है । आनुवंशिक सहसम्बन्ध की मानक त्रुटि के बूटस्ट्रैप आकलक आमतौर पर अनुमानित मानक त्रुटि की तुलना में कम होते हैं तथा अधिकांश मामलों में प्रतिदर्श के आकार में वृद्धि होने पर यह अन्तर शून्य तक हो जाता है ।
- शून्य-स्फीत आँकड़ों के लिए लघु क्षेत्र आकलन नामक अध्ययन के अन्तर्गत यह देखा गया कि आँकड़ों में शून्य मानों का अनुपात अधिक होने पर, सापेक्ष अभिनति तथा सापेक्ष वर्ग-माध्य मूल त्रुटियो के संदर्भ में मिश्रित मॉडल के माध्यम से प्राप्त परिणाम उत्तम थे ।
- स्टेटिस्टिकल पैकेज फ़ॉर एनिमल ब्रीडिंग (एस.पी.ए.बी.) 2.1 में विभिन्न आनुवंशिक सम्बन्धों के आँकड़ों की पुनरावृत्ति, अनुकार एवं बूटस्ट्रैप तकनीकों की गणना के लिए मॉडलों को शामिल कर सुदृढ़ बनाया गया ।
- गेहूँ फ़सल प्रबन्धन पर विशेषज्ञ तंत्र में सूत्रकृमि की पहचान के लिए उप-मॉड्यूल शामिल कर सुदृढ़ बनाया गया। विशेषज्ञ तंत्र के हिन्दी मॉड्यूल के लिए एस.क्यू.एल सर्वर, जो हिन्दी भाषा के स्पोर्ट के लिए UNICODE स्वीकार करता है, का उपयोग करते हुए एक डाटाबेस तैयार किया गया है । वैरायटी सिलेक्शन मॉड्यूल का एक भाग पूरा हो चुका है । यह सिस्टम हिन्दी इन्टरफेस से राज्य एवं क्षेत्र मानचित्रों के माध्यम से प्रजातियाँ प्रदर्शित करता है ।
- आंशिक रूप से सन्तुलित अपूर्ण ब्लॉक (पी.बी.आई.बी.) अभिकल्पनाओं के वेब सोल्यूशन्स में क्यूबिक PBIB(3) अभिकल्पनाओं की श्रेणी के निर्माण की विधियाँ संकलित की गयीं हैं तथा इन अभिकल्पनाओं के ऑन-लाइन जनरेशन, यादृच्छिकीकरण एवं विश्लेषण के लिए कम्प्यूटर मॉड्यूल विकसित किये गये ।
- फ़सलों से सम्बन्धित डाटा मार्ट को रिडिज़ाइन करके 'नॉलेज डाटा वेअरहाउस फ़ॉर एग्रिकल्चर' को सुदृढ़ बनाया गया तथा ऑन-लाइन डी.एस.एस. में भविष्य में प्रोजेक्शन के तीन तकनीकें शामिल की गयीं । पारिवारिक सुख-सुविधाओं से सम्बन्धित जनगणना के आँकड़ों का बहुविमीय मॉडल डिज़ाइन किया गया तथा इसमें कुछ राज्यों के आँकड़े प्रकाशित भी किये गये । जनगणना आँकड़े (2001) के लिए ऑन-लाइन एनालिटिकल प्रोसेसिंग (OLAP) क्यूबस प्रकाशित की गयीं। जी.आई.एस. सॉफ़्टवेयर की सहायता से ऐतिहासिक आँकड़ों के आधार पर विभिन्न फ़सलों की उत्पादकता के थिमैटिक मानचित्रों को डिज़िटाइज़्ड किया गया।
- मानव शक्ति नियोजन के (PERMISNET) लिए डिसिज़न स्पोर्ट सिस्टम की बीटा टेस्टिंग पूरी की गयी । ऑन-लाइन परमिसनेट डाटाबेस के आँकड़ों का परमिसनेट-II के डाटाबेस में विलयन किया गया । प्रयोक्ता मैनुअल प्रकाशित कर सिस्टम के साथ लिंक किया गया। मानव शक्ति नियोजन पर नयी रिपोर्टें भी तैयार की गयीं ।
- पी.जी. स्कूल, भा.कृ.अ.सं., नई दिल्ली के इन्ट्रानेट सोल्यूशन्स के लिए पी जी स्कूल की ग्रीन बुक को ऑन-लाइन बनाया गया, जहाँ से विभिन्न संकायों के विभिन्न विषयों का सिलेबस

तथा अध्याय पी.डी.एफ. तथा डॉक फारमेट में डाउनलोड किये जा सकते हैं । अन्य इन्ट्रानेट सोल्यूशन्स के लिए डाटाबेस स्कीम की डिज़ाइनिंग अर्थात् छात्र प्रबन्धन, संकाय प्रबन्धन एवं पी.जी. स्कूल प्रशासन प्रबन्धन का कार्य पूरा किया गया ।

- मशीन लर्निंग अप्रोच फ़ॉर डाटा माइनिंग के अन्तर्गत दो डाटा सेटों के अन्वेषणात्मक आँकड़ों के विश्लेषण से यह देखा गया कि आँकड़ों के विविक्तीकरण तथा विविक्तीकरण के बिना, दोनों ही स्थितियों में ANN की तुलना में स्पोर्ट वेक्टर मशीन (एस.वी.एम.) तकनीकें वर्गीकरण की बेहतर परिशुद्धता देती हैं । विविक्तकरण आधारित एस.वी.एम. के लिए वर्गीकरण की परिशुद्धता की साधारण एस.वी.एम. से तुलना करने से पता चलता है कि विविक्तकरण आधारित एस.वी.एम. साधारण एस.वी.एम की तुलना में बेहतर निष्पादन करता है ।
- ई-लर्निंग सोल्यूशन फ़ॉर एग्रिकल्चरल एज्यूकेशन यूजिंग MOODLE (मोड्यूलर ऑबजेक्ट ओरिएन्टिड डायनेमिक लर्निंग एनवार्यनमेन्ट) में समीकरणों के साथ कार्यशील बनाने के लिए प्लग-इन फॉर इक्वेशन एडिटर, MOODLE के साथ समाकलित किया गया । ''सेन्सीटाइजेशन वर्कशॉप ऑन कान्टेण्ट मैनेजमैन्ट फॉर ई-लर्निंग सिस्टम्स यूजिंग MOODLE'' नामक एक कार्यशाला भी आयोजित की गयी । ''डिस्क्रिप्टिव स्टैटिस्टिक्स'' अध्याय पर एक साइट तैयार की गयी ।
- आई.सी.ए.आर.डी.ए., सीरिया के सहयोग से सांख्यिकी की मूलभूत अवधारणाओं तथा परीक्षणों की अभिकल्पना पर ई-लर्निंग रिर्सोसेज विकसित कर सी.जी. ऑन-लाइन लर्निंग रिसोर्सेज (http://learining.cgiar.org) पर उपलब्ध करवाये गये ।
- एन.ए.आई.पी. द्वारा वित्त पोषित विजनिंग, पॉलिसी अनैलिसिस ऐण्ड जेन्डर (V-PAGE) सब-प्रोग्राम II : टेक्नोलॉजी फोरकास्टिंग के अन्तर्गत उत्पादकता के आधार पर जिलों के वर्गीकरण से सम्बन्धित मॉडलिंग पहलुओं पर चावल के विस्तृत सांख्यिकीय विश्लेषण से ज्ञात हुआ कि यदि निम्न उत्पादकता वर्ग वाले जिलों की प्रौद्योगिकीय आवश्यकताओं को यदि पूरा कर दिया जाए तो चावल का उत्पादन 7 प्रतिशत तक बढ़ सकता है । भारतीय कृषि के भावी विकास में सूचना एवं संचार प्रौद्योगिकी (आई.सी.टी.) के प्रभावों की, विशेष रूप से एशियाई क्षेत्र में, अनुसंधान एवं विकास से सम्बन्धित विभिन्न पहलुओं के संदर्भ में जाँच की गयी । पेटेण्ट विश्लेषण से ज्ञात हुआ कि वर्ष 1990 के बाद आई.सी.टी के पेटेण्टों की संख्या में अत्यधिक वृद्धि हुई है । शोध-प्रकाशनों के विबलियोमैट्रिक विश्लेषण ने संकेतित किया कि आई.सी.टी. के क्षेत्र में मूलभूत अनुसंधान से अनुप्रयुक्त अनुसंधान की शोध-प्राथमिकता बढ़ी है । केन्द्रीय चावल अनुसंधान संस्थान, कटक, उड़ीसा में ''भारत में चावल के लिए भावी प्रौद्योगिकीय आवश्यकताओं के पूर्वानुमान'' पर एक कार्यशाला आयोजित की गयी।
- एक पैकेज ''PAYBITAX'' विकसित किया गया तथा वेतन-बिल, पे-स्लिप, जी.पी.एफ खातों के रखरखाव तथा विभिन्न रिपोर्टें, आयकर विवरण एवं फार्म 16, और बकाया-राशि सम्बन्धी बिल तैयार करने इत्यादि के लिए जारी किया गया। छठे वेतन आयोग के लागू होने के पश्चात ''PAYBITAX'' पैकेज का संशोधित वर्जन विकसित किया जिसमें कुछ अतिरिक्त सुविधाएँ हैं ।
- भारतीय कृषि अनुसंधान परिषद् के परियोजना सूचना एवं प्रबन्धन प्रणाली (PIMS-ICAR) का आवश्यकता विश्लेषण एवं डाटाबेस की डिज़ाइनिंग का कार्य पूरा किया गया ।
- केन्द्रीय सांख्यिकीय संगठन, सांख्यिकी एवं कार्यक्रम कार्यान्वयन मंत्रालय, भारत सरकार, नई दिल्ली द्वारा वित्त पोषित; सी.एम.एफ.आर.आई, कोचीन एवं सी.आई.एफ.आर.आई., बैरकपुर के सहयोग से ''मत्स्य सांख्यिकी'' पर एक मैनुअल तैयार किया गया ।
- कृषि अनुसंधान डाटा पुस्तिका (ए.आर.डी.बी.) 2008 प्रकाशित की गयी जो श्रृंखला की 12वीं कड़ी है ।

संस्थान के वैज्ञानिकों द्वारा राष्ट्रीय एवं अन्तरराष्ट्रीय स्तर के जर्नलों में कुल 57 शोध पत्र, 11 लोकप्रिय लेख, 07 पुस्तक अध्याय, 20 परियोजना/तकनीकी रिपोर्टें-मैनुअल, 02 पैम्लेट और 06 शोध पत्र सम्मेलनों/कार्यशालाओं में प्रकाशित किये गये ।

वर्ष 2001-05 की अवधि की पंचवर्षीय पुनरावलोकन दल (क्यू.आर.टी.) की रिपोर्ट का भारतीय कृषि अनुसंधान परिषद् द्वारा अनुमोदन कर दिया गया है ।

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान तथा राष्ट्रीय कृषि आर्थिकी एवं नीति अनुसंधान केन्द्र की संयुक्त अनुसंधान सलाहकार समिति की दूसरी बैठक 04 दिसम्बर, 2008 को हुई ।

डॉ. वी. के भाटिया, निदेशक, अन्तरराष्ट्रीय भारतीय सांख्यिकीय ऐसोसिएशन-भारत संयुक्त सांख्यिकीय बैठक (IISA-INDIA JSM) 2000 ट्रस्ट के अध्यक्ष चुने गये ।

डॉ. वी. के. गुप्ता, राष्ट्रीय प्राध्यापक राष्ट्रीय कृषि विज्ञान अकादमी (एन.ए.ए.एस) के फैलो चुने गये।

डॉ. राजेन्द्र प्रसाद, नैशनल फ़ैलो अन्तरराष्ट्रीय सांख्यिकीय संस्थान, नीदरलैण्ड्स के सदस्य चुने गये ।

डॉ. राजेन्द्र प्रसाद को इन्टरनेशनल सेन्टर फ़ॉर एग्रिकल्चरल रिसर्च इन ड्राई एरियाज़, एलिप्पो, सिरिया में तीन माह के लिए जीव-सांख्यिकीक परामर्शदाता के रूप में आमन्त्रित किया गया । उन्हें काठमांडू, नेपाल में आयोजित दक्षिण एशिया में चावल-गेहूँ प्रणाली में समेकित फ़सल एवं संसाधन प्रबन्धन के माध्यम से किसानों की आय एवं जीविका वृद्धि करने सम्बन्धी ए.डी.बी. परियोजना की अन्तिम रिव्यू बैठक में सहभागिता करने हेतु प्रतिनियुक्त किया गया ।

डॉ. रंजना अग्रवाल को उनके लेख ''कम्प्यूटर की कहानी उसी की ज़ुबानी'' पर केन्द्रीय सचिवालय हिन्दी परिषद् द्वारा आयोजित 26वीं अखिल भारतीय वैज्ञानिक तथा तकनीकी विषयों पर हिन्दी लेख प्रतियोगिता के अंतर्गत अखिल भारतीय महिला विशेष पुरस्कार मिला ।

श्री के.के. चतुर्वेदी, वैज्ञानिक को 'सोसाइटी फ़ोर रीसेन्ट डिवेल्पमेन्ट इन एग्रिकल्चर द्वारा ''साइन्टिस्ट ऑफ़ दि ईयर'' पुरस्कार प्रदान किया गया ।

डॉ. हुकुम चन्द्र, वैज्ञानिक को 'इन्टरनेशनल ऐसोसिएशन आफ़ सर्वे स्टेटिशियन्स' द्वारा ''कोकरान हेनसेन पुरस्कार - 2009'' के लिए चुना गया ।

डॉ (श्रीमती) सुशीला कौल को 'आर्थिक एवं मानव संसाधन विकास एसोसिएशन' द्वारा ''बेस्ट ऐज्यूकेशन परफॉरमेन्स पुरस्कार - 2007'' प्रदान किया गया । उन्हें इन्टरनेशनल को-ऑपरेटिव्स अलायन्स द्वारा हैनोई, वियतनाम में आयोजित '5वीं एशिया-पैसिफिक को-ओपरेटिव रिसर्च कॉन्फ्रेन्स' में सहभागिता करने हेतु प्रतिनियुक्त किया गया ।

डॉ. हिमाद्री घोष, वरिष्ठ वैज्ञानिक ने '96वीं भारतीय विज्ञान काँग्रेस' के गणितीय विज्ञान अनुभाग में ''श्रेष्ठ पोस्टर प्रस्तुति'' पुरस्कार प्राप्त किया ।

संस्थान के वैज्ञानिकों को अनेक राष्ट्रीय/अन्तरराष्ट्रीय सम्मेलनों में शोध-पत्र प्रस्तुत करने के लिए प्रतिनियुक्त किया गया ।

हिन्दी को प्रोत्साहन देने के लिए संस्थान में एक शोध -पत्र-पोस्टर-प्रदर्शन प्रतियोगिता आयोजित की गयी जिसमें हिन्दी पोस्टर तैयार करने में उल्लेखनीय योगदान देने वाले कर्मियों को पुरस्कृत किया गया ।

सांख्यिकीय विज्ञान के पाठ्यक्रम पर चर्चा करने के लिए सांख्यिकीय विज्ञान पर ''ब्रोड सब्जेक्ट मेटर एरियाज (बी.एस.एम.ए.)'' समिति की एक कार्यशाला आयोजित की गयी ।

''कृषि में ई-संसाधन के लिए कंसोटियम'' (CeRA) पर एक इन्ट्रेक्टिव कार्यशाला आयोजित की गयी जिसमें पोर्टल की सुविधाओं, लक्षण और क्षमता के सम्बन्ध में जानकारी दी गई ।

इस वर्ष निम्नलिखित दस प्रशिक्षण कार्यक्रम आयोजित किये गये:

- (i) ऑन-लाइन ई-लर्निंग प्रणाली के लिए विषय वस्तु का विकास; (ii) कृषि में डाटा माइनिंग; (iii) कृषि अनुसंधान में उन्नत मात्रात्मक तकनीकें तथा (iv) प्रतिदर्श सर्वेक्षण आँकड़ों के विश्लेषण में नवीनतम उन्नतियाँ विषयों पर उच्च अध्ययन केन्द्र के अन्तर्गत चार 21 दिवसीय प्रशिक्षण कार्यक्रम ।
- कृषि परीक्षणों की अभिकल्पना एवं विश्लेषण में विकास विषय पर एक शीतकालीन स्कूल।
- एन.ए.आई.पी. परियोजना विजनिंग, नीति विश्लेषण एवं जेन्डर (V-PAGe) के अन्तर्गत मूल्य प्रवृत्ति एवं बाज़ार एकीकरण पर एक 10 दिवसीय प्रशिक्षण कार्यक्रम ।
- भारतीय सांख्यिकीय सेवा (XXVIII cSp) के परिवीक्षाधीन अधिकारियों के लिए केन्द्रीय सांख्यिकीय संगठन द्वारा प्रायोजित सांख्यिकीय विधियों से आँकड़ों का विश्लेषण विषय पर 26 दिवसीय प्रशिक्षण कार्यक्रम ।
- भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद् के वैज्ञानिकों के लिए अनुसंधान पद्धति पर दो सप्ताह का एक प्रशिक्षण कार्यक्रम।
- आई.सी.ए.आर.डी.ए. एलिप्पो, सीरिया में कृषि सूचना प्रबन्धन, परीक्षणात्मक अभिकल्पना एवं आँकड़ों का विश्लेषण नामक विषय पर परामर्शदात्री सेवा के अंश के रूप में एक अन्तरराष्ट्रीय प्रशिक्षण कार्यक्रम ।

- अफ़गानिस्तान के प्रतिभागियों के लिए खाद्य एवं कृषि संगठन द्वारा प्रायोजित भारतीय कृषि सांख्यिकी प्रणाली पर एक अध्ययन दौरा ।

संस्थान की शिक्षण एवं प्रशिक्षण सम्बन्धी गतिविधियाँ, जिनमें समस्त स्नातकोत्तर अध्यापन कार्यक्रमों का नियोजन, आयोजन एवं समन्वयन शामिल है, भारतीय कृषि अनुसंधान संस्थान के पी.जी. स्कूल के सहयोग से चलायी गयीं । इस वर्ष कुल 09 छात्रों (03 पीएच.डी. (कृषि सांख्यिकी), 05 एम.एससी. (कृषि सांख्यिकी) एवं 01 एम.एससी. (संगणक अनुप्रयोग)) ने अपना डिग्री पाठ्यक्रम पूरा किया । 19 नये छात्रों (05 पीएच.डी. (कृषि सांख्यिकी), 06 एम.एससी. (कृषि सांख्यिकी) एवं 08 एम.एससी. (संगणक अनुप्रयोग)) को प्रवेश दिया गया ।

भारत एवं सार्क देशों सहित अन्य विदेशों के अनुसंधान संस्थानों / विश्वविद्यालयों में सांख्यिकीय आँकड़ों के संकलन, विश्लेषण एवं विवेचना के कार्यों में लगे शोधकर्ताओं के लाभार्थ ''कृषि सांख्यिकी एवं संगणक'' में एक उच्च प्रमाण-पत्र पाठ्यक्रम आयोजित किया गया । इस प्रमाण-पत्र पाठ्यक्रम में 06 अधिकारियों ने सहभागिता की ।

संस्थान का पुस्तकालय राष्ट्रीय कृषि अनुसंधान प्रणाली (NARS) के अन्तर्गत देश का एक क्षेत्रीय पुस्तकालय है जो संस्थान के प्रयोक्ताओं के साथ-साथ अन्य अनुसंधान संगठनों के प्रयोक्ताओं की सूचना सम्बन्धी आवश्यकताओं को पूरा करने में महत्वपूर्ण भमिका निभा रहा है । पुस्तकालय की सेवाओं को पूरी तरह डिज़िटाइज़्ड कर दिया गया है जो पुस्तकालय की वेबसाइट (http://lib.iasri.res.in) पर उपलब्ध है । इसमें पुस्तकालय में उपलब्ध सभी संसाधनों और सेवाओं के लिंक भी दिये गये हैं ।

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Executive Summary

Indian Agricultural Statistics Research Institute (IASRI) established in1959 as an Institute of Agricultural Research Statistics was mainly responsible for conducting research and education/training in Agricultural Statistics. With the advances in information technology, the Institute has adapted itself to the current needs of agricultural research. In the changed scenario, the mandate of the Institute is to undertake basic, applied and adaptive research in Agricultural Statistics, to conduct post graduate and in-service training courses in Agricultural Statistics and Computer Applications, to provide consultancy services, to act as a repository of information on Agricultural Statistics for research, to develop the Institute as an Advanced Centre of Excellence in education and training in Agricultural Statistics and Computer Applications and to liaise with other ICAR Institutes and SAUs, State Agricultural/Animal Husbandry Departments, to assist in the development and strengthening of National Agricultural Statistics System and to undertake sponsored research and training of national and international organisations in these disciplines.

A number of research projects were undertaken during the year in different Divisions of the Institute namely Sample Survey, Design of Experiments, Biometrics, Forecasting Techniques, Econometrics and Computer Applications. Research was carried out under 50 research projects in the Institute, of which 40 were Institute funded, 01 AP Cess funded, 06 funded by outside agencies and 03 in collaboration with other institutes in various thrust areas. This year 08 projects were completed and 11 new projects were initiated.

Some of the salient research achievements were:

- Developed a column wise co-ordinate exchange and replacement algorithm for generation of two-level balanced supersaturated designs (SSDs) for even number of runs and nearly balanced SSDs for odd number of runs with desired efficiency. The concept of repeated webs has been introduced in the coordinate exchange algorithm to generate multi-level SSDs with desired efficiency.
- Developed a general purpose algorithm to obtain balanced and unbalanced mixed-level SSDs through

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intensive computer aided search. The algorithm relies heavily on exchange and interchange of column coordinates, but because of asymmetry, the exchange and replacement have been so modified that the levels appear unequal number of times but in a given order so that the pair wise occurence of levels of any two factors is proportional to the frequency of occurence of respective levels in the design. A catalogue of SSDs has been prepared.

- A method of construction of block designs having orthogonal factorial structure (OFS) with balance has been obtained in which all main effects are balanced in the sense that these are estimated with full efficiency. Prepared a catalogue of designs for three-factor factorial experiments having OFS and balance.
- A procedure of simultaneous optimization of several ingredients for complete/incomplete multi-response experiments useful in food processing experiments has been developed.
- Balanced incomplete block designs that are globally resistant of degree one and/or of degree k(block size) have been identified and catalogued.
- Neighbour balanced block designs for making test treatments-control treatment(s) comparisons have been obtained. Robust neighbour balanced block designs against missing observations have been identified and catalogued.
- Design Resources Server has been strengthened by adding links on experiments with mixtures, online generation of mutually orthogonal latin squares and orthogonal arrays, online generation of randomized layout of factorial completely randomized designs, factorial randomized complete block designs.
- For the experimental situations in which it is required to measure the effect of response from two or more factors such as types of fertilizers, fertilizer and pesticide spray, fertilizer and irrigation, feed and medicine, two or more types of feeds, etc. over varying periods of time, a class of designs involving sequences of treatments with two or more interacting factors balanced for first order residual effects of the treatment combinations has been constructed and a list of parameters of these designs along with the variance of contrasts of treatments has been prepared.
- A class of nested designs involving sequences of treatments for the experimental situations, in which the experimental units are subjected to sequences of treatments in different periods over different sessions such that conditions are altered from one session to other, is obtained.
- The methodology of projection has been used for construction of the mixture designs with process variables.
- In a pilot study to develop methodology for estimation of production of Mushroom, the productivity of mushroom as estimated from data obtained through stratified two-stage random sampling was found to be 4.46 kg/tray with 1.2% standard error. The producitivity based on complete enumeration was observed as 4.94 kg/tray. The magnitudes of standard errors as well as the closeness of the two figures pointed towards the fact that the random sample survey based approach appears to be suitable for estimating the production of mushroom.
- Minimum Variance Linear Unbiased Estimators (MVLUEs) for estimating different parameters such as extent of farming practices, resources and activities with energy use at district/state level have been finalized. MVLUEs for estimating seasonal variation and average of farming practices and resources over Kharif and Rabi seasons have also been developed. MVLUEs of the parameters for the characteristics, viz. land used under dairy, land under cultivation and allied agriculture, total land possessed by the households and land area under irrigation have been obtained.
- In a study on status and projection estimates of agricultural implements and machinery, the district-wise mechanization indicators, such as ratio of mechanical power to the total power (comprising of power from animate and inanimate sources) have been worked out. Group-wise correlations between mechanization indicators and average food grain productivity have been obtained. Projection estimates of agricultural machinery making use of different models have also being worked out.
- Socio-economic analysis of 120 selected fish farmers of Punjab state revealed that the net benefit-cost ratio of aquaculture was 0.62 on large farms indicating that the return per rupee of investment was impressive on large farms whereas it was 0.31 for small category of farms. It was also observed that about 96 percent of the difference between the observed and the frontier output was mainly due to the inefficient use of resources which are under the control of fish farmers.

- The weather parameter based models for forecasting potato yield in Uttar Pradesh, were developed at district as well as at zone levels by pooling the data of various districts within the respective zones. The performance of the models was judged on the basis of co-efficient of determination and predicted residual sum of squares (PRESS). In most of the cases, the coefficient of determination of models were highly significant with reasonably low value of PRESS indicating very good fitting of the models. The forecast from weather indices based regression models were found to be better than those based on complex polynomials.
- Models for forecasting rice and sugarcane yield were developed at district level using discriminant function technique, principal component analysis and weather indices based approaches. Forecast models developed through discriminant function technique performed better than the models based on principal component analysis and weather indices.
- For stochastic process modeling and forecasting through discrete nonlinear time series approach, three operators, selection, crossover and mutation have been used.
- In a study of rainfall distribution and rainfall based crop insurance, method of moments, and method of maximum likelihood were used for estimation of parameters of Generalized Lambda Distributions (GLD).
- For computational analysis of SNPs at functional elements of rice genome, the genomic coordinates of functional elements have been obtained and stored in database. A web page has been developed for Agricultural Bioinformatics Lab (ABL) wherein links are provided to bioinformatic tools, local BLAST, *etc. BioPerl* and *.cgi* scripts are written for sequence alignment and filtering of BLAST report. SNPs along with their flanking sequences are collected and processed in a format suitable for populating database. Online local BLAST has been developed to locate and quantify blocks of similarity between query sequence and database sequences.
- Under the study on empirical investigations on estimation of genetic correlation, it has been observed that the estimates of genetic correlations are biased in general and the bias decreased considerably with increase in sample size, whereas it increases considerably with increase in heritabilities of the two correlated traits. The estimates of genetic correlation are highly overestimated from samples drawn from populations with negative genetic correlation and their bias is quite high as compared to positive genetic correlation. The bootstrap estimates of standard error of genetic correlation are in general lower than the estimated standard error and the difference reduces to zero with increase in sample size in most of the cases.
- In a study small area estimation for zero inflated data, it has been observed that the results obtained through mixture model perform good in terms of relative biases and relative root mean squared errors when data contains a large proportion of zero values.
- Statistical Package for Animal Breeding 2.1 (SPAB 2.1) was strengthened by additing modules for calculation of repeatability, simulation and bootstrap techniques of data analysis for different genetic relationships.
- Expert system on wheat crop management was strengthened by the addition of one sub module for nematode identification. The database for the hindi module of expert system has been designed using SQL server that accepts UNICODE for the support of hindi language. A part of the variety selection module is complete. The system displays varieties through state and zone map with the hindi interface.
- In the web solutions for Partially Balanced Incomplete Block (PBIB) designs, methods of construction of a series of cubic PBIB (3) designs were compiled and computer modules were developed for online generation, randomization and analysis for these designs.
- Knowledge data warehouse for agricultural research was strengthened by redesigning the data mart related to crops and three techniques of future projections were incorporated in on-line Decision Support System (DSS). Multidimensional model of the census data related to household amenities was designed and data of some states have been published. On-line Analytical Processing (OLAP) cubes for the Census data (2001) were published. Thematic maps of productivity of various crops were digitized based on historical data using GIS software.
- Beta testing of decision support system for manpower planning (PERMIS*net)* was completed. Data from online PERMIS*net* database has been merged with database structure of PERMIS*net*-II.

User manual has been printed and linked with the system. New reports on manpower planning were also developed.

- For the intranet solutions for PG School, IARI, the Green Book of PG School, IARI, New Delhi has been made online from where various chapters and syllabi of various disciplines can be downloaded in PDF and Doc format. Designing of database schema for other intranet solutions viz., Student Management, Faculty Management and PG School Administration Management has been completed.
- Under the machine learning approach for data mining, exploratory data analysis of two datasets has been performed. Support Vector Machines (SVM) gave better accuracy of classification in comparison to ANN both with or without discretization of data. Comparing the classification accuracies for discretization based SVM with simple SVM, it has been shown that discretization based SVM performs better than simple SVM.
- In the e-Learning solution for agricultural education using *MOODLE (Modular Object Oriented Dynamic Learning Environment)*, Plug-in for Equation Editor was installed and integrated with MOODLE for working with equations. A workshop entitled "Sensitization Workshop on content management for e-Learning systems using MOODLE" was also organized. A site containing lesson on "Descriptive Statistics" were prepared and deployed.
- Developed e-Learning resources on Basic concepts of Statistics and Design of Experiments through CG online learning resources (http://learning.cgiar.org) in collaboration with ICARDA, Syria.
- Detailed statistical analysis for rice on modeling aspects pertaining to classification of districts based on productivity under the NAIP funded project Visioning, Policy Analysis and Gender (V-PAGe) Sub-programme II: Technology Forecasting, revealed that if technological needs for districts which fall under low productivity group are fulfilled then an increase of 7% in rice production can be achieved. Implications of Information and Communication Technology (ICT) in the future growth of Indian agriculture was examined with respect to various dimensions of related research and developments specifically in Asian region. Patent analysis revealed that, there is tremendous growth in number of patents in ICT after 1990. Bibliometric analysis of research publication indicated that there is shift in research priority from basic to applied research in the field of ICT. A workshop on "Forecasting Future Technological Needs for Rice in India" at Central Rice Research Institute, Cuttack, Orissa, was also organised.
- A package 'PAYBITAX ' was developed and released for preparing pay bills, pay slips, maintaining GPF accounts, generating different reports, income tax statements and Form-16, and generating arrear bills etc. After the implementation of the 6th Pay Commission, a modified version of the package 'PAYBITAX' was developed which has some additional facilities.
- For the Project Information & Management System of ICAR (PIMS-ICAR), requirement analysis and designing of the database were completed.
- Manual on "Fishery Statistics" in collaboration with CMFRI, Cochin & CIFRI, Barrackpore, funded by CSO, MOS & PI, New Delhi has been prepared.
- The Agricultural Research Data Book (ARDB) 2008 which is twelfth in the series has been published.

Scientists of the Institute published 57 research papers in National and International refereed Journals along with 11 popular articles, 7 book chapters, 21 projects/ technical reports/e-manuals, 2 pamphlets, and 6 research papers in conferences/workshops proceedings.

The QRT report for the period 2001-05 has been approved by the Council.

The second meeting of Common Research Advisory Committee (RAC) of the Indian Agricultural Statistics Research Institute (IASRI) and National Centre for Agricultural Economics and Policy Research (NCAP) was held on 04 December 2008.

Dr. VK Bhatia, Director, IASRI was elected as President/ Chairman of International Indian Statistical Association-India Joint Statistical Meeting (IISA-INDIA JSM) 2000 Trust.

Dr. VK Gupta, National Professor was elected as NAAS Fellow.

Dr. Rajender Parsad, National Fellow was elected as Member of the International Statistical Institute, Netherlands.

Dr. Rajender Parsad was also invited as Consultant Biometrician at International Center for Agricultural Research in Dry Areas, Aleppo, Syria for 3 months. He

was also deputed to participate in Final Review Meeting of the ADB Project on Enhancing Farmers Income and Livelihoods through Integrated Crop and Resource Management in the Rice-Wheat System in South Asia held at Kathmandu, Nepal.

डॉ. रंजना अग्रवाल को उनके लेख 'कम्प्यूटर की कहानी उसी की जुबानी' पर केन्द्रीय सचिवालय हिन्दी परिषद् द्वारा आयोजित 26वीं अखिल भारतीय वैज्ञानिक तथा तकनीकी विषयों पर हिन्दी लेख प्रतियोगिता के अंतर्गत अखिल भारतीय महिला विशेष पुरस्कार मिला।

Sh. KK Chaturvedi, Scientist received the Scientist of the Year Award from the Society for Recent Development in Agriculture.

Dr. Hukum Chandra, Scientist has been chosen for the award the Cochran-Hansen Prize 2009 by the International Association of Survey Statisticians

Dr.(Mrs.) Sushila Kaul, Senior Scientist was awarded Best Education Performance Award-2007 by the Economic and Human Resource Development Association. She was also deputed to participate in 5th Asia-Pacific Co-operative Research Conference organized by International Cooperatives Alliance at Hanoi, Vietnam.

Dr. Himadri Ghosh, Senior Scientist received Best Poster Presentation Award in Mathematical Sciences section of 96th Indian Science Congress.

Scientists of the Institute were deputed for presentation of their papers in several National/International conferences.

To promote Hindi, a poster presentation was organized at the Institute and awards were distributed for the outstanding performances.

A workshop of Broad Subject Matter Areas (BSMA) Committee on Statistical Science to discuss curricula and syllabi for Statistical Sciences was organised .

An Interactive Workshop on Consortium for e-resources in Agriculture (CeRA) to bring awareness in facilities, features and potential of Portal was organized.

This year following ten training programme were organized:

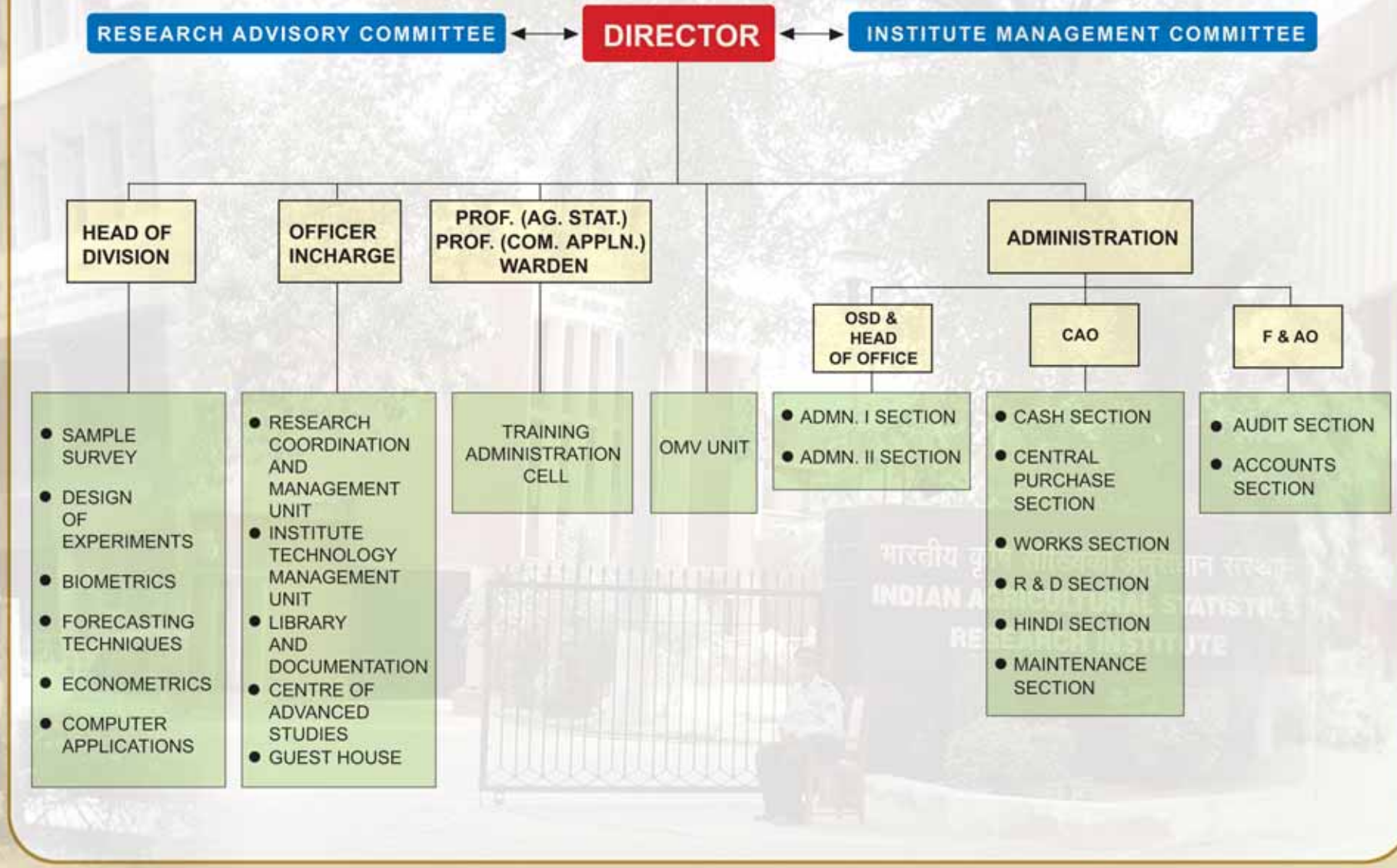
– Four 21 days duration training programmes under Centre of Advanced Studies on (i) Development of Contents for Online e-Learning Systems; (ii) Data Mining in Agriculture; (iii) Advanced Quantitative Techniques in Agricultural Research and (iv) Recent Advances in Sample Survey and Analysis of Sample Survey Data
– Winter School on Advances in Design and Analysis of Agricultural Experiments.
– 10 days training programme on Price Trends and Market Integration under the NAIP project Visioning, Policy Analysis and Gender (V-PAGE).
– CSO Sponsored 26 days training programme on Data Analysis with Statistical Tools for Indian Statistical Services Probationers of XXVII batch.
– Two weeks training programme on Research Methodology was organized for the scientists of Indian Council of Forestry Research and Education.
– International Training Programme on Agricultural Information Management, Experimental Design and Data Analysis at ICARDA, Aleppo, Syria as part of consultancy.
– FAO sponsored Study Visit on Indian Agricultural Statistics System for Afghanistan nationals.

