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वार्षिक रिपोर्ट ANNUAL REPORT 2005-06

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ANNUAL REPORT

2005-06

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान, भा.कृ.अनु.प.,
लाइब्रेरी एवेन्यू, पूसा, नई दिल्ली-110012

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

Preface

It gives me immense pleasure in bringing out the Annual Report 2005-06 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 grew over time into a full fledged Institute headed by a Director in the year 1970. The Institute got its present name in the year 1978. 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 blend towards applications, it has made its presence felt in the National Agricultural Research System. The Institute has started becoming a repository of information on Agricultural Research Data. The Institute has taken a lead in the country in developing a data warehouse 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 organisations 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.

The Institute initiated various new studies/projects during the year. These are- 'Crop forecasting using state space models', 'Development of PERMISnet-II' and 'Effect of selection and incomplete model specification on heritability'. The Institute also initiated some outside funded projects on - 'Assessment of survey capabilities of private sector' and 'Pilot study to develop an alternative methodology for estimation of area and production of horticultural crops'. The Institute also undertook a CSO sponsored project on the preparation of manuals on `Area and crop production statistics'; 'Animal husbandry statistics'; 'Agricultural prices and marketing'; 'Cost of cultivation surveys', and 'Horticulture and spices statistics'.

A Brain Storming Session on 'Statistical Issues in Rapeseed-Mustard Trials' in collaboration with National Research Centre on Rapeseed-Mustard was also organised. The Institute also provided consultancy services to various research studies/projects in NARS.

A lead paper entitled 'Fertiliser Response Ratios' analysing the crop-fertiliser ratios for various crops in different regions of the country, was presented during Brain Storming Session on Declining Crop Responses to Fertilisers.

In a bid to evolve efficient design of experiments for quality agricultural research, a comprehensive catalogue of A-efficient α-designs was prepared.

I am happy to note that some of our colleagues received academic distinctions during the year. Dr. VK Gupta received ICAR National Professor Award for his contributions in the field of Agricultural Statistics to work in the project entitled 'Designs for single factor and multi-factor experiments and their applications in agricultural systems research'. Dr. VK Gupta was also awarded Prof. PV Sukhatme Gold Medal Award for outstanding contributions in Agricultural Statistics from Indian Society of Agricultural Statistics, New Delhi. Dr. Rajender Parsad, National Fellow was awarded Dr. DN Lal Memorial Lecture Award from Indian Society of Agricultural Statistics, New Delhi.

The scientists of the Institute were deputed for presentation of their papers in various national/ international conferences.

To promote Hindi, a poster presentation of research papers in Hindi was organized at the Institute and scientists were also awarded for their 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 benefit immensely 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.

(SD SHARMA)
Director

Advisors / Directors

Dr. P.V. Sukhatme	.....	September, 1940 - July, 1951
Dr. V.G. Panse	.....	August, 1951 - March, 1966
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
Dr. S.D. Sharma	.....	October, 1997 onwards

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
	• Establishment of Revolving Fund Multimedia Lab for conduct of training programs in Information Technology
2002	• Establishment of National Information System on Animal Experiments Laboratory funded through AP Cess Fund
	• Development of PIMSNET(Project Information Management System on Internet) for NATP
	• Establishment of Post-Graduate Laboratory for students
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	• Initiation of "National Information System on Agricultural Education" (NISAGENET) Project
	• 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) released
	• Statistical Package for Agricultural Research (SPAR) 2.0 released
	• Design Resources Server with an aim to provide E-advisory in NARS initiated
	• Establishment of Statistical Computing Lab
	• Stregthening of Reproductive Lab with colour photocopier
	• Installation of Digital Telephone Exchange

Goal

Indian Agricultural Statistics Research Institute (IASRI) conducts research, education and training in Agricultural Statistics and Computer Application in Agriculture