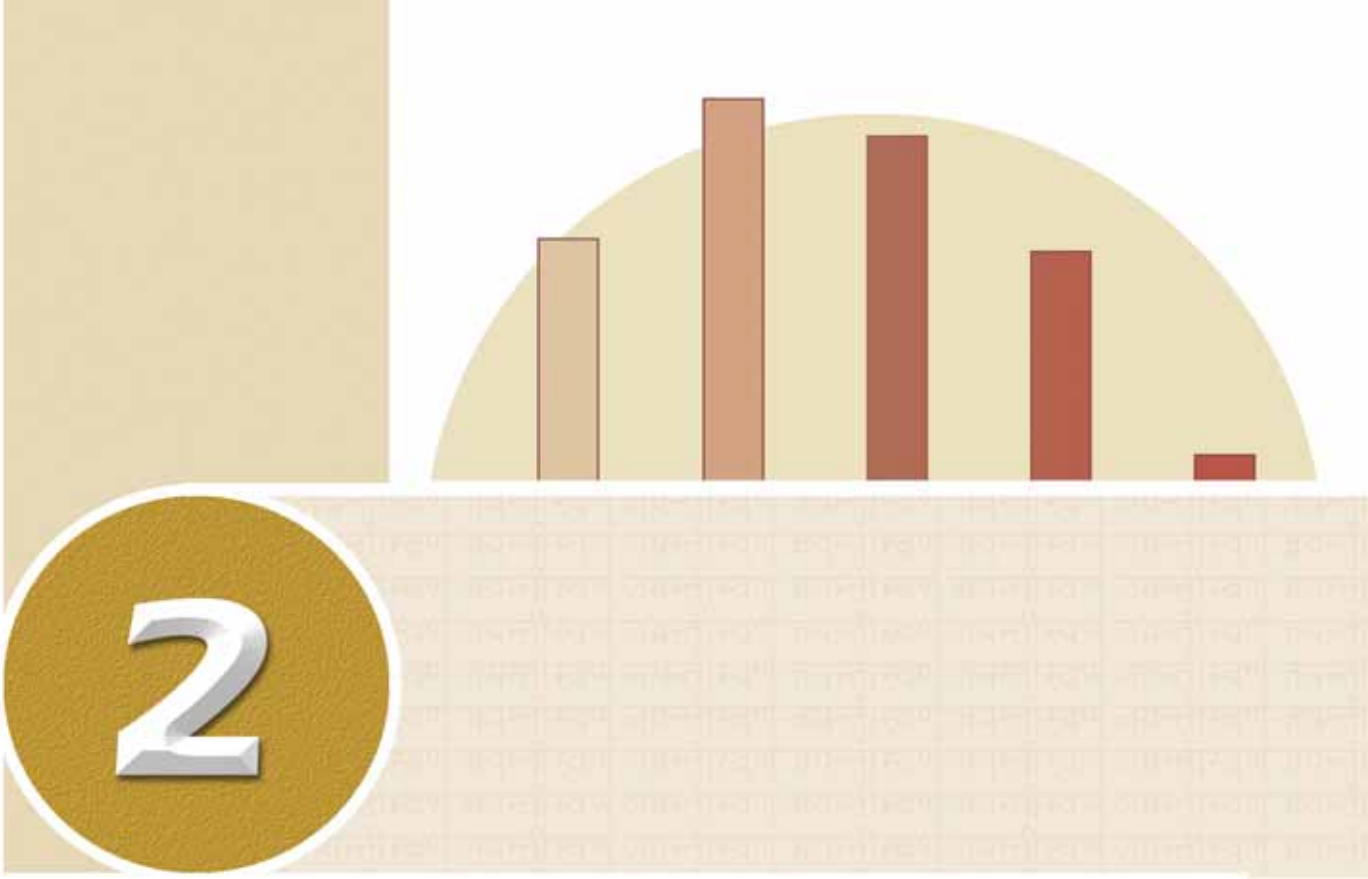
The activities relating to education and training which include planning, organization and coordination of the entire Post-graduate teaching programmes of the Institute were undertaken in collaboration with PG School, IARI. During the year, a total of 09 students 03 Ph.D. (Agricultural Statistics), 05 M.Sc. (Agricultural Statistics) and 01 M.Sc. (Computer Application) completed their degrees. 19 new students 05 Ph.D. (Agricultural Statistics), 06 M.Sc. (Agricultural Statistics) and 08 M.Sc. (Computer Application) were admitted.

A Senior Certificate Course in Agricultural Statistics and Computing was organised for the benefit of research workers engaged in handling statistical data collection, processing, interpretation and employed in research Institutions/Universities of India and foreign including SAARC countries. Six officials participated in this Certificate Course.

The Library of the Institute with a status of Regional Library under NARS, played a vital role in meeting the information needs of the in-house users as well as users from other research organisations. The library services have been totally transformed into digital form with the launch of elaborated and well featured website of Library (http://lib.iasri.res.in) with link to all resources and services available in Library.

ORGANOGRAM


RESEARCH ADVISORY COMMITTEE
DIRECTOR
INSTITUTE MANAGEMENT COMMITTEE
HEAD OF DIVISION
OFFICER INCHARGE
PROF. (AG. STAT.)
PROF. (COM. APPLN.)
WARDEN
ADMINISTRATION
OSD & HEAD OF OFFICE
CAO
F & AO
SAMPLE SURVEY
DESIGN OF EXPERIMENTS
BIOMETRICS
FORECASTING TECHNIQUES
ECONOMETRICS
COMPUTER APPLICATIONS
RESEARCH COORDINATION AND MANAGEMENT UNIT
INSTITUTE TECHNOLOGY MANAGEMENT UNIT
LIBRARY AND DOCUMENTATION
CENTRE OF ADVANCED STUDIES
GUEST HOUSE
TRAINING ADMINISTRATION CELL
OMV UNIT
ADMN. I SECTION
ADMN. II SECTION
CASH SECTION
CENTRAL PURCHASE SECTION
WORKS SECTION
R & D SECTION
HINDI SECTION
MAINTENANCE SECTION
AUDIT SECTION
ACCOUNTS SECTION



2

Introduction

Brief History

The Institute made a modest beginning in 1930 as a small Statistical Section in the then Imperial Council of Agricultural Research to assist the State Departments of Agriculture and Animal Husbandry in planning their experiments, analysis of experimental data, interpretation of results and also rendering advice on the formulation of the technical programmes and examining the progress reports of the schemes funded by the Council. The activities of the Section increased rapidly with the appointment of Dr. PV Sukhatme as Statistician to the Council in 1940 and researches were initiated for developing objective and reliable methods for collecting yield statistics of principal food crops. The efficiency and practicability of these methods was demonstrated in different States for estimating yield by crop cutting experiments. The result was such that, in the course of a few years, the method was extended practically to the entire country to cover all principal food and non-food crops.

Research in sampling theory and training of field staff and statistical staff were the activities initiated in this period resulting in the re-organization of the Statistical Section into a Statistical Branch in 1945 with appropriate expansion in its strength. The designation of Statistician was changed to Statistical Advisor. The Statistical Branch was renamed as Statistical Wing in 1949. The Statistical Wing soon acquired international recognition as a centre for research and training in the field of Agricultural Statistics. During 1952 on the recommendations of two FAO experts, Dr. Frank Yates and Dr. DJ Finney, who visited the Council on the invitation of the Government of India, activities of the Statistical Wing were further expanded and diversified. Subsequently, in recognition of its important role as a training and research institution, the Statistical Wing was re-designated as the Institute of Agricultural Research Statistics (IARS) on 02 July 1959. An important landmark in the development of the Institute was the installation of an IBM 1620 Model-II Electronic

Computer in 1964. Another major landmark for the Institute was the signing of a Memorandum of Understanding with Indian Agricultural Research Institute (IARI), New Delhi in 1964, consequent to which new courses leading to M.Sc. and Ph.D. degrees in Agricultural Statistics were started in collaboration with IARI in October 1964. In April 1970, the Institute was declared as a full-fledged Institute in the ICAR system and is since then headed by a Director. On 01 January 1978 the name of the Institute was changed to Indian Agricultural Statistics Research Institute (IASRI) emphasizing the role of 'Agricultural Statistics' as a full-fledged discipline by itself.

The main thrust of the Institute is to conduct basic, applied and adaptive research in Agricultural Statistics and Computer Application, to develop trained manpower and to disseminate knowledge and information produced so as to meet the methodological challenges of agricultural research and also to improve the quality of agricultural research in the country. Through the untiring and concerted efforts of the scientists, the Institute has made its presence felt in the National Agricultural Research System (NARS). The Institute is also becoming progressively a repository of information on agricultural research data and has taken a lead in the country in developing a data warehouse on agricultural research data. The Institute also occupies a place of pride in the National Agricultural Statistics System and has made several important contributions in the strengthening of the National Agricultural Statistics System, which has a direct impact on the national policies. The methodology for agricultural crop insurance based on small area statistics is one of the recent important contributions of the Institute.

As the activities of the Institute started expanding in all directions, the infrastructure facilities also started expanding. Two more buildings 'Computer Centre' and 'Training-cum-Administrative Block' were constructed in the campus of the Institute in the years 1976 and 1991, respectively. A third generation computer Burroughs B-4700 system was installed in March 1977. A large number of computer programs for specific problems as also general purpose application softwares were developed. The Burroughs B-4700 system was replaced in 1991 by a Super Mini COSMOS-486 LAN Server with more than hundred nodes consisting of PC/AT's, PC/XT's and dumb terminals all in a LAN environment. Later, COSMOS-486 LAN Server was replaced by a PENTIUM-90 LAN Server having state-of-art technology with UNIX operating system. Computer laboratories equipped with PCs, terminals and printers, etc. had been set up in each of the six Scientific Divisions as well as in the Administrative Wings of the Institute.

For undertaking research in the newer emerging areas, a laboratory on Remote Sensing (RS) and Geographic Information System (GIS) was created in the Institute. The laboratory was equipped with latest state-of-art technologies like computer hardware and peripherals, Global Positioning System (GPS), softwares like ER Mapper, PC ARC/INFO, Microstation 95, Geomedia Professional, ARC/INFO Workstation and ERDAS Imagine with the funds received through two AP Cess Fund projects. This computing facility has further been strengthened with the procurement of ARC-GIS software under NATP programme.

An Agricultural Bioinformatics Lab (ABL) fully equipped with software and hardware has been created to study crop and animal biology with the latest statistical and computation tools.

The LAN at IASRI has steadily been strengthened and the Computer Centre, Sample Survey Block, Training and Administration Block and Panse Guest House of IASRI have been connected using fiber optical cable as backbone and connectivity has been established for 413 nodes. The LAN is being managed using manageable Switches. Currently the internet services are being provided through Firewall and secure servers with multiple CPU capabilities on a 4 Mbps bandwidth. Primary and Secondary DNS, Domain: iasri.res.in, Website (http://www.iasri.res.in) and E-mail services are being maintained in house. Live E-mail and Internet facilities are being provided to the scientists/technical/ administrative staff of IASRI.

There are various labs at the Institute for dedicated services like ARIS lab for Training, Stat lab for Statistical analysis and Centre for Advance Study Lab.

Keeping pace with the emerging technologies in the area of Information Technology (IT), from the year 1998 onwards the computer hardware and software have been constantly upgraded / replaced with newer platforms and versions. The computing environment in the Institute has latest rack mount servers, PCs, notebook computers, laser mono & colour printers, inkjet printers, scanners, DVD duplicator, visualiser and

video projectors. All the divisions, administrative and accounts sections of the Institute have been provided with PCs, printers and peripherals. Software packages that are needed for application development, statistical data analysis, network securities and office automation are being made available to the scientists and staff of the Institute. Some of the important softwares that are available in the Institute are SAS, SPSS, SYSTAT, GENSTAT, Data warehouse software – Cognos, SPSS clementine, MS Office 2007, MS Visual Studio dot net, Macro-Media, MS Project, E-views, Trend Micro Antivirus, NEURAL NETWORKS(STATISTICA), Gauss Software, Minitab 14, Maple 9.5, Matlab, Sigma Plot Web Statistica and Lingo Super.

The Institute continued to provide selective information documentation services to scientists in the ICAR Institutes and Agricultural Universities on references to documents relating to areas of their specific interest. The bibliographic databases in Biotechnology and Animal Science Research are being maintained in the Bio-Informatics Laboratory providing Selective Dissemination of Information (SDI) services on VETCD, BEASTCD and AGRICOLA databases of the Food and Agriculture Organisation under United Nations.

The Institute functioned as a Centre of Advanced Studies in Agricultural Statistics and Computer Application during October, 1983 to March 1992 under the aegis of the United Nations Development Programme (UNDP). This programme aimed at developing a Centre of Excellence with adequate infrastructure and facilities to undertake advanced training programmes and to carry out research on various aspects of Agricultural Statistics and Computer Application. Under this programme, a number of distinguished statisticians and computer experts from abroad visited the Institute with a view to interacting with the scientists of the Institute, giving seminars/ lectures and suggesting improvements in the research programmes of the Institute.

Another Centre of Advanced Studies (CAS) programme in Agricultural Statistics and Computer Application was established during the VIII Five Year Plan in 1995. So far 43 training programmes have been organised under the aegis of centre of Advanced Studies. In all a total of 767 participants have been benefited.

A course leading to M.Sc. degree in Computer Application in Agriculture was initiated from the session 1985–86, which was subsequently changed to M.Sc. (Computer Application) from the session 1993–94. The Institute has so far produced 173 Ph.D. and 287 M.Sc. students in the discipline of Agricultural Statistics and 81 M.Sc. students in the discipline of Computer Application.

For the benefit of statisticians and other workers for whom the knowledge of statistics is essential, the Institute had been organizing four professional courses in statistics namely Professional Statisticians' Certificate Course (PSCC), Senior Certificate Course (SCC), Junior Certificate Course (JCC) and Post Graduate Diploma in Agricultural Statistics. The PSCC, SCC and Post Graduate Diploma courses were of one year duration while JCC was of six months duration. In Post Graduate Diploma Course, the students were required to conduct research for one year. These courses were providing a linkage of the Institute with State Departments of Agriculture and Animal Husbandry. Due to some reasons these courses were discontinued. Later on, in view of growing demand from various quarters, the Institute revived the Senior Certificate Course in 'Agricultural Statistics and Computing' in 1997 with appropriate changes in the course curriculum in Agricultural Statistics with adequate exposure of Computer Application.

The Institute has achieved international recognition for its high quality research and teaching work in the field of Agricultural Statistics and Computer Application. A number of research workers from the Institute have served as consultants and advisors in Asian, African and Latin American countries. Also, a number of statisticians and students of the Institute are at present occupying high positions in universities and other academic and research institutions of USA, Canada and other countries.

The Standing Finance Committee had approved the XI Plan budget of the Institute. The total outlay of Rs. 1200 lakhs was sanctioned under the XI Plan budget of the Institute.

Organisational Set-up

The Institute has following six Divisions, two Units and three Cells to undertake research, training, consultancy, documentation and dissemination of scientific output.

Divisions

- Sample Survey
- Design of Experiments
- Biometrics
- Forecasting Techniques
- Econometrics
- Computer Applications

Units

- Research Co-ordination and Management Unit (RCMU)
- Institute Technology Management Unit (ITMU)

Cells

- Training Administration Cell (TAC)
- Consultancy Processing Cell (CPC)
- Planning, Monitoring and Evaluation Cell (PMEC)

Financial Statement

Through regular monitoring, the Institute was able to ensure optimal utilization of funds available in the budget. The actual utilization of the budget both under the plan and non-plan is furnished below:

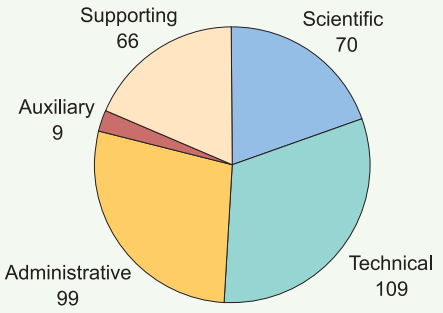
Budget Allocation vis-à-vis Utilization (2008–09)

(Rupees in Lakhs)

Head of Account	Allocation		Expenditure	
	Plan	Non-Plan	Plan	Non-Plan
Pay & Allowances	0.00	1730.00	0.00	1638.89
TA	6.00	4.00	6.00	4.00
OTA	0.00	0.50	0.00	0.50
HRD/Fellowship	6.00	20.00	2.42	18.76
Contingencies	60.00	145.00	60.00	123.98
Equipments	63.00	0.00	62.98	21.00
Works	55.00	36.00	54.94	35.96
Library	30.00	0.00	29.90	0.00
Total	**220.00**	**1935.50**	**216.24**	**1843.09**

Staff Position (as on 31 March 2009)

Manpower	No. of posts sanctioned	No. of posts filled
Director	1	1
Scientific	130	69
Technical	232	109
Administrative	109	99
Auxiliary	14	9
Supporting	85	66
Total	**571**	**353**



Staff Strength in Position as on 31 March 2009

3

Research Achievements

The research targets set by the Institute were implemented by six Divisions of the Institute, viz. Sample Survey, Design of Experiments, Biometrics, Forecasting Techniques, Econometrics and Computer Applications. The basic, applied, adaptive and strategic research in Agricultural Statistics and Computer Application is carried out under six broad programmes that cut across the boundaries of the Divisions and encourage interdisciplinary research. The six programmes are as under:

1. Development and analysis of experimental designs for agricultural system research
2. Forecasting and remote sensing techniques and statistical applications of GIS in agricultural systems
3. Development of techniques for planning and execution of surveys and analysis of data including economic problems of current interest
4. Modeling and simulation techniques in biological systems
5. Development of informatics in agricultural research
6. Teaching and training in Agricultural Statistics and Computer Application

Programme 1: DEVELOPMENT AND ANALYSIS OF EXPERIMENTAL DESIGNS FOR AGRICULTURAL SYSTEM RESEARCH

Designs for Single Factor and Multi-Factor Experiments and Their Applications in Agricultural Systems Research (National Professor Scheme)

Super saturated design (SSD) has received much attention because of its potential in factor screening experiments. A SSD is a fractional factorial design in which the degrees of freedom for all the main effects and the intercept term exceed the total number of distinct factor level combinations in the design. Consider a design for fractional factorial experiment with m factors and n runs, the j^{th} factor being experimented at

q_j levels, j = 1,2, …, m. Define $\upsilon = \frac{\sum_{j=1}^{m}(q_j - 1)}{n-1}$.

Generally, $\upsilon < 1$. When $\upsilon = 1$, the design is saturated. For $\upsilon > 1$, the design is supersaturated. The huge advantage of these designs is that they reduce the experimental cost drastically, while their critical disadvantage is the confounding involved in the statistical analysis. But because of the run size economy SSDs have been studied extensively in the literature.In such experiments, the experimenter's endeavor is to minimize the number of runs to identify the active factors for efficient utilization of resources and minimization of cost and time.

Two-level SSDs have been studied extensively in the literature because of their tremendous potential of application and ease of generation. Mostly the designs generated are balanced in the sense that the two levels of all the factors appear an equal number of times in the design runs. A column wise co-ordinate exchange and replacement algorithm has been developed that generates two-level balanced SSDs for even number of runs and nearly balanced SSDs for odd number of runs with desired efficiency. This algorithm modifies the algorithms of Lejeune (2003; *Am. J. Math. Manage. Sci.* **23**), Nguyen (1996; *Technometrics* **38**) and Gupta *et al.* (2008; *J. Ind. Soc. Agril. Statist.* **62(2)**).

The designs generated through this algorithm are such that all the columns of the design matrix are distinct and no column of the design matrix can be obtained from any other column by permutation of +1 and -1 levels or by multiplying any other column by -1. An upper bound to the number of distinct factors that can be accommodated in the design with given number of runs has been obtained and the algorithm takes care of that bound while generating the design. To make the design generated more useful the algorithm also identifies the maximum number of pair wise orthogonal columns in the final design. The maximum correlation (r_{max}) and minimum correlation (r_{min}) values are also obtained through the algorithm. The designs generated by the proposed algorithm compete very well with those obtained earlier in the literature. In one case, the algorithm generates a design better than that of Nguyen and Cheng (2008; *Technometrics* **50**) and in all cases the designs generated are better than those reported in Gupta *et al.* (2008; *J. Ind. Soc. Agril. Statist.*, **62(2)**).

The coordinate exchange algorithm has also been modified to generate multi-level SSDs with any number of levels. For generating designs with desired efficiency, the concept of repeated webs has been introduced in the algorithm. Popular $E(f_{NOD})$ and $E(\chi^2)$ criteria have been used as a measure of non-orthogonality of the designs generated. The designs generated through the algorithm have high χ^2-efficiency. The f_{NOD}-efficiency of the design obtained is also computed through the algorithm.

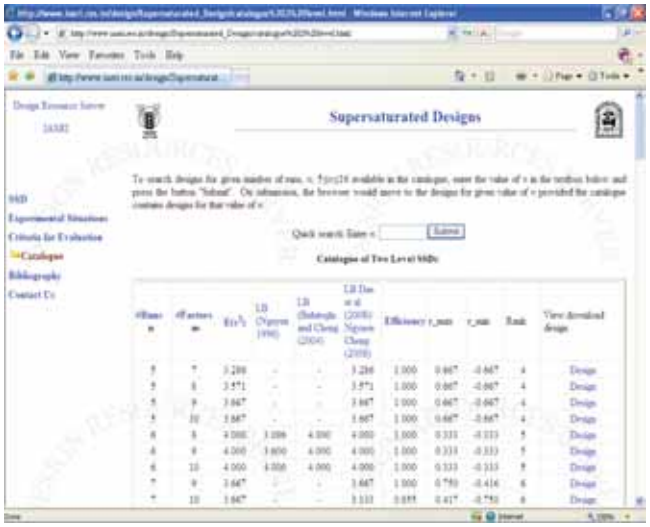
A general purpose algorithm has been developed to obtain balanced (U-type) and unbalanced (non-U type) mixed-level SSDs through intensive computer aided search. A mixed level SSD is balanced (or U-type) if every factor has all the levels appearing a constant number of times in the design. On the other hand, a SSD is unbalanced (non U-type) if the factors do not have all the levels appearing equal number of times in the design. The algorithm once again relies heavily on exchange and interchange of column coordinates, but because of asymmetry, the exchange and replacement have been so modified that the levels appear unequal number of times but in a given order so that the pairwise occurrence of levels of any two factors is nearly proportional to the product of the frequency of occurrence of respective levels in the design. The algorithm has the capability of generating mixed level SSD's with any number of factors, any amount of asymmetry and any number of runs. However, at present, designs with two distinct sets of factors with two and three levels and designs with three distinct sets of factors with two, three and four levels respectively and with number of runs $5 \le n \le 10$ have been generated. χ_U^2-efficiency for all the designs generated through the algorithm have efficiency more than 0.9. The algorithm also computes the f_{UNOD}-efficiency of the design generated.

A catalogue of two-level SSDs has been prepared for both the situations when the number of runs is even and the number of runs is odd. The catalogue gives the value of E(s^2), the lower bounds to E(s^2) obtained by Nguyen (1996; *Technometrics* **38**), Bulutoglu and Cheng (2004; *Ann. Statist.* **32**), Das *et al.*(2008; *J.*

Statist. Plan. Inf. **138**), Nguyen and Cheng (2008; *Technometrics* **50**) and the efficiency of the design. The catalogue gives 143 designs in the restricted parametric range with $5 \le n \le 16$ runs. Most of the designs have efficiency 1.000. The lowest efficiency obtained for any design is 0.855.

Similarly, a catalogue of multi-level SSDs has been prepared. Once again the catalogue gives the value $E_d(\chi^2)$ and $E_d(f_{NOD})$ along with their lower bounds, respectively. The catalogue contains 122 χ^2-efficient SSDs for different number of factors *m*, design runs $n, 5 \le n \le 16$, and different number of factor levels *q*, $3 \le q \le 6$. The catalogue also gives the f_{NOD}-efficiency of the designs. Most of the designs have efficiency 1.000. The smallest efficiency obtained for any design is $E(\chi^2)$-efficiency = 0.971 and for this design f_{NOD}-efficiency = 0.979.

Further, the layout of the designs given in the catalogue can also be obtained. The bibliography on SSDs has also been expanded by adding the latest references on SSDs. The catalogues of SSDs, the design layout and the bibliography on SSDs is available at the Design Resources Server hosted at www.iasri.res.in/design/Supersaturated_Design/Supersaturated.html. Some screen shots are:



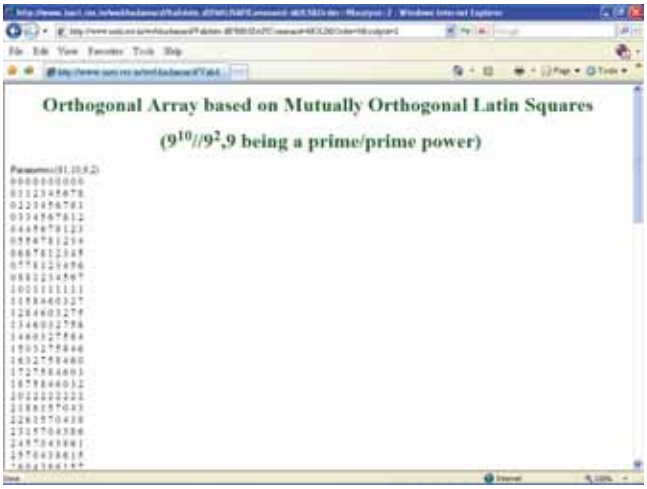
A method of construction of block designs having orthogonal factorial structure (OFS) has been developed in which all main effects are balanced in the sense that these are estimated with full efficiency. By this method some designs for three-factor factorial experiments retaining full information on all main effects have been obtained. A catalogue is prepared for designs for three-factor factorial experiments having Orthogonal Factorial Structure with balance. These designs have been obtained from an existing method in which designs are developed from starting with block designs and the efficiencies of interactions can be controlled up to some suitable order in terms of the component designs. The efficiencies of main effects of these designs are very high. Some of these designs retain full information on one main effect and one interaction effect. A catalogue of designs has been prepared for the use of experimenters in crop-sequence experiments.

The Design Resources Server was strengthened in collaboration with National Fellow by adding the following links:

Online Design Generation II

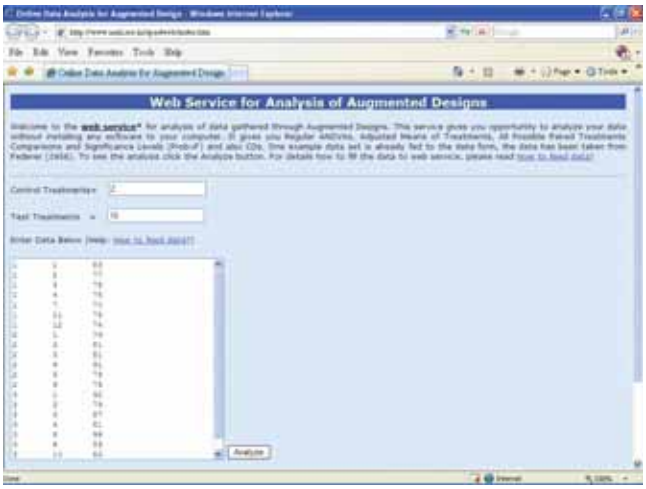
Using this link, one can generate a complete set of mutually orthogonal Latin squares of order *s* smaller than 1000, *s* being a prime or prime power. One can also generate an Orthogonal Array with parameters (s^{s+1}, s^2, *s*, 2) by choosing the output option as Orthogonal Arrays. These are hosted at

www.iasri.res.in/webhadamard/mols.htm. A screen shot is



Online Analysis of Data

Online analysis of data generated from augmented designs can be done by using the link "Online Analysis of Data" hosted at www.iasri.res.in/spadweb/index.htm. A screen shot is



Experiments with Mixtures

Experiments with mixtures are quite useful for the experiments where a fixed quantity of inputs (may be same dose of fertilizer, same quantity of irrigation water or same dose of insecticide or pesticide etc.) are applied as a combination of two or more ingredients. In these experiments the response is a function of the proportion of the ingredients in the mixture rather than the actual amount of the mixture. A bibliography (321 references) of experiments with mixtures and online generation of simplex centroid designs and simplex lattice designs are available on this page at www.iasri.res.in/mixture/mixtures.aspx. A screen shot of experiments with mixtures is

Efficient Design of Experiments for Quality Agricultural Research (National Fellow Scheme)

A large number of experiments are conducted for establishing a relationship between the levels of input factors and several response variables. These experiments are usually conducted in response surface designs to perform simultaneous optimization of several responses. Generally, the optimum combinations are obtained separately for each of the response variables. Optimal conditions for one response may be far from optimal or even physically impractical for the remaining responses. A simultaneous optimization procedure of several responses for complete multi-response experiments has been developed which can obtain the combination that optimizes all the response variables simultaneously. A SAS code has been developed for simultaneous optimization of a maximum of 5 response variables for a maximum of 5 input factors.

In some of these multi-response experiments, it may not be possible to observe data on all the response variables from all the experimental units. The data from only a subset of responses is collected from some

experimental units and other subset of responses from other experimental units. Some of the responses may be common to two or more experimental units. Such experimental situations are known as Incomplete Multi-Response Experiments. The experimenter is interested in determining the simultaneous optimum combination of ingredients.

A procedure has been developed for simultaneous optimization of several ingredients for incomplete multi-response experiments useful in food processing experiments for two different situations viz. (i) on n_1 units all the p responses are recorded while on $n_2 = n - n_1$ units a subset of $p_2 < p$ responses is recorded and (ii) on n_2 units all the p responses are recorded, on n_1 units a subset of $p_1 < p$ responses is recorded and on $n_3 (= n - n_1 - n_2)$ units the remaining subset of $p_2 (= p - p_1)$ responses is recorded. The procedure of estimation of parameters from linear multi-response models for incomplete multi-response experiments has been developed for both the situations. The parameter estimates are consistent and asymptotically unbiased. Using these parameter estimates, simultaneous optimization of incomplete multi-response experiments is performed using the generalized distance criterion of Khuri and Conlon (1981, *Technometrics*, 23, 363-375). Developed a SAS code for its implementation up to a maximum of 5 response variables and 5 input factors ($k \leq 5$, $p_1 = 2, 3$ and $p_2 = 2, 3$, where k is the number of factors).

In agricultural experiments, there may occur experimental situations where all the observations pertaining to a particular treatment or a specific subset of treatments are lost. This may happen either due to the non-availability of material at the time of experimentation or toxic effect of the treatment(s). In such situations it will be more desirable that the original property of the design like variance balance, partial balance etc. is retained even after the loss of some observations. To deal with such situations, balanced incomplete block designs that are globally resistant of degree one and/ or of degree k (block size) have been identified and catalogued.

Design Resources Server (www.iasri.res.in/design) has been strengthened in collaboration with National Professor. The home page of the server is

The material available on the server has been partitioned into four main components:

Useful for Experimenters: Electronic books, online generation of randomized layout of designs, online analysis of data, analysis of data using various softwares

Useful for Statisticians: Literature and catalogues of BBB designs, designs for making test treatments-control treatment comparisons, supersaturated Online generation of Hadamard matrices, MOLS and orthogonal arrays

Other Useful Links: Discussion board, ask a question, who-is-where, important links

Site Information: Feedback, how to quote design resources server, copyright, disclaimer, contact us and site map

The following new additions have been made on Design Resources Server

Online Generation of Designs

Online generation of randomized layout of factorial completely randomized designs and factorial randomized complete block designs have been added on the link "basic designs" hosted at www.iasri.res.in/design/Basic Designs/basicdesigns.aspx. The facility of generation of field book for data entry has also been created for completely randomized designs, randomized complete block designs both for single and multi-factor experiments and Latin square designs for single factor experiments. The field book can be created

as a comma separated value (csv) file or a text file. A screen shot is

Analysis of Data

The page "Analysis of Data" hosted at www.iasri.res.in/design/Analysis of Data.html has been strengthened by adding the following:

SAS and SPSS steps/ codes for

- obtaining descriptive statistics, generating discrete frequency distribution, grouped frequency distribution, histogram, testing the normality of a given variable (overall groups or for each of the groups separately).
- analysis of data generated from completely randomized designs and cross over designs.
- performing analysis of covariance of the data generated from experiments conducted using a block design.
- performing principal component analysis.

SAS codes for performing analysis of data from experiments conducted using complete/incomplete block designs in different environments. Using codes, one can analyze the data for each of the environments separately, test the homogeneity of error variances using Bartlett's χ^2-test, perform combined analysis of data considering environment effects as fixed (useful for the situations of artificially created environments), considering environment effects as random (both through PROC GLM and PROC MIXED) and prepare site regression or GGE biplots.

Some screen shots for analysis of data are

To popularize the server among agricultural scientists, mobile seminars were delivered at (i) IISS, Bhopal (ii) Final Review Meeting of the ADB Project on Enhancing Farmers Income and Livelihoods through Integrated Crop and Resource Management in the Rice-Wheat System in South Asia at Kathmandu, Nepal (iii) National Research Centre for Agroforestry, Jhansi and (iv) CRIDA, Hyderabad.

Usage of the Server

In the discussion board created to provide a platform for sharing any useful piece of research or idea with scientists over the globe, 7 new researchers (6: Agricultural Research Statisticians; 1: Experimenter) have registered.

The Server is also linked at

- ICARDA Intranet: Biometric Services
- CG Online learning resources- http://learning.cgiar.org/moodle/Experimental Designs and Data Analysis

The server has been cited at:

Chiarandini, Marco (2008). DM811-Heuristics for Combinatorial Optimization. Laboratory Assignment, Fall 2008. Department of Mathematics and Computer.

Design Resources Server is a copyright of IASRI (ICAR). The server was registered under Google analytics on 26 May 2008. For the period 26 May 2008 – 31 March 2009, Google Analytics gave 5010 page views, 4031 unique page views and usage through 528 cities across 79 countries in 6 continents.

Cropping Systems Research

Planning, designing, analysis of experiments planned 'On Stations' under the Project Directorate for Cropping Systems Research

Experiments under Project Directorate of Cropping Systems Research were planned and conducted under four types of research programmes: (i) development of new cropping systems; (ii) nutrient management in cropping systems, (iii) development of system based management practices and (iv) sustainable resource management. The data pertaining to 250 experiments for the crop year 2007-08 were analyzed.

The combined analysis of data for the years 2003 to 2006 generated from the experiment conducted at Kanpur Centre to evaluate organic farming, integrated nutrients and pest management in terms of economic advantage and soil health on maize-potato-onion cropping systems was performed. The experiment was conducted with eight treatments (One-pure inorganic, one integrated and six organic based treatments) applied in unreplicated plots with one meter strip between plots. For the analysis, years have been taken as replications.

Analysis of 4 years cycle revealed that highest net monetary return of Rs. 1,68,700/ha was obtained with 100% inorganic followed by Rs. 1,56,250/ha with application of 50% inorganic + 50% organic treatment.

Fertility status after four years crop cycle showed maximum decrease in pH, EC and Bulk density in the treatment receiving organic fertilizer in comparison to initial soil values. Maximum improvement in organic carbon content was observed in organic and organic + bio-fertilizer treatments, while in available phosphorus and potassium status maximum improvement was observed in treatment receiving inorganic and integrated nutrients as compared to organic and organic + biofertilizer treatments.

Planning, designing and analysis of 'On Farm Research Experiments' planned under the Project Directorate for Cropping Systems Research

During 2007-08 the data of 103 experiments conducted at 2053 farmers' fields at 27 On Farm centres were processed for statistical analysis. These 103 experiments include three different types of experiments viz. Response of Nutrients (33 experiments); Diversification/Intensification of Cropping System (34 experiments) and Sustainable Production System (36 experiments). In 58 of these experiments, percent coefficient of variation was less than 5% and in 7 experiments, it was more than 10%.

Under diversification and/or intensification of cropping system, in rice based crop sequences, an experiment was conducted with 5 different crop sequences (rice-wheat, rice-veg pea, rice-cabbage, rice-tomato and rice-onion) at Ambikapur (Chhattisgarh) for three years (2004-05 to 2006-07). The results revealed that rice-cabbage (Rs. 1295824/ha) performed significantly superior to existing rice-wheat sequence (Rs. 46622/ha) on net returns basis but from energy view point rice-veg pea sequence performed significantly better than other crop sequences.

At Jalandhar (Punjab), another experiment was conducted with crop sequence (rice-wheat, rice-gobhi sarson, rice-gobhi sarson-moong, rice-gram-moong and rice-gram) for diversification and intensification of existing cropping system rice-wheat for three years. From the analysis of data, it was observed that rice-gobhi sarson-moong gave maximum net returns of Rs. 46686/ha which was statistically significant than the net returns obtained from rice-wheat (Rs. 45102/ha). Rice-wheat has recorded significantly higher calorific value than rice-gobhi-sarson-moong.

A statistical investigation on production, economic and energy potential of crop sequences in different agro-ecosystems

Grain yield data converted into monetary returns and energy equivalents (proteins, carbohydrates, calories, iron and fat) was analysed and Duncan's Multiple Range test was employed for comparison of various

sequence means and for examining the consistency of the performance of sequences.

At Junagadh centre, it is concluded that the 3 crop sequences including onion as one of the crop could preferably be tried at this centre like pearlmillet-onion-cowpea and soybean-onion-cowpea. Land use efficiency was also found to be maximum for these sequences.

At Hissar centre, pearlmillet-potato-greengram sequence provides highest energy in terms of calories, carbohydrates and fat and in terms of protein and iron its rank is three as compared to soybean-wheat-cowpea in protein and pearlmillet-mustard-greengram in iron. It can be concluded that crop sequence pearlmillet-potato-greengram including potato as one of the crop could preferably be tried at this center. Another crop sequence soybean-wheat-cowpea (F) could also be tried as it not only enhances the gross return but also provides the protein and iron rich crop.

Planning, designing and analysis of experiments relating to AICRP on STCR

Experiments with new treatment structure involving organic manures and major nutrients N, P and K in 24 design points were conducted at all the 17 centres of AICRP on STCR using the design suggested by the Institute. Analysis of data for the years 2006-07 and 2007-08 received from 4 centres (Hisar, New Delhi, Pantnagar and Raipur) involving 7 crops had been carried out and the results were sent to the Project Coordinator and the respective centre in-charges.

To examine whether the fertility gradient has been created, analysis of variance was carried out using the soil nutrients, SN, SP and SK separately as dependent variables. It is observed that the fertility gradient with respect to soil available nitrogen was created only at Hisar and with respect to soil available phosphorous it is created at all the centres.

The following types of analysis were performed: (1) Evaluation of responses to N, P and K, (2) Checking of creation of fertility gradient, (3) Analysis of variance with and without covariates, (4) Fitting of response surfaces at various levels of organic manure and also combined over all levels, (5) Testing of Homogeneity of the regression equations, (6) Exploration of response surface in the vicinity of the stationary point, (7) Estimating the optimal values of N, P and K to be applied and (8) Targeted yield equations.

The regression equations fitted for different levels of FYM were found to be homogenous for all the 7 crops on all the 4 centres. It showed that a combined response surface can be fitted over all levels of FYM. There is no need to use separate recommendations for different levels of FYM.

For the STCR experiment on Wheat at New Delhi centre, the fertility gradient has been created only with respect to SP. The response to N at the middle doses of P and K showed that the response over N_0 increased for N_{50} and N_{100} and then decreased for N_{150}. In case of response to P at middle doses of N and K, there was a gradual decrease from P_{40} to P_{80} and to P_{120}. Same is the case with response to K over middle doses of N and P.

For obtaining the optimum dose of FN, FP and FK, separate multiple regressions were fitted at the three levels of FYM and found to be homogeneous and therefore, combined regression over all the levels of FYM was obtained to arrive at appropriate response function.

Combined regression equation for SN=238 kg/ha; SP=30kg/ha ; and SK=247 kg/ha, gave the reduced complete second order response surface as:

$$Y=21.61308+0.534631*FN-0.07043*FP-0.14246*FK-0.00185*FN^2+0.000604*FP^2+0.000751*FK^2-0.00035*(FN)(FP)-0.00015*(FN)(FK)+0.000785*(FP)(FK)$$

Canonical analysis of response surface gave the stationary point as Saddle Point with optimum doses of Fertilizer Nitrogen=137.02 kg/ha, Fertilizer Phosphorus =41.52 kg/ha and Fertilizer Potash= 86.95 kg/ha and with predicted yield at stationary point as 5058 kg/ha.

Table: Exploration of Response Surface in the vicinity of Stationary point

Desired Yield (Q/ha)	FN (kg/ha)	FP (kg/ha)	FK (kg/ha)
50	159.44	49.94	130.06
	159.99	43.85	122.83
	160.54	37.77	115.59
55	162.39	17.27	91.23
	160.40	39.28	117.39
	163.19	8.33	80.59
60	162.89	11.63	84.52
	161.89	22.72	97.71
	162.89	11.63	84.52

The site specific optimal doses of fertilizer nutrients obtained through this project would be utilized in giving fertilizer recommendations to the farmers in the form of follow up trials.

Planning, designing and analysis of data relating to experiments conducted under AICRP on Long-Term Fertilizer Experiments

The statistical analysis of the data generated from experiments conducted over the years to study the effect of continuous application of plants nutrients, singly and in combination with organic/ inorganic forms, including need based application of secondary and micronutrient elements in multiple cropping systems, under the project (AICRP-LTFE) at various locations have shown that soil organic matter plays a key role in soil fertility sustenance. In soybean-wheat system, without balanced input of nutrients, organic matter status of soil declined over time in Alfisols of Ranchi. Whereas, balanced fertilization with NPK and NPK+FYM improved the organic matter status in Vertisols under soybean-wheat system at Jabalpur. Thus, assessing soil organic carbon (SOC) status under intensive cropping with different management practices plays an important role in long-term maintenance of soil quality.

Summarization of results of respective mono crops over the years revealed that the integrated application of 100 % NPK (Recommended dose) inorganic with organic FYM continued to give the highest sustained crop productivity over rest of the treatments at each of the locations.

Use of dummy variables for investigating structural stability in fertilizer- yield response models

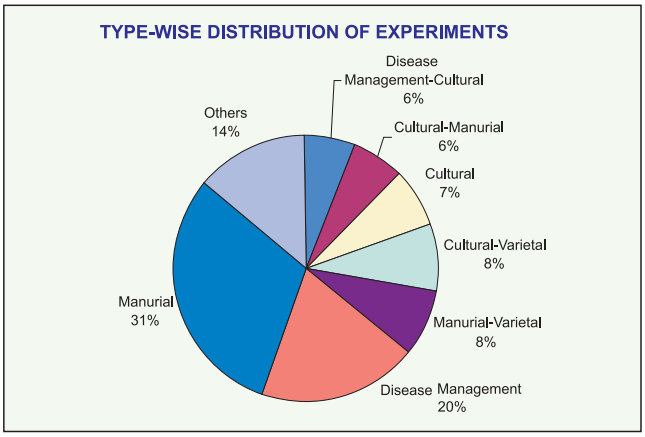
The yield of a crop may be affected by varieties (qualitative) besides the fertilizer doses (quantitative) applied. A method of quantifying such qualitative attributes is used by constructing dummy variables that take value of 1 (presence of an attribute) or 0 (absence of an attribute) and then use them in fertilizer-response models. Dummy variable technique has been used for combining data for different varieties, over years and testing structural stability of fertilizer-yield quadratic response function on wheat crop grown in Haryana for two years over three varieties. Models for individual years and varieties have also been deduced from the pooled regression. It is shown that the rate of change of yield with respect to nitrogen is different in two years and thus the model is structurally different over years. However, the quadratic response function is stable over three wheat varieties.

Information System for Agricultural and Animal Experiments

Agricultural field experiments information system

Agricultural field experiments information system (AFEIS) is a web-enabled information system wherein agricultural field experiments conducted in the country are stored and maintained on-line. It is a repository of information about agricultural field experiments conducted in the country, aims at storing, retrieving data and/ or the results and ancillary information. It also provides some customized reports of Agricultural Field Experiments conducted in the past - at a central place - in compatible form, so as to serve as a reference material for scientists, research workers working in the field of agricultural sciences. It also helps planners in planning and monitoring new experiments.

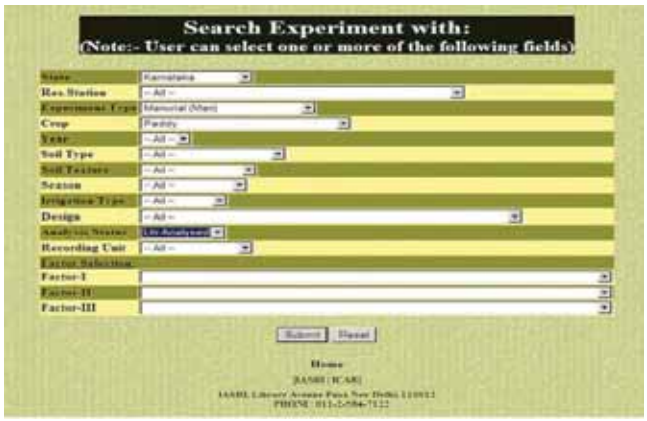
Depending upon the nature of treatments tried, experiments have been classified in various types such as Manurial, Cultural, Disease, Pest and Weed control measures and their combinations with variety, if any. At present pure varietal trials are excluded from this information system. The distribution of experiments in various categories is depicted as



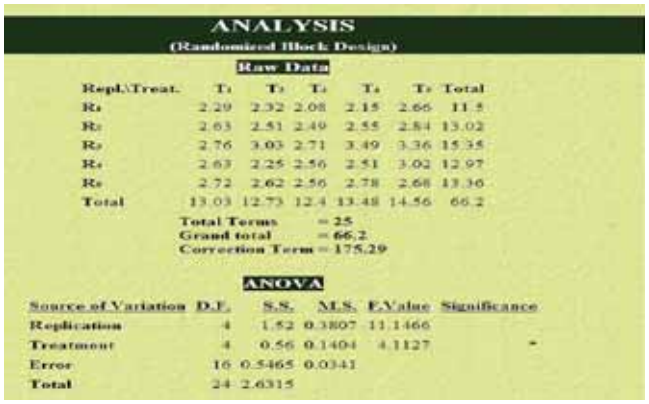
Some of the important characteristics of experiments are Objectives; Details about treatments; Statistical Design adopted; Cultural and other practices followed; General crop conditions; Summary Results and/or Plot-wise observations.

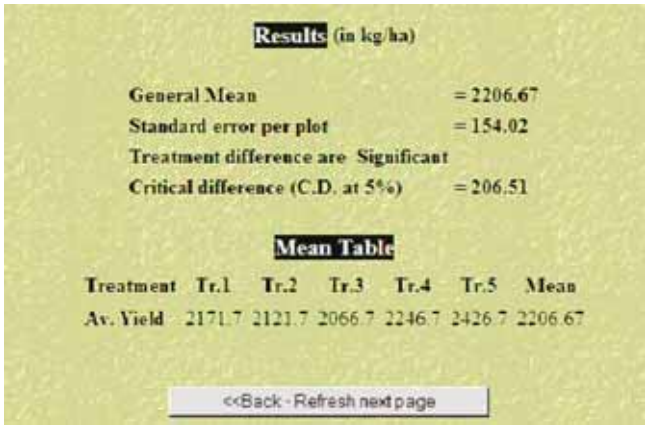
User can access the information system by clicking the link Field Exp Inf System available at the Institute's website http://www.iasri.res.in or http://iasri.res.in:8081/afeis. The home page of the Information System is

There is a provision of generation of online reports. Some screen shots of search reports and experiment information are



Out of 27020 experiments available in the information system, raw data for 13278 experiments is available which can be analysed and for 13742 experiments only analysed results are available. From the raw data, provision for on-line analysis of data generated from randomized complete block designs for single factor and two factor experiments, factorial experiments with extra treatments conducted using randomized complete block designs and split plot designs are incorporated in the system. Some screen shots are:





For on-line data entry, data validation and data approval, necessary trainings have been imparted to the regional staff of IASRI. For on-line data entry by scientists conducting experiments, trainings and seminars have been delivered at G.K.V.K., University of Agriculture, Bangaluru, Central Potato Research Institute, Shimla at Krishna Godavari Zone of ANGRAU at Regional Agricultural Research Station, Guntur.

Experimental Designs for Agricultural, Animal, Agro-forestry and Fisheries Research

Designs for mixture experiments in agriculture

In some mixture experiments, the response depends not only on the proportion of the mixture components present in the mixture but also on the processing conditions which are called as process variables. Thus the process variables are factors in an experiment that do not form any portion of the mixture but whose levels when changed could affect the blending properties of the ingredients.

The mixture experiments with process variables, related to time of application of Nitrogen, under the project Agricultural Field Experiments Information System (AFEIS) have been studied. In these experiments the process variables are generally the methods of application of nitrogen, methods of application of K_2O (Murate of Potash), levels of farm yard manure, levels of irrigation, cultural practices such as tillage, etc. In most of these mixture experiments, the number of runs is small. Analysis of these experiments is being performed as per usual processing of Randomized Complete Block Design. These experiments, if viewed as mixture experiments with change in treatment structure and appropriate model may provide optimum level of mixture components for maximizing the yield.

The designs for experiments with mixtures with process variables have been constructed by using the method of Prescot (2000; *Comm. Statist. - Theory Methods,* **29**, 2229–2253).

The methodology of projection has also been used for construction of the designs for experiments with mixtures with process variables using response surface designs with orthogonal blocking. The orthogonal blocks are taken as the levels of the process variable. Some of the designs for mixture experiments have been constructed using the projection method from the response surface designs given in Technical Report by Parsad *et al.* (2004; Designs for fitting response surfaces in agricultural experiments, IASRI, New Delhi). The designs obtained by projection preserve the property of the orthogonal blocking.

A SAS code for constructing the designs for mixture experiments by projecting the response surface designs into the constrained mixture region has been developed.

Experimental designs for agricultural research involving sequences of treatments

In many agricultural experiments and veterinary medicinal trials, it is often required to measure the effect of response from two or more factors over varying periods of time. For example, two or more types of fertilizers, fertilizer and pesticide spray, fertilizer and irrigation, feed and medicine, two or more types of feeds etc. may have to be given simultaneously to a unit over periods. Under this situation, factorial experiments involving sequences of treatments would be more beneficial than running separate experiments for each factor. Hence, a class of designs involving sequences of treatments with two or more interacting factors balanced for first order residual effects of the treatment combinations has been constructed. These designs are found to be variance balanced. A list of the parameters of these designs along with the variance of contrasts pertaining to direct as well as residual effects of treatments has been prepared for number of treatment combinations less than 50, number of periods less than 50 and number of experimental units less than 100.

When a sequence of treatments is applied to each experimental unit over varying periods of time using a design involving sequences of treatments, the presence of residual effects of treatments to the succeeding periods is quite possible. A treatment with a large direct effect would generally have a large residual effect. Under this situation, a model with residual effects proportional to direct effects would be appropriate. The advantage of this model is that it reduces the number of parameters to be estimated.The performance of some series of efficient designs involving sequences of treatments has been studied under this model. SAS codes have been written to compute the variance of contrasts pertaining to direct effects of treatments for different values of the proportionality parameter λ in balanced designs, pre-period designs and extra-period designs.

In some experimental situations, designs with factorial structure involving sequences of treatments are required. Efficiency of a series of designs involving sequences of treatment combinations arising from two non-interacting factors has been calculated as compared to a single factor design involving same number of periods and units. The designs were found to be quite efficient with efficiency more than 85%.

When experimental units are subjected to sequences of treatments in different periods over different sessions such that conditions are altered from one session to other, nested or split plot type change over designs are suitable. Within each session, carry over effects are assumed to be present and as sessions are well-spaced over time, carry over effect from one session to other are less likely to occur. A class of nested designs involving sequences of treatments has been obtained for such experimental situations.

A class of three-period designs involving sequences of treatments balanced for first order residual effects has been obtained for comparing test treatments with a control treatment. The variances of treatment contrasts pertaining to test versus test as well as test versus control comparisons were calculated. The designs were found to be variance balanced for test versus test comparisons and test versus control comparisons.

A class of designs involving sequences of treatments has been obtained for comparing prime number of test treatments versus a control treatment. These designs are found to be partially balanced following varying circular association scheme for the test treatments.

Programme 2: FORECASTING AND REMOTE SENSING TECHNIQUES AND STATISTICAL APPLICATIONS OF GIS IN AGRICULTURAL SYSTEMS

Neural network based forecast modeling in crops

In this study, weather based neural network models (using multilayer perceptron (MLP) and radial basis function (RBF) architectures) and weather indices (WI) based regression models were developed/ modified for forecasting yield of rice, wheat and sugarcane for different agroclimatic zones of Uttar Pradesh. Forecasts have been obtained for subsequent years not included in model development. Mean Absolute Percentage Error (MAPE) of various models for different zones for various crops are presented in Table 2.1.

Table 2.1: Mean Absolute Percentage Error (MAPE) of yield forecast

Zone	Crop	MLP	RBF	WI
Central Plain Zone	Rice	7.9	10.0	6.4
	Wheat	10.9	21.2	9.2
	Sugarcane	11.4	15.9	7.0
Eastern Plain Zone	Rice	6.4	16.1	21.6
	Wheat	13.3	11.5	12.2
	Sugarcane	6.5	9.0	10.5
Bundelkhand	Rice	10.8	21.8	19.4

Neural network and regression models were developed / modified for forecasting different characters relating to pests / disease (for different crops at various centres) such as Alternaria blight and powdery mildew (mustard), American boll worm, Pink boll worm, Bacterial blight & Whitefly (cotton) and Helicoverpa armigera (pigeon pea). Forecasts have been obtained for subsequent years not included in model development for each case. Mean Absolute Percentage Error (MAPE) for few centres in mustard crop are presented in Table 2.2.

Table 2.2: Mean Absolute Percentage Error (MAPE) of forecast for different characters in mustard crop

Location (Disease)	Character	Variety	MLP	RBF	WI
Behrampur (Alterneria Blight on leaf)	Y_1	Varuna	11.3	19.5	22.3
		Binoy	10.2	12.0	12.4
	Y_2	Varuna	12.5	10.1	9.7
		Binoy	9.6	9.9	9.7
	Y_3	Varuna	36.0	54.3	61.9
		Binoy	36.5	45.8	61.0
S.K. Nagar (Powdery mildew)	Y_1	Varuna	11.0	12.5	20.2
		GM2	8.0	18.0	21.7
	Y_2	Varuna	7.9	14.5	12.8
		GM2	7.9	15.5	13.8
	Y_3	Varuna	26.5	49.0	35.1
		GM2	10.7	46.2	74.6

Y_1= Age at first appearance of disease,
Y_2= Age at peak severity of diseases
Y_3= maximum severity of diseases

Weather based models for forecasting potato yield in Uttar Pradesh

The weather data on maximum temperature, minimum temperature, morning & evening relative humidity from 40^{th} to 3^{rd} standard meteorological weeks (smw) available during the period 1971-2002 were utilised for construction of weather indices which were used for

development of regression models (RM) and complex polynomials (CP) using Group Method of Data Handling technique. The models were developed at district as well as at zone levels (by pooling the data of various districts within the respective zones). The performance of the models has been judged on the basis of co-efficient of determination and predicted residual sum of squares (PRESS). In most of the cases, the coefficient of determination of models were highly significant with reasonably low value of PRESS indicating very good fitting of the models. Using these models, the forecasts were computed at district-level. The district-level forecasts were combined by taking appropriate weights to obtain forecasts at agro-climatic zone/state level. The percent deviations of forecasts for the year 2002-03 (not included in model development) from the observed ones were less than 10% in most of the cases. The forecast from weather indices based regression models are better than the complex polynomials in most of the situations. The observed and forecast values obtained by fitting appropriate models for some selected districts, one from each zone are presented in the Figure. 2.1. Using this approach, it is feasible to obtain reliable forecasts three/ four weeks before harvest.

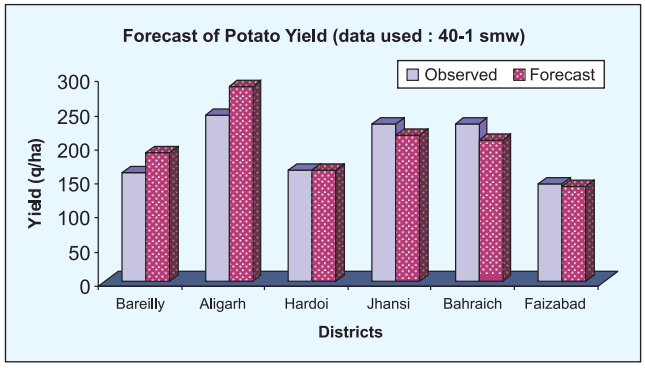


Figure 2.1

Use of discriminant function and principal component techniques for weather based crop yield forecast

Models for forecasting rice and sugarcane yield were developed at district level for Uttar Pradesh using discriminant function technique, principal component analysis and weather indices based approaches. For development of rice yield forecast models weekly data available during the years 1970 to 2002 on weather variables namely, maximum and minimum temperature, relative humidity (morning) and rainfall for the periods 23 th to 38th standard meteorological weeks (smw) and for sugarcane crop fortnightly weather data during 10th to 39th smw for the period 1971-2002 were used. The performance of the models has been judged on the basis of co-efficient of determination and predicted residual sum of squares (PRESS statistic). The R^2 values of the fitted models for various districts using different approaches were found highly significant. Based on values of PRESS statistic, the performance of forecast models developed through discriminant function technique is found better than other approaches. Crop yield forecasts for the years 2002-03 and 2003-04 were obtained.

Visioning, Policy Analysis and Gender (V-PAGe) - Sub Programme II : Technology Forecasting (NAIP Funded)

Detailed statistical analysis for rice on modeling aspects such as area under HYVs, irrigated area, productivity, import/export status etc. for India and other competing countries was attempted. National and Zone level projections of area, production and productivity of rice were obtained using various models (Gompertz model found best) and comparison with other existing results has been done. Classification of districts at state and national levels based on productivity of rice has been done and districts in different categories were identified. Based on above analysis and the document received from CRRI, Cuttack, questionnaires were prepared for conducting survey to collect the information for forecasting technological needs for rice in India. Separate questionnaires were prepared for experts & planners, State Departments of Agriculture and farmers.

The scientists associated in the project were trained on “Technology Foresight Methodologies in Agricultural Innovation System” at Centre for Studies in Science Policy, Jawaharlal Nehru University, New Delhi.

A workshop was organized on “Forecasting future technological needs for rice in India” at Central Rice Research Institute, Cuttack during 28-29 July 2008.

Detailed statistical analysis for rice on modeling aspects pertaining to classification of districts based on productivity revealed that, if technological needs for

districts which fall under low productivity group are fulfilled then an increase of 7% in rice production can be achieved. A document based on workshop/meeting for forecasting technological needs in rice and wheat crop was prepared. Implications of Information and Communication Technology (ICT) on agriculture were studied from various perspectives. The patent analysis of ICT related technologies for Asian countries revealed that number of patents in this field up to 1990 was quite low in Asia. Further, patent citation results revealed that 93.48% of total citation belonged to South Korea and Taiwan. India had very low citation ratio. There is wide gap in innovation quality among different Asian countries. Comparison of innovation configuration in ICT among Asian countries indicates that scientists and researchers in India focus on latest scientific developments and fundamental innovations. Conversely, Taiwan and South Korea are focused towards applied innovations. Bibliometric analysis shows that there is change in research priorities in ICT from specific domain to generic domain. Figure 2.2 shows percentage of ICT publications from European Federation of Information Technology in Agriculture (EFITA) conferences pertaining to agricultural applications across different domains. It was observed that ICT is increasingly being used for extension services while its use is declining for basic research over the years. This analysis also indicates that over the time, Management Information System (MIS) has evolved in the form of Decision Support System (DSS). Bibliometric analysis for technology forecasting in the segment Genetics and Plant Breeding of agriculture revealed that India is not far behind any of the developed countries like USA and Japan.

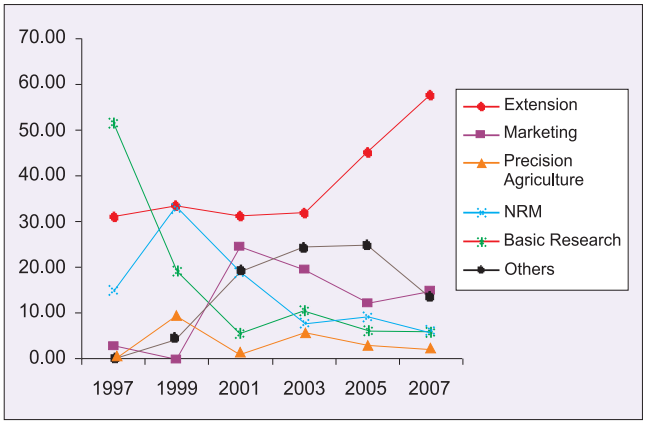


Figure 2.2. Research publications (%) of ICT based technologies in agriculture

Stochastic process modeling and forecasting through discrete nonlinear time series approach

Genetic Algorithm (GA) has been employed for fitting the Self Exciting Threshold Autoregressive (SETAR) nonlinear time-series model. The model comprises several linear autoregressive models and a switch mechanism, which switches according to the comparison of the delay output and the threshold value. One heartening feature of this model is that it is capable of describing "cyclical" time-series data. Recently developed optimization technique, viz. Real-coded GA is a stochastic search and optimization procedure motivated by the principles of genetics and natural selection. The three operators, viz. Selection, crossover, and mutation make GA an important tool for optimization. As an illustration, the methodology is applied to describe All-India lac export annual data for the period 1901-2001 and the data from 2002 to 2008 is used for validation of the fitted model. The fitness (objective) function used is the Normalized Akaike information criterion. The GA parameters, viz. population size, crossover probability, and mutation probability for minimization are 100, 0.9, 0.01 with number of generations as 100. The proposed algorithm enables us to select SETAR (2; 1, 1) model, when delay parameter d =1, p_1 =1 and p_2 = 1. The optimal threshold value comes out as *10500* metric tonnes, which is the 30th percentile of the data. A mechanistic interpretation of the fitted *SETAR* model is as follows: In the upper regime, i.e. $X_{t-1} > 10500$, $X_t - X_{t-1}$ tends to be negative, implying decrease in the lac export. In the lower regime, i.e. $X_{t-1} \leq 10500$, $X_t - X_{t-1}$ tends to be marginally positive, implying slow increase in lac export. This phenomenon leads to cyclicity, which is in agreement with observed lac export data. It is shown that the SETAR model fitted, using GA technique, is superior to other competing models.

Wavelet frequency domain methodology is employed for analyzing the monthly rainfall data of India during the years 1879 to 2006, available at the website of the Indian Institute of Tropical Meteorology, Pune. The trend in the monsoon rainfall data for the four months, i.e. June till September is estimated by computing the Haar and Daubechies (D4) wavelets for levels 5 and 6 using S–PLUS wavelet toolkit software package. As the level increases, the declining trend present in the data set is clearly depicted. This important feature, however, could not be captured by Box Jenkins Autoregressive Integrated Moving Average (ARIMA) methodology. For

testing H_0: Trend = 0 against H_1: Trend ≠ 0, under the normality assumption, size and power of the test is computed by using bootstrap technique. It is found that the Haar wavelet performed slightly better than the Daubechies (D4) wavelet. When the errors are not normally distributed and exhibit some form of dependency, the distribution of test statistic is unknown. It is, therefore, necessary to generate empirical critical values. This is done by means of a simulation experiment. Under H_0, for different values of long memory parameter and under the assumption of t-distributed errors, critical values are generated for both the wavelets. It is concluded that, for both the wavelets and levels, the test is significant at 5% level, implying thereby presence of declining trend. This conclusion that Indian monsoon rainfall time-series data has a declining linear trend is a matter of serious concern and may have serious implications from "Global warming" point of view. The rainfall data under consideration follow a long memory process. The fitted values for the time-series data are obtained by adding trend component and long memory process. Superiority of wavelet approach over ARIMA approach is demonstrated.

Remote sensing based methodology for collecting Agricultural Statistics in North-East hilly region" (Funded by Space Applications Center, Ahmedabad, Department of Space, Govt. of India)

An integrated methodology for area estimation of multiple crops which includes paddy, maize, potato, ginger, pineapple, cashew nut and vegetables as a group was developed based on ground survey, remote sensing satellite data and GIS. Four districts of Meghalaya State namely East Garo Hills, West Garo Hills, East Khasi Hills and Ri-Bhoi are covered under this study. Estimates of area under various crops are obtained on the basis of data collected during the previous year survey. For the current year, it is decided to conduct the survey in two seasons as all the crops are not covered in one season. For the first season survey, spatial stratification is done by overlaying cropped area layer which was extracted from land use/ land cover maps and was categorized as low, medium and high on the basis of cropped area and digital elevation model (DEM). Sixty villages/habitats were selected from each district by proportional allocation. Five farmers were selected from each of these selected villages/ habitats for data collection. Modified the schedules for primary data collection and prepared the instruction manual. Imparted the training to the officials of State Government and primary workers in all the four districts. Survey has been conducted in four districts(East Garo Hills, West Garo Hills, East Khasi Hills and Ri-Bhoj). Supervision of data collection work done during the survey and scruitinized the filled in schedules. Estimates of area under paddy, ginger, maize, pineapple, potato cashew nut and vegetables were obtained. For the following season survey, thirty new villages were selected and thirty villages out of sixty selected villages in the earlier season survey were retained.

Programme 3: DEVELOPMENT OF TECHNIQUES FOR PLANNING AND EXECUTION OF SURVEYS AND ANALYSIS OF DATA INCLUDING ECONOMIC PROBLEMS OF CURRENT INTEREST

Visioning, Policy Analysis and Gender (V-PAGe) (Sub-Prog. III): Policy Analysis & Market Intelligence (NAIP Project)

Per capita monthly consumption expenditure and the production pattern of major food commodities was analyzed for major producing states of the country. The wholesale price of important markets for major vegetables, fruits, cereals, pulses and oilseeds were subjected to time series analysis. The data was de-seasonalized and detrended for analysis. Seasonal indices of fruits and vegetables were computed to examine the extent of seasonality in the prices. The instability in the prices of major vegetables, fruits, cereals and pulses was studied using different measures like intra-year price rise, average seasonal price variation, and co-efficient of variation. The extent of market integration was also analyzed for major wholesale fruits and vegetables markets of the country. The supply analysis of mustard, groundnut, tur and gram was also completed. The supply constraints of rice and major pulses in the country were also studied based on secondary information.

An econometric study of women empowerment through dairying in selected districts of Haryana

The analysis of secondary data pertaining to the various agricultural and dairy attributes of the selected districts was completed. Based on data collected from Karnal block, it was observed that about 90% of women spent more than 60% of their time in dairy and crop sector put together. However in Indri block, it was slightly higher. The time spent in dairying in Karnal district by women was 36.8%, in dairy it was 29.6% & household

activities took around 33.6% of their time. The same pattern emerged for Indri district. The empowerment index was categorized in four categories. The maximum number of households seemed to be moderately empowered. Two major constraints observed were lack of easy availability of loan for purchase of animals, their feed and equipments and lack of proper communication with the extension workers. Similarly, lack of basic knowledge, training facilities at village and block levels and knowledge of cooperative societies and milk processing units were also observed as constraints.

An econometric analysis of groundwater markets in Indo-Gangetic plain of India

The groundwater irrigated area statistics and groundwater volumetric statistics were analyzed to study the groundwater development in agro-climatic regions & sub-regions of Indo-Gangetic Plain. Used the area statistics to study the growth in the groundwater irrigation in Trans and Upper Gangetic plain regions and sub-regions. The volumetric statistics is used to examine percentage of groundwater development and proportion of over exploited, critical and safe blocks in all the regions and sub-regions. The secondary data on source-wise irrigated area was updated for all the regions.

The analysis of volumetric statistics on groundwater revealed that groundwater development, defined as Annual recharge Groundwater

(Annual ground water withdraw/Annual Recharge) ×100

based on the data published in 'Dynamic Groundwater Resources of India 2004 by Central Groundwater Board, Govt. of India was 75 per cent in Indo-gangetic plains as a whole during March 2004. The agro-climatic region-wise analysis showed that groundwater development was 134, 74, 51 and 51 per cent in the trans, upper, middle and lower-gangetic plains, respectively. The district-wise analysis revealed that of the total districts of Indo-gangetic plains, 17 and 22 percent districts were in over-exploited and dark categories, respectively. However, region-wise and district-wise analysis showed that there were 66 and 16 per cent of the total districts in over-exploited and dark categories in trans-gangetic plains followed by 3 and 48 percent in upper-gangetic plains, respectively.

Impact assessment of fisheries research in India

The primary data on different aspects of aquaculture from 120 selected fish farmers of Punjab state for the agricultural year 2007-08 were collected. Tabular analysis was performed to study the socio-economic status of sampled framers and benefit-cost analysis was performed. Frontier production function to assess the farm specific technical efficiency was fitted. The determinants of Technical Efficiency by fitting the multiple regression model were identified. Finally, the constraints to the aquaculture in Punjab were also identified.

The socio-economic analysis of the fish farmers from Punjab revealed that the majority of the farmers were having the pond size of less than 2.5 hectares with an average size being 1.4 ha. The net benefit-cost ratio was 0.62 on large farms indicating that the return per rupee of investment was impressive on large farms whereas it was 0.31 for small category of farms. It was found that among all the variables included in Frontier Production Function viz. stocking density, labour, fertilizers and feed, only stocking density and feed were significant, indicating that one percent increase in stocking density would result in a change in output by 0.24 percent. It was observed that about 96 percent of the difference between the observed and the frontier output was mainly due to the inefficient use of resources which are under the control of fish farmers. The farmers' perception about the constraints to the aquaculture in Punjab revealed that high cost of feed, low dissolved oxygen, poor availability of electricity, inadequate seed supply and poor quality of seed were the major constraints.

Although the farms are technically sound to some extent, the economic efficiency is low. There is a tremendous chance to increase technical, allocative and economic efficiencies of Punjab fish farmers. The aquaculture in Punjab is profitable, but it is wrought with certain constraints. Hence, there is still some scope to increase the profitability in general and of small and medium category of farmers in particular by improving the technical efficiency and mitigating the constraints to the extent possible.

Estimation of extent of farming practices, resources and activities with energy use

Weighted correlation coefficients for the characteristics (i) total irrigated area, (ii) land possessed under cultivation (iii) land use under dairy and (iv) total land possessed during the two visits/seasons have been worked out for each district and over the state in respect of the 20 major States. Minimum Variance Linear

Unbiased Estimators (MVLUEs) for estimating different parameters e.g. extent of farming practices, resources and activities with energy use at District/State level have been finalized. MVLUEs for estimating seasonal variation and average of farming practices and resources over kharif and rabi seasons have also been developed. A computer program has been prepared for working out the MVLUEs of the parameters under study. The program was tested with real time data obtained from NSSO. Subsequently the MVLUEs of parameters for the characteristics, viz. Land used under dairy, Land under cultivation and allied agriculture, total land possessed by the households and land area under irrigation have been obtained.

Study to investigate the causes of variation between official and trade estimates of cotton production (Funded by Ministry of Agriculture, Department of Agriculture & Cooperation, DES, New Delhi)

The study was undertaken in two states namely, Maharashtra and Andhra Pradesh (A.P.). A total of ten districts, five each from Maharashtra and A.P. were selected for carrying out field survey. Data collection work pertaining to Crop Cutting Experiments on cotton was completed in both the states with the co-operation of concerned State Governments. Supervision of data collection was done at regular intervals in both the states. Scrutiny of filled-in schedules, data entry, and scrutiny of entered data and data analysis of all the ten selected districts have been completed. The progress of the project was presented in a Review Meeting. As a follow-up action to the review meeting of the project, a meeting involving all trade organizations, traders associations, ginning/pressing mills representatives, representatives from Ministry of Textiles, Ministry of Agriculture and IASRI and members of Cotton Advisory Board was held at Mumbai. In the meeting, presentation of the project was made highlighting the progress of the study so far, salient findings, proposed solutions and the difficulties faced in getting the trade data as well as in obtaining the documents related to the methodology being followed to get the trade estimates. The documents related to trade methodology being followed by trade organizations for obtaining the trade estimates and clarification sought on the methodology have been received from Office of the Textile Commissioner, Mumbai. Planning for trade data collection was done and the details of two ginning/ pressing mills per district for all the selected districts have been obtained from both the State Govts. The schedule for trade data collection was designed, modified and finalized. Technical discussions were held with mill owners of selected ginny pressing mills of Aurangabad district, a representative of Maharashtra State Cotton Corporation, a progressive farmer, a legal advisor of the mill owners and managers of the mills on 27 March 2009 and with officers of Maharashtra State Cotton Corporation to understand the flow of trade data from ginning/pressing mills in arriving at final figure of trade estimate of cotton production.

The study has revealed that the official estimates are based on scientific methodology. The methodology is objective, scientific and verifiable and sampling design is proper but various problems have been observed in actual implementation of the Crop Estimation Surveys Scheme through Crop Cutting Experiments for Cotton. The analysis of the secondary data revealed that the sampling design and estimation procedure for estimation of cotton production is correctly being followed in Andhra Pradesh while it is not being correctly followed in Maharashtra state. The methodology for obtaining trade estimates by trade organizations is not scientific. The final figures of the trade estimates are obtained on the basis of discussion between various trade agencies under the umbrella of Cotton Advisory Board (CAB). Average weight of cotton bale varies from 150 to 172 kg in the selected districts of states under study as against standard weight of 170kg. The percentage of submission of returns by the ginning and pressing units has been found to be 16% in Maharashtra and 9% in Andhra Pradesh in the year 2007-08 which are being used in arriving at final figure of the CAB estimates. The estimates of cotton production obtained based on market arrival data support that the official estimates seem to be closer to the actual production than the CAB estimates.

Pilot study to develop sampling methodology for estimation of production of mushroom

At present, the data on production of mushroom is being collected by the State Government Departments on complete enumeration basis. For this, the enumerator is required to go for the data collection of each and every picking which is time consuming, costly and cumbersome. So, there is a possibility of non-sampling errors creeping in the estimates of production of mushroom crop. Sample survey based approach is, therefore, desirable for framing the estimates of production of mushroom. Accordingly, this study was

undertaken in the Sonepat district of Haryana state as Haryana is the third leading state in the production of mushroom crop. Primary data was collected in Sonepat district of Haryana State pertaining to Button Mushroom (*Agaricus bisporus*) crop from November 2007 to April 2008.

The sampling design adopted for data collection was stratified two-stage random sampling with blocks/ group of blocks as strata, mushroom-growing villages as primary sampling unit and mushroom growing cultivators as the ultimate unit of selection. The productivity of mushroom was maximum 383.62 q/ha with 5.17% standard error in Rai followed by 325.44 qtl/ha with 9.62% standard error in Sonepat and 312.34 q/ha with 4.76% standard error in Ganaur. Pooled over all the strata, the estimate of productivity of mushroom in Sonepat district was to the tune of 328.78 q/ha with a standard error of 4.63%.

The estimate of productivity (kg/tray) was observed highest in Rai (4.63 kg/tray with 4.31 percent standard error) and the lowest in Sonepat (4.35 kg/ha with 1.98 percent standard error). The productivity in Gannaur was observed as 4.50 kg/tray with 1.38% standard error. The productivity of mushroom for the entire Sonepat district was estimated to be 4.46 kg/tray with 1.21% standard error.

As reported by District Horticulture Office, Sonepat, the production of mushroom in the Sonepat district on the basis of complete enumeration approach was to the tune of 2063 MT with 416810 trays. The productivity of mushroom was observed as 4.94 kg/tray on the basis on complete enumeration approach while the same as estimated through sample survey based approach was 4.46 kg/tray with 1.2% of standard error. The magnitudes of standard errors as well as the closeness of the two figures pointed towards the fact that the random sample survey based approach appears to be suitable for estimating the production of mushroom.

The estimate of wet compost used in mushroom cultivation was observed to be of the tune of 269.8 q/ha with 6.50% standard error. Estimate of spawn used in cultivation of mushroom crop was of the order of 20.61 q/ha with 4.52% standard error. in Sonepat district pooled over all the strata.

Recommendations

- Sample survey based approach appears to be appropriate for developing estimate of production of mushroom.
- For validation upscaling some more studies needed to be carried out before the developed methodology can be recommended for adoption.
- Mushrooms are grown in sheds/beds. Therefore, reporting the estimates of different parameters on the basis of area (quintal per ha) is a better way of reporting than reporting made on the basis of kg per tray as there is no practice for cultivating mushrooms in trays in the district.
- The area under mushroom may be calculated as the total area in hectare of the beds used in a shed for cultivating mushroom crop.

Pilot study on small area crop estimation approach for crop yield estimates at the Gram Panchayat level

Data entry and subsequently, analysis of data were carried out as per the already developed estimation procedure. For this purpose, two type of estimators i.e. ratio and regression type estimators were considered for estimation of crop yield at Gram Panchayat level. The results were satisfactory i.e. the standard errors were within acceptable limit in most of the cases.

Small area estimation for zero-inflated data

Survey data often contain large proportion of zero values (for example, Agricultural and environmental surveys etc.) than would be expected under standard model assumptions. Presence of excess zeros in the data (i.e., zero-inflated data) makes the model assumptions invalid. Consequently, problems with inference are liable to occur by ignoring this feature of the data. Small Area Estimation (SAE) under a linear mixed model may not be efficient for zero-inflated data. A SAE method for zero-inflated data that account for excess zeros in the data has been proposed. In particular, a mixture model based approach has been adopted to SAE for zero inflated data. For comparing the performance of proposed estimator of small area means under a mixture model, three alternative estimators under the linear mixed effects model have been identified. These are the empirical best linear unbiased prediction, Pseudo-empirical best linear unbiased prediction and Jiang-Lahiri empirical best predictor estimator. The first estimator is model dependent and sensitive to model, however, second and third are model-assisted estimators for small area means. Limited model-based simulation is carried out to contrast the performance of developed estimator with three alternative linear mixed effects model based small

area estimators. The results obtained so far through mixture model perform better in terms of relative biases and relative root mean squared errors when data contains a large proportion of zero values.