Mandate

- To undertake basic, applied and adaptive research leading to new developments in Agricultural Statistics and related fields for bridging of gaps in the application of statistical techniques to the problems of agricultural research
- To assist in the development and strengthening of National Agricultural Statistics System
- To conduct post-graduate and in-service training courses in Agricultural Statistics and Computer Application in Agriculture
- To provide advisory/consultancy services to agricultural scientists, planners, policy makers and others on their statistical and computing requirements
- To act as a repository of information on Agricultural Statistics for research and dissemination of such information
- To develop the Institute as an Advanced Centre of Excellence for education and training in Agricultural Statistics and Computer Application
- To liaise with ICAR Institutes, SAUs and State Agricultural/Animal Husbandry/Veterinary Sciences departments etc. and undertaking sponsored research and training for national and international organisations

विशिष्ट सारांश

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान (भा.कृ.अनु.प.) की स्थापना सन् 1959 में कृषि सांख्यिकी अनुसंधान संस्थान के रूप में हुई और तभी से यह संस्थान कृषि सांख्यिकी में अनुसंधान के साथ-साथ शिक्षा/प्रशिक्षण प्रदान 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 गए 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 उन्नत केन्द्र के रूप में संस्थान को विकसित करना, भा.कृ.अनु.प. के अन्य संस्थानों एवं राज्य कृषि विश्वविद्यालयों, 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 द्वारा प्रायोजित अनुसंधान करना और प्रशिक्षण प्रदान करना।

इस वर्ष के दौरान, संस्थान के विभिन्न प्रभागों - प्रतिदर्श सर्वेक्षण, परीक्षण अभिकल्पना, जैवमिति, पूर्वानुमान तकनीक, अर्थमिति और संगणक अनुप्रयोग में अनेक अनुसंधान परियोजनाएँ चलाई गईं। कुल 30 अनुसंधान परियोजनाओं के अन्तर्गत अनुसंधान किया गया जिनमें से 17 परियोजनाएँ संस्थान द्वारा, 8 ए.पी. सेस फ़ण्ड द्वारा और 5 बाह्य ऐजेंसियों द्वारा वित्त पोषित थीं। इन 30 परियोजनाओं में से 5 परियोजनाएँ (2 संस्थान द्वारा तथा 3 ए.पी. सेस फ़ण्ड द्वारा वित्त पोषित) पूरी हो चुकी हैं। इस वर्ष 4 नई परियोजनाएँ (2 संस्थान द्वारा तथा 2 केन्द्रीय सांख्यिकी संगठन द्वारा वित्त पोषित) आरम्भ की गईं।

कुछ प्रमुख अनुसंधान उपलब्धियाँ निम्न हैं :