Study on status and projection estimates of agricultural implements and machinery

Data relating to different items of agricultural machinery and implements from different publications/literature e.g. Livestock Censuses have been compiled. Data pertaining to area and production of various food grain crops and average food grain productivity for different states have also been obtained. For Madhya Pradesh state, district-wise mechanization indicators, as ratio of mechanical power to the total power (comprising of power from animate and inanimate sources) have been worked out and stratified into different groups. Group-wise correlations between mechanization indicators with the average food grain productivity have been obtained.

Assessment of post harvest losses of crops/ commodities

The data analysis has been completed for all 120 selected districts for all the selected major crops/ commodities. The results obtained after data analysis have been validated. The results were discussed at length in a meeting with former DDG (Engg.) and ADG (Engg.) held at IASRI on 13 January 2009. As a follow-up action of the meeting with former DDG (Engg.), the required schedule was designed and sent to CIPHET, Ludhiana for its onward dispatch to the concerned places. The final results of the study were presented in an ICAR Expert Committee meeting on 19 March 2009.

Programme 4: MODELING AND SIMULATION TECHNIQUES IN BIOLOGICAL SYSTEMS

A Statistical study of rainfall distribution and rainfall based crop insurance

Method of moments, and Method of maximum likelihood were used for estimation of parameters of Generalized Lambda Distributions (GLD). Ver. 1.0.3 of the GLDEX package, in R software (Ver. 2.8.1) was used for estimating parameters of unimodal GLD by Starship method as well as Discretized nonparametric method. Further, for assessing goodness of fit, several methods, like the Resample Kolmogorov-Smirnov test, are included in the package. Rainfall data of Assam and Meghalaya meteorological subdivision for the period 1871-2006 were used to illustrate these techniques. For given data, the performance of the Starship method is the best. From monthly rainfall data sets at Meteorological Subdivision level, It is observed that the rainfall distribution is heavy-tailed or belongs to a mixture of long-tailed probability density function. The estimation of extreme value index is carried out by Hill's nonparametric density estimation method. Under this method the parameter which controls extreme values of the underlying rainfall data is estimated by minimizing mean square error of the Hill's estimator. Steps for carrying out the computations are finalized and the computer program is developed. Trend in yield was examined for all the districts. Significant linear trend was present in the yield series of Akola, Parbhani and Kheda districts except for Jhansi district. Relationship between rainfall minima of various durations such as 1-week total rainfall , 2-week total rainfall etc. upto 13-week total rainfall and yield (and trend adjusted yield) was examined. Based on the scattergram of observations suitable models were tried. No model could describe the relationship significantly. Similarly, relationship between rainfall maxima of various durations and yield (and trend adjusted yield) was examined. Based on the fitted models surplus / excess rainfall thresholds (above which yield is expected to be below median) were obtained for Jhansi, Akola and Kheda districts. Quadratic regression model for Jhansi and linear models for Akola and Kheda fitted well to duration (I,2,3,…,n weeks) and corresponding threshold values. Base values of surplus rain obtained from these models can be used for crop insurance programmes.

Computational analysis of SNPs at functional elements of rice genome

Genomic information on all the 12 chromosomes of *Oryza sativa* has been collected from TIGR site. Sequence information on different functional elements, *viz.*, exons, introns, UTRs, mRNA, proteins, promoter regions, 1K nucleotides of upstream has been collected. The collected information has been processed in a way suitable for extraction through web interface. The genomic coordinates of functional elements have been obtained and stored in database. Necessary scripts are written in *perl* for the extraction of coordinates of functional elements. A web page has been developed for Agricultural Bioinformatics Lab (ABL) wherein links are provided to bioinformatic tools, Local BLAST, *etc. BioPerl* and *.cgi* scripts are written for sequence alignment and filtering of BLAST report. SNPs along with their flanking sequences are collected and

processed in a format suitable for populating database. Online local BLAST has been developed to locate and quantify blocks of similarity between query sequence and database sequences. Local BLAST includes *blastp*, *blastn*, *blastx*, *tblastn*, and *tblastx* programmes to align protein *vs* protein, nucleotide *vs* nucleotide, translated nucleotide *vs* protein, protein *vs* translated nucleotide, translated nucleotide *vs* translated nucleotide sequences respectively. A database on functional elements of rice genome has been populated. Programmes are being written to extract information on functional elements through web interface. Web page on Agricultural Bioinformatics Lab (ABL) has been updated with genomic sequence analysis tools. More online computational facilities for genomic data analysis are being provided in the ABL page. Programmes are being written to obtain genomic coordinates of Single Nucleotide Polymorphisms (SNPs).

Empirical investigations on estimation of genetic correlation

Computer program is prepared to simulate half- sib data with sire effects as gamma and errors as normal distributions. The data under half-sib model was simulated for different combinations of low, moderate and high genetic correlation, phenotypic correlations, heritabilities of the two traits and for different family sizes and structures. These simulated samples were analysed to obtain the estimates of genetic correlations along with their bias, standard error and mean square error. The observed, estimated, predicted and bootstrap standard errors of genetic correlation are obtained for various combinations of population values of genetic correlation, phenotypic correlation and heritabilities of the two traits. It has been observed that the estimates of genetic correlations are biased in general and the bias decreased considerably with increase in sample size. The bias increases considerably with increase in heritabilities of the two correlated traits. The estimates of genetic correlation are highly overestimated from samples drawn from populations with negative genetic correlation and their bias is quite high as compared to positive genetic correlation. The bootstrap estimates of standard error of genetic correlation are in general lower than the estimated standard error and the difference in the two decreases and reduces to zero with increase in sample size in most of the cases. The probabilities of inadmissible estimates are also obtained for various combinations of population genetic parameters and sample sizes and these probabilities in general decrease with increase in sample size. In general there is decline in probabilities of inadmissible estimates with increase in heritabilities of the two traits for a given genetic correlation and sample size.

Programme 5: DEVELOPMENT OF INFORMATICS IN AGRICULTURAL RESEARCH

National Information System on Agricultural Education Network in India (NISAGENET II) (AP Cess Fund Scheme of ICAR)

The Project was designed, developed and made operational at http://www.iasri.res.in/Nisagenet/ during 2005-07. It contains data with regard to academics, infrastructural facilities, budget provisions, manpower employed, personal information of the faculty members and the research and development activities of the organizations imparting agricultural education in India. For Country/State/University/College level reporting, the NISAGENET has been maintained at the Central server located at IASRI, New Delhi. For data management the system is operational at the Local Servers of all the participating organizations where facility has been provided for data entry/updating and uploading of data to Central Server for data integration at country level. The software of the Administrative module for management of the activities at the Central Server has been strengthened by adding newly established universities into the system for implementation of the data management application software at the local server of the respective universities. For upkeep and maintenance of NISAGENET at the Local Servers of the participating organizations, technical support through e-mail, telecommunication and visits by the concerned staff has been provided.

Statistical Package for Animal Breeding 2.1 (SPAB 2.1)

Computer programs were developed for application of Sanders correction, calculation of repeatability upto 10 locations, skillings and Mack's nonparametric test, simulation of data for parent-offspring (heritability model), half-sib (heritability model), full-sib (heritability model), parent-offspring (genetic correlation model), and half-sib (genetic correlation model), bootstrap studies for data of half sib (heritability model), full sib (heritability model) and half sib (genetic correlation model). Care has been taken to keep processing procedure very simple and useful for animal breeding scientists.

Strengthening, refining and implementation of expert system on wheat crop management

The crop protection part of the expert system has been strengthened by adding one sub module for nematode identification. Information has been collected for strengthening the Cultural Practices and Harvest Module. New rules, interfaces and heuristics have been developed. A major change in the database has also been done to accommodate new knowledge. The database for the Hindi Module of Expert System has been designed using SQL server that accepts UNICODE for the support of Hindi language. The system displays varieties through State and Zone Map with the Hindi Interface.

Web solutions for Partially Balanced Incomplete Block (PBIB) designs

Methods of construction of a series of cubic PBIB(3) designs with parameters $v=s^3$, $b= b^{*3}$, $r=r^{*3}$, $k=k^{*3}$, $\lambda_1 = r^{*2}\lambda^*$, $\lambda_2 = r^*\lambda^{*2}$, $\lambda_3 =\lambda^{*3}$ and a series of rectangular designs with parameters $v=v'v''$, $b= b'b''$, $r=r'r''$, $k=k'k''$, $\lambda_1 =r'\lambda''$, $\lambda_2 = r''\lambda'$, $\lambda_3 =\lambda' \lambda''$ have been compiled from literature and computer modules have been developed for online generation and randomization of these designs. Design and development of module for online analysis for block designs have been completed. This module analyzes the data generated from complete/ incomplete block designs having equal/unequal replications as well as block sizes. This module provides ANOVA(s), treatment means, CD(s) and comparison of treatment means. In case of PBIB designs, various associates for all the treatments are also displayed.

Knowledge data warehouse for agricultural research

The data mart related to crops were redesigned and three techniques of future projections i.e. growth models, trend models and auto-regressive models have been incorporated in on-line DSS. Apart from this, derived parameters have also been included in this data mart. Multidimensional model of the census data related to household amenities has been designed and data of some states have been published. On-line Analytical Processing (OLAP) cubes for the Census data (2001) have been prepared for all states and published. Further, new web site (K-Mart) of the project has been designed (Figure. 5.1). Thematic maps of productivity of various crops were digitized based on historical data using GIS software (Figure. 5.2). Attempts have also made to calculate crop diversification index at state level. Further, data mart of crops, livestock and fisheries sectors has also been updated.

Figure 5.1. Home page of Knowledge Management System

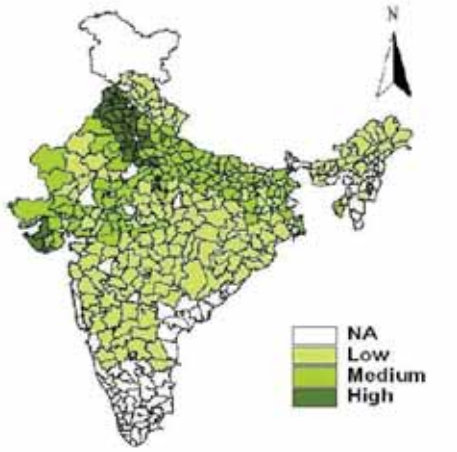


Figure 5.2. Thematic map of Wheat Crop

Decision support system for manpower planning - PERMIS*net*

Data from online PERMISnet database has been merged with database structure of PERMISnet-II. Alpha testing of the system has been done with data from three institutes. System has been implemented at IASRI for Beta testing. User Manual has been printed and linked with the system. Few graphical reports are also available. New reports on manpower planning e.g. personnel in caste category, training details and abroad visit have also been developed. Regular backup of PERMISnet is being taken. Coordination with nodal officers and solution to the problems faced by them

and various queries from PERMISnet database is continuing.

Intranet solutions for PG School IARI

Green Book of PG School, IARI has been made online from where various chapters and syllabi of various disciplines can be downloaded in PDF and Doc format. The e-Green Book is also linked through the project website. IASRI Virtual Learning Environment has been developed and deployed using Moodle. All the courses of the discipline of Agricultural Statistics and Computer Applications of PG School, IARI are added in the system. The system can be accessed through http://elearning.iasri.res.in by faculty, instructors and students. Designing of database schema for other Intranet Solutions viz., Student Management, Faculty Management and PG School Administration Management has been completed. The home page of the Management System for PG School, IARI is given in Figure 5.3.

Figure 5.3. Management System for the PG School, IARI, New Delhi

Machine learning approach for data mining

Exploratory data analysis of two datasets Haryana Farmer's Data and CIMMYT Data was completed. Data Cleaning and Data Preparation was also completed for both datasets and as its part, both the datasets were discretized. Machine Learning techniques namely, Artificial Neural Network (ANN) – Multi Layer Perceptron (MLP) model, and Support Vector Machines (SVM) have been used for Classification of CIMMYT data and Rough Set based Technique for classification have been used for Haryana Farmer's Data. The results for CIMMYT data have shown that Support Vector Machines gives better accuracy of classification in comparison to ANN both with or without discretization of data. Comparing the classification accuracies for discretization based SVM with simple SVM, it has been shown that discretization based SVM performs better than simple SVM.

An e-Learning solution for agricultural education using MOODLE (Modular Object Oriented Dynamic Learning Environment) was initiated to design and develop a framework for eLearning courses, develop multimedia enabled e-course content, design, integrate and deploy the eLearning solution and impart training on content creation through eLearning system. The course material collection for the following two courses, Elementary Statistical Methods, AS-101, Discipline of Agricultural Statistics and Computer Fundamentals and programming, CA-101, Discipline of Computer Application under PG School, IARI has been completed. The Plug-in for Equation Editor has been installed and integrated with MOODLE for working with equations. The lesson contents, Quiz's and Power Point Presentations of the initial lessons of both the courses have been finalized and digitized. The digitized contents have been integrated in MOODLE. A workshop entitled "Sensitization Workshop on content management for eLearning systems using MOODLE" was organized at IASRI on 30 January 2009. The eLearning site http://elearnagri.iasri.res.in/ has been launched in the workshop and its home page is given as in Figure 5.4.

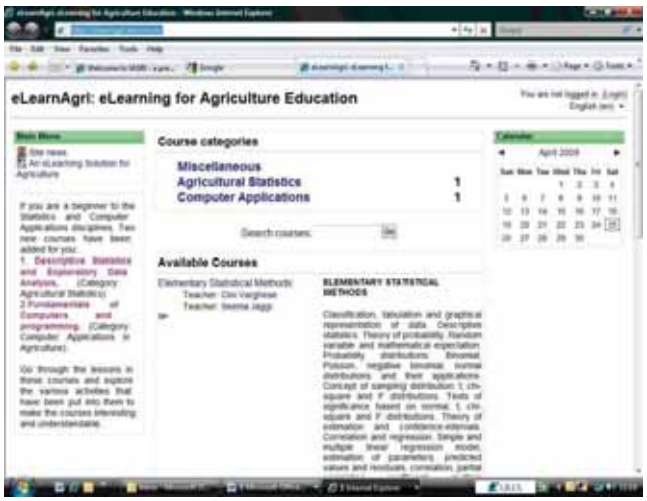


Figure 5.4. Home page of eLearning Agri: eLearning for Agriculture Education

A site containing lesson on 'Descriptive Statistics' was prepared and deployed on "http://elearnagri.iasri.res.in". A screen shot is given in Figure 5.5.

Figure 5.5. e-lesson on "Descriptive Statistics"

Keeping in view the decision taken in the 211th Governing Body Meeting of ICAR held on 13 October 2008 in New Delhi, a Project Information & Management System of ICAR (PIMS-ICAR) is under development. This computerized system will help in taking decisions to check duplication in research projects. Requirement Analysis has been completed on the basis of existing RPF-I, II, and III proformas. The designing of the database is completed according to requirement analysis. The development of user interface(s) is in progress for the online project data entry.

A package **'PAYBITAX Package Ver 1.0'** was developed for preparing pay bills, pay slips, maintaining GPF accounts and generating different reports, income tax statements and Form-16, writing PBR and generating arrear bills etc. for ICAR Institutions employees. The package was released on 2 July 2008 on the Institute's day. It was implemented in 9 organizations of ICAR. After the implementation of the 6th Pay Commission, a modified version of the package **'PAYBITAX Package Ver. 2.0'** was developed which had some additional facilities like e-mailing pay-slip and generating new arrear bills. Necessary training for installation and its use was imparted to the concerned officers. This modified version was implemented in 7 organizations of ICAR.

The Home Page of the package is as given in Figure 5.6.

Figure 5.6. Home Page of PAYBITAX Package Version 2.0

IASRI

GOLDEN JUBILEE

1959-2009

4

Library and Documentation

The Library of IASRI is one of the Regional Libraries of NARS (National Agricultural Research System) of the country. The Library has an excellent print and electronic resource base in the fields of Agricultural Statistics, Computer Applications, Agricultural Economics and allied sciences to support teaching, research and consultancy in the relevant areas. This is a sole referral library in Agricultural Statistics and Computer Applications in India. It caters to the information needs of students, faculty, researchers, scientists and trainees etc. not only of IASRI but also from different Institutes of ICAR and State Agricultural Universities under NARS both in conventional as well as electronic format.

The Library Advisory Committee plays an important role in Management of the Library and it clears proposals relating to enrichment of Resources of the library such as books, journals, On-line bibliographical, Statistical, Abstract cal and CD-ROM databases as well as Infrastructural development etc. The Library Advisory Committee for the year 2008-09 was as under:

Dr. S.D. Sharma	Chairman (up to August 2008)
Dr. V.K. Bhatia	Chairman (from13 August 2008)
Dr. V.K. Gupta	Member
Dr. H.V.L. Bathla	Member
Dr. P.K. Batra	Member
Dr. P.K. Malhotra	Member
Dr. Ranjana Agrawal	Member
Dr. Prajneshu	Member
Dr. Amit Kumar Vasisht	Member
Sh. A.K. Chaturvedi	Member
Capt. Mehar Singh	Member
Sh. Krishan Kumar	Member
Ms. Yogita Gharade	Student Representative
Dr. (Mrs.) P. Visakhi	Member Secretary

The internal administration and organization of the Library & Information System is supervised by Dr. (Mrs.) P. Visakhi, Librarian under the guidance of Dr. P.K. Malhotra as Scientist-in-Charge, Library.

स्वर्ण जयन्ती
Golden Jubilee

Library Information System of the Institute is automated, barcoded and partially digitized. The Full text of M.Sc. and Ph.D. Thesis are available online in digital format. Library has its well featured website at *http://lib.iasri.res.in* which is accessible across the world in all 365 days.

Home page of Library Information System

During the year, the library provided following services to its users.

Reprographic Service (Manuals)

Periodicals

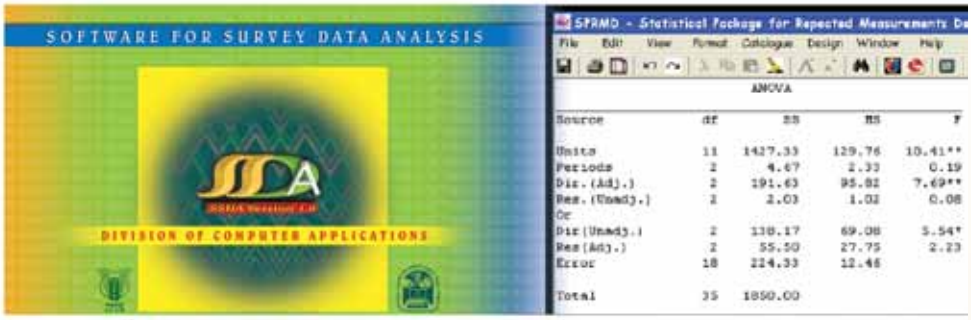
- Indian Journals - 41 (Print)
- Foreign Journals - 61 (Print)
- Computerized Services
  - Computerized Circulation
  - Bibliographical Database
  - On-line Catalogue
  - Archival Database (Digitized Thesis and old & Fragile Journals-) - 2
  - On-line Journals - 55
  - On-line Bibliographical Database - 7
  - CD-ROM Database (on-line and off-line) - 25
  - Current Content Service (JCC) - 1
  - Internet Search
  - On-line Enquiry (OPAC)
  - Current Awareness Service (New Arrivals)
  - On-line Reservation of Documentation
  - On-line User Profile Service
  - Consortium for e-Resources in Agriculture (CeRA) (http://www.cera.jccc.in) more than 2,000 Journals through NAIP

The following Computer Activities were undertaken:

- All resources added in the library have been bar-coded and updated in the Library Bibliographical Database using "Alice for Windows" Library Management software.
- Library users were given Hands-on training whenever necessary on the use of library computerized services/resources
- All trainees of the short term training programmes held in the Institute were given lectures and Hands-on training on "On-line Library Information Services.
- Library subscribed/renewed the following Bibliographical, Statistical and Abstracting on-line portals during the period:
  - MathSciNet (http://www.ams.orgmathscinet.com)
  - Ingenta (http://gateway.ingenta.com)
  - Indiastat.com(http://indiastat.com)
  - Economic Intelligence Services (http://cmie.com)
  - State Analysis Services (http://172.16.1.239/sas/)
  - Indian Harvest (http://lib.iasri.res.in/cmie.asp)
  - Developing Library Network (http://delnet.nic.in)
  - Sciencedirect (http://www.sciencedirect.com)
  - Consortium for e-resources in Agriculture (CeRA) (http://www.cera.jccc.in)

Statistics Relating to the Library

Item	Number
Number of books added (English)	110
Number of books added (Hindi)	74
Number of grey literature added	152
Number of Indian journals subscribed	41
Number of Foreign journals subscribed	61
Number of On-line journals subscribed (Indian and Foreign)	55
Number of electronic and printed thesis added	17
Number of publications issued from the library	13,763
Number of users visited library website	35,000
Number of articles (E+P) received from DELNET	40
Number of books received on Inter-library loan through DELNET	10
Number of outside users accessed e-services in library premises (NARS)	563
Number of publication lent out on inter-library loan	122
Number of readers visited and consulted the library	14,500
Number of scientific and technical papers reprographed (pages)	17,543
Number of CD-ROM added	108
Number of articles sent under Document Delivery Services including digital format	274
Internet/databases access searches	60,000



5

Technology Assessed and Transferred

National Research Centre on Rapeseed and Mustard

In 2007-08, 18 Initial varietal trials were conducted using α-designs. The parameters of these designs are:

(i) v = 30, b = 9, r = 3, k = 10,
A-efficiency = 0.9683, D-efficiency = 0.9857

(ii) v = 30, b = 15, r = 3, k = 6,
A-efficiency = 0.9536, D-efficiency = 0.9778

(iii) v = 30, b = 18, r = 3, k = 5
A-efficiency = 0.9478, D-efficiency = 0.9745

14 trials were conducted using design (i), 3 using design (ii) and one using design (iii). The data were analyzed. In 6 trials blocks within replication differences were found to be significant and in other 9 of the trials, CV% reduced in comparison to a RCB design. Since, the use of α-designs has helped in reducing the CV%, therefore, it is recommended that α-designs should be used in IVTs.

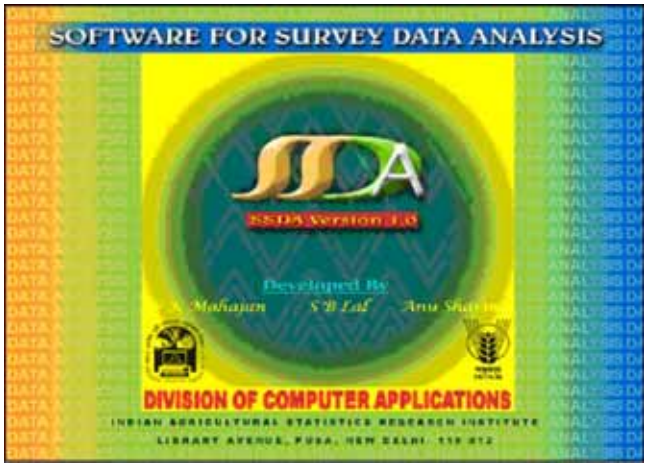
A total of 82 initial varietal trials (18 using α-designs and 64 using RCB designs) were conducted. Plant stand data were provided for 61 trials (12 using α-designs and 49 using RCB designs). The analysis of covariance was performed using plant stand as covariate. The plant stand as covariate was found to be significant in 8 trials and in 19 other trials CV% reduced by taking plant stand as covariate. Therefore, it was recommended that the issue of plant stand as covariate needs to be further investigated.

The combined analysis of data from initial varietal trials conducted using α-designs and RCB designs by National Research Centre on Rapeseed and Mustard, Bharatpur during 2007-08 was performed over locations within a given zone. It has been seen that in all the trials location × genotype interactions were highly significant. Therefore, a single strain cannot be promoted for all the locations in a given zone. Hence, the strains promoted may be different for different subset of locations. Further, the entries giving 10% higher yields than the best performing check may not be significantly different from the best performing check.

Therefore, it was suggested that an entry should be promoted only when it is statistically significant from the best performing check. A procedure based on site regression biplots was suggested for identification of varieties to be promoted for a subset of locations within a given zone.

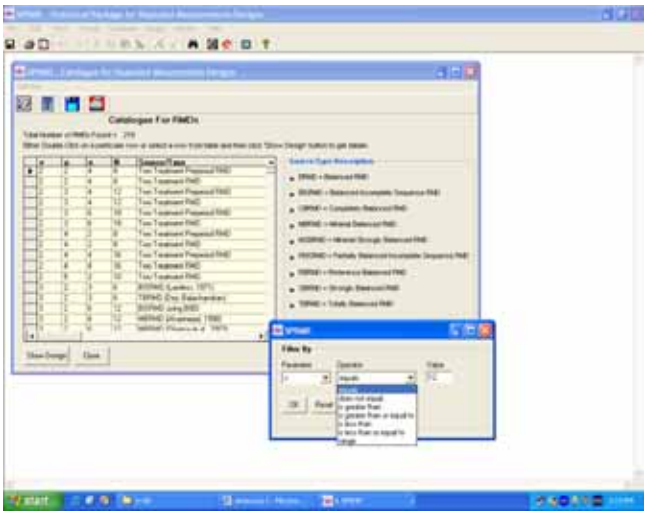
Software Released

Software for Survey Data Analysis SSDA 1.0 was released by Professor Alok Dubey, INSA Senior Scientist on September 05, 2008. The software is completely menu driven and guides users step-by-step through data analysis process. The software is capable of providing estimates of the population mean based on the sampling data collected using simple random sampling, stratified sampling, systematic sampling, cluster sampling, two stage and stratified two stage sampling.



A screen shot of Software for Survey Data Analysis (SSDA1.0)

SPRMD-Statistical Package on Repeated Measurements Designs' was released in the 47th meeting of the Programme Advisory Committee on Mathematical Sciences of Department of Science and Technology. A screen shot for functioning of the back page is



A screen shot of Statistical Package on Repeated Measurements Designs

6

Education and Training

DEGREE COURSES

The Institute continued to conduct the following degree courses in collaboration with the Post Graduate School of Indian Agricultural Research Institute (IARI) which has the status of a Deemed University:

(i) Ph.D. (Agricultural Statistics)

(ii) M.Sc. (Agricultural Statistics)

(iii) M.Sc. (Computer Application)

Both Ph.D. and M.Sc. students are required to study courses not only in Agricultural Statistics but also in Agricultural Sciences like Genetics, Agronomy, Agricultural Economics, etc. The courses in Mathematics, Agricultural Statistics and Computer Application are offered at this Institute while the courses in Agricultural Sciences are offered at IARI.

The eligibility qualification for admission to Master's degree in Agricultural Statistics is a Bachelor's degree with atleast 60% marks or its equivalent overall grade point average (OGPA) in Agriculture/Horticulture/Forestry/Agroforestry/Sericulture/Agricultural Marketing/B.Sc. (10+2+3 System). For admission to Master's degree in Computer Application, the eligibility qualification is a Bachelor's degree with atleast 60% marks or its equivalent overall grade point average (OGPA) in Agriculture/Computer Science/Agricultural Engineering/B.Sc. (Horticulture), Veterinary Science, Home Science, B.Sc. (Forestry)/B.Sc. with Maths./Statistics/Physics/Biology/B.Sc. (10+2+3 System).

Further, for admission to Doctor's degree in Agricultural Statistics, the eligibility qualification is a Master's degree with atleast 60% marks or its equivalent overall grade point average (OGPA) in Agricultural Statistics/Statistics/Mathematical Statistics/Bio-Statistics of IVRI/Professional Statisticians' Certificate Course (PSCC) from IASRI.

Number of students admitted/completed various courses are:

(a) **Ph.D. (Agricultural Statistics)**

Admitted	:	5
Completed	:	3

(b) **M.Sc. (Agricultural Statistics)**

Admitted	:	6
Completed	:	5

(c) **M.Sc. (Computer Application)**

Admitted	:	8
Completed	:	1

Brief of work done by students completed various courses during 2008-09 is as follows:

Ph.D. (Agricultural Statistics)

i) Susheel Kumar Sarkar

Computer aided search of linear trend free multifactor designs

Designs for factorial experiments have been widely used in agricultural, biological and industrial experiments. The experimental units in a design of a factorial experiment may exhibit a trend over space or time. Such situations may occur in agricultural experiments when there is a slope in the field and there is sequential application of the treatments to the same experimental unit over time periods. This may also happen when the land is irrigated, the nutrients supplied by the fertilizers may not be equally distributed and trend in experimental units may be due to slope. In such situations, a common polynomial trend within experimental units may occur. In factorial experiments the interest of the experimenter is in the estimation of main effects, two-factor interactions, three-factor interactions, and so on and testing the hypothesis with respect to these effects. In the presence of trends among the experimental units, it may be desirable to estimate the main effects and interactions of interest free from trend effects. The trend may be represented by a polynomial of appropriate degree smaller than the block size minus one. Generally, we consider the presence of a linear trend among the experimental units within a block. In the presence of linear trends among the experimental units within a block of a factorial experiment, it is desired to allocate the treatment combinations to experimental units such that the main effects and interactions of interest are estimated free from the trend effects. In other words, the estimates of the main effects and the interactions of interest are orthogonal to linear trend effects. Such designs are called as *linear trend-free designs for factorial experiments* for estimating the effects of interest and the ordered application of treatments to experimental units is called *run order*.

This research work is devoted to the development of computer algorithms for construction of trend-free designs for multifactor experimental settings. The algorithms developed are helpful in generating the complete and confounded factorial experiments that are linear trend-free for main effects. A search has been made to identify the two and three factor interactions that are estimable free or nearly free from linear trend effect. The algorithms are developed using the criterion of component-wise product. This algorithm has been translated in Microsoft Visual C++ program. From this program, one can obtain the design for factorial experiment for any number of factors k (≥ 3) each at two levels. The catalogue of the obtained designs for 2^k factorial experiment (k = 3, …, 7) that are linear trend-free for main effects along with two and three factor interactions has been given for complete and confounded factorial experiments, separately.

Algorithms have been developed to obtain fractional factorial plans that are linear trend-free for main effects and to identify two factor interactions that are linear trend-free/ nearly linear trend-free using the criterion of complement foldover. Algorithm has also been developed to obtain computer aided linear trend-free Box-Behnken response surface designs with the help of a given BIB design. The catalogue for fractional factorial plans for k = 5 to 8 factors each at 2 levels and for linear trend-free Box-Behnken response surface designs for k taking values as 2, 3, 4 and 5 has been prepared.

Guide: Dr. Krishan Lal

ii) Nishanti Rupika Abeynayake (Foreign student from Sri Lanka)

A study on neighbour-balanced designs

Neighbour-balanced designs, wherein the allocation of treatments is such that every treatment occurs equally often with every other treatment as neighbours, are used when the treatment applied to one experimental plot may affect the response on neighbouring plots besides the response to which it is applied. These designs ensure that no treatment is unduly disadvantaged by its neighbours and help in estimating the neighbour

effects besides the direct effects of treatments. Under the Neighbour Balanced Block (NBB) design setting, it may sometimes be desired to compare a set of test treatments with a control or a set of controls. The main interest here is to estimate the contrasts pertaining to tests (with respect to direct and neighbours) versus control(s) with high precision. Some series of NBB (complete and incomplete) designs for comparing a set of test treatments to control(s) have been developed. The information matrix for estimating direct effects, left and right neighbour effects for all these class of designs have been derived. The designs obtained are totally balanced in the sense that all the contrasts among test treatments for direct effects, left and right neighbour and all the contrasts pertaining to test versus control effects are estimated with same variance. In experimentation using NBB designs, there may arise the possibility that some of the observations could become unavailable for analysis. The robustness of NBB designs have been examined against missing observation(s). The information matrix for estimating direct treatment effects of the resultant design under one-sided neighbour effects model against a missing observation from the last plot of a block has been derived and the efficiency of resulting design is investigated. Robustness of various classes of NBB designs under one-sided and two-sided neighbour model, with complete and incomplete blocks have been studied against missing observation(s) and the efficiency of these designs have been calculated. The NBB designs are found to be robust/fairly robust against missing of observations for number of treatments more than 5. NBB designs have also been studied when the treatment form a factorial structure. Complete NBB designs and incomplete partially NBB designs for two factors have been constructed that are balanced for one factor.

Guide: Dr. Seema Jaggi

iii) Ranjit Kumar Paul

A study of some parametric and nonparametric approaches for nonlinear time-series models

The basic concepts of various statistical modelling techniques are introduced, Generalized autoregressive conditional heteroscedastic (GARCH) nonlinear time-series model along with its estimation procedures are thoroughly studied. As an illustration, autoregressive integrated moving average (ARIMA) and GARCH models are employed for modelling and forecasting of all-India export data of spices. Superiority of GARCH model over ARIMA approach is demonstrated for the data under consideration. A very important extension of GARCH model, viz. Exponential GARCH (EGARCH) model is thoroughly studied. A heartening feature of this model is that, it is capable of describing asymmetric volatility present in the data sets. Procedure for estimation of parameters of this model is also discussed. As an illustration, GARCH and EGARCH models are applied for modelling and forecasting of all-India monthly export data of fruits and vegetables seeds. It is concluded that, for data set under consideration, EGARCH model has performed better than GARCH model for both modelling and forecasting purposes.

For periodic and ARCH effects, best predictor and prediction error variance for carrying out out-of-sample forecasting up to three-steps ahead are derived analytically by recursive use of conditional expectation and conditional variance. As an illustration, modelling and forecasting of monthly rainfall data of Sub-Himalayan West Bengal meteorological subdivision, India is carried out. The study reveals that for the data under consideration, the Periodic autoregressive (PAR) model with AR-GARCH errors has performed better than the Seasonal ARIMA (SARIMA) model for modelling as well as forecasting. The powerful methodology of "Wavelet analysis in frequency domain" is studied for analyzing time-series data. The procedure for estimating the trend and modelling of time-series data through generation of long memory process by Haar and Daubechies (D4) wavelets is thoroughly discussed. As an illustration, Indian monsoon rainfall time-series data is considered. The discrete wavelet transform (DWT) and multiresolution analysis (MRA) of the data are computed and behaviour at different scales is analyzed. By using bootstrap method, size and power of the test for testing significance of trend in the data is computed. It is concluded that there is a declining trend in the Indian monsoon rainfall data. This feature, however, is not able to be captured by ARIMA approach. Finally, a very versatile nonparametric nonlinear time-series model, viz. Functional-coefficient autoregressive (FAR) model, in which the coefficient function changes gradually rather than abruptly, is investigated. This model is applied to India's annual export lac data during the period 1900 to 2000. Superiority of FAR model over Self exciting threshold autoregressive (SETAR) model and ARIMA approaches is demonstrated for the data under consideration.

Guide: Dr. Prajneshu

M.Sc. (Agricultural Statistics)

i) Sanjay Kumar Prasad

A study on Bayesian analytical techniques for experimental data

A Bayesian approach to a problem starts with the formulation of a model that is adequate to describe the situation of interest. Then a *prior* distribution over the unknown parameters of the model is formulated, which is meant to capture our beliefs about the situation before seeing the data. After observing some data, Bayes' Rule is applied to obtain a *posterior* distribution for these unknowns, which takes account of both the prior and the data. Bayes' statistics is now rapidly becoming accepted as a way to solve applied statistical problems and has several special features which combine to make it appealing for solving applied problems. In recent times, Bayesian methods are being widely used in designed experiments.The present thesis deals with the development of Bayesian methods of analysis of block designs. In literature, there are several distributions available which can be taken as a form of prior information. Out of the available distributions which can approximate the prior information are divided into two categories namely conjugate and non-conjugate family. Both the categories of distributions have been considered. Under conjugate family we have considered Normal-Gamma and Normal-Chi density for approximating the factors contributing for block design and variance parameter respectively. In case of non-conjugate family, distributions considered are as Multivariate–t and Gamma for assignable and non-assignable causes have been considered respectively. The developed procedures have been applied to a real experimental data set pertaining to Long-Term Fertilizer Experiments conducted at Ranchi under the aegis of AICRP on LTFE. It was observed that some of the treatment pairs which are not significant in classical analysis become significant after Bayesian analysis of the same set of data with the use of respective prior information. It is also found that in some of the cases block effects become significant after applying the Bayesian method. The Bayesian analysis with non-conjugate prior pose the problem of high dimensionality and complexity in integration and is solved by using Gibbs sampling (MCMC method) technique.

Guide: Dr. L.M. Bhar

ii) Kaustav Aditya

Forecasting of crop yield using discriminant function technique

In the present study wheat crop yield forecast models for Kanpur district of Uttar Pradesh have been developed using weekly data on the weather variables such as maximum temperature, minimum temperature, rainfall and morning relative humidity. Discriminant function technique has been used for developing the forecast models. Crop yield forecast models have been developed taking the discriminant scores and trend variable as regressors and crop yield as the dependent variable. Variables (weather indices) used in the discriminant function analysis were derived through different procedures. Evaluation of the performance of the models developed using the various procedures is done by comparing the Percentage Deviations of forecasts obtained from various models with the observed yield, Percent Standard Error (PSE), Root Mean Square Deviation (RMSE) etc. Using these criteria, the model which came out to be most suitable for forecasting is based on the discriminant function approach. In this approach, two discriminant scores have been calculated by taking the data of the weather variables of the first week. Then taking these two scores and the weather data of the second week again two scores have been obtained. This procedure is repeated till the last week and finally two scores have been obtained. Then taking these two scores and trend variable as the regressors, forecast regression model has been fitted. This procedure gave minimum root mean square error among all procedures studied. Thus, this procedure can be used as the most suitable procedure for forecasting of wheat yield for Kanpur district of Uttar Pradesh.

Guide: Dr. Ranjana Agrawal

iii) Bishal Gurung

Construction of supersaturated designs

In factorial experiments, if the number of factors is large the number of treatment combinations becomes very large. While experimenting with such large number of factors, many difficulties are encountered. In such studies 'complete' factorial is not necessary as the interest is generally not in 'higher order interactions'. The experimenter's endeavour is to minimize the number of runs to identify the active factors for efficient

utilization of resources and minimization of cost and time. In the event of large number of factors, one may opt for Supersaturated design (SSD) where the number of factors(parameters) is very large compared to the number of experiments (runs) to be conducted.

Here non-orthogonality is introduced in the design, i.e., the parameters to be estimated are not done independently because of the lesser number of runs compared to the number of factors to be estimated. The experimenter's endeavour is to minimise this non-orthogonality as much as possible. Hence with this motivation, we have proposed a new procedure of computer aided random generation of multi-level as well as mixed-level SSDs. A catalogue of designs generated from the algorithm is also prepared. The proposed method is also compared with the existing designs. The new method proposed is an attempt to make the SSDs with less departure from orthogonality. Further, the designs constructed are evaluated to see the utility of the proposed methods.

Guide: Dr. L.M. Bhar

IV) Sukanta Dash

Some investigations on classificatory techniques in agriculture

The present investigation has been conducted to explore Artificial Neural Network (ANN) methodology for classification of crop genotypes and to compare it with classical clustering methods based on different distance measures. The secondary data of ten morphological characters consisting of seventy seven genotype of maize crop collected from All India Coordinated Maize Improvement Project for the year 2005-06 has been used. The seventy seven genotypes of maize were clustered using different classical methods such as single linkage, average-between linkage, average-within linkage, Ward's method and non-hierarchical K-means method. The five homogeneous groups so obtained from consensus basis were tested for their significant difference using Hotelling's T^2 statistic. Since some of the grouped pairs were non significant, the data were reclassified by considering four and three homogeneous groups. Ultimately three significantly different homogeneous groups were obtained.

Taking the mean vector and dispersion matrix of three distinct homogeneous groups, the multivariate normal samples of different sample sizes were obtained with prior knowledge of cluster identity. These samples were classified using different classical clustering methods and distance measures as well as ANN method. All the methods were compared by the probability misclassification. From the methods studied, ANN is the best method of classification as it gives minimum probability of misclassification irrespective of distance measures used in classical clustering methods and sample sizes. The second best method is non-hierarchical K-means method as it gives less probability of misclassification as compared to hierarchical methods irrespective of distance measures in case of medium and large sample sizes. In case of small sample size, Ward's method with square Euclidean distance is the second best next to ANN as compared to the remaining classical methods.

Guide: Sh. S.D. Wahi

V) Manoj Kumar

A study on development indices and their sensitivity analysis

Development is a multi-dimensional process and its impact cannot be captured fully by any single indicator. An indicator is a quantitative or a qualitative measure derived from a series of observed facts that reveal relative positions in a given area. A composite index is useful in identifying trends and drawing attention to particular issues in the context of policy analysis. There are several methods of construction of composite index but they have certain limitations. Therefore, in this study, an attempt was made to review the methodological issues for the construction of composite index. Agricultural Development Index (ADI) of Bihar State has been constructed using Principal Component Analysis (PCA). The performance of the districts has been compared based on these developed indices. The categorization of developed indices has also been done. An attempt has also been made to generate thematic maps of Bihar based on the Agricultural Development Index and its sub indices like Input, Output and Infrastructure index using Geographical Information System (GIS). The GIS software has been used in generating suitable thematic maps depicting the level of development of each district. Sensitivity analysis of the developed indices have been carried out using empirical method of variance-based technique and also by using a software namely, SIMLAB, that is especially designed for sensitivity analysis. Sensitivity analysis of the Agricultural Development Index over input, output and infrastructure indices and sensitivity analysis of sub-

indices over their variables (available secondary data) have been carried out using both the approaches. The results of sensitivity analysis using empirical method of variance-based technique have been compared with the results obtained using SIMLAB software.

Guide: Dr. Tauqueer Ahmad

M.Sc. (Computer Application)

i) Ramdasi Sanmit Suresh

Design & development of data marts for household amenities from census data (Maharashtra)

The first and foremost need for developing a decision support system on agriculture resources is to integrate the scattered historical information which is spread across the nation into a central data warehouse. Keeping the above need in mind the available data from census of India 2001, regarding the Household Amenities in Maharashtra State have been analyzed to identify possible data marts and the dimensions that can be associated with these data marts. To find out the associated dimensions with the data marts and conformed dimensions, the top-down planning approach called as Data Warehouse Bus Architecture Matrix was used. With the help of this matrix the dimensional models have been designed and subject wise data marts have been created. The data storage has been converted into a form of multidimensional model, known as cube. These cubes have been designed by using fact and dimension tables and deployed on Internet for on-line analysis, which is called as On-Line Analytical Processing (OLAP). The data in the developed cubes can be viewed in cross tab view as well as graphical views including simple bar graph, pie chart, clustered bar graph, stacked bar graph, multiline graph, three dimensional bar graph etc. Drill downs and roll ups can be performed on the data available in the cubes. Another important functionality incorporated in these cubes is Drill Through in which user can find interesting trends or anomalies while analyzing data. The advantage of this approach is that the often query-intensive work of ad hoc data analysis is performed using summarized data in the cube.

Guide: Dr. S.D. Sharma

NATIONAL / INTERNATIONAL TRAINING PROGRAMMES

Senior Certificate Course in Agricultural Statistics and Computing

Senior Certificate Course in Agricultural Statistics and Computing was organized for the benefit of research workers engaged in handling statistical data collection, processing and interpretation and employed in research Institutes of the Council, State Agricultural Universities and State Government Departments, etc. & foreign countries including SAARC countries. The main objective of the course was to train the participants in the use of latest statistical techniques as well as use of computers and software packages. The course was organized during the period 07 July 2008 to 27 December 2008, comprised of two independent modules of three months duration each (Module-I: 07 July - 27 September 2008 and Module-II: 13 October-27 December 2008). Two officers participated in both the modules. Four officers participated in Module-I only. The courses covered under both the modules included Statistical Methods and Official Agricultural Statistics, Use of Computers in Agricultural Research, Sampling Techniques, Econometrics and Forecasting Techniques, Design of Experiments and Statistical Genetics.

A participant receiving the certificate after the completion of 'Senior Certificate Course in Agricultural Statistics and Computing'

Programme under Centre of Advanced Studies in Agricultural Statistics and Computer Applications

- A 21 days training programme on "Development of contents for online e-Learning systems" was organised during 10-30 September 2008. Nineteen participants from ICAR Institutes and State Agricultural Universities attended the training programme. Some of the topics covered were Overview of e-Learning, Content Designing for e-Learning Systems, Content Designing with MS Powerpoint, Data Warehouse and its Applications in Agriculture, Overview of NISAGEnet System,

Introduction to Moodle: e-Learning System, Adobe Photoshop, Macromedia Flash, Audio and Video Capturing and Editing, Cyber Law for IT, Cyber Security: An Overview, PERMISNET and Installing Moodle on Linux and Digital Signatures Integration with Web Applications etc. Shri Sudeep Marwaha was the Course Director for the training programme.

A participant receiving the certificate after the completion of training programme on 'Development of Contents for Online e-Learning Systems'

- A 21 days training program on "Data mining in agriculture" was organised during 04-24 November 2008. Sixteen participants from various ICAR Institutes and State Agricultural Universities attended the training programme. This training programme offered sufficient knowledge about data mining and its applications in agriculture. Ms. Anshu Bharadwaj was the Course Director for the training programme.
- A 21 days training programme on "Advanced quantitative techniques in agricultural research" was organised during 02-22 December 2008. 18 participants attended the training programme. Dr. Aloke Lahiri was the Course Director for the training programme.
- A 21 days training programme on "Recent advances in sample survey and analysis of sample survey data" was organized during 10 February-02 March 2009. Dr. UC Sud was the Course Director and Dr. Hukum Chandra was the Course co-director of the training programme.

Inaugural function of training programme on 'Recent Advances in Sample Survey and Analysis of Sample Survey Data'

Summer/Winter School Organized

A Winter School on "Advances in design and analysis of agricultural experiments" was organized during 14 January - 03 February 2009. The Winter School was aimed at familiarizing the participants with the advances in designing experiments and analysis of data for making valid inferences from agricultural research data and to acquaint the participants with the use of statistical packages SAS/ SPSS/ GenStat for data analysis and also to undertake collaborative research in future. This winter school was intended for the scientific research personnel working in the National Agricultural Research System. It was attended by 25 participants (8 from ICAR Institutes and 17 from State Agricultural Universities), representing 11 different disciplines of Agricultural

Inaugural function of Winter School on 'Advances in Design and Analysis of Agricultural Experiments'

Sciences. The entire course for this programme was structured in a series of six modules namely (i) Computer Usage and Statistical Software Packages; (ii) Designs for Non-factorial Treatment Structure; (iii) Designs for Factorial Treatment Structure; (iv) Diagnostics and Remedial Measures; (v) Designs for Multiple Response Experiments and (vi) Other Useful Statistical Techniques such as Bio-informatics, Statistical Genomics, Precision farming, Microarrays, etc. The course material was distributed to the participants at the beginning of the programme in the form of Reference Manual in two volumes. Dr. A.K. Singh, Deputy Director General (NRM and Engineering) distributed the certificates to the participants. Dr. Rajender Parsad was the Director of this winter school.

OTHER TRAINING PROGRAMMES

- A 26 days training programme on "Data analysis with statistical tools" was organised during 02-27 June 2008. This training programme was specialy designed for probabtioners of Indian Statistical Service (XXVIII batch) and was sponsore by Central Statistical Organisation (CSO), Ministry of Statistics & Programme Implementation, GOI, New Delhi. All the topics starting with basics to some advanced topics covering Statistical Methods, Experimental Designs, Sample Surveys, Biometrics and Spatial Statistics were covered. The practicals were done using statistical software like SAS, SPSS and GenStat etc. The course material was distributed to the participants at the beginning of the training programme in the form of Reference Manual in two volumes. Dr.VK Bhatia was the Course Director for the training programme.
- One day training programme was organized on "Familiarization of AFEIS with emphasis on data entry and retrieval system" on 26 August 2008 at GKVK, Bangalore.
- A 10 days training programme was organized on "Price trends and market integration" under the NAIP project "Visioning, Policy Analysis and Gender (V-PAGe)" at IASRI, New Delhi during 16 - 25 October 2008.
- A Study Visit on "Indian Agricultural Statistics System" was organised for Afghanistan nationals sponsored by FAO during 03-17 November 2008. As part of the study four, the participants were taken to DES, Hyderabad (Andhra Pradesh) and DES, Trivandrum (Kerala). Dr. HVL Bathla was the Course Director.
- A one day training programme was organised for ISS Probationers on 12 December 2008.
- A two weeks training programme was organised on "Statistical techniques for research methodology" for scientists of Indian Council of Forestry Research and Education (ICFRE) from 26 December 2008 to 07 January 2009. This training programme was specially designed for scientists of ICFRE undertaking forestry research to equip them with the art of collection, analysis of data and drawing valid interpretation of their results. 18 scientists from various disciplines of forestry and representing seven different Institutes of ICFRE attended this

A participant receiving the certificate after the completion of training programme on 'Data Analysis with Statistical Tools'

Inaugural function of training programme on 'Statistical Techniques for Research Methodology'

training. All the topics useful for forestry research starting with basics to some advanced topics covering Statistical Methods, Experimental Designs, Sample Surveys, Biometrics and Spatial Statistics were covered. The practicals were done using statistical software, mainly SPSS. Course material in the form of Reference Manual and Electronic Manual was provided to all the participants. Dr. Seema Jaggi was the Course Director for the training programme.

- Two days training programme on "New experimental designs for research" was organized at RAR Station, LAM, Guntur during 16-18 March 2009. In the Inaugural session, Associate Director Research and Project Director introduced the overview of the Training Programme and elaborated its usefulness to agricultural scientists. About 80 scientists participated in the training programme. There were many queries of the scientists regarding the planning of the experiments and analysis of data when there is heterogeneity in the experimental material and the same were clarified. Dr. P.K. Batra, Dr. Krishan Lal and Sh. O.P. Khanduri conducted this training programme.

FACULTY MEMBERS OF P.G. SCHOOL, IARI IN AGRICULTURAL STATISTICS

S. No.	Name	Year of induction
1.	Dr. VK Bhatia, Director and Professor (Agricultural Statistics)	1987
2.	Dr. VK Gupta, National Professor	1984
3.	Dr. Prajneshu, Principal Scientist	1984
4.	Dr. VT Prabhakaran, Principal Scientist	1987
5.	Sh. SD Wahi, Principal Scientist	1987
6.	Dr. Ranjana Agrawal, Principal Scientist	1988
7.	Dr. HVL Bathla, Principal Scientist	1991
8.	Dr. UC Sud, Principal Scientist	1995
9.	Dr. KK Tyagi, Principal Scientist	1995
10.	Dr. Rajender Parsad, National Fellow	1995
11.	Dr. Anil Rai, Principal Scientist	1995
12.	Dr. Seema Jaggi, Senior Scientist	1995
13.	Dr. Chandrahas, Principal Scientist	1996
14.	Dr. PK Batra, Principal Scientist	1996
15.	Dr. Jagbir Singh, Principal Scientist	1996
16.	Ms. Asha Saksena, Principal Scientist	1998
17.	Dr. Aloke Lahiri, Senior Scientist	1998
18.	Dr. Amit Kumar Vasisht, Principal Scientist	1998
19.	Dr. Lal Mohan Bhar, Senior Scientist	1998
20.	Dr. Amrit Kumar Paul, Senior Scientist	1998
21.	Dr. Tauqueer Ahmad, Senior Scientist	1998
22.	Dr. AR Rao, Senior Scientist	1998
23.	Dr. Ramasubramanian V, Senior Scientist	1999
24.	Dr. Girish Kumar Jha, Senior Scientist (at IARI)	1999
25.	Dr. Cini Varghese, Senior Scientist	2000
26.	Dr. Prachi Misra Sahoo, Scientist (Sr. Scale)	2002
27.	Dr. RL Sapra, Principal Scientist (at IARI)	2002
28.	Dr. Krishan Lal, Principal Scientist	2003
29.	Sh. Hukum Chandra, Scientist (Sr. Scale)	2003
30.	Sh. Amrender Kumar, Scientist (Sr. Scale)	2003
31.	Md. Wasi Alam, Scientist (Sr. Scale)	2003
32.	Dr. Prawin Arya, Scientist (Sr. Scale)	2003
33.	Dr. Himadri Ghosh, Senior Scientist	2004

Research Fellowship

During 2008 – 09,13 Ph.D. and 31 M.Sc. students received research fellowship. 11 Ph.D. students received IARI Scholarship at the rate of Rs.10,500 /- p.m. in addition to Rs.10,000/- per annum as the contingent grant and 2 Ph.D students received CSIR fellowship at the rate of Rs.12,000 /- p.m. in addition to Rs. 20,000/- per annum as the contingent grant.

15 M.Sc. students received ICAR Junior Research Fellowship at the rate of Rs. 8640 /- besides Rs. 6000/- per annum as the contingent grant and 16 M.Sc. students received IARI Scholarship at the rate of Rs. 7560 /- p.m. besides Rs. 6000/- per annum as the contingent grant.

FACULTY MEMBERS OF P.G. SCHOOL, IARI IN COMPUTER APPLICATION

S. No.	Name	Year of induction
1.	Dr. SD Sharma, ADG (HRD)	1996
2.	Dr. PK Malhotra, Professor (Computer Application)	1991
3.	Dr. RC Goyal, Principal Scientist	1995
4.	Dr. IC Sethi, Principal Scientist	1995
5.	Dr. VK Mahajan, Principal Scientist	1996
6.	Dr. DK Agarwal, Principal Scientist	1999
7.	Sh. Harnam Singh Sikarwar, Scientist (SG)	1997
8.	Md. Samir Farooqi, Scientist (Sr. Scale)	2001
9.	Ms. Alka Arora, Scientist (Sr. Scale)	2001
10.	Ms. Shashi Dahiya, Scientist (Sr. Scale)	2001
11.	Ms. Sangeeta Ahuja, Scientist	2002
12.	Sh. Sudeep Marwaha, Scientist (Sr. Scale)	2002
13.	Sh. KK Chaturvedi, Scientist (Sr. Scale)	2002
14.	Sh. SN Islam, Scientist (Sr. Scale)	2004
15.	Sh. SB Lal, Scientist (Sr. Scale)	2004
16.	Ms. Anshu Dixit, Scientist (Sr. Scale)	2004
17.	Ms. Anu Sharma, Scientist (Sr. Scale)	2004
18.	Ms. Rajni Jain, Sr. Scientist (at NCAP)	2007

COURSES TAUGHT DURING THE ACADEMIC YEAR 2008–09

Code	Title	Course Instructors
	Trimester – III	
	Agricultural Statistics	
AS-103	Elementary Sampling & Non- Parametric Methods (2+1)	Asha Saksena & K.K.Tyagi
AS-163	Statistical Inference (4+1)	L.M. Bhar & Hukam Chand
AS-164	Design of Experiments – I (3+1)	Seema Jaggi & V.K.Gupta
AS-166	Statistical Genetics – I (3+1)	V.K. Bhatia
AS-302	Advanced Design of Experiments – II (2+1)	P.K. Batra & Krishan Lal
AS-304	Advanced Sample Survey – II (2+1)	U.C.Sud
AS-307	Forecasting Techniques (1+1)	Chandrahas & Ramasubramanian V.
AS-370	Recent Advances in the Field of Specialisation (1+0)	V.K. Gupta
AS-299	Seminar (1+0)	Seema Jaggi
	Computer Application	
CA-131	Data Base Management System (2+2)	R.C. Goyal, Sudeep Marwaha & Anu Sharma
CA-132	Data Structures and Algorithms (2+1)	K.K. Chaturvedi & Shashi Dahiya
CA-134	Modeling and Simulation (2+1)	P.K. Malthotra & Anshu Bhardwaj
CA-135	Computer Networks (2+1)	S.N. Islam & Sudeep
CA-299	Seminar (1+0)	S.N. Islam

COURSES TAUGHT DURING THE ACADEMIC YEAR 2007–08

Code	Title	Course Instructors
	Agricultural Statistics	
	Trimester – I	
AS-101	Elementary Statistical Methods (2+1)	K.K. Tyagi & A.K. Gupta
AS-150	Mathematical Methods – I (4+0)	Cini Varghese & Himadri Ghosh
AS-160	Probability Theory (2+0)	P.K. Batra & Anil Kumar
AS-161	Statistical Methods – I (2+1)	V.T. Prabhakaran & Seema Jaggi
AS-167	Applied Multivariate Analysis (2+1)	Ranjana Agrawal & A.R. Rao
As-168	Econometrics (2+1)	A.K.Vasisht & Prawin Arya
AS-169	Planning of Surveys / Experiments (2+1)	R.S. Khatri & Aloke Lahiri
AS-200	Design of Experiments – II (1+1)	Rajender Parsad & Cini Varghese
AS-201	Sampling Techniques – II (1+1)	K.K. Tyagi & Prachi Misra Sahoo
AS-202	Statistical Genetics – II (1+1)	S.D. Wahi & A.K. Paul
AS-203	Regression Analysis (1+1)	L.M. Bhar & Ramasubramanian V.
AS-204	Linear Models (2+0)	Krishan Lal & V.K. Gupta
AS-206	Optimization Techniques (1+1)	U.C. Sud & Prajneshu
AS-299	Seminar (1+0)	Seema Jaggi
	Trimester – II	
AS-102	Elementary Design of Experiments (2+1)	Aloke Lahiri & D.K. Sehgal
AS-151	Mathematical Methods in Statistics – II (4+0)	N.K. Sharma, Anil Kumar & Cini Varghese
AS-162	Statistical Methods – II (2+1)	Seema Jaggi & A.R. Rao
AS-165	Sampling Techniques – I (3+1)	Tauqueer Ahmad & Anil Rai
AS-170	Statistical Modeling (2+1)	Prajneshu
AS-171	Bioinformatics – I	A.R. Rao & Rajender Parsad
AS-207	Stochastic Processes (3+0)	Himadri Ghosh
AS-301	Advanced Design of Experiments – I (2+1)	L.M. Bhar & V.K. Gupta
AS-303	Advanced Sample Survey – I (2+1)	Jagbir Singh & K.K. Tyagi
AS-299	Seminar (1+0)	Seema Jaggi
	Computer Application	
	Trimester – I	
CA-100	Introduction to Computer Application (1+1)	V.H. Gupta & Balbir Singh
CA-111	Computer Organization and Architecture (3+0)	Anil Rai & Sudeep Marwaha
CA- 112	Fundamentals of Computer Programming in C (2+1)	K.K. Chaturvedi & Pal Singh
CA-114	Mathematical Foundations in Computer Application (4+0)	H.S. Sikarwar, P.K. Batra & N.K. Sharma
CA-211	Compiler Construction (2+1)	S.B. Lal
CA-212	Computer Graphics (2+1)	Pal Singh
CA-214	Internet Technologies & Applications (2+1)	Sudeep Marwaha & Rajni Jain
CA-215	Software Engineering (2+0)	Anu Sharma & Rajni Jain
CA-299	Seminar (1+0)	Anu Sharma
	Trimester – II	
CA-101	Computer Fundamentals & Programming (3+1)	Alka Arora & Pal Singh
CA-121	Object Oriented Programming & Design (2+1)	Sangeeta Ahuja
CA-122	Operating System (2+1)	H.O. Agarwal
CA-124	System Analysis & Design (2+1)	I.C. Sethi
CA-221	Data Warehousing and Data Mining (2+1)	K.K. Chaturvedi & Anshu Bhardwaj
CA-222	Multimedia & Applications (1+1)	Shashi Dahiya
CA-224	GIS and Remote Sensing Techniques (2+1)	Prachi Misra Sahoo & M.S. Farooqi
CA-225	Data Analysis in Agriculture (1+2)	V.K. Mahajan & M.S. Farooqi
CA-299	Seminar (1+0)	Anu Sharma

Note: Figures in the parentheses indicate the number of credits (Lectures + Practicals)

7

Awards and Recognitions

AWARDS

- Sh. KK Chaturvedi received the "Scientist of the Year Award" from the Society for Recent Development in Agriculture during National Symposium on "Scenario of Agriculture in Changing Climatic Conditions" held on 18 October 2008 at SVBP University of Agriculture and Technology, Meerut.

- Dr. Hukum Chandra, Scientist (senior Scale) has been chosen for the Cochran-Hansen Prize 2009 by the International Association of Survey Statisticians for his research on "Small Area Estimation under Transformation to Linearity". He would present his research paper at the 57th Session of the International Statistical Institute(ISI) to be held in Durban, South Africa during 16-22 August 2009 and will receive this award.

- Dr. (Mrs.) Sushila Kaul was awarded :
  - National Status Award for intellectual Development-2007 by Intellectual People and Economic Growth Association on 31 August 2008 at New Delhi.

Dr. Sushila Kaul receiving National Status Award for intellectual Development-2007

- the International Achievers Award for "Eminent Scientist" from International Achievers Forum (in absentia) on 20 September 2008 at Bangkok,Thailand.
- "Best Education Performance Award-2007" for outstanding individual achievement and distinguished service to the nation by "The Economic and Human Resource Development Association" on 29 December 2008 at New Delhi. The award included a Gold Medal, Trophy and a Certificate.

- Dr. Himadri Ghosh received Best Poster Presentation award for "GARCH Nonlinear time series modeling and forecasting for volatile meteorological sub-division rainfall data" in Mathematical Sciences section of 96th Indian Science Congress held at NEHU, Shillong during 3-7 January, 2009.

Dr. Himadri Ghosh receiving Best Poster Presentation Award

During Hindi Pakhwara celebrations at IASRI in September 2008:

- Dr. A.R. Rao received first prize in "Hindi Shrutlekh and Shabdarth Competition" and third prize in'Hindi Vartani Competition'.
- Dr. Cini Varghese received second prize in "Hindi Shrutlekh and Shabdarth Competition".

- डॉ. रंजना अग्रवाल को उनके लेख "कम्प्यूटर की कहानी उसी की जुबानी" पर केन्द्रीय सचिवालय हिन्दी परिषद् द्वारा आयोजित 26वीं अखिल भारतीय वैज्ञानिक तथा तकनीकी विषयों पर हिन्दी लेख प्रतियोगिता के अंतर्गत दिनांक 26 फरवरी 2009 को ''अखिल भारतीय महिला विशेष पुरस्कार'' भारत सरकार के माननीय सूक्ष्म, लघु तथा मध्यम उद्यम मंत्री श्री महावीर प्रसाद जी के कर कमलों द्वारा प्रदान किया गया।

डॉ. रंजना अग्रवाल पुरस्कार प्राप्त करते हुए

- संस्थान में हिन्दी पखवाड़े के अन्तर्गत दिनाँक 10 सितम्बर, 2008 को आयोजित हिन्दी पोस्टर प्रतियोगिता में निम्नलिखित पोस्टर पुरस्कृत किये गये।
  - "सृष्टि का बढ़ता तापमान" द्वारा मीना नन्दा एवं आदर्श कुमार मोघा (प्रथम पुरस्कार)
  - "सर्वेक्षण आँकड़ों के विश्लेषण हेतु सॉफ्टवेयर" द्वारा विजय कुमार महाजन, शशि भूषण लाल एवं अनु शर्मा (द्वितीय पुरस्कार)
  - "काले चने के उत्पादन एवं बाजार में विपणन हेतु लाई गई मात्रा का आकलन" द्वारा अशोक कुमार गुप्ता, हर विशन लाल बठला एवं विजय बिन्दल (तृतीय पुरस्कार)

RECOGNITION

- Dr. VK Bhatia, Director was elected President/ Chairman of International Indian Statistical Association-INDIA Joint Statistical Meeting (IISA-INDIA JSM) 2000 Trust.
- Dr. VK Gupta, ICAR National Professor was:
  - elected as Fellow of National Academy of Agricultural Sciences
  - invited to Deliver P.V. Sukhatme Memorial Lecture by Indian Society of Probability and Statistics on "Combinations in Controlled Sampling" during its XXVIII Annual Conference held at University of Kashmir at Srinagar during October 20-23, 2008.

- Dr. Rajender Parsad, National Fellow was
  - elected as Member of the International Statistical Institute, Netherlands.
  - invited as Consultant Biometrician at International Center for Agricultural Research in Dry Areas, Aleppo, Syria for a period of three months during April 27, 2008 – July 26, 2008.

(a) Affiliation with Professional Societies/ Institutions

Many scientists and technical personnel are members of the following Professional Societies/ Institutions

- Agricultural Economics Research Association
- Allahabad Mathematical Society
- Alumni Association, NAARM, Hyderabad
- Andaman Science Association
- Association of Commonwealth Universities
- Bharata Ganita Parisad
- Bhoovigyan Vikas Foundation
- Calcutta Mathematical Society
- Computer Society of India
- Farming System Research and Development Association
- Forum for Interdisciplinary Mathematics
- Haryana Economic Association
- IARI Alumini
- Indian Academy of Mathematics
- Indian Association of Statistics and Applied Research
- Indian Dairy Association
- Indian Econometric Society
- Indian Economics Association
- Indian National Science Academy
- Indian National Science Academy for Indian Journal of Pure and Applied Mathematics
- Indian National Science Association
- Indian Science Congress Association
- Indian Society for Medical Statistics
- Indian Society for Sheep and Goat Production and Utilization
- Indian Society of Agricultural Economics
- Indian Society of Agricultural Engineering
- Indian Society of Agricultural Marketing
- Indian Society of Agricultural Sciences
- Indian Society of Agricultural Statistics
- Indian Society of Extension Education
- Indian Society of Genetics and Plant Breeding
- Indian Society of Geometrics
- Indian Society of Ornamental Horticulture
- Indian Society of Remote Sensing
- Indian Statistical Association
- Institute of Mathematical Statistics (IMS)
- International Association of Survey Statisticians
- International Biometric Society (Indian Region)
- NAARM Alumini
- Ramanujan Mathematical Society
- Sankhya
- Society of Extension and Agricultural Education
- Society of Recent Development in Agriculture
- Society for Soybean Research and Development
- Society of Statistics, Computer and Applications
- Southampton Statistical Sciences Research Institute, United Kingdom
- Statistical Publishing Society
- Swadeshi Science Movement of Delhi
- The Indian Journal of Agricultural Sciences

(b) Offices in Professional Societies

Indian Society of Agricultural Statistics

Dr. VK Gupta	Vice President Chair Editor
Prof. SD Sharma	Honorary Secretary (till 31-12-2008) Member, Editorial Board
Dr. VK Bhatia	Honorary Secretary (01-01-2009 onwards) Honorary Joint Secretary (till 31-12-2008) Member, Editorial Board
Sh. RS Khatri	Honorary Joint Secretary
Dr. Rajender Parsad	Honorary Joint Secretary Member, Editorial Board
Dr. HVL Bathla	Member, Executive Council
Dr. Prajneshu	Member, Editorial Board
Dr. PK Malhotra	Honorary Joint Secretary Member, Editorial Board
Dr. Hukum Chandra	Member, Executive Council

Society of Statistics, Computer and Applications

Dr. VK Gupta	Executive President
Dr. VK Bhatia	Vice President Member, Editorial Board
Dr. Aloke Lahiri	Joint Secretary

Dr. Rajender Parsad	Joint Secretary Member, Editorial Board
Dr. LM Bhar	Joint Secretary

International Indian Statistical Association- INDIA Joint Statistical Meeting (IISA-INDIA JSM) 2000 Trust

Dr. VK Bhatia	President/Chairman

International Statistical Institute, Netherlands

Dr. VK Gupta	Elected Member
Dr. Rajender Parsad	Elected Member

Journal of Statistical Planning and Inference

Dr. VK Gupta	Associate Editor

Journal of Statistical Theory and Practice

Dr. VK Gupta	Associate Editor
Dr. Prajneshu	Associate Editor

Statistics and Applications

Dr. VK Gupta	Managing Editor

Bureau of Indian Standards, New Delhi

Dr. VK Gupta	Member, Management and Systems Division Council
Dr. Rajender Parsad	Member, Management and Systems Division Council

National Centre of Agricultural Economics and Policy Research, New Delhi

Dr. VK Gupta	Member, Institute Management Committee

Ministry of Statistics & Programme Implementation Statistics

Dr. VK Gupta	Member, Screening Committee for Awards and Fellowship for Outstanding and Meritorious Research Work in Statistics

Broad Subject Matter Area Committees (BSMA), Statistical Sciences, ICAR

Dr. VK Gupta	Chairman
Dr. VK Bhatia	Member

Indian Journal of Agricultural Science

Prof. SD Sharma	Member, Editorial Board

Aligarh Journal of Statistics

Dr. Tauqueer Ahmad	Member, Editorial Board

Farming Systems Research and Development Association

Dr. Anil Kumar	Joint Secretary

Brassica News, Mustard Research and Promotion Consotium (MRPC)

Dr. Seema Jaggi	Member, Editorial Board

Institute of Applied Statistics and Development Studies

Prof. SD Sharma	Member, Governing Body
Dr. VK Bhatia	Member, Governing Body
Dr. VK Gupta	Member, Governing Body
Dr. Prajneshu	Member, Governing Body
Dr. Rajender Parsad	Member, Governing Body

Journal of IARI, PG School

Dr. Rajender Parsad	Member, Editorial Board

Forum for Interdisciplinary Mathematics

Dr. Rajender Parsad	Joint Secretary

Indian Society of Agricultural Marketing

Dr. AK Vasisht	Member, Executive Council

Board of Studies of Department of Statistics at NEHU, Shillong

Dr. Prajneshu	Member

International Journal of Agricultural and Statistical Science

Sh. Anil Kumar	Member, Editorial Board

Computer Society of India

Dr. PK Malhotra	Member, Managing Committee
Ms. Alka Arora	Member, Managing Committee

Swadeshi Science Movement of Delhi

Dr. Sushila Kaul	Member, Executive Council

Department of Educational Measurement and Evaluation of National Council of Educational Research and Training

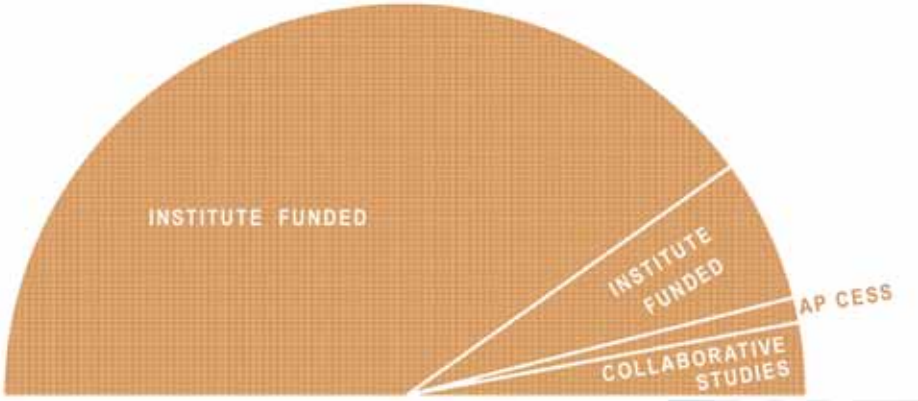
Dr. Rajender Parsad	Nominated Member of Advisory Board

Indian Journal of Applied Statistics

Dr. Prajneshu	Member, Editorial Board

International Journal of Essential Sciences

Sh. RS Khatri	Member, Advisory Board



8

Linkages and Collaboration in India and Abroad including Outside Funded Projects

S. No.	Title	Collaborative/ Funding Agency	Date of Start	Date of Completion
1.	Planning, designing and analysis of experiments planned ON-STATION under PDCSR	Project Directorate of Cropping System Research, Modipuram	01 April 2002	Continuing
2.	Planning, designing and analysis of ON-FARM experiments under PDCSR	Project Directorate of Cropping System Research, Modipuram	01 April 2002	Continuing
3.	Planning, designing and analysis of data relating to experiments conducted under AICRP on LTFE	Project Coordinator (LTFE) IISS, Bhopal	01 April 2002	Continuing
4.	Planning, designing and analysis of experiments relating to AICRP on Soil Test Crop Response (STCR) correlation	Project Co-ordinator (STCR), Indian Institute of Soil Science (ICAR), Bhopal	March 2000	Continuing
5.	Study to investigate the causes of variation between official and trade estimates of cotton production	Ministry of Agriculture, Department of Agriculture & Cooperation, DES, New Delhi	01 October 2006	30 September 2008
6.	Impact assessment of fisheries research in India	IARI, ICAR AP Cess Fund	01 August 2005	30 September 2008
7.	Long term manurial and fertilizer experiment on potato based cropping systems	CPRS, Modipuram	01 April 2004	31 March 2009
8.	Developing remote sensing based methodology for collecting agricultural statistics in Meghalaya	SAC, Ahmedabad and NESAC, Shillong	01 October 2007	31 March 2010

S. No.	Title	Collaborative/ Funding Agency	Date of Start	Date of Completion
9.	Pilot study on small area crop estimation approach for crop yield estimates at the Gram Panchayat level	DES, DOAC, MOA, GOI, New Delhi	01 September 2007	31 August 2008
10.	Visioning, Policy Analysis and Gender (V-PAGe) - Sub-Programme II : Technology forecasting	NCAP , New Delhi NAARM, Hyderabad; NAIP Funded	01 June 2007	31 May 2012
11.	Visioning, Policy Analysis and Gender (V-PAGe) Sub-Programme III : Policy analysis and market intelligence	NCAP, IARI, NAARM, NRCWA, Yes Bank, Agri-Watch; NAIP Funded	01 June 2007	31 May 2012
12.	Development of forecasting module for podfly, *Melanagromyza obtusa* Malloch in late pigeonpea	Indian Institute of Pulses Research, Kanpur	01 July 2007	30 June 2012
13.	Weather based models for forecasting potato yield in Uttar Pradesh	Deptt. of Agri. Statistics & Crop Insurance, Directorate of Agri., U.P., Lucknow	01 November 2007	30 April 2009
14.	Computational analysis of SNPs at functional elements of rice genome	NRC on Plant Biotechnology, IARI, New Delhi	01 September 2007	31 August 2009
15.	Strengthening, refining and implementation of expert system on wheat crop management	DWR, Karnal/IARI, New Delhi	25 August 2007	24 February 2010
16.	Stochastic process modelling and forecasting through discrete non-linear time series approach	Department of Science and Technology (DST), New Delhi	01 March 2008	28 February 2011
17.	Study on status and projection estimates of agricultural implements and machinery	CIAE, Bhopal	01 March 2008	31 August 2009
18.	Statistical analysis of survey data	NCAER, IP Estate, New Delhi	August 2008	February 2009
19.	Experimental designs for agricultural research involving sequences of treatments	AP-Cess Fund, ICAR	01 January 2008	31 December 2009
20.	Risk assessment and insurance products for agriculture	NCAP, NAIP Funded	01 October 2008	31 March 2012
21.	Whole Genome Association (WGA) analysis in common complex diseases: An Indian initiative	UDSC, NII, Delhi Univ., AIIMS, DMC DBT Funded	29 September 2008	28 September 2013
22.	Expert system on seed spices	NRCSS, Ajmer	01 February 2009	31 July 2010

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Research Coordination and Management Unit

Research Coordination and Management Unit (RCMU) is responsible for documentation and dissemination of scientific output of the Institute through IASRI News and Annual Report, etc. It also organizes National Conferences of Agricultural Research Statisticians once in three years and conducts meetings of Senior Officers (SOM) every month. The Unit also assists the Research Advisory Committee (RAC) and Quinquennial Review Team (QRT) Consultancy Processing Cell (CPC), Institute Technology Management Committee (ITMC), Institute Technology Management Unit (ITMU) and Planning Monitoring and Evaluation (PME) Cell. The unit is also responsible for correspondence with ICAR, ICAR Institutes, SAUs and other organizations in India and abroad. The other functions of the Unit are: to examine the new research project proposals before these are considered by the Institute Research Committee (IRC) in respect of importance of problem, its design and final requirements; to monitor the progress of on-going research projects and to bring out Half Yearly Monitoring Progress Reports; to prepare Annual Action Plan, Activity Milestones, SFC Memo, Monthly Targets and Progress of the Institute, Half Yearly Scientific Targets and Achievements, Quarterly Performance Review, Zero Based Budgeting, to maintain the Research Project Files (RPF), combined SFC memo of IASRI and NCAP, Monthly Progress of Identified Thrust Areas and also their submission to ICAR. The Unit also provides help in Art, Photography and Reprographic Services. The following activities were undertaken by the Unit during the year under report:

Publications

- Annual Report of the Institute for the year 2007–08
- IASRI Newsletters (published quarterly)
- Monitoring Progress Reports: Half-yearly summary of progress of on-going research projects ending 31 March 2008 and 30 September 2008.