- उच्च कोटि के कृषि अनुसंधान के लिए परीक्षणों की दक्ष अभिकल्पनाएँ विकसित करने की दृष्टि से A एवं D दक्षताओं की न्यूनतम सीमाओं के साथ α-अभिकल्पनाओं का एक विस्तृत कैटलॉग तैयार किया गया।
- परीक्षण उपचार-नियंत्रण उपचार की तुलना करने के लिए नीड़ित ब्लॉक अभिकल्पनाओं के निर्माण की एक नई विधि विकसित की गई जिससे उप-ब्लॉक के संदर्भ में मिनिमली कनेक्टेड अभिकल्पनाएँ प्राप्त हुईं।
- 'उर्वरकों के संतुलित उपयोग' पर कृषि मंत्रालय, भारत सरकार द्वारा गठित कार्य-दल की संस्तुतियों के आधार पर, फार्म पर किए जा रहे परीक्षणों की सहायता से विभिन्न पोषक तत्वों के लिए विभिन्न फ़सलों के उर्वरक अनुक्रिया अनुपातों के मूल्यांकन पर एक विस्तृत अध्ययन किया गया तथा राज्य एवं राष्ट्रीय स्तर पर खाद्यान्नों, दलहनी, तिलहनी फसलों के अनुक्रिया अनुपात प्राप्त किए गए।
- मिट्टी के विभिन्न लक्षणों, अर्थात् उपलब्ध N, P, K, pH और OC के साथ उपज प्रवृत्तियों का अध्ययन करने के लिए मिट्टी के आँकड़े प्रतिलेखित किए गए। विभिन्न सस्य-क्रम-प्रणालियों में फ़ॉस्फ़ोरस डालने का स्तर एवं आवृत्ति का निर्धारण करने के लिए किए गए परीक्षणों के सांख्यिकीय विश्लेषण से पता चलता है कि फ़ॉस्फ़ोरस के उचित उपयोग के लिए प्रति दूसरे वर्ष किसी भी फसल-ऋतु में 30 कि.ग्रा. की दर से P_2O_5 प्रति हेक्टेयर खेत में डालना लाभकारी हो सकता है।
- कृषिवानिकी परीक्षण के लिए, पारस्परिक लांबिक लैटिन वर्ग के एक पूर्ण समुच्चय की सहायता से v वृक्ष प्रजातियों और (v-1) फ़सल प्रजातियाँ लेकर वृक्ष प्रभावों के लिए वृत्तीय निकटवर्ती सन्तुलित पूर्ण ब्लॉक अभिकल्पनाओं की एक श्रृंखला प्राप्त की गई।
- सभी त्रुटि सहसंबंध संरचनाओं के लिए संतुलित, सम ब्लॉक आकारों वाली, युगलतः एकसमान, अभिकल्पनाओं की एक श्रृंखला प्राप्त की गई।
- अनेक आउटलायरों की उपस्थिति में प्रच्छादी प्रभाव की जाँच करने के लिए, विभिन्न परीक्षणात्मक परिस्थितियों में एक नवीन विकसित प्रतिदर्शज का उपयोग किया गया जिससे निष्कर्ष निकला कि व्यष्टिगत रूप से कुछ प्रेक्षण प्रभावी नहीं थे, परन्तु अन्य प्रेक्षणों के साथ संयुक्त रूप से वे प्रभावी पाए गए।
- मेघालय में कृषि सांख्यिकी एकत्रित करने की दृष्टि से सुदूर संवेदन आधारित पद्धति के उपयोग की संस्तुति की गई और भू-सर्वेक्षण एवं

सुदूर संवेदन से प्राप्त वर्गीकृत चित्रों की सहायता से धान की फ़सल के अन्तर्गत आने वाले क्षेत्रफल के उपयुक्त आकलन विकसित किए गए। इसके अतिरिक्त, अनुपात आकलक, ग्रिड आधारित प्रतिचयन इत्यादि जैसी आकलन की विभिन्न विधियों का उपयोग करके चित्र में बादलों/बादल की छाया से आच्छादित धान के क्षेत्र का आकलन किया गया।