Communication of Research Material to

(i) Indian Council of Agricultural Research

- Material for preparation of DARE/ICAR Annual Report for the year 2008–09
- Half yearly information regarding programme of Conferences, Seminars, Symposia, Workshops, Meetings, etc. in Agricultural and Allied Sciences proposed to be held during July-December 2008 and January–June 2009
- Material for quarterly publications, 'ICAR Newsletter' and 'ICAR Reporter'
- Material for International Training Programme - 2009 for International Trainning Calendar
- Information for the meeting of Directors and Project Coordinators of Agricultural Engineering Division (SMD) held on 22 December 2008
- Proposal from CARP, Sri Lanka for organizing short-term training on 'Public Private Partnership in Extension' for a Senior Advisory Officer of the Tea Research Institute (TRI), Sri Lanka
- Information for organization of Summer School/ Winter School/Short Course at the Institute during 2009-10
- Financial and Research Achievements for the year 2008-09 and Financial and Research Targets for the year 2009-10 of the Institute
- Information for the project 'Consultancy Services for Business Planning and Development (BPD) Units

Chief Guest releasing the Annual Report of the Institute during the Annual Day Function

- Monitorable targets Annual/Five yearly in respect of various programmes being implemented at the Institute
- Quarterly/Half-yearly Performance Review (QPR/HPR) of Central Schemes by Planning Commission
- Plan budget estimate (B.E. and R.E.) for the Years 2008-09 and 2009-10
- Monthly targets and progress of the Institute
- Half-yearly scientific and financial targets and achievements
- Monthly progress of identified thrust areas required by Planning Commission

(ii) Department of Personnel and Training, Ministry of Personnel, Grievances and Pensions, New Delhi

- Information for 'Compendium of training programmes for the year 2008-09 and 2009-10'

(iii) Information Supplied to CSO

- Quarterly information for CSO Newsletter
- Miscellaneous correspondence with respect to the Institute

(iv) Ministry of Statistics and Programme Implementation, New Delhi

- Information for 'Statistical System in India - 2007'
- Information for report of 'Directory of Sample Survey in India for the Year 2005 and 2006

(v) Central Soil Salinity Research Institute, Karnal

- Information on technologies developed during 2006-07 and 2007-08 and agenda for XX Meeting of the ICAR Regional Committee No. V held at NASC, New Delhi during 19-20 December 2008

(vi) Indian Association of Social Science Institutions, New Delhi

- Information for Survey of On-going and Recently Completed Research Projects for the year 2007-08

Organisation of Meetings

- Two meetings of Institute Research Committee (IRC) during 07-08 August 2008 and 18-21 February 2009.
- 10th meeting of RAC of IASRI and 2nd meeting of the Joint Research Advisory Committee (RAC) of IASRI and NCAP held on 04 December 2008 at

the Institute under the Chairmanship of Dr. P.V. Shenoi, former Special Secretary, Ministry of Agriculture and Co-operation, New Delhi.

- Six meetings of Consultancy Processing Cell on 09 April, 06 June, 17 June, 14 July, 04 October 2008 and 03 March 2009 were held for finalizing the proposals of 4 consultancy trainings/ 1 study tour and 2 consultancy advisory services as per ICAR Guidelines and getting approval of the Director.
- Thirteen Senior Officers Meetings (SOM) of the Institute to discuss the obstacles in achievements in terms of various activities of the Institute including research, teaching, training, projects, publications, library, administrative, financial and others were organized on 19 April, 13 May, 07 June, 07 July, 04 August, 01 September, 13 October, 10 November, 08 December, 2008; 01 and 12 January, 09 February and 09 March, 2009. The meetings were chaired by the Director, IASRI.
- A Meeting of Institute Technology Management Committee (ITMC) was held on 21 February 2009 to discuss 'The Protection and Utilization of Public Funded Intellectual Property Bill 2008'.

Art, Photography and Reprography

RCM Unit assisted the scientists in preparing and updating diagrams, charts, histograms and maps, photographs for research publications and also visual display of research findings in the Exhibition Room. It also caters the need of reprography of the Institute. A Sony Handy Cam DCR PC 350E and a Digital Still Camera of Sony Model No. MVC-CD 500 are available for covering important events organised at the Institute. More than 1000 photographs and video films of important occasions of research and extension activities of the Institute were undertaken and also some slides were prepared. The photocopy needs of the Institute were fulfilled by 07 photocopy machines installed at the Reprographic Lab working under the Unit. Unit has Gestetner Copy Printer 5327, Rex Rotary Copy Printer 1560, Toshiba E studio 352, Panasonic DP 4510 and two Godrej G 2238 photocopy machines and a colour photocopier Canon iRC 3170i. About 4 lakhs black and white and 6482 coloured copies were multi-copied and supplied to various users of the Institute. A HP Scanjet 4070 Photosmart Scanner is also available. A lab of Senior Artist for Graphic Designing with Macintosh Computer system is also maintained. A Toshiba E studio 252 photocopier has also been installed recently in the unit.

Miscellaneous Activities

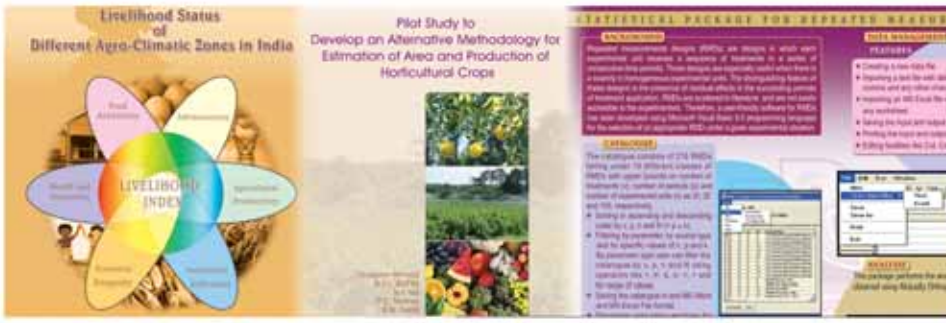
In addition to the above, the Unit is involved in the following work:

- Correspondence/Initiation for procuring various useful softwares and other equipments at the Institute
- Making availability of Annual Report, Newsletters, Perspective Plan Vision and other important material on the website of the Institute
- Arrangement of demonstration of procured and other software packages
- Supplying the information about training programmes/research activities received from ICAR and various organisations from time to time among the HDs and Scientists of the Institute
- Proposals for deputation of scientists of the Institute for various conferences/symposia/workshops etc.
- Installation of video projector in the Committee Room of the Institute
- Reply of various Audit para raised by External Audit Party
- Reply of various Parliament Questions raised from time to time
- Captured important moments of various functions organized at the Institute/NASC/NCAP in the Digital Still Camera/ Video Camera and also make arrangements for inclusion of these moments at the website of the Institute

IASRI

GOLDEN JUBILEE

1959-2009



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List of Publications

PUBLICATIONS

Research Papers Published

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- Gupta, VK, Parsad, Rajender, Kole, Basudev and Bhar, Lal Mohan (2008). Computer-generated construction of efficient two level supersaturated designs. *J. Ind. Soc. Agril. Statist.,* **62(2)**, 183-194.
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हिन्दी पत्रिका का प्रकाशन

- संस्थान द्वारा हिन्दी पत्रिका "सांख्यिकी-विमर्श : 2008-09" का प्रकाशन किया गया ।

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Popular Articles

संस्थान की हिन्दी पत्रिका सांख्यिकी-विमर्श : 2008-09 में निम्नलिखित लेख प्रकाशित हुए :

- बठला, हर विशन लाल एवं त्यागी, कृष्ण कान्त । संस्थान के कीर्तिस्तम्भ : डॉ. दरोगा सिंह, 1-2
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Consultancy and Advisory Services

Consultancy/Advisory Services Provided

Dr. Arun K. Joshi, Professor, Genetics and Plant Breeding, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi was advised on analysis of data pertaining to an experiment conducted for mapping of resistance to spot blotch disease caused by *Bipolaris sorokiniana* in spring wheat. The experiment was conducted to evaluate the resistance to spot blotch of 139 single seed descent (SSD) derived Recombinant Inbred Lines (RILs, F_8) of the cross between two wheat genotypes 'Yangmai 6' (Chinese cultivar of unknown origin, resistance to spot blotch) and 'Sonalika' (popular variety in Eastern India during 1970s and 1980s susceptible to spot blotch) in a RCB design in 3 replications for 3 years 2003-04 (F_6-generation), 2004-05 (F_7-generation) and 2005-06 (F_{7-8}-generation) at the Agricultural Research Farm of Banaras Hindu University, Varanasi. Each line was sown in single row of 3m under normal irrigated conditions. Row to row and plant to plant distance was 25 cm and 5 cm respectively. Based on the number of days to maturity of the RILs observed in the F_5 generation, differential sowings were carried out in the F_6, F_7 and F_{7-8} generations to synchronize the growth stages between progeny rows, thereby attempting to nullify the growth stage × disease severity interaction. The data on disease severity(%) of each row was recorded at 3 different crop growth stages (beginning of anthesis to half complete, anthesis complete, late milking). This data was converted to area under disease progress curve (AUDPC). The data on days to maturity were also observed. The data were analyzed for each year separately and combined analysis of data was performed using year having a random effect both without and with days to maturity as covariate. As 139 lines were divided into three groups, therefore, the differences between group effects, RILs nested within groups and groups × year interactions were also studied.

Dr. Vedna Kumari, Associate Professor (Plant Breeding), Department of Plant Breeding and Genetics, CSKHPKV,

Palampur, Himachal Pradesh was the advised on the use an α-design with parameters v = 48, b = 18, r = 3, k = 8, AE = 0.9603, DE = 0.9813, á(0,1,2) for evaluation of 48 rice varieties. Here, v denotes the number of varieties, b number of blocks, r replication number, k block size and á(#, #, #) different concurrences of the varieties. The block contents of the design are

Replication I								
Block 1	1	7	13	19	25	31	37	43
Block 2	2	8	14	20	26	32	38	44
Block 3	3	9	15	21	27	33	39	45
Block 4	4	10	16	22	28	34	40	46
Block 5	5	11	17	23	29	35	41	47
Block 6	6	12	18	24	30	36	42	48
Replication II								
Block 1	1	8	17	23	28	32	39	48
Block 2	2	9	18	24	29	33	40	43
Block 3	3	10	13	19	30	34	41	44
Block 4	4	11	14	20	25	35	42	45
Block 5	5	12	15	21	26	36	37	46
Block 6	6	7	16	22	27	31	38	47
Replication III								
Block 1	1	12	16	20	29	33	41	46
Block 2	2	7	17	21	30	34	42	47
Block 3	3	8	18	22	25	35	37	48
Block 4	4	9	13	23	26	36	38	43
Block 5	5	10	14	24	27	31	39	44
Block 6	6	11	15	19	28	32	40	45

Dr. NVPR Ganga Rao, Legume Breeder (Chickpea & Pigeonpea), ICRISAT-Nairobi, Kenya was provided the randomized layout of Augmented Randomized Block design for evaluation of 115 genotypes of chickpea for drought and other yield related traits to be planted along with 6 checks in 9 blocks (7 blocks of size 19 and 2 blocks of size 18).

Sh. Wakchaure Goraksha Chimaji, Ph.D. (Agricultural Engineering), student of PG School of IARI, New Delhi was advised on the analysis of data pertaining to the experiment conducted to study densification of biomass briquetting plant for fuel. The experiment was conducted with three biomass materials (mustard stalks, wood waste and mixed waste), three binders (molasses, distiller's dry gain, press mud from sugar solution), each of the binders were used with 4 concentrations (5%, 10%, 15% and 20%). There were a total of 36 treatment combinations. The experiment was conducted in a laboratory with 3 replications. Randomization, however, was done for 36 treatment combinations in each replication separately. Therefore, it was suggested that the data may be analyzed as per procedure of factorial randomized complete block design with three factors at 3, 3 and 4 levels respectively. The experimenter also studied the effect of three pressure levels (1258.52 kg/cm^2, 1200 kg/cm^2, 1145.49 kg/cm^2) on briquette formation. As it is difficult to change the pressure levels, therefore, separate experiments were conducted using three pressures as artificially created environments. To study the effect of pressure levels and its interaction with biomass materials, binders and their concentration, groups of experiments analysis was performed using pressure as artificially created environments.

Dr. CA Nimbalkar from National Agricultural Research Project (Plain Zone), Mahatma Phule Krishi Vidyapeeth, Rahuri was advised on the analysis of data pertaining to the experiment conducted to compare performance of tomato, capscium and brocoli under shednet cultivation and open field cultivation of three crops.

Sh. Amit Kumar Dixit from School of Biochemistry, Devi Ahilya University, Indore was advised on the analysis of data pertaining to an experiment conducted to study the effect of different doses of x-radiation on 3 genotypes of maize. The experiment was conducted in a factorial completely randomized design with two factors (genotype at 3 levels and radiation at 4 levels). The data were collected on total carotene content.

Dr. Neelima Chaube from PDKV, Akola was advised on computations of transition probability matrices and use of Markov Chain Process. She was also advised on Principal Component Analysis.

Dr. NL Joshi, Principal Scientist, CAZRI, Jodhpur was advised to use cluster analysis for the grain yield data of pearl millet.

Dr. H.S. Ginwal from Forest Research Institute, Dehradun was advised on computation of genotypic variance components and genotypic correlations from unbalanced data.

Provided statistical consultancy to Directorate of Wheat Research, Karnal for analysis of varietal trials (IVT-I, IVT-II) and resource management trials planned under All India Coordinated Research Project on Wheat and Barley during 2007-08. Besides, analysis of nearly 1000 trials was carried out location-wise and agro-climatic zone-wise as per the design adopted. The pooled analysis was also carried out at national level. The results were prepared in suitable format for inclusion in their reports.

Dr. Sachin Sudhakar More, Scientist, AICRP on cropping system, Marathwada University has been advised for individual analysis as well as Combined Analysis of Data collected for 5 years using a split plot design on Soybean crop.

Biometric consultancy services were provided to the scientists of head quarter of International Centre of Agricultural Research in Dry Areas (ICARDA), Aleppo, Syria during 27 April, 2008 to 26 July, 2008.

A brief description of the advisory consultancy provided to ICARDA scientists is:

Provided statistical support in the analysis of data from Biodiversity & Integrated Gene Management Program; Integrated Water and Land Management Program and Social, Economic & Policy Research Program and Diversification & Sustainable Intensification of Production Systems Program.

During consultancy period an International training programme was conducted on Agricultural Information Management, Experimental Design and Data Analysis during 29 June -17 July 2008 at ICARDA, Aleppo, Syria. The course was sponsored by Japan International Co-operation Agency (JICA). There were 16 participants, including four from ICARDA and two female participants, from Afghanistan and Syria . The first week of the course was devoted to Information Exchange Management and next two weeks on Experimental Design and Data Analysis. The trainees were trained in Concepts and Importance of Statistics in Agricultural Research, Designing of Agricultural Experiments and Analysis of Experimental Data and Use of Statistical Packages for the Analysis of Data. The participants were also exposed to Experimental Design Resources on Web such as Design Resources Server (www.iasri.res.in/design). The participants also had practice of using the ICARDA Online BioComputing facilities.

A view of International training programme on 'Agricultural Information Management, Experimental Design and Data Analysis'

A special feature of the training was the online component. The basic concepts of Statistics and Design of Experiments were made available to the participants through CG Online learning resources (http:/learning.cgiar.org.moodle)

Conducted one day Training Programme for 7 participants of the training programme on Lentil Breeding from India, Bangladesh and Syria.

Dr. AK Mangal was provided guidance concerning the estimation procedure for certain parameters relating to the "DST Project on Animal Diseases and Veterinary Care Systems" of Centre for Economic and Social Research, Delhi, on 28 April 2008.

Technical guidance was provided to the officers of National Dairy Development Board (NDDB), Anand, Gujarat.

Consultancy services have been provided to National Council of Applied Economic Research (NCAER), New Delhi related to statistical analysis of survey data.

The statistical consultancy was provided for the analysis of data generated from Farmers' Participatory Research trials for Conservation Agriculture conducted under the ADB Project on Enhancing Farmers' Income and Livelihoods through Integrated Crop and Resource Management in the Rice-Wheat System in South Asia of Rice Wheat Consortium for Indo Gangetic Plains, convening centre International Rice Research Institute. The data from the trials conducted in Bangladesh, Pakistan, Nepal and India (Balia and Modipuram Centres) were statistically analyzed using linear mixed effects model by taking farmer effects or field effects as random and Resource Conservation Technologies (RCTs, henceforth called as treatments) effects as fixed. All possible pair-wise treatment comparisons were made on the adjusted treatment means using a SAS Macro. Since RCTs help in saving on fuel and other inputs, while comparing treatments, therefore, it was advised to perform comparisons of grain yield, costs, irrigation water volume and returns over variable cost as to take into account the resource conservation. A treatment that gives high returns over variable cost and does not reduce grain yield may be taken as the best. RCTs may have interaction with crop varieties, years, soil types, and land levelling, etc. Therefore, to identify sub-sets of treatments to be recommended for specific crop varieties, years, soil types, and land levelling etc. site regression biplot technique has been used. They were also advised on using uniform terminology for the treatments and other parameters and prepare the data files in a common format including units in MS-EXCEL.

IASRI

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1959-2009

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QRT, RAC, Management Committee and IRC

Quinquennial Review Team (QRT)

A Quinquennial Review Team (QRT) to review the work done by Indian Agricultural Statistics Research Institute (IASRI), Pusa, New Delhi for the period 2001–05 constituted by the Director General, Indian Council of Agricultural Research (ICAR), New Delhi had number of meetings. The composition of the QRT was as under:

1. Prof. A.K. Nigam — Chairman
   Director
   Institute of Applied Statistics & Development Studies (IASDS)
   B-16/1, First Floor, Rajajipuram
   Lucknow-226 017 (U.P.)
2. Dr. P.K. Joshi — Member
   Coordinator (IFPRI), NASC
   Pusa, New Delhi-110 012
   Presently
   Director
   National Centre for Agricultural Economics and Policy Research (NCAP)
   Library Avenue, Pusa Campus
   New Delhi-110 012
3. Dr. A.P. Gore — Member
   Professor
   Department of Statistics
   University of Pune
   Ganeshkhind
   Pune-411 007
4. Dr. Rahul Mukerjee — Member
   Professor
   Indian Institute of Management
   Joka Diamond Harbour Road
   P.O. Alipur, Kolkata-700 027
   West Bengal

5. Dr. K.K. Bhardwaj — Member
Professor
School of Computer Systems Sciences
Jawaharlal Nehru University
New Delhi-110 067

6. Dr. A.K. Srivastava — Member-Secretary
Ex-Joint Director of IASRI
B-25/G-1, Dilshad Garden
Delhi-110 095

The QRT report of the Institute for the period 2001-05 has been approved by the Council vide letter no. PA/ADG(PE)/2009 dated 09 March 2009.

Research Advisory Committee (RAC)

The Joint Research Advisory Committee (RAC) of the Indian Agricultural Statistics Research Institute (IASRI) and National Centre for Agricultural Economics and Policy Research (NCAP) was constituted for a period of three years w.e.f. 29 January 2007. The composition of RAC is as follows:

1. Dr. P.V. Shenoi — Chairman
Former Special Secretary
Ministry of Agriculture
Govt. of India and Director, ISEC
20-C, First Main Road
RMV Extension, Stage-II, Block-I
Bangalore-560 094

2. Dr. S.S. Acharya — Member
Former Director
Institute of Development Studies
8-B, Jhalana Instituitional Area
D-95, First Floor, Krishna Marg
Bapu Nagar
Jaipur-302015 (Rajasthan)

3. Dr. Rahul Mukerjee — Member
Professor
Indian Institute of Management
Joka Diamond Harbour Road
P.O. Alipur, Kolkata-700 027 (W.B.)

4. Dr. A.K. Nigam — Member
Director
Institute of Applied Statistics and Development Studies (IASDS)
B-16/1, First Floor, Rajaji Puram
Lucknow-226 017 (UP)

5. Dr. A.P. Gore — Member
Professor
Department of Statistics
University of Pune
Ganeshkhind, Pune-411 007

6. Dr. S.M. Jharwal — Member
Principal Advisor
DAC, Ministry of Agriculture
Krishi Bhawan, New Delhi-110 114

7. Dr. Rajeeva L. Karandikar — Member
Executive Vice-President-Analytics
Cranes Software International Limited
4th Floor, Block I, Shankaranarayana
Building, 25 Mahatma Gandhi Road
Bangalore-560001

8. Prof. V.K. Bhatia, — Member Secretary
Director,
Indian Agricultural Statistics Research Institute (IASRI)
Library Avenue, Pusa Campus
New Delhi-110 012

9. Dr. P.K. Joshi — Member
Director
National Centre for Agricultural Economics and Policy Research (NCAP)
Library Avenue, Pusa Campus
New Delhi-110 012

10. Assistant Director General (ESM) — Member
Indian Council of Agricultural Research
Krishi Bhawan, New Delhi-110 114

The 10th meeting of RAC of IASRI and 2nd meeting of the Joint Research Advisory Committee (RAC) of IASRI and NCAP was held on 04 December 2008 at the Institute under the Chairmanship of Dr. P.V. Shenoi, former Special Secretary, Ministry of Agriculture and Co-operation, New Delhi. The meeting was attended by all the members except Dr Rahul Mukerjee and Dr Rajeev L Karandikar. Dr. VK Gupta, National Professor, ICAR and Dr. Rajender Parsad, National Fellow and HDs from IASRI and NCAP also attended the meeting as special invitees.

Dr. VK Bhatia made a presentation about the achievements, functions, and future research programs of IASRI. The details of the training and teaching activities of IASRI were also presented by him.

Dr. PK Joshi made the presentation about the achievements, functions, impact and future research programs of NCAP. He also presented new policy initiatives undertaken by NCAP.

After these presentations, Chairman, RAC emphasized that the information including achievements may be updated regularly on their respective websites so that whosoever is interested may retrieve up to date useful information.

Chairman invited the suggestions from all the members on presentations made on the research achievements and future programs of both the Institutes and after discussions, the following points emerged:

i) Both the institutes have very strong research capabilities and thus should pursue rigorously to achieve their mandates in the context of the national priorities. They need to formulate collaborative studies with strong statistical base for proper economic evaluation of agricultural research and policy implications.

ii) In order to formulate research studies in the areas such as biotechnology, conservation agriculture, plant variety protection, biodiversity etc., efforts may be made for the capacity building of the scientists of the both the institutions.

iii) Research results must be properly validated and the outcomes of the research studies be disseminated to different stakeholders including the govt. agencies.

iv) IASRI may focus its attention in developing sound statistical methodologies for assessing precise information on:
   - Crop acreage and production including horticultural crops at lower level using small area techniques along with the confidence band
   - Area and production of sugarcane in India
   - Farmers' income in relation to several inputs and labour availability
   - Risk assessment and crop insurance
   - Loss in crop yields due to erratic rainfall
   - Crop weather models for forecasting
   - Development of decision support system for major crops

v) IASRI and NCAP may jointly initiate methodological studies for the construction of different types of Index numbers both at macro and micro level. This would primarily involve identification of suitable variables along with their weightage criteria based on statistical consideration and economic importance. The index numbers on food security, farm products, soil fertility, land degradation, water table, farm income etc. would be of great national importance.

vi) NCAP may include the following studies in their research program:
   - Dynamics of farmers' income over time
   - Assessing market efficiency - Comparative study of innovative marketing models
   - Impact of loan waiver scheme
   - Qualifying impact of resources conservation approaches, including watershed, zero tillage on agricultural performance and livelihood security

Management Committee

The Director of the Institute, who is In-charge of the overall management of the Institute, is assisted in the discharge of his functions by the Management Committee of the Institute (constituted by the Council) by providing a broad-based platform for decision making process by periodically examining the progress of the Institute activities and by recommending suitable remedial measures for bottlenecks, if any. The present Management Committee of the Institute comprises of:

1.	Prof. V.K. Bhatia Director IASRI (ICAR) New Delhi-110 012	Chairman
2.	Director (Agriculture) Government of Delhi, ITO New Delhi-110 001	Member
3.	Sh. V.K. Singh Director (Agriculture) Government of Uttar Pradesh Lucknow, Uttar Pradesh	Member
4.	Dr. K.R. Kundal Joint Director (Research), IARI, Pusa, New Delhi-110 012	Member
5.	Sh. Vijay Sardana Executive Director International Business Centre in Agriculture and Agriculture Related Industries	Non-Official Member

82-83, Third Floor
Baikunth House
Nehru Place
New Delhi-110 019

6. Dr. S.K. Dorge — Non-Official Member
81, Shivaji Housing Society
Senapati, Bapat Road
Pune-411 016

7. Sh. Radhey Shayam — Member
Senior Finance and Accounts Officer
ICAR, Krishi Bhawan
New Delhi-110 114

8. Dr. P.K. Agarwal — Member
Head
Division of Environmental Sciences
IARI, Pusa, New Delhi-110 012

9. Dr. Madhuban Gopal — Member
National Fellow
Division of Agricultural Chemistry
IARI, Pusa, New Delhi-110 012

10. Dr. R.K. Mahajan — Member
Principal Scientist (Agril. Stat.)
Division of Germplasm Evaluation
NBPGR, Pusa, New Delhi-110 012

11. Dr. R.L. Sapra — Member
Principal Scientist (Agril. Stat.)
Division of Genetics,
IARI, Pusa
New Delhi-110 012

12. Dr. S.K. Tandon — Member
Assistant Director General (Engg.)
KAB-II, ICAR, Pusa
New Delhi-110 012

13. Chief Administrative Officer — Member-Secretary
IASRI (ICAR)
Pusa, New Delhi-110 012

The 57th Meeting of the Management Committee was held on 07 January 2009 under the Chairmanship of Dr. V.K. Bhatia, Director, IASRI. The following agenda items were discussed:

- Confirmation of proceedings of the 56th meeting of the Management Committee held on 27 July 2007.
- Review of action taken on recommendations of the 56th meeting of the Management Committee held on 27 July 2007.
- For reimbursement of expenditure incurred on residential telephone lines proposed to be provided to all the six Heads of Division of Institute
- To discuss proceedings of the meetings of the Institute Research Committee held on 17-18 August 2007, 22-23 February 2008 and 07- 08 August 2008
- Expenditure statement of IASRI budget for the year 2003-04 to 2008-09
- For considering the proposal to make amendments in the Staff Quarters Allotment Rules, 1999
- Any other item with the permission of the Chair

Institute Research Committee

The Institute Research Committee (IRC) is an important forum to guide the scientists in the formulation of new research projects and to review the progress of on-going research projects periodically. It also monitors the follow up action on the recommendations of the Quinquennial Review Team (QRT), Research Advisory Committee (RAC) in respect of technical programmes of the Institute. Dr. V.K. Bhatia, Director is the Chairman and Dr. V.K. Mahajan, Principal Scientist and In-charge (RCMU) is the Member Secretary of the IRC.

A view of Institute Research Committee meeting

Two meetings of the Institute Research Committee (IRC) were held during 07–08 August 2008 and 18–21 February 2009. In the first meeting 06 new research projects were approved and progress of 40 ongoing research projects were discussed. In the second meeting three Institute funded new research projects were approved and progress of 38 ongoing research projects was reviewed.

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Papers Presented and Participation of the Institute at the Conferences/Workshops, Etc.

RESEARCH PAPERS PRESENTED

Group Meeting of STCR (AICRP) at IISS, Bhopal during 06-07 June 2008

- Lahiri, Aloke. Design and analysis of STCR experiments and layout of the new experiment (Special Invited talk).

Workshop on "Improvement of Agricultural Statistics" organised by Directorate of Economics and Statistics, Ministry of Agriculture, GOI, New Delhi organised at Vigyan Bhawan, New Delhi during 08-09 July 2008

- Ahmad, T, Bathla, HVL, Rai, Anil and Sharma, SD. Study to investigate the causes of variation between official and trade estimates of cotton production.
- Ahmad, T, Bathla, HVL, Rai, Anil and Sharma, SD. Pilot study to develop an alternative methodology for estimation of area and production of horticultural crops.

Workshop at CRRI, Cuttack during 28-29 July 2008

- Rai, Anil, Chaturvedi, KK, Malhotra, PK and Sharma, SD. Implication of ICT in agricultural research and development.

Regional Workshop on Farm Mechanization for Small Holder Agriculture in SAARC Countries organized by CIAE, Bhopal during 22-24 September 2008

- Tyagi, KK. Long term mechanization strategy for different agro climatic zone project.

1st Annual Conference of Indian Society of Agri Business Management organised at UAS, Bangalore during 25-27 September 2008

- Bhardwaj, SP. Contract farming

National Seminar on NSS 62nd Round Survey Results organized by NSSO, MOS & PI at SCOPE Complex, Lodhi Road, New Delhi during 25-26 September 2008

- Sud, UC, Bathla, HVL, Chandra, H and Singh, J.

स्वर्ण जयन्ती Golden Jubilee

Small area estimation – Some application to National Sample Survey data.

International Conference on e-Content & Sustainability and ICT Mela at NCUI, New Delhi during 16-18 October 2008

- Islam, SN, Chaturvedi, KK, Agarwal, Hari Om, Farooqi, MS, Sabir, Naved, Sharma, Kirti, Sharma, AK, Singh, Randhir, Sharma, RK and Sikarwar, HS. Expert system on wheat crop management.

Sixth International Conference on Rough Sets and Current Trends in Computing (RSCTC 2008) during 23-25 October 2008 held at Akron, Ohio, USA

- Arora, Alka, Upadhyaya, Shuchita and Jain, Rajni. Learning patterns from clusters using reduct.

16th Annual Conference of AERA organised at Amity University, Lucknow during 21-23 November 2008

- Bhardwaj, SP, Kaul, Sushila and Vasisht, AK. Supply side constraints to pulse production in India: A review.
- Kumar, Ashok and Singh, DR. Study of supply side constraints in tur (arhar).
- Singh, DR, Kaul, Sushila, Arya, Prawin and Kumar, Naresh. Impact assessment of technological interventions and supply side constraints in migratory sheep production system: A study in Ajmer district of Rajasthan.

National Seminar on IT in Agriculture and Rural Development organized at BAU, Ranchi during 21-22 November 2008

- Islam, SN. Expert system for a new revolution in agriculture.

62nd Annual Conference of Indian Society of Agricultural Statistics held at SV Agricultural College, Acharya NG Ranga Agricultural University, Tirupati (AP) during 24-26 November 2008

- Agrawal, Ranjana and Goyal, Gaurav. Use of two-phase sampling for crop yield forecasting.
- Behera, Subrat Keshori, Paul, Amrit Kumar, Wahi, SD and Singh, Pal. Estimation of heritability of mastitis disease using ANOVA method.
- Bhardwaj, SP. Methodological issues in agricultural marketing research
- Chandra, H, Bathla, HVL and Sud, UC. Estimation of small area quantities with zero-inflated data.
- Goyal, RC. A decentralized process for web based data management of agricultural education. (Invited talk)
- Paul, Amrit Kumar, Alam, Wasi, Singh, Pal. Average linkage method for clustering rice producing states of India.
- Prajneshu and Ghosh, H. GARCH and EGARCH nonlinear time-series modelling and forecasting of volatile data.
- Rai, Anil, Chaturvedi, KK, Malhotra, PK and Sharma, SD. ICT for accelerated growth and development of Indian agriculture – Status and prospects. (Invited talk)
- Ramasubramanian, V, Chandrahas and Dhandapani. A Time series modeling for forecasting seasonal paddy yield of Tamil Nadu.
- Sarkar, Susheel Kumar, Lal, Krishan, Parsad, Rajender and Gupta, VK. Computer aided generation of linear trend-free designs for factorial experiments.
- Sarkar, Susheel Kumar, Lal, Krishan. Computer aided generation of linear trend-free response surface designs.
- Sharma, Anu, Lal, SB and Mahajan, VK. SSDA – A C# library for analysis of survey data.
- Singh, DR and Vasisht, AK. Frontier production function for estimation of technical efficiency of aquaculture: A study of Punjab state of India.
- Singh, Jagbir, Tyagi, KK, Kher, KK, Gupta, AK and Jain, VK. Estimators for farming practices, resources and activities.
- Singh, Pal, Paul, Amrit Kumar and Wadhwa, Savita. A comparative study for growth pattern of ginger yield in India.

5th Asia-Pacific Co-operative Research Conference organized by International Cooperatives Alliance, Hanoi, Vietnam on 02 December 2008

- Kaul, Sushila. An analytical study of cooperative advantage from membership perspective in agricultural credit cooperatives of India.

Pre-ICM International Convention of Mathematical Sciences (ICMS 2008) organized at Department of Mathematics, University of Delhi during 18-20 December 2008

- Chandra, H. Estimation of population proportion for small domains.

- Mandal, BN, Parsad, Rajender and Gupta, VK. A family of distance balanced sampling plans. (Invited Talk)
- Mandal, BN, Parsad, Rajender and Gupta, VK. Balanced sampling plans excluding adjacent units: Polygonal designs. (Invited Talk)

Workshop on Implementing a Holistic and Output-oriented Biotechnology in India held at National Academy of Agricultural Sciences, National Agricultural Science Complex, New Delhi on 23 December 2008

- Prasanna, BM, Gupta, PK and Parsad, Rajender. Marker-based trait analyses & statistical genomics. (Invited Talk)

International Symposium on Optimization and Statistics- 2008 held at AMU, Aligarh during 29-31 December 2008

- Gupta, AK, Bathla, HVL, Sud, UC and Tyagi, KK. Methodology for estimation of production of flowers on the basis of market arrivals.

Poster presentations in the 96th Indian Science Congress held at NEHU, Shillong during 03-07 January 2009

- Agrawal, Ranjana and Mehta, SC. Crop yield forecast models based on weather and agricultural inputs.
- Ghosh, Himadri and Prajneshu. GARCH Non-linear time-series modeling and forecasting for volatile meteorological sub-division rainfall data.

Conference on Innovative Change: Library and Information Services for the Present and Future held at Guntur organised during 10-11 January 2009 by Andhra Pradesh Library Association

- Visakhi, P. World Bank boosts the NARS libraries.

15th Meeting of the Regional Technical Coordination Committee of Rice Wheat Consortium for the Indo-Gangetic Plains at New Delhi during 02-03 February 2009

- Parsad, Rajender, Crossa, Jose, Gupta, VK, Gupta, Raj K and Ladha, JK. Statistical methods and concepts for analysis of farmer's field data. (Invited Talk)

Poster presentations in the 4th World Congress on Conservation Agriculture organized during 04-07 February 2009

- Jaggi, Seema, Varghese, Cini, Gill, AS, Sharma, VK and Singh, NP. Impact assessment of agroforestry system on yield of associated barley and gram.
- Kaul, Sushila and Singh, DR. Reducing vulnerability of migratory sheep herders through technological interventions: A case study of North-West Indian states.
- Kumar, Anil, Batra, PK, Gill, MS, Singh, Gyan and Kumar, Sanat. Modeling yield prediction under long-term fertility experiments in rice-wheat rotation of Indo-Gangetic plains.
- Sahoo, PM, Rai, Anil and Ahmad, T. Influence of various parameters on livelihood security of rural India.
- Varghese, Cini, Jaggi, Seema, Gill, AS, Sharma, VK and Singh, NP. Modeling the crop yield under agroforestry system.

11th Annual Conference of Society of Statistics, Computer and Application held at University of Madras, Chennai during 23-26 February 2009

- Gupta, VK, Singh, Poonam, Kole, Basudev, Parsad, Rajender and Bhar, LM. Computer aided construction of efficient multi-level supersaturated designs.
- Gurung, Bishal, Bhar, LM and Gupta, VK. Construction of supersaturated designs.
- Lahiri, Aloke. On optimal fertilizer doses for experiments of AICRP on soil test crop response correlations.
- Mandal, BN, Parsad, Rajender and Gupta, VK. Balanced sampling plans excluding adjacent units. (Invited Talk)
- Ramasubramanian V, Rai, Anil, Kumar, Amrender and Premi, Sarvesh Kumar. Technology forecasting of agricultural scenario - A case study in genetics and plant breeding.

22nd National Conference on Agricultural Marketing organised at PAU, Ludhiana during 25-27 February 2009

- Bhardwaj, SP and Vasisht, AK. Price volatility and integration in spot and futures market of gram.

- Sivaramane N, Singh, DR and Arya, Prawin. An econometric analysis of household demand for major vegetables in India.
- Vasisht, AK, Bathla, Seema, Arya, Prawin, Singh, DR and Bhardwaj, SP. Market integration for horticultural crops: A co-integration and error correction analysis.

National conference on "Floriculture for livelihood and profitability" organized by Indian Society of Ornamental Horticulture during 16-19 March 2009 at IARI, New Delhi

- Gupta, AK. Production of flowers in Delhi based on market arrival and village survey approaches

PARTICIPATION

- Training workshop on "Technology foresight methodologies in agricultural innovation system" from the Centre for Studies in Science Policy organised at JNU, New Delhi during 31 March - 10 April 2008.
- "Global agro-industry forum" organized jointly by Ministry of Agriculture, Government of India; Food and Agriculture Organisation, United Industrial Development Organisation (UNIDO) and International Fund for Agricultural Development (IFAD) at Vigyan Bhawan, New Delhi during 09-10 April 2008.
- "2011 census – First data user Conference" organised at Vigyan Bhawan, New Delhi during 24-25 April 2008.
- National Symposium on "Quality protein maize for human nutritional security and development of poultry sector in India" organised at NASC Auditorium, New Delhi on 03 May 2008.
- National Seminar on "Improvement of bovine fertility through use of reproductive biotechnology at farmers' door" organized by Department of Animal Reproduction, Gynaecology & Obstetrics, College of Veterinary & Animal Sciences, GBPUAT, Pantnagar during 05-06 May 2008.
- ITTO sponsored workshop on "Forestry products statistics in India" organised by the Ministry of Environment and Forest at New Delhi during 13-16 May 2008.
- National Workshop on "Spices statistics" organised at Calicut during 22-23 May 2008.
- Workshop on BSMA organized at NASC by the Education Division of ICAR, New Delhi on 29 May and during 23-24 June 2008.
- Release of final results of the "Fifth economic census" organised at NASC, New Delhi on 29 May 2008.
- Foundation Day lecture 2008 on "Rejuvenating agriculture: The challenges ahead" by Dr. Montek Singh Ahluwalia, Dy. Chairman, Planning Commission and Annual General Body Meeting of the National Academy of Agricultural Sciences organised at ICAR Symposium Hall, NASC Complex, New Delhi during 04-05 June 2008.
- National seminar on "Production, processing, marketing and export of litchi for economic prosperity" organised at National Research Centre for Litchi, Muzaffarpur (Bihar) during 08-11 June 2008.
- Training workshop on "Computable general equilibrium modeling" under NAIP project Visioning Policy Analysis and Gender (V-PAGe) - Sub-Programme-III: Policy, Analysis & Market Intelligence organised at Indira Gandhi Institute of Development Research, Mumbai during 17-26 June 2008.
- National Symposium on "Livestock genomics in productivity enhancement for food security" organised at NASC Complex, New Delhi during 03-04 July 2008.
- Workshop on "Improvement of agricultural statistics" organized by Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi in Vigyan Bhawan during 05-06 July and 08-09 July 2008 and made presentation on Causes of variation in official and trade estimates of cotton production.
- Workshop on "Scientific writing" organized by Directorate of Information and Publications of Agriculture on 08 August 2008 at NASC, New Delhi.
- ICAR VICHAR MANCH special lecture on "Global food crisis: Policy options for developing countries" delivered by Dr. Joachim von Braun, DG, IFPRI organised at NASC, New Delhi on 11 August 2008.

- Workshop on "Exploring future of Indian agriculture" under NAIP project V-PAGe organised at NCAP, New Delhi during 01-02 September 2008.
- Training programme on "Agricultural policy research" organised at IGIDR, Mumbai during 15-20 September 2008.
- Interactive Workshop on "Climate change and Indian livestock" organised at National Dairy Research Institute, Karnal during 20-21 September 2008.
- Regional Workshop on "Farm mechanization for small holder agriculture in SAARC countries" organized by CIAE, Bhopal, during 22-24 September 2008.
- 10th Executive Training Programme at NAARM Hyderabad during 23-27 September 2008.
- 2nd Green Revolution Summit and Expo' organized at Kolkata during 24-26 September 2008.
- 28th workshop of AICRP on Cropping Systems organised at Regional Station, TNAU, Kanyakumari during 03-05 October 2008.
- 5th Convention of "Grameen gyan abhiyan" from 03-05 October 2008 at NASC, New Delhi.
- International Conference on e-Content & Sustainability and ICT Mela organized at NCUI Auditorium, August Kranti Marg, New Delhi during 16-18 Oct. 2008.
- 35th Foundation Day Programme of Agricultural Scientists Recruitment Board organised at Symposium Hall, NASC, New Delhi during 04 November 2008.
- National Education Day Lecture organised at IARI, New Delhi during 11 November 2008.
- Workshop on "Heuristic evaluation of websites of Deemed Universities in NARS" held at the Unit of Simulation and Informatics (USI), Indian Agricultural Research Institute, New Delhi on 14 November 2008. One scientist chaired the Pre Lunch Session of the workshop and presented an overview of NISAGENET to the Participants.
- Conference of Central and State Statistical Organisations organized by Department of Economics and Statistics, Himachal Pradesh organised at Shimla during 04-05 December 2008.
- "Promotion of sulphur fertilizer use in Indian agriculture" organised at India Habitat Centre, New Delhi on 10 December 2008.
- 27th Annual workshop of AICRP-PHT at UAS Bangalore on 17-20 December 2008.
- National Meet on "Tractor and allied machinery manufacturers (TAMM-2008)" and XXVII Annual Workshop of AICRP on FIM organised at IIT, Kharagpur during 19-21 December 2008.
- Workshop on "Research methodology and survey techniques for development" at IPEM Group of Institutions in collaboration with IASDS, Lucknow at Ghaziabad during 29-30 December 2008.
- National Seminar on "Rural India developmental alternatives: Sectoral convergence for livelihood security" inaugurated by Chairman of ASRB organized by Mobilization (society for community Mobilization for Sustainable Development) in collaboration with CIRG, Makhdoom, Farah, Mathura (UP) organised on 16 January 2009.
- Workshop on "Fisheries Information System Network (FISHNET)" jointly organized by the Department of Animal Husbandry, Dairying and Fisheries (DADF) and National Informatics Center (NIC) on 21 January 2009 at NASC, New Delhi.
- Workshop on "e-Prabha : agricultural digital thesis depository " at CCSHAU, Hissar during 24-25 February 2009.
- SPSS 17.0 launch programme organised at IASRI, New Delhi during 28-29 January 2009.
- Presentation by Department of Science and Technology on "Estimation of yield at Gram Panchyat level through Remote Sensing Technology" organized by Agriculture Insurance Company of India at Krishi Bhawan, New Delhi on 09 March 2009.
- Workshop on Koha : An open access library Management Software at DELNET, JNU Campus, New Delhi during 24-27th March 2009.
- Training programme on "Applied analytics using SAS enterprise Miner 5" from 26-28 March 2009 at Statistical Intelligence Business Analytics Pvt. Ltd, Bangalore organized by SAS Institute (India) Pvt. Ltd, Mumbai.

- Training workshop on "Technology foresight methodologies in agricultural innovation system" organised at Centre for Studies in Science Policy, JNU, New Delhi during 31 March to 10 April 2008.

LECTURES DELIVERED AT OTHER ORGANISATIONS

Dr. Prajneshu

- Two lectures in a training programme at the Division of Agricultural Economics, IARI, New Delhi on 16 October 2008.

Dr. Ranjana Agrawal

- Delivered a lecture on "Pre-harvest forecasting of crop yield" in the training programme on Advances in Agricultural & Food Marketing under Centre of Advance Studies in Agricultural Economics at IARI, New Delhi on 07 October 2008.

Dr. UC Sud

- A lecture on "Use of NSSO data in agricultural research" in a training programme on Price Trends and Market Integration organised by Division of Economics, IARI, New Delhi during 16-25 October, 2008.
- Four lectures on "Model based procedures for small area estimation, Small area, Mixed models, Small area estimation – Some applications in India and Small area estimation using R" to senior and middle level officers of ISS in a training programme organized by GKVK, UAS Bangalore during 22-23 January 2009.

Dr. Rajender Parsad

- Two lectures on "Multivariate Techniques: Application to Marketing" to the participants of the training programme on Advances in Agricultural & Food marketing held at Division of Agricultural Economics.
- Two lectures on "Statistical Techniques Useful in Food Quality Control" to the participants of the Winter School on Application of Quality Assurance and Food Safety Systems in Supply Chain and Agri-business Development held at Division of Post Harvest Technology, New Delhi during September 30 – October 20, 2008.
- A lecture on "Fundamentals of Design of Experiments with Emphasis on Agroforestry Experiments" to the participants of the training programme on Advances in Agroforestry Research and development for the scientists of ICFRE, Dehradun organized at National Research Centre for Agroforestry, Jhansi during November 24 – December 05, 2008.
- A lecture on "Design of Experiments: An Overview" and Applications on December 11, 2008 at Ram Lal Anand College, New Delhi.
- A lecture on "Multivariate Analytical Techniques: An Overview" to the participants of the Training Programme on Sustainable agricultural development for food security' held at Division of Agricultural Economics, IARI, New Delhi during January 08-28, 2009.
- Two lectures on "Fundamentals of Experimental Designs", and "Analysis and Interpretation of Experimental Data" to the participants of Training Cum Workshop on Statistical Tools for Data analysis organized for the capacity building of the consortium partners of the Project Development of Decision Support Systems for Insects Pests of major Rice and Cotton Based Cropping Systems at CRIDA, Hyderabad during March 02-07, 2009.

Dr KK Tyagi

- A lecture on "Long term farm mechanization strategy for different agro climatic zones in India", in the CAS training programme on Advances in Agricultural and Food Marketing organized at Division of Agricultural Economics, IARI, New Delhi on 14 October 2008.

Sh. RS Khatri

- A lecture on "Arid horticulture" in a training programme organized by Agricultural Economics, Extension and Training Division, CAZRI, Jodhpur (Rajasthan) during 05-12 January 2009.
- A lecture on "Bharat mein krishi ka vikas - Ek najar mein" in the National training programme on Commercial Goat Farming organized by Central Institute for Research on Goats, Makhdoom, Mathura, UP on 20 October 2008.

Dr. SP Bhardwaj

- A lecture on "Logistics for supply chain management" in a winter school on Application of Quality Assurance and Food Safety Systems in Supply Chain and Agribusiness Development at

Division of Post Harvest Technology, Indian Agricultural Research Institute, New Delhi on 16 October 2008.

- A lecture on "Supply chain management" in winter school at Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi on 14 October 2008.

Dr. Anil Rai

- A lecture on "Application of data warehousing in agriculture" at Indian Institute of Management (IIM), Lucknow during 16-27 February 2009.
- A lecture on "Remote sensing and GIS" in a refresher course on Computer Applications at Center for Professional Development in Higher Education (CPDHE), University of Delhi on 20 September 2008.
- A lecture on "Log linear modeling using SPSS" in a training programme on Price Trends and Markets Integration at Division of Agricultural Economics, IARI, New Delhi on 21 October 2008.

Dr. Seema Jaggi

- A lecture on "Application of multiple regression technique for market analysis" under a CAS training programme on Advances in Agricultural and Food Marketing at Division of Agricultural Economics, IARI during 3-23 October 2008.
- A lecture on "Statistical designs for engineering experiments" in winter school on Designer and Functional Foods through Extrusion Cooking Technology organized at CIPHET Ludhiana on 16 December 2008.
- A lecture on "Statistical tests for monitoring and evaluation" under a training programme on Monitoring and Evaluation Techniques at Division of Agricultural Extension, IARI, sponsored by Directorate of Extension, Dept. of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India during 14-21 October 2008.

Dr LM Bhar

- Three lectures on "Augmented designs, Balanced block designs and Factorial experiments" at Birsa Agricultural University, Ranchi during 04-06 August 2008.
- Two lectures on "Regression diagnostics and Non-linear regression models" in a training programme on Application of Statistical Tools for Data Analysis held at Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad during 02-07 March 2009.

Dr. AR Rao

- A lecture on "R - Statistical software for marketing data analysis" in training programme at the Division of Agricultural Economics, IARI, New Delhi on 16 October 2008.
- A lecture on "SPAR 2.0" at Birsa Agricultural University, Ranchi during 28-29 July 2008.

Dr. AK Gupta

- A lecture on "Estimation of area, production and productivity in flower crops" in the training programme on Advances in Floriculture Research and Development of Floricultural Crops organised at the Division of Floriculture and Landscaping, IARI, New Delhi on 24 October 2008.

Dr. V Ramasubramanian

- A lecture on "Technology forecasting methods for planning future agricultural scenario" in the CAS training programme on Sustainable Agricultural Development for Food Security held at Division of Agricultural Economics, IARI, New Delhi during 08-28 January 2009.
- A lecture on "Time series analysis" in the CAS training course on Advances in Agricultural and Food Marketing at Division of Agricultural Economics, IARI, New Delhi during 03-23 October 2008.

Dr. Prachi Misra Sahoo

- A lecture on "Geographical information system, its application in agriculture and recent developments" in the workshop-cum-training programme on Bioinformatics and Information Management in Aquaculture held at Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar during 19-21 March 2009.
- A lecture on "Overview and applications of GIS in socio-economic research" in the training programme on Sustainable Agricultural Development for Food Security in the Division of Agriculture Economics, IARI, New Delhi during 16-25 October 2008.

Dr. Anil Kumar

- A lecture on "Combined analysis and multicollinearity in cropping systems experiments"

in a winter school on Developing New Options in Integrated Nutrient Management for Sustainable Crop Production and Soil Health organised at Project Directorate for Cropping Systems Research, Modipuram on 26 December 2008.

Dr. Sudeep Marwaha

- Six lectures in refresher course of Computer Applications organized at Institute of Life Long Learning, University of Delhi from 10-30 September 2008.

Mohd. Samir Farooqi

- A lecture on "Use of SPSS" in the CAS training programme organized by Division of Economics, IARI, New Delhi on 15 October 2008.
- A lecture on "Livestock census in India" in a training programme on Commercial Goat Farming organized by Central Institute for Research on Goats, Makhdoom, Mathura, UP on 03 November 2008.

Sh. KK Chaturvedi

- A lecture "Basics and overview of GAMS" in the NAIP training programme on Price Trends and Market Integration during 16-24 October 2008.
- A lecture on "e-Marketing and food products in agriculture" in the CAS training program on Advances in Agricultural and Food Marketing at IARI during 03-23 October 2008.
- A lecture on "Data warehousing: A step ahead databases" in a national seminar on Emerging Technology on Data Acquisition held at Sri Guru Govind Singh College of Commerce (Delhi University), New Delhi on 12 February 2009.

Sh. SN Islam

- A lecture "Expert system: An IT application for crop protection" in a winter school on IPM in Wheat Based Cropping System organized at DWR Karnal during 05-25 February 2008.
- A lecture in Hindi on "कृषि में सूचना प्रौद्योगिकी के प्रयोग" in a Hindi Workshop organized at Bharatpur by NRC Mustard on 18 April 2008.
- A lecture on "Enhancing efficiency and effectiveness of people at work" in NAARM off campus programme based on the request received from NRCSS, Ajmer on 19 September 2008.
- A lecture on "Expert systems and its applications" in a national seminar on New Paradigms in Computing at Bhai Parmanand Institute of Business Studies on 25 February 2009.

VISIT ABROAD

- Dr. Rajender Parsad deputed to International Centre of Agricultural Research in Dry Areas, Aleppo, Syria for providing biometric consultancy to the scientists at headquarters of ICARDA during April 27, 2008 to July 26, 2008.
- Dr. Rajender Parsad deputed to attend Final Review Meeting of the ADB Project on Enhancing Farmers Income and Livelihoods through Integrated Crop and Resource Management in the Rice-Wheat System in South Asia held at Kathmandu, Nepal during 25-26 November 2008. He also delivered a talk on Statistical designing and analysis of farmers' participatory research trials for conservation agriculture.
- Dr. Sushila Kaul deputed to present a paper at 5th Asia-Pacific Co-operative Research Conference organized by 'International Cooperatives Alliance' at Hanoi, Vietnam on 02 December 2008.

MEETINGS

- Research Advisory Committee meeting at PDCSR, Modipuram on 17 April 2008 and during 24-25 March 2009.
- Presented Agricultural Field Experiments Information System (AFEIS) in the SLTP meeting (kharif & rabi programmes) held at ANGRAU, Rajendranagar, Hyderabad on 07 May 2008.
- Annual IRC of the National Research Centre on Camel, Bikaner as an Outside Expert in Statistics organised at National Research Centre on Camel, Bikaner during 09 May 2008.
- Meeting under the chairmanship of ADG (Engg.) at Krishi Anusandhan Bhawan regarding the All India project on Harvest and Post-Harvest Losses on 08 August 2008.
- Meeting at NE-SAC, Shillong for implementation of the methodology for estimation of area under paddy crop developed by the Institute in all other North Eastern States on 12 August 2008.
- Meeting with the Principal Secretary (Ag.) & Director (Ag. Stat. & Crop Insurance), UP, regarding "Pilot

study on small area crop estimation approach for crop yield estimates at gram panchayat level" at Lucknow on 18 August 2008. Also, participated in a meeting with the Scientists of Central Institute of Aromatic and Medicinal Plants (CIAMP), Lucknow on 19 August 2008.

- Meeting of Working Group for construction of index numbers of area, production and yield of crops, Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, New Delhi.
- Screening Committee and Empowered Committee meetings for the scheme "Awards and Fellowships" for Outstanding Meritorious Research Work in Statistics of the Ministry of Statistics and Programme Implementation, New Delhi.
- Meeting of the Expenditure Finance Committee (EFC) to consider the memorandum on integrated sample survey for estimation of major livestock products during 11th Five Year Plan under the Chairmanship of Secretary, Deptt. of Animal Husbandry, Dairying and Fisheries (DADF) at Krishi Bhawan, New Delhi on 09 September 2008.
- Meeting under the Chairmanship of DDG (Engg) for discussing observations of the Hon DG / DDG (Fisheries) / ADG (Engg) on Agricultural Research Data Book 2008 on 11 September 2008.
- A meeting held on 15th September 2008 regarding organisation of 4th World Congress on Conservation Agriculture to be held during 04-07 February 2009.
- Meeting of Screening Committee to discuss the project proposals for updating rates and ratios at CSO, Sardar Patel Bhawan, New Delhi on 26 September 2008 under the Chairmanship of Addl. Director General (NAD).
- Advisor and Head from National Dairy Development Board (NDDB), Anand, Gujarat visited IASRI on 30 September 2008 to discuss the modalities for collaborative research study on milk production estimates in one of the districts of Uttar Pradesh.
- High Level Co-ordination Committee Meeting of Agricultural Statistics for Karnataka, Uttar Pradesh, Haryana, Tamil Nadu & Rajasthan states.
- 47th meeting of the Project Advisory Committee of DST at Birla Science Centre, Jaipur on 14 November 2008.
- Meeting of the Steering Committee for preparation of manuals under the Chairmanship of DG, CSO on 09 January 2009.
- 3rd meeting of the Technical Committee on FASAL under the Chairmanship of Dr. SM Jharwal, Principal Advisor, DAC on 05 February 2009 at Krishi Bhawan, New Delhi.
- 6th Meeting of the Technical Monitoring Committee (TMC) for the Central Sector Scheme on "Strengthening of Database and Geographical Information System for the Fisheries Sector" under the Chairmanship of Dr. VK Bhatia, Director IASRI, at Central Fisheries Research Institute (CIFRI) Barrackpore, Kolkata, West Bangal on 12 February 2009.
- Meeting of the Committee constituted for the revision of methodology for estimation of major livestock products and the prescribed guidelines under the Chairmanship of Animal Husbandry Commissioner on 13 February 2009 at Krishi Bhawan, New Delhi.
- Meeting pertaining to presentation on assessment of yield at GP level using remote sensing technology made by Department of Science and Technology in Krishi Bhawan, New Delhi under the Chairmanship of Dr. SM Jharwal, Principal Adviser, DES, Min. of Agriculture, GOI on 09 March 2009.
- Meeting of the organizers of the NCISET 2009 at IARI, New Delhi on 12 March 2009.
- Meeting of organizers of the National Symposium on Floriculture for livelihood and profitability at IARI, New Delhi during 16-19 March 2009.
- Expert Consultation Meeting on Guidelines for Testing and Releasing of Tree Varieties and Clones organized at ICFRE, Dehradun.

Related to Agricultural Statistics Systems

- Meeting under the Chairmanship of Secretary (A&C), Ministry of Agriculture, Govt. of India held at Krishi Bhawan on 30 June 2008 to discuss the possible causes of variation between official and trade estimates of Cotton production and to discuss the ways to arrive at a single set of estimate of Cotton production.
- Meetings of the Standing Committee for the Conference of Central and State Statistical

Organizations (COCSSO) under the Chairmanship of Secretary (S&PI) at Sardar Patel Bhawan, New Delhi on 16 July 2008 and 12 Nov. 2008.

- Meeting under the Chairmanship of Textile Commissioner, Govt. of India held at Office of Textile Commissioner, Mumbai on 05 September 2008 involving all trade organizations, traders associations, ginning/pressing mills representatives, representatives from Ministry of Textiles, Ministry of Agriculture and IASRI and members of Cotton Advisory Board to discuss the possible causes of variation between official and trade estimates of Cotton production and to discuss trade methodology for arriving at final figure of cotton production.

Related to Teaching Activities

- Meeting as an Expert of the Screening Committee for filling of vacant teaching positions in FOA at SKUAST, Jammu during 14-15 May 2008.

Related to Administrative Activities

- Institute Management Committee meeting held on 17 January 2009.
- Annual General meeting of Indian Council of Agricultural Research on 20 January 2009 at NASC Complex, New Delhi.
- 47th meeting of the Project Advisory Committee of DST organised at Birla Science Centre, Jaipur on 14 November 2008.

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Workshops, Conferences, Meetings, Seminars and Annual Day Organized

Workshop of "Broad Subject Matter Areas" (BSMA) Committee on Statistical Science to discuss curricula and syllabi for Statistical Sciences at the Institute on 28 May 2008. Participants were from various ICAR Institutes and State Agricultural Universities. Dr. VK Gupta, National Professor, ICAR and Chairman, BSMA Committee presented the objectives of the workshop. Two meetings of BSMA committee were also organized on April 28, 2008 and May 26-27, 2008 before the workshop.

A view of Workshop on 'Broad Subject Matter Areas'

A two days workshop on "Forecasting Future Technological Needs for Rice in India" under NAIP Project V-PAGe: Sub programme II – Technology Forecasting in collaboration with Central Rice Research Institute (CRRI), Cuttack during July 28-29, 2008. Prof. M.P. Pandey, Director CRRI, Cuttack welcomed the participants and outlined the purpose and importance of the workshop. This was followed by comments by Dr. S.D. Sharma, Director, IASRI, New Delhi; Dr. Viraktamath, Project Director, Directorate of Rice Research (DRR), Hyderabad and Dr. (Mrs.) Krishna Srinath, Director, National Research Centre on Women in Agriculture (NRCWA), Bhubaneshwar and Prof. S.C. Mani, Eminent Rice Breeder, GBPUAT, Pantnagar.

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Dr. Ranjana Agrawal presented the overview & objectives of the workshop and questionnaire for forecasting future technological needs for rice. Detailed presentations were made on various issues related to rice cultivation by speakers from CRRI, DRR, IASRI, NAARM and NRCWA.

A one day workshop on "A sensitization workshop on content management for eLearning systems using MOODLE" on 30 Januray 2009 at IASRI, New Delhi as a part of one of the objectives of the Institute project "An eLearning Solution for Agricultural Education" for the course instructors/ faculty members of the PG School, IARI under the disciplines of Agricultural Statistics and Computer Applications in Agriculture and also for other scientists of IASRI.

An interactive workshop for all scientist and technical staff of the Institute on "Consortium for e-resources in Agriculture (CeRA) to bring awareness in facilities, features and potential of Portal on 06 January 2009.

Seminars

Salient outcomes from the completed research projects undertaken in different aspects of Agricultural Statistics and Computer Application were presented in the seminars organized regularly at the Institute. Open seminars were also organized for new research projects proposals. Outline of Research Work (ORW) seminars, Course seminars and Thesis seminars were delivered by the students of M.Sc. and Ph.D., Agricultural Statistics and M.Sc., Computer Application.

During the period under report, a total of 77 seminar talks were delivered. Out of these, 54 were student seminars, 13 by scientists of the Institute and 10 by guest speakers as follows:

1. Sh. Ajesh Averachan and Sh. Sumit Sukmaran, Software Engineer, Focuz Infotech. Office automation software tech focus R-governance on 25 July 2008.
2. Prof. Raj S. Chikara, Visiting Professor, University of Houston, Claire Lake (U.S.A). Modelling and estimation of states variances for designing area face sample surveys on 01 December 2008.
3. Prof. J.N. Srivastava, Professor Emeritus, Colorado University, U.S.A. (i) Some Thoughts in Latin Square Experiments on 02 December 2008; (ii) Two Seminars on " Some Thoughts in Factorial Experiments" on 23 and 27 January 2009.

A view of Seminar by Dr. J.N. Srivastava

4. Prof. Bikas Kumar Sinha, Professor, Indian Statistical Institute, Kolkata. Statistical surveillance: Issue models and methods with applications on 26 December 2008.
5. Prof. Ravindra Khattree, Professor of Applied Statistics, Oakland University, Rochester, MI, U.S.A. Anti eigen values and anti eigen vectors in statistics on 27 December 2008.

Dr. Ravindra Khattree receiving the Memento from Director, IASRI

6. Prof. Prem Narain, Former Director, IASRI. Quantative genetics in modern era on 09 January 2009.

Director IASRI presenting the Memento to Dr. Prem Narain

7. Prof. Aloke Dey, ISI, Delhi. Some aspects of analysis of block design on 24 January 2009.
8. Dr. Pitam Chandra, Assistant Director General, ICAR. A perspective on expanding frontiers of agricultural statistics on 28 February 2009.

Dr. Pitam Chandra delivering the Seminar Talk on National Science Day

ANNUAL DAY CELEBRATIONS

The Annual Day of the Institute was celebrated on 2 July 2008. Dr. Nawab Ali, Deputy Director General (Ag. Engg.), ICAR was the Chief Guest of the programme. Dr. A.K. Sikka, Technical Director on behalf of Dr. J.S. Samra, Chief Executive Officer, National Rainfed Area Authority, Ministry of Agriculture, Govt. of India, New Delhi delivered the Nehru Memorial Lecture entitled, "Challenges and Opportunities in the Rainfed Agriculture".

A view of Annual Day celebrations of the Institute

Nehru Memorial Gold Medals for the year 2005-07 were awarded to Sh. Sandip Shil, M.Sc. (Computer Application) student and Ms. Yogita Gharde, M.Sc. (Agricultural Statistics) student.

IASRI

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1959-2009

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Distinguished Visitors

INDIAN

Dr. Nawab Ali
Deputy Director General (Ag. Engg.)
ICAR, New Delhi

Dr. AK Sikka
Technical Director
National Rainfed Area Authority
Ministry of Agriculture
Govt. of India, New Delhi

Dr. Aloke Dey
INSA, Senior Scientist
Indian Statistical Institute, New Delhi

Dr. AK Nigam
Director, IASDS
Lucknow, Uttar Pradesh

Dr. AK Srivastava
Former Joint Director
IASRI, New Delhi

Dr. BS Bisht
Assistant Director General (HRD-I)
Krishi Anusandhan Bhavan-II, Pusa, New Delhi

Dr. SK Tandon
Deputy Director General (Engg.)
Krishi Anusandhan Bhavan-II, Pusa, New Delhi

Dr. Madhusudan Sathe
Pune, Maharashtra

Dr. PK Agrawal
IARI, New Delhi

Dr. Madhuban Gopal
National Fellow (ICAR)
IARI, New Delhi

Dr. RK Mahajan
NBPGR, New Delhi

Dr. RL Sapra
IARI, New Delhi

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Sh. Vinod Kumar
Director
Agricultural Statistics and Crop Insurance
Lucknow, Uttar Pradesh

Sh. Radhey Shyam
Chief Finance & Accounts Officer
IARI, New Delhi

Dr. Neeraj Tiwari
Reader
Department of Statistics, Kumaon University
S.S.J. Complex, Almora

Dr. BB Singh
Director, FOD
NSSO, New Delhi

Dr. BVS Sisodia
Prof. & Head
NDUAT, Faizabad, Uttar Pradesh

Dr. PV Shenoi
Former Special Secretary (DAC)
Shantiprem, 20-C First Main Road
Raj Mahal Villa Extension, Stage-II
Block-I, Bangalore

Dr. S.S. Acharya
Former Chairman, CACP, GOI
Honarary Professor (Former Director)
Institute of Development Studies, Jaipur
33, Shali Complex, Sector-II, Udaipur, Rajasthan

Dr. PK Joshi
Director
NCAP, New Delhi

Dr. AP Gore
Bakul, 40 Empress Garden View Society
Sopan Baug
Pune - 411001

Dr. S.M. Jharwal
Principal Advisor
DAC, Ministry of Agriculture
Krishi Bhawan, New Delhi

Dr. KK Bhardwaj
Professor, School of Computer Systems Sciences
Jawaharlal Nehru University, New Delhi

Dr. Bikas Kumar Sinha
Member, National Statistical Commission and
Professor, Indian Statistical Institute, Kolkata

Sh. Ajesh Averachan
Software Engineer
Focuz Infotech

Sh. Sumit Sukmaran
Software Engineer
Focuz Infotech

Prof. Prem Narain
Former Director, IASRI

Dr. Pitam Chandra
Assistant Director General (Process Engg.)
ICAR, New Delhi

FOREIGN

Prof. JN Srivastava
CNS Research, Professor (Emeritus)
Colorado State University, USA

Prof. Raj S. Chikara
Visiting Professor, University of Houston
Clair Lake, USA

Prof. Ravindra Khattree
Professor of Applied Statistics
Department of Mathematics and Statistics
Auckland University, Rochester
Michigan-18309-4401

Mr. Abdul Ghafar
Regional Field Assistant
UNFAO, Kunduz, Afghanistan

Mohd. Hasib Najib
Regional Field Assistant
UNFAO, Hirat, Afghanistan

Mr. Shah Wali
Regional Field Assistant
UNFAO, Jalalabad, Afghanistan

Mr. Shamsuddin Shams
Regional Field Assistant
UNFAO, Kandahar, Afghanistans

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IASRI Personnel

DIRECTOR
Dr. V.K. Bhatia

NATIONAL PROFESSOR
Dr. V.K. Gupta

NATIONAL FELLOW
Dr. Rajender Parsad

DIVISION OF SAMPLE SURVEY
Dr. H.V.L. Bathla,
Principal Scientist and Head

Principal Scientists
Dr. U.C. Sud
Dr. K.K. Tyagi
Dr. Jagbir Singh

Senior Scientists
Dr. Ashok Kumar Gupta
Dr. Tauqueer Ahmad

Scientists
Sh. D.C. Mathur
Sh. V.K. Jain
Sh. K.K. Kher
Dr. (Smt.) Prachi Misra Sahoo
Dr. Hukum Chandra

DIVISION OF DESIGN OF EXPERIMENTS

Dr. P.K. Batra
Principal Scientist and Head (A)

Principal Scientist

Dr. Krishan Lal

Senior Scientists

Dr. Aloke Lahiri
Dr. (Smt.) Seema Jaggi
Dr. L.M. Bhar
Dr. (Smt.) Cini Varghese

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Scientists
Sh. N.K. Sharma
Sh. D.K. Sehgal
Sh. O.P. Khanduri
Dr. Anil Kumar
Dr. S.M.G. Saran

DIVISION OF BIOMETRICS
Dr. Prajneshu
Principal Scientist and Head

Principal Scientists
Sh. S.D. Wahi
Smt. Asha Saksena

Senior Scientists
Dr. Amrit Kumar Paul
Dr. A. Ramakrishna Rao

Scientist
Md. Wasi Alam (on leave)

DIVISION OF FORECASTING TECHNIQUES
Dr. (Smt.) Ranjana Agrawal,
Principal Scientist and Head

Principal Scientist
Dr. Chandrahas

Senior Scientist
Dr. Himadri Ghosh

Scientists
Sh. S.S. Walia
Sh. S.C. Mehta
Sh. Satya Pal
Sh. S.C. Sethi
Sh. Amrender Kumar

DIVISION OF ECONOMETRICS
Dr. A.K. Vasisht
Principal Scientist and Head

Principal Scientists
Dr. S.P. Bharadwaj
Dr. Ashok Kumar

Senior Scientist
Dr. (Smt.) Sushila Kaul

Scientists
Dr. Prawin Arya
Dr. Dharam Raj Singh
Sh. Shivramane N. (on leave)

DIVISION OF COMPUTER APPLICATIONS
Dr. P.K. Malhotra
Principal Scientist and Head

Principal Scientists
Dr. R.C. Goyal
Dr. I.C. Sethi
Dr. V.K. Mahajan
Dr. Anil Rai

Senior Scientist
Dr. Ramasubramanian V.

Scientists
Sh. H.S. Sikarwar
Sh. Hari Om Agarwal
Sh. Balbir Singh
Sh. V.H. Gupta
Sh. Pal Singh
Smt. Alka Arora
Smt. Shashi Dahiya
Smt. Anshu Bhardwaj
Dr. Sudeep
Md. S.N. Islam
Md. Samir Farooqi
Sh. Krishan Kumar Chaturvedi
Sh. Shashi Bhushan Lal
Smt. Anu Sharma
Smt. Sangeeta Ahuja

Scientists (at ICAR Headquarter)
Sh. Tribhuwan Rai
Sh. Rajendra Kumar
Sh. Sanjeev Panwar

RESEARCH COORDINATION AND MANAGEMENT UNIT
Dr. V.K. Mahajan
Principal Scientist and In-charge

TRAINING ADMINISTRATION CELL
Dr. V.K. Bhatia, Professor (Agricultural Statistics)
Dr. P.K. Malhotra, Professor (Computer Application)

NATIONAL AGRICULTURAL SCIENCE MUSEUM
Dr. R.C. Goyal, Principal Scientist and Nodal Officer
Sh. R.P. Jain, Scientist (SG) & Incharge

WARDEN
Dr. Krishan Lal, Principal Scientist

LIBRARY
Dr. (Smt.) P. Visakhi, Head

ADMINISTRATION
Capt. Mehar Singh, Chief Administrative Officer
Sh. A.K. Chaturvedi, Officer on Special Duty
Sh. Krishan Kumar, Finance and Accounts Officer

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Any Other Relevant Information

National Agricultural Science Museum

The National Agricultural Science Museum (NASM), situated in the National Agricultural Science Centre campus of ICAR is located at Dev Prakash Shastri Marg, Opposite Dasghara Village, Pusa Campus, New Delhi.

The museum is the first of its kind in the country. It is spread over a two storey centrally air-conditioned specially designed building of floor area of 23,000 sq ft. The museum portrays the development of agriculture in India since prehistoric time the present state-of-the-art technology in agriculture in our country, with a futuristic projection.

The history of agriculture has been exhibited at the museum through 150 exhibits which are displayed in 10 major sections viz. Six Pillars of Agriculture, Agriculture in Prehistoric Era, Indus Valley Civilization, Vedic and Post Vedic Era, Sultnat and Mughal Era, Advent of British, Advancement of Agricultural Sciences in Independent India, Global Issues related to Agriculture, Towards a Food-Secure Future, and Children's Section. The exhibits in the museum are a combination of electronics, computer hardware/software, mechanical devices, art and science objects.

The museum is a source of information on the agricultural and allied disciplines disseminated through latest technology using audio, video, slides and computer medium using touch screen facility for agricultural scientists, farmers, agriculture students, college and the school children. An exposure of the museum is also available on the website http://www.icar.org.in/nasm.

The Museum is open to visitors on all days from 10.30 a.m. to 4.30 p.m. except Monday - the weekly holiday.

The NASM is looked after by a Central Management Committee constituted at the ICAR headquarter level and

is comprised of:

Dr. M.M. Pandey	Deputy Director General (Engg.)	Chairman
Dr. P. Chandra	Assistant Director General (PE)	Member
Sh. V.P. Kothiyal	Director (Works)	Member
Sh. Rabindra Patra	Director (Finance)	Member
Sh. P. K. Jain	Under Secretary (GAC)	Member
Dr. V.K. Bhatia	Director, IASRI	Member Secretary

A Sub-Management Committee under the Chairmanship of Director IASRI has been constituted for up-keep and maintenance of the Museum:

Dr. V.K. Bhatia	Director, IASRI	Chairman
Dr. P.K. Malhotra	Head (C.A.)	Member
Dr. H.V.L. Bathla	Head (S.S.)	Member
Dr. R.C. Goyal	Pr. Scientist & Nodal Officer	Member
Capt. Mehar Singh	C.A.O.	Member
Sh A.K. Chaturvedi	O.S.D.	Member
Sh. Krishan Kumar	F. & A.O.	Member
Sh. R.P. Jain	Scientist & In-charge	Convener

The day to day activities of the museum were looked after by the following officers of IASRI, New Delhi under the guidance of the above committees.

Sh. Arbind Kumar	Technical Officer (T-7-8)
Sh. Ram Naresh	Technical Officer (T-7-8)
Sh. O.P. Singh	Technical Officer (T-6)

During the period under report, many visitors including the prominent personalities like the Hon'ble President/ Ministers of various countries and states visited the museum. In all 20,558 visitors visited the museum 5126 tickets were sold.

Besides this, farmers belonging to different parts of India, Staff/Media and the Students of various State Agricultural Universities/Colleges/Schools in India and abroad gained vital knowledge from the exhibits displayed in the Museum. The exhibits and functioning of the museum were well appreciated by the visitors, especially by high dignitaries and foreigners. Some of the distinguished visitors are:

USA	Perry Bohn, U.S. Department of Agriculture
	Abin Hussain, Former Indian Ambassador to U.S.A.
France	Michiel Ryan, Organisation for Economic Co-operation & Development (OECD), Paris

Visit of H. E. Madam Michelle Bachelet, President of Chile to National Agricultural Science Museum

Sri Lanka	W. Guruge, Secretary, Ministry of Industries
	Hemakumara W. Nanayakkara, Minister of Agriculture
	Delegation of 10 Members from Sri Lanka Council of Agricultural Research Policy (CARP), Sri Lanka
Central America	Marco Sierra
Iran	Javadi Kuagvaghi, UNIDO Coordinator
TOGO	Goto-Chantal, International Institute of Threat & Risk Assessment (IITRA)
Nepal	Delegation of Nepal with Secretary, Ministry of Agriculture (8 Members)
Pakistan	Mushtaq Ahmad Gill, DG Agri. (Water Management), Lahore
	Mahrukh Siraj, Coordinator, Knowledge & Innovation System
	Gouhar Ayub, Rural Sociologist CABI-South Asia Regional Office
	Tauqir Ahmad Faiq, Additional Secretary, Ministry of Food, Agriculture and Livestock, Islamabad
	Fazal Abbas Maken, Ministers (Trade), Pakistan High Commission, New Delhi
	Mazhar Javed, Director (SAARC), Ministry of Foreign Affairs, Islamabad
Philippines	Clarito M. Barron, Assistant Director, Bureau of Plant Industry/Department of Agriculture
	Milagros B. Abaquita, Agricultural Centre Chief, Bureau of Plant Industry
Myanmar	Than Aye, Deputy Director General, Department of Agricultural Planning
	Naw Jenny Loo, Manager, Myanmar Agriculture Service
Lao P.D.R.	Inthanongsith KOMMAMEUNG, Director of Agronomy Management Division, Department of Agriculture, Ministry of Agriculture and Forestry

	SENGCHAND PHETKHOUNLUANG, Project Co-ordinator, Rice Seed Multiplication & Distribution Project, National Agriculture and Forestry Extension service (NAFES)
Malaysia	Zanil Abdin Bin Yusuf, Deputy Director of Strategic Planning and International Section, Department of Agriculture, Planning & Information Communication Technology Division
	Nordion Bin Mamat, Deputy Director of Horticulture, Department of Agriculture, Planning & Information Communication Technology Division
Vietnam	Nguyen Van Tuat, Vice Director of Vietnam Academy of Agriculture Sciences
	Le Thanh Tung, Researcher, Plant Department on the Southern of Vietnam
Brunei	Fuziah Haji Hamdan, Assistant Director of Agriculture, Department of Agriculture, Brunei Darussalam
	Hajah Khartini Haji Musa, Senior Plant Breeder, Department of Agriculture, Brunei Darussalam
Indonesia	I NYOMAN WIDIARTA, Head of Program and Evaluation Division, Indonesian Centre for Food Crops Research and Development (ICFORD)
	Reddy Gaswanto, Researcher (Plant Breeder), Indonesia Vegetable Research Institute
	Suriyan Vichitlekarn, Senior Officer, Natural Resources Unit, Bureau for Economic Integration and Finance, ASEAN Secretariat
	Sri Dyah Kusumawardhani, Technical Officer, Natural Resources Unit, Bureau for Economic Integration and Finance, ASEAN Secretariat
Cambodia	Pich ROMNEA, Head of International Cooperation Unit, Department of Agronomy and Agricultural Land Improvement, Ministry of Agriculture, Forestry and Fisheries
	Lor Bunna, Head of Socio-Economics Science Division, Cambodian Agricultural Research and Development, Ministry of Agriculture, Forestry and Fisheries
Thailand	Chamlong Kogram, Senior Agricultural Research Scientist, Office of Agricultural Research & Development Region, Department of Agriculture
	Piroge Suvanjinda, Director, Office of Agricultural Research & Development Region, Department of Agriculture
China	Lu Xiaoping, Vice Director General, Department of International Co-operation, Ministry of Agriculture
	Chen Lijun, Director, Division of Asian and African Affairs, Department of International Cooperation, Ministry of Agriculture
	Shao Jiancheng, Vice Director, Security Manage Office of GMO, Department of Science and Technology, Ministry of Agriculture
	Li Wenxing, Vice Director, Division of Seed, Department of Crop-production, Ministry of Agriculture
	Li Na, Official, Division of System Reformation and Policy, Industry Policy and Rules of Law, Ministry of Agriculture
	Gu Weilbing, Official, Division of Asian and African affairs, Department of International Cooperation, Ministry of Agriculture
	Zhen Yougui, Vice Director General, the Center of Rural Economy Research, Ministry of Agriculture
	Wang Shumin, Vice Director, the Institute of Science Crop, the Chinese Academy of Agricultural Sciences, Chinese Academy of Agricultural Sciences
	Xia Ying, Scientist, Institute of Agricultural Economics and Development, Chinese Academy of Agricultural Sciences
	Chen Rurnei, Scientist, Biotechnology Research Institute, Chinese Academy of Agricultural Sciences
	Liu Haillang, Director, Division of Dairy Industry and Animal Products Processing, National Animal Husbandry Service
	Wang Fei, Vice Director, Institute of Environment Protecting and Energy Sources, Chinese Academy of Agricultural Engineering
	Zhang Wei, Interpreter, Ministry of Agriculture
Afghanistan	Assadullah Habib and A. Ghufar Ahmeedi, FAO and PPQD with 12 more International delegates to Ug 99 Conference
Bangladesh	M. Abdul Aziz ndc, Secretary, Ministry of Agriculture, Dhaka M. Khalequzzaman Akanda Chowdhury, Member-Director (Crops), BARC, Dhaka
Mauritius	H.E. Sir Anerood Jugnauth, Hon'ble President of Mauritius with a 10 member's delegation
Chile	H. E. Madam Michelle Bachelet, President of Chile, along with a delegation of 50 members

All farmers and groups of students from Schools, Universities and other Educational Institutions were allowed free of charge and for others a nominal entry fee of Rs. 5 per head was charged. There is ample free parking space available for the public in the campus.