- अनेक संकेतकों एवं वस्तुगत जाँच के आधार पर, एक प्रायोजित अध्ययन के माध्यम से निजी क्षेत्र की सर्वेक्षण क्षमताओं का मूल्यांकन किया गया।
- न्यूरल नेटवर्क की सहायता से संपादन एवं आरोपण पर एक अध्ययन में अप्राप्त आँकड़े आरोपित करने के लिए जावा में कमान्ड लाइन इण्टरफ़ेस में पश्च चरण एल्गोरिथ्म का विकास किया गया।
- फ़सल राजस्व बीमा के अन्तर्गत कर्नाटक राज्य के विभिन्न ज़िलों की विभिन्न फसलों के लिए वर्तमान उपज उपागम पद्धतियों की सहायता से, किस्त की दरों का आकलन किया गया।
- ग्रामीण परिवारों की आहार प्रणाली एवं पोषण स्तर पर किए गए एक अध्ययन से, आहार में अनाज के उपयोग में कमी तथा अनाज रहित आहार में वृद्धि की एक सामान्य प्रवृति देखी गई। अध्ययनाधीन अधिकांश राज्यों में दूध एवं दूध से बने उत्पादों, अण्डे, मांस, मछली एवं फल व सब्जियों आदि जैसे पदार्थों के उपभोग की मात्रा में वृद्धि की प्रवृत्ति पाई गई। परन्तु, अनाज वाले आहार के स्थान पर अनाज रहित आहार लेने की प्रवृत्ति सभी सामाजिक-आर्थिक वर्गों में एक समान नहीं देखी गई। ग्रामीण परिवारों में विटामिन एवं खनिजों सहित विभिन्न महत्वपूर्ण पोषक तत्वों की कमी पर भी अध्ययन करने के प्रयास किए गए। यह देखा गया कि विभिन्न पोषक तत्वों की कमी वाले परिवारों का अनुपात विभिन्न राज्यों एवं जोतों वाले परिवारों में अलग-अलग था। अधिकांश राज्यों के ग्रामीण क्षेत्रों में पोषक तत्वों की कमी वाले परिवारों का अनुपात, भूमिहीन, न्यूनतम भूमि तथा कम भूमि वाले परिवारों में अधिक पाया गया जो कि जोतों के आकार में वृद्धि के साथ कम होता गया। विश्लेषण से यह संकेत मिलते हैं कि अधिकांश राज्यों में भूमिहीन, न्यूनतम भूमि एवं कम भूमि वाले परिवारों को लक्ष्य-समूह के रूप में मानते हुए, उनके पोषण स्तर को बनाए रखने के लिए उनकी आय बढ़ायी जानी चाहिए।
- विगत दशकों के दौरान देश में लाख के कुल उत्पादन में हो रही कमी की समस्या का व्यावहारिक समाधान निकालने के लिए 'भारत में लाख विपणन' पर एक अध्ययन किया गया। तद्नुसार, लाख का उत्पादन करने वाले मुख्य राज्यों, झारखण्ड, पश्चिम बंगाल, छत्तीसगढ़, मध्यप्रदेश और महाराष्ट्र में सर्वेक्षण आँकड़ों का उपयोग करके एक समेकित प्रणाली अपनाकर लाख के तीन मुख्य पक्षों अर्थात् लाख की खेती, विपणन और प्रसंस्करण का अध्ययन किया गया।
- विभिन्न स्रोतों से उपलब्ध कृषि अनुसंधान, शिक्षा एवं अन्य संबंधित पक्षों की सूचनाओं को कृषि अनुसंधान डाटा पुस्तिका 2005 के रूप में संकलित किया गया। इस श्रृंखला की यह नौवीं कड़ी है और इसमें संबंधित सूचना के प्रमुख घटक/सूचकों को एक साथ संकलित करने का प्रयास किया गया है।
- जीनोटाइप x पर्यावरण आँकड़े अप्रसामान्य होने पर अप्राचलिक स्थायित्व युक्तियों के कार्य निष्पादन पर सांख्यिकीय अन्वेषण के अन्तर्गत विभिन्न अप्राचलिक स्थायित्व युक्तियों की गुणवत्ता का अध्ययन किया गया।
- कृषि एवं संबंधित विज्ञान के उभर रहे क्षेत्रों में प्रयुक्त होने वाली महत्वपूर्ण गुच्छ विधियों का सर्वसमावेशी एवं समीक्षात्मक अध्ययन करने के उद्देश्य से स्थिर एवं रॉबस्ट गुच्छ प्रक्रियाओं पर कुछ अन्वेषण किए गए।
- आनुवंशिक प्रसरण संघटकों के परिशुद्ध आकलन का अध्ययन करने के लिए विभिन्न विधियों की पहचान की गई और विभिन्न स्थितियों में वंशागतित्व आकलकों की अभिनति का अध्ययन किया गया।
- पशु प्रजनन के लिए सांख्यिकीय पैकेज 2 (एस.पी.ए.बी. 2) नामक परियोजना के अन्तर्गत विभिन्न मॉडल विकसित किए गए।
- 'गेहूँ की फसल के प्रबंधन पर विशेषज्ञ तंत्र का विकास' नामक परियोजना के लिए तंत्र में मल्टी मीडिया प्रभाव जोड़े गए ताकि उसकी आवाज़ से उपयोगकर्त्ता को रोगों, कीटों और खरपतवारों की पहचान करने में सुविधा हो सके।
- निसेजनेट परियोजना के अन्तर्गत, विभिन्न राज्य कृषि विश्वविद्यालयों और अनुसंधान संस्थानों में विभिन