Consultancy Processing Cell (CPC)

As per the 'ICAR Rules and Guidelines for Training, Consultancy, Contract Research and Contract Services, 1997' a Consultancy Processing Cell (CPC) has been functioning at the Institute since 16 August 1997.

This Cell was reconstituted with the following composition w.e.f. 02 March 2009:

Dr. H.V.L. Bathla, HD (SS)	Chairman
Dr. P.K. Malhotra, HD (CA)	Member
Dr. V.K. Mahajan, Principal Scientist and Incharge (RCMU)	Member
Officer on Special Duty and Head of Office	Member
Finance and Accounts Officer	Member
Sh. P.P. Singh, Technical Officer	Member-Secretary

The functions of the Cell are as follows:

- Give broad guidelines for consultancy work
- Bring out consultancy information system, catalogues periodically
- Identify and prepare list of consultants in different fields; the consultants could be retired Scientist/ Officer of proven experience
- Prepare a roster of available human resources on the basis of time schedule
- Identify team for specific consultancy assignments and periodic reviews of progress
- Prepare consultancy proposals as per prescribed flow chart

Six meetings on 09 April, 06 June, 17 June, 14 July, 04 October 2008 and 03 March 2009 were held for finalizing the proposals of 4 consultancy trainings/ 1 study tour and 2 consultancy advisory services received at Consultancy Processing Cell as per ICAR Guidelines and getting approval of the Director.

Planning, Monitoring and Evaluation (PME) Cell

To facilitate all activities related to priority setting, monitoring and evaluation a Planning, Monitoring and Evaluation (PME) Cell within the RCMU in the capacity as against their names is working at the Institute. The composition of the PME Cell is as given below:

Dr. P.K. Malhotra, HD (CA)	Nodal Officer
Dr. V.K. Mahajan, Principal Scientist and Incharge (RCMU)	Member
Dr. Rajender Parsad, National Fellow	Member
Dr. Ashok Kumar, Senior Scientist	Member
Dr. Tauqueer Ahmad, Scientist (SS)	Member
Dr. Ramasubramanian V., Scientist (SS)	Member
Sh. P.P. Singh, Technical Officer	Member Secretary

The Terms of Reference of the Cell are as follows:

- Sensitization of policy makers, managers, scientists and others about the need for research priority assessment
- Prioritization of Institute's programmes
- Tracking of current resource allocations
- Interface with ARIS, SREP, ATMA, IVLP, TAR and KVK for research, extension education and other services
- Facilitate monitoring and evaluation of research projects of the Institute/SAU
- Participation of monitoring and evaluation (site-level) activities of NATP/NAIP
- Impact analysis, especially that of research and extension activities

Institute Technology Management Committee (ITMC)

As per the 'ICAR Guidelines for Intellectual Property Management and Technology Transfer/ Commercialization' a Institute Technology Management Committee (ITMC; short title for Institute Intellectual Property Management and Technology Transfer/Commercialization Committee, i.e. IIPM&TCC) has been constituted for addressing Intellectual Property (IP) related matters of the Institution as detailed in the ICAR Rules and Guidelines for Training, Consultancy, Contract Research and Contract Services, 1997. The composition of the ITMC is as given below:

Prof. V.K. Bhatia Director, IASRI	Chairman
Dr. Amit Kumar Vasisht HD (Econometrics) IASRI	Member
Dr. Anil Rai Principal Scientist, IASRI (Technical Expert–A Scientist of the Institute)	Member
Dr. Seema Jaggi Senior Scientist, IASRI (Technical Expert – A Scientist of the Institute)	Member
Dr. Madhuban Gopal Principal Scientist and National Fellow, IARI (IPR Expert–A Scientist from ICAR Institute in the Zone	Member
Dr. V.K. Mahajan, PS and Incharge, RCMU, IASRI (Member Secretary, IRC and Incharge, ITMU)	Member Secretary

A meeting of Institute Technology Management Committee (ITMC) was held on 21 February 2009 to discuss 'The Protection and Utilization of Public Funded Intellectual Property Bill 2008'.

Institute Technology Management Unit (ITMU)

As per the 'ICAR Guidelines for Intellectual Property Management and Technology Transfer/ Commercialisation' an Institute Technology Management Unit (ITMU; short title for Intellectual Property Management and Technology Transfer Commercialization Unit at Institute level, i.e. IPM&TTU) for management of its IP/Deemed IP and transfer/commercialization of technologies has been constituted for pursuing all IP protection, maintenance and transfer/commercialization related matters at the institute level as per these guidelines and any other administrative or policy decisions taken in the ICAR from time to time. This will seek any specific, case-to-case basis advice/ assistance from the Zonal Agro-Technology Management Centres (ZTMCs) at the zonal level or the Agro-Technology Management Centre (ATMC) at the ICAR headquarters. The composition of the ITMC is as given below:

Dr. V.K. Mahajan Principal Scientist and Incharge (RCMU)	Officer Incharge
Dr. Tauqueer Ahmad, Scientist (SS)	Member
Sh. P.P. Singh, Technical Officer	Member

Joint Staff Council

The Institute has a Joint Staff Council (IJSC) to promote harmonious relations and secure the best means of co-operation between the Council/IASRI as employer and the general body of its employees in matters of common concern for ensuring a high degree of efficiency in the service.

The Joint Staff Council of the Institute is as under:

Dr. V.K. Bhatia	Director	Chairman
Official-side Representatives		
Dr. P.K. Malhotra	HD (CA)	Member
Dr. V.K. Mahajan	Principal Scientist/ Incharge RCMU	Member
Sh. R.S. Khatri	Principal Scientist and Welfare Officer (31.01.2009)	Member
Dr. P.K. Batra	Principal Scientist and Welfare Officer (09.02.2009)	
Dr. K.K. Tyagi	Principal Scientist	Member
Sh. Krishan Kumar	F&AO (Ex-Officio)	Member
Sh. A.K. Chaturvedi	OSD	Member-Secretary
Staff-side Representatives		
Sh. Raj Pal	S.S.Gr.-II	Secretary
Sh. D.P.S. Mann	Assistant	Member
Sh. M.M. Maurya	Technical Officer	Member
Sh. Satya Pal Singh	Technical Officer	Member
Sh. K.B. Sharma	U.D.C.	Member
Sh. Ashok Kumar	SS Gr. II	Member

Two meetings of the Institute Joint Staff Council were held on 23 July and 28 November 2008 under the Chairmanship of Director, IASRI.

IASRI Employees Co-operative Thrift and Credit Society Limited

The Society which is registered with the Registrar, Co-operative Societies, Delhi Administration continued its activities during 2008–09 in the similar manner as during the past years by advancing regular and emergent loan to its members and looking after their welfare. The sources of funds of the society are share money (value of each share is Rs. 50 only) and compulsory deposits (Rs.100 per month from each member) and fixed deposit. The present strength of the members of the society is 346.

The Management Committee of the Society for the year 2006–09 is as follows:

Sh. U.C. Bandooni	President
Ms. Vijay Bindal	Vice-President
Sh. Pratap Singh	Secretary
Sh. Pradeep Kumar	Treasurer
Sh. V.K. Mishra	Internal Auditor
Smt. Meena Nanda	Member
Smt. Satinder Pal	Member
Sh. Arbind Kumar	Member
Sh. G.M. Pathak	Member
Sh. Sudershan Sharma	Member
Sh. Parbhu Dayal	Member
Sh. Gabar Singh Rana	Member

- The society advanced Rs. 64,99,000 (Rupees sixty four lakh ninty nine thousand only) to its members as loan.
- An amount of Rs. 751 (Rupees seven hundred fifty one only) each was given as gift to members on their retirement from the Institute.
- The financial help of Rs. 5000 (Rupees five thousand only) to each was extended from member welfare fund of the society to the families of (Late) Sh. Raj Pal Singh Sehrawat and Sh. D.N. Bhatia after their death.

Grievance Committee

The Grievance Committee of the Institute (constituted as per ICAR rules) provides the employees a forum to ventilate their grievances relating to official matters and for taking remedial measures. The Grievance Committee of the Institute was reconstituted with the approval of the Management Committee of the Institute for a period of two years w.e.f. October 2007 as follows:

Official-side Representative	
Dr. V.K. Bhatia	Chairman
Dr. Prajneshu	Member
Sh. A.K. Chaturvedi	Member
Sh. Krishan Kumar	Member
Sh. Narender Kumar	Member Secretary
Staff-side Representative	
Sh. Pal Singh	Member
Sh. Vijay Pal Singh	Member
Sh. Basant Kumar	Member
Sh. Charan Singh	Member

Nine meetings of the Grievance Committee of the Institute were held on 3 May, 11 June, 26 July, 26 August, 10 October, 14 November, 16 December 2008, 17 January and 19 March 2009.

Benevolent Fund

The employees of the Institute have constituted a Benevolent Fund from their own contributions to provide relief to the families of the employees who die in harness and are left in an indigence condition and a gift of Rs. 600 is being given to the retiring employees of the Institute. During the year, a sum of Rs. 8326 was collected from members. This year, gifts of Rs. 9000 were distributed to fifteen retiring personnel of the Institute. A relief of Rs. 1500 to the grieved families of (Late) Sh. DN Bhatia was provided on his untimely death.

Women Cell

A Women Cell has been set up at the Institute on 27 January 2000. The cell functions for the welfare of women in general. It caters to the issues pertaining to the grievances of women employees. The present compositions of Women Cell is :

Dr. Ranjana Agrawal	Principal Scientist & HD (FT)	Chairperson
Dr. Seema Jaggi	Sr. Scientist	Member
Ms. Vijay Bindal	Tech. Officer	Member
Smt. Sushma Banati	Sr. PS	Member
Smt. Satyavati Tripathi (Upto 30 Nov. 2008)	Asstt. Fin. & Account Officer	Convenor

A Meeting of Women Cell was held on 23 September 2008.

Complaint Committee

A Complaint Committee has been set up at the Institute on 18 August 2006 for the prevention of sexual harassment of women at work place. The committee comprises of the following members:

Dr. Ranjana Agrawal	Principal Scientist and HD (FT)	Chairperson
Smt. Meera Mathur	Technical Officer (CSIR)	Member (3rd Party)
Sh. S.K. Sublania	MTO (T-9)	Member
Smt. Satinder Pal	Technical Officer	Member
Sh. Fabian Minz	UDC	Member

Hostel Activities

There are two well furnished hostels, viz. Panse Hostel and Sukhatme Hostel to cater the residential requirements of the trainees and students of M.Sc., Ph.D. courses and Senior Certificate Course (SCC) at the Institute within its premises. Officers and other trainees of the various other refresher, short-term and ad-hoc training courses organised at the Institute are also provided residential accommodation at the Panse Hostel-cum-Guest House. Boarding and lodging arrangements are made available for the guests who stay in Guest House from different departments/ organisations. Ample facilities exist for the cultural activities and sports for the hostel inmates.

Hostel mess is run by the students on Co-operative basis. The general management of the hostels is vested with the Warden, who is assisted by the Prefect and other students. The main activities included are as follows: A General Body meeting of IASRI hostel inmates was held under the Chairmanship of Shri R.S. Khatri, Warden. For smooth functioning of the hostel activities, the Executive Committee members elected for the session 2008-09 were:

Prefect	Nitiprasad Jambhulkar
Assistant Prefect/Mess Secretary	Kaustav Aditya
Cultural Secretary	Sukanta Dash
Maintenance Secretary	Ankur Biswas
Cashier	Jayprakash Srivastava
Health Secretary	Praveen Meher
Sports Secretary	Alok Kumar Das
Common Room Secretary	Sankalpa Ojha
Computer Lab Secretary	Eldho Varghese
Auditors	Shashi Shekhar and Anil Yadav
Warden's Nominee	Eldho Varghese

Dr. Krishan Lal has taken the charge of Warden from 01 February 2009. The following changes were made in

the Executive Committee in the meeting held in February 2009.

Assistant Prefect/Mess Secretary	Ankur Biswas
Maintenance Secretary	Arijit Saha
Sports Secretary	Roopam Kumar Sarkar

A General Body meeting of IASRI hostel inmates of Sukhatme Hostel was held under the Chairmanship of Dr. Krishan Lal in the month of March 2009. In the meeting, matters related to cleaning and maintenance of Sukhatme Hostel and to follow certain rules and regulations for the smooth functioning of the Hostel, were discussed.

On the eve of the Annual Day of the Institute on 02 July, 2008, a sports week was organised by IASRI in Sukhatme Hostel where students at IASRI participated in various sports like table-tennis, badminton and musical chair, etc.

Recreation and Welfare Club

The Institute has a Recreation and Welfare Club, which provides facilities for indoor and outdoor games, promotes social and friendly relations among the members and general recreation and welfare of its members. The club organises sport tournaments annually at Institute level for different games/events. The functioning of the Recreation and Welfare Club is monitored by the following Executive Committee:

Dr. V.K. Bhatia	President
Dr. K.K. Tyagi	Vice-President
Sh. K.B. Sharma	Secretary
Sh. Sunil Bhatia	Sports Secretary
Sh. Girish	Treasurer
Smt. Vijay Laxmi Murthy	Member
Smt. Satinder Pal	Member
Sh. Diwan Singh	Member

Sports Activities

For organizing different activities relating to sports meet, Institute Sports Committee has been constituted as follows:

Dr. V.K. Bhatia	President
Dr. K.K. Tyagi	Vice President
Dr. P.K. Batra	Member
Capt. Mehar Singh	Member
Sh Arun Kumar Chaturvedi	Member
Sh. Krishan Kumar	Member
Sh. R.S. Tomar	Member
Smt. Vijaya Laxmi	Member
Sh. D.P.S. Mann	Member
Sh. R.K. Saini	Member
Sh. Amar Singh	Member
Sh. Rambhool	Member
Sh. K.B. Sharma	Member
Sh. Ashok Kumar	Member
Sh. M.M. Maurya	Member
Sh. Raj Kumar Verma	Member
Sh. Raj Pal	Member
Smt. Satinder Pal	Member
Sh. V.K. Mishra	Convenor

During the period under report, the Institute Sports Contingent participated in ICAR Zone II (Central Zone) Sports Meet 2007-08 held during 07-11 April, 2008 at IARI, New Delhi. The Institute achieved prestigious positions as Championship Trophy in Kabaddi and Table Tennis (Team Events-Men and in Chess (Men), Runner-up position in Table Tennis (Women-Singles & Doubles) and Carrom (Men-Singles) in individual events.

ICAR Inter-Zone Sports Meet 2007-08 was organized by NAARM, Hyderabad during 17-20 November, 2008. The Institute players secured Runner-up position in Table Tennis (Team Events-Men), in Table Tennis (Women-Singles & Doubles).

ICAR Zone II (Central Zone) Sports Meet 2009 was organised by CIAE, Bhopal during 17-23 February 2009. The Institute achieved prestigious positions as Championship Trophy in Kabaddi and Table Tennis (Team Events-Men), Runner-up position in Chess (Men) and Runner-up position in Table Tennis (Women-Doubles) in Individual events.


IASRI
GOLDEN
JUBILEE
1959-2009

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भारतीय कृषि सांख्यिकी अनुसंधान संस्थान में राजभाषा के बढ़ते चरण

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान में वर्ष-दर-वर्ष हिन्दी के प्रगामी प्रयोग में अभिवृद्धि हो रही है। राजभाषा नीति को संस्थान में सुचारु रूप से कार्यान्वित किया जा रहा है। राजभाषा विभाग द्वारा जारी वार्षिक कार्यक्रम में निहित लक्ष्यों को संस्थान में लगभग पूरा कर लिया गया है। संस्थान द्वारा समस्त प्रशासनिक कार्य शत-प्रतिशत हिन्दी में और यथा आवश्यक द्विभाषी हो रहा है। वैज्ञानिक कार्यों में भी हिन्दी के प्रयोग को प्रोत्साहित किया जाता है। न केवल मात्रात्मक रूप में बल्कि हिन्दी के प्रयोग में गुणवत्ता की ओर भी ध्यान दिया जा रहा है।

संस्थान में हिन्दी की प्रगति का जायजा लेने के लिए भारतीय कृषि अनुसंधान परिषद् के निदेशक (राजभाषा), श्री हरीश चन्द्र जोशी द्वारा 19 अगस्त, 2008 को संस्थान का राजभाषा सम्बन्धी निरीक्षण किया गया। उन्होंने संस्थान में हो रहे हिन्दी कार्यों की भूरि-भूरि प्रशंसा की।

संस्थान के पूर्वानुमान तकनीक प्रभाग की अध्यक्षा, डॉ. रंजना अग्रवाल को केन्द्रीय सचिवालय हिन्दी परिषद् द्वारा आयोजित 26वीं अखिल भारतीय वैज्ञानिक तथा तकनीकी विषयों पर हिन्दी लेख प्रतियोगिता (2006-07) के अन्तर्गत उनके लेख "कम्प्यूटर की कहानी उसी की जुबानी" के लिए अखिल भारतीय महिला (विशेष) पुरस्कार प्रदान किया गया।

प्रतिवेदनाधीन अवधि में संस्थान में राजभाषा कार्यान्वयन समिति की तिमाही बैठकें नियमित रूप से आयोजित की गयीं। इन बैठकों में राजभाषा अधिनियम 1963 की धारा 3(3) के अनुपालन को सुनिश्चित करने, राजभाषा विभाग द्वारा जारी वार्षिक कार्यक्रम की विभिन्न मदों, हिन्दी पत्रिका के प्रकाशन, कार्यशालाओं के नियमित आयोजन, हिन्दी पखवाड़े के आयोजन इत्यादि पर विस्तार से चर्चा हुई। बैठकों का आयोजन 21 अप्रैल 2008, 19 जुलाई 2008, 23 अक्टूबर 2008 तथा 19 जनवरी 2009 को हुआ।

इस वर्ष में संस्थान के कर्मियों के लिए चार कार्यशालाएँ आयोजित की गयीं। पहली कार्यशाला 26 से 28 मई 2008 के

दौरान "हिन्दी टंकण" पर आयोजित की गयी। इस कार्यशाला में केन्द्रीय हिन्दी प्रशिक्षण संस्थान के सहायक निदेशक (टंकण/आशुलिपि), सर्वश्री चमन सिंह रावत, राकेश कुमार वर्मा तथा दिनेश चन्द्र ने प्रतिभागियों को कम्प्यूटर पर हिन्दी टंकण का प्रशिक्षण दिया। द्वितीय कार्यशाला 26 तथा 27 सितम्बर 2008 को "हिन्दी वर्तनी एवं व्याकरण" विषय पर आयोजित की गयी। इस कार्यशाला में भारतीय कृषि अनुसंधान परिषद् के उपनिदेशक (राजभाषा), श्री लक्ष्मी कांत तथा अलीगढ़ मुस्लिम विश्वविद्यालय, अलीगढ़ के हिन्दी विभाग के रीडर, डॉ. राजीव लोचन नाथ शुक्ला ने "हिन्दी वर्तनी एवं व्याकरण" विषय पर व्याख्यान दिये। तृतीय कार्यशाला 22 तथा 23 दिसम्बर 2008 को संस्थान के वैज्ञानिक एवं तकनीकी वर्ग के लिए "वैज्ञानिक/तकनीकी सामग्री का हिन्दी अनुवाद" विषय पर आयोजित की गयी। इस कार्यशाला में भारतीय कृषि अनुसंधान परिषद् के निदेशक (राजभाषा), श्री हरीश चन्द्र जोशी ने "वैज्ञानिक विषयों का हिन्दी अनुवाद" तथा भारतीय कृषि अनुसंधान परिषद् के उपनिदेशक (राजभाषा), श्री लक्ष्मी कांत ने "कार्यालयीन अनुवाद" विषय पर व्याख्यान दिये। चतुर्थ कार्यशाला 05 तथा 06 मार्च 2009 को "राजभाषा नीति एवं कार्यान्वयन" विषय पर आयोजित की गयी जिसमें भारतीय कृषि अनुसंधान परिषद् के पूर्व निदेशक (हिन्दी), श्री राजेन्द्र प्रसाद गुप्त तथा भारतीय कृषि अनुसंधान संस्थान के पूर्व सम्पादक (हिन्दी), श्री अनिल कुमार दुबे ने "राजभाषा नीति एवं कार्यान्वयन" विषय पर व्याख्यान दिये।

हिन्दी कार्यशाला के उपरान्त एक प्रतिभागी प्रमाण पत्र प्राप्त करते हुए

संस्थान में कार्यरत सभी हिन्दीतर भाषी अधिकारियों/कर्मचारियों द्वारा हिन्दी ज्ञान सम्बन्धी प्रशिक्षण पूरा किया जा चुका है । आज तक की स्थिति के अनुसार, संस्थान में अब कोई ऐसा हिन्दीतर भाषी अधिकारी/कर्मचारी शेष नहीं रह गया है जिसे हिन्दी ज्ञान सम्बन्धी प्रशिक्षण दिया जाना शेष हो । इसके अतिरिक्त, "हिन्दी शिक्षण योजना" के अन्तर्गत संस्थान में हिन्दी आशुलिपि के प्रशिक्षण का लक्ष्य भी संस्थान द्वारा पूरा कर लिया गया है तथा केवल दो नव नियुक्त टंकक अपनी टंकण परीक्षा शीघ्र देंगे।

संस्थान में वार्षिक कार्यक्रम में निहित लक्ष्यों को पूरा करते हुए संस्थान के अधिकारियों/ कर्मचारियों द्वारा अपनी ओर से लिखे जाने वाले सभी पत्र तो हिन्दी अथवा द्विभाषी रूप में लिखे ही गये साथ ही, 'क', 'ख' तथा 'ग' क्षेत्रों से अँग्रेज़ी में प्राप्त पत्रों के उत्तर भी शत-प्रतिशत हिन्दी में अथवा द्विभाषी रूप में दिये गये। 'क' तथा 'ख' क्षेत्रों की राज्य सरकारों एवं उनके कार्यालयों और ग़ैर-सरकारी व्यक्तियों के साथ पत्राचार शत-प्रतिशत हिन्दी में अथवा अपेक्षानुसार द्विभाषी रूप में ही किया गया। संस्थान के विभिन्न वैज्ञानिक प्रभागों तथा प्रशासनिक अनुभागों द्वारा आयोजित की जाने वाली बैठकों की कार्यसूची तथा कार्यवृत्त शत-प्रतिशत हिन्दी में अथवा द्विभाषी रूप में जारी किये गये।

भारत सरकार, गृह मंत्रालय, राजभाषा विभाग द्वारा जारी वार्षिक कार्यक्रम के अनुसार अपना कार्य शत-प्रतिशत हिन्दी में करने के लिए आठ अनुभागों को विनिर्दिष्ट करने का लक्ष्य संस्थान द्वारा पहले ही प्राप्त कर लिया गया है। हमारे संस्थान में अपना कार्य शत-प्रतिशत हिन्दी में करने के लिए दस अनुभाग पहले से ही विनिर्दिष्ट हैं।

प्रशासनिक कार्य के अतिरिक्त संस्थान में वैज्ञानिक प्रकृति के कार्यों में भी हिन्दी के उपयोग को प्रोत्साहित किया जाता है। वैज्ञानिकों ने अपनी परियोजना रिपोर्टों के सारांश द्विभाषी रूप में दिये, विद्यार्थियों द्वारा अपने शोध-प्रबन्धों में द्विभाषी रूप में सारांश प्रस्तुत किये गये। वैज्ञानिकों एवं तकनीकी कर्मियों द्वारा हिन्दी में शोध-पत्र प्रकाशित किये गये । इसके अतिरिक्त, संस्थान से बाहर आयोजित हिन्दी संगोष्ठियों में भी संस्थान के तकनीकी कर्मियों ने सहभागिता की। संस्थान द्वारा किये जाने वाले सर्वेक्षणों की प्रश्नावलियाँ/प्रपत्र/निर्देश द्विभाषी रूप में तैयार किये गये।

संस्थान द्वारा हिन्दी पत्रिका, "सांख्यिकी-विमर्श" के चौथे अंक का प्रकाशन किया गया। इस अंक में संस्थान के कीर्तिस्तम्भ, संस्थान द्वारा इस वर्ष किये गये अनुसंधानों व अन्य कार्यों का संक्षिप्त

विवरण, वर्तमान परिदृश्य एवं भावी चुनौतियों की एक झलक, राजभाषा से सम्बन्धित कार्यों/गतिविधियों की जानकारी के साथ-साथ कृषि अनुसंधान डाटा पुस्तिका एवं पुस्तकालय कन्सोर्टियम का विवरण भी दिया गया है। साथ ही, कृषि सांख्यिकी एवं कृषि में संगणक अनुप्रयोग से सम्बन्धित विभिन्न लेखों एवं शोध-पत्रों, जिनमें कुछ प्रमुख एवं नवीनतम अनुसंधानों के व्याख्यान एवं सॉफ़्टवेयर का वर्णन है, से भी पाठकों को परिचित कराया गया है। संस्थान में आयोजित डॉ. दरोगा सिंह स्मृति व्याख्यानमाला के अन्तर्गत 17वाँ वैज्ञानिक व्याख्यान इस वर्ष खाद्य एवं कृषि संगठन (एफ.ए.ओ.) के पूर्व विशेषज्ञ, डॉ. कर्ण देव सिंह जी द्वारा ''ग्रामीण दरिद्रता.....सकते हैं'' विषय पद दिया गया। जिसे आमन्त्रित ज्ञानवर्धक लेख के रूप में इस पत्रिका में सम्मिलित किया गया है। अन्त में, दैनिक स्मरणीय सांख्यिकीय एवं संगणक अनुप्रयोग से सम्बन्धित सौ शब्दों का शब्द-शतक हिन्दी व अँग्रेज़ी में दिया गया है।

संस्थान की वेबसाइट द्विभाषी है जिसको समय-समय पर अद्यतन किया गया। इस वर्ष संस्थान की वेबसाइट पर उपलब्ध "हिन्दी-सेवा लिंक" में द्विभाषी टिप्पणियों तथा वैज्ञानिक तथा प्रशासनिक शब्दावली में सामग्री जोड़ने के साथ-साथ पदनामों की द्विभाषी सूची भी शामिल की गयी है।

गृह मंत्रालय, राजभाषा विभाग द्वारा जारी तथा परिचालित विभिन्न नकद पुरस्कार योजनाएँ संस्थान में लागू हैं। संस्थान के कर्मियों ने इन योजनाओं में भाग लिया ।

संस्थान में सितम्बर 2008 के दौरान हिन्दी पखवाड़े का आयोजन किया गया। इस दौरान आयोजित कार्यक्रम/प्रतियोगिताएँ इस

डॉ. पी.के. जोशी, प्रोफेसर अलोक डे को सम्मानित करते हुए

प्रकार हैं: काव्य-पाठ, शिक्षक दिवस, डॉ. दरोगा सिंह स्मृति व्याख्यान, प्रभागीय चल-शील्ड, प्रश्न-मंच, हिन्दी श्रुतलेख एवं शब्दार्थ लेखन (हिन्दीतर भाषियों के लिए), हिन्दी वर्तनी एवं शोध -पत्र-पोस्टर-प्रदर्शन प्रतियोगिता। संस्थान में 05 सितम्बर 2008 को शिक्षक दिवस का आयोजन किया गया । इस अवसर पर मुख्य अतिथि, प्रोफेसर अलोक डे को सम्मानित किया गया। 15 सितम्बर 2008 को हिन्दी दिवस समारोह के मुख्य अतिथि, भारतीय कृषि अनुसंधान परिषद् के उप-महानिदेशक (एन.आर. एम), डॉ. अनिल कुमार सिंह द्वारा सफल प्रतियोगियों को पुरस्कृत किया गया।

IASRI

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1959-2009

List of Approved On-going Research Projects

Remote Sensing and Geographic Information System

1. Developing remote sensing based methodology for collecting agricultural statistics in North-East hilly region.

   Prachi Misra Sahoo, Anil Rai , HVL Bathla, Tauqueer Ahmad, Samir Farooqi

Assessment and Evaluation Studies

2. Impact assessment of fisheries research in India.

   GP Reddy (NAARM, Hyderabad), AK Vasisht, DR Singh

3. Study on status and projection estimates of agricultural implements and machinery

   KKTyagi, Jagbir Singh, KK Kher, VK Jain, Surendra Singh (CIAE, Bhopal)

Production and Area Estimation

4. Study to investigate the causes of variation between official and trade estimates of cotton production.

   Tauqueer Ahmad, HVL Bathla, Anil Rai, Prachi Misra Sahoo, AK Gupta, VK Jain, DV Mhadgut (CIRCOT, Mumbai)

5. Pilot study to develop sampling methodology for estimation of production of mushroom.

   AK Gupta, UC Sud, DC Mathur

6. Pilot study on small area crop estimation approach for crop yield estimates at the gram panchayat level.

   UC Sud, HVL Bathla, RS Khatri, VK Mahajan, DC Mathur, Hukum Chand

7. Small area estimation for zero inflated data

   Hukum Chandra, HVL Bathla, UC Sud

Cropping Systems Research

8. Planning, designing and analysis of experiments planned ON STATION under the Project Directorate of Cropping Systems Research.

   Anil Kumar, Aloke Lahiri, OP Khanduri

9. Planning, designing and analysis of ON FARM research experiments planned under Project Directorate of Cropping Systems Research.

   NK Sharma, PK Batra, OP Khanduri

10. Planning, designing and analysis of data relating to experiments conducted under AICRP on long-term fertilizer experiments.

    DK Sehgal, Krishan Lal, SMG Saran, Shashi Dahiya

11. A statistical investigation on production, economic and energy potential of crop sequences in different agro-ecosystems.

    Anil Kumar

12. Planning, designing and analysis of experiments relating to AICRP on STCR.

    Aloke Lahiri, VK Gupta, A Subha Rao, Y Muralidharudu (IISS, Bhopal), Rajender Parsad, Abhishek Rathore (IISS, Bhopal) VK Sharma (upto 31-01-2008).

13. Long term manurial and fertilizer experiment on potato based cropping systems.

    CPRI Campus, Modipuram: NC Upadhayay, OP Singh, AK Shukla, MA Khan, BP Singh, DB Singh, V Sunaina, Kamlesh Malik, Nalini Rajan Kumar, Dinesh Kumar

    From CPRI, Shimla: MC Sood, PM Govindakrishnan, KP Chandran

    From PDCSR, Modipuram: SS Paul

    From IASRI, New Delhi: Rajender Parsad

14. Impact of micronutrients on crop productivity and returns.

    SP Bhardwaj, Rajendra Kumar, Ashok Kumar, Anil Kumar

Information System for Agricultural and Animal Experiments

15. Agricultural field experiments information system.

    PK Batra, OP Khanduri, DK Sehgal, Rajender Parsad, Sudeep Marwah

Experimental Design for Agricultural, Animal, Agroforestry and Fisheries Research

16. Designs for mixture experiments in agriculture.

    Krishan Lal, VK Gupta, PK Batra, Lalmohan Bhar

17. Estimation of extent of farming practices, resources and activities with energy use.

    Jagbir Singh, KK Tyagi, KK Kher, AK Gupta, VK Jain

18. Web solutions for partially balanced incomplete block designs.

    Anu Sharma, Cini Varghese, Seema Jaggi

19. Experimental designs for agricultural research involving sequences of treatments. (Lal Bahadur Shastri Young Scientist Award Project)

    Cini Varghese, Seema Jaggi

Studies on Gene Action, Estimation of Genetic Parameters and Genetic Merit, Genetic Progress and Other Related Statistical Methods

20. Effect of selection and incomplete model specifications on heritability estimates.

    VK Bhatia, SD Wahi, AK Paul, AR Rao

21. A statistical study of rainfall distribution and rainfall insurance.

    Asha Saksana, Prajneshu, Himandri Ghosh

22. Computational analysis of SNPs at functional elements of rice areas.

    AR Rao, Anu Sharma, SB Lal, Trilochan Mohapatra (NRCPB, New Delhi)

23. Empirical investigations on estimation of genetic correlation.

    SD Wahi, AR Rao

24. Whole Genome Association (WGA) analysis in common complex diseases: An Indian initiative (DBT Funded)

    BK Thelma (UDSC, New Delhi), Ramesh C. Juyal (NII, New Delhi), Sanjay Jain (DU), **AR Rao**, Ashok Kumar (AIIMS, New Delhi), Ajit Sood (DMC, Ludhiana)

25. Risk Assessment and Insurance Products for Agriculture (NAIP).

    NCAP, New Delhi: PK Joshi, BC Barah
    IASRI, New Delhi: Anil Rai, PK Malhotra
    KK Chaturvedi, Ramasubramanian V

Forecasting Techniques in Agricultural System

26. Crop forecasting using state space models.

    Ramasubramanian V, Chandrahas

27. Neural network based forecast modeling in crops.

    Amrender Kumar, Ramasubramanian V, Ranjana Agrawal

28. Stochastic process modeling and forecasting through discrete nonlinear time series approach.

    Himadri Ghosh, Prajneshu

29. Use of discriminant function and principal component techniques for weather based crop yield forecast.

    Chandrahas, Ranjana Agrawal, SS Walia

30. Weather based models for forecasting potato yield in UP.

    SC Mehta, Satya Pal, Vinod Kumar, Krishi Bhawan Lucknow

31. Development of Forecasting module for podfly, *Melanagromyza obtusa* Malloch in late pigeonpea.

    SK Singh (IIPR, Kanpur), Ranjana Agrawal Amrender Kumar

Study of Technological Change, Risk and Uncertainity in Agriculture

32. A study on editing and imputation using Neural Networks.

    Ramasubramanian V, Ranjana Agrawal, SB Lal

33. An econometric analysis of groundwater markets in Indo-Gangetic Plains of India.

    DR Singh, A K Vasisht, Prawin Arya , Ashok Kumar, Mahender Singh

34. Visioning, policy analysis and gender (V-PAGe) (Sub-Prog. III): Policy analysis & market intelligence (NAIP Project).

    VK Bhatia, AK Vasisht, DR Singh, Ashok Kumar, SP Bhardwaj, Prawin Arya , Sushila Kaul, Pratap Singh (NCAP, New Delhi), NP Singh (IARI, New Delhi), Anil Rai, KK Chaturvedi

35. Visioning Policy Analysis and Gender (V-PAGe) Sub-Prog. II: Technology forecasting.

    VK Bhatia, Ranjana Agrawal, Ramasubramanian V, Amrender Kumar, Satya Pal, Anil Rai, KK Chaturvedi, Girish Kumar Jha (IARI, New Delhi)

36. An econometric study of women empowerment through dairying in selected districts of Haryana.

    Sushila Kaul, SP Bhardwaj, Sanjeev Panwar

Development of Databases and Information System for National Agricultural Research System

37. Statistical Package for Animal Breeding 2.1 (SPAB 2.1).

    IC Sethi, SD Wahi

38. Knowledge data warehouse for agricultural research

    Anil Rai, PK Malhotra, Seema Jaggi, KK Chaturvedi, Prachi Mishra Sahoo, Mohd. Samir Farooqi

39. Strengthening, refining and implementation of expert system on wheat crop management.

    SN Islam, HO Agarwal, Mohd. Samir Farooqi, KK Chaturvedi, HS Sikarwar

40. Decision support system for manpower planning – PERMISnet.

    Alka Arora, Balbir Singh, Samir Farooqi, Shashi Dahiya, Anil Rai

41. National Information System on Agricultural Education Network in India (NISAGENET 2).

    RC Goyal, PK Malhotra, Ashok Kumar , VH Gupta, KK Chaturvedi , Mohd. Samir Farooqi, Sudeep Marwah

42. Internet solutions for PG School, IARI.

    Sudeep Marwaha, Hari Om Agarwal, Pal Singh

43. Machine learning approach for data mining

    Anshu Bharadwaj, Shashi Dahiya, Rajni Jain (NCAP, New Delhi).

44. An eLearning solutions for agricultural education.

    Shashi Dahiya, Anshu Bharadwaj, KK Chaturvedi, Seema Jaggi, Cini Varghese

45. Project Information & Management System of ICAR (PIMS-ICAR)

    RC Goyal, PK Malhotra, VH Gupta, Sudeep Marwaha, Alka Arora, Pal Singh

46. National Information System on Agricultural Education Network in India (NISAGENET).

    RC Goyal, VH Gupta

47. Software for Survey Data Analysis.

    SB Lal, Anu Sharma, VK Mahajan, Hukum Chandra, Anil Rai

48. Development of Expert System on Seed Spices.

    SN Islam, Hari Om Agarwal: NRC on Seed Spices, Tabiji, Ajmer RK Kakani, Krishna Kant, OP Aishwat, MA Khan and GK

49. Development of Web Enabled Statistical Package for Agricultural Research (SPAR 3.0).

    Sangeeta Ahuja

50. Development of gender information system for agriculture.

    H.K. Dash (NRCWA), S.B. Lal (IASRI)


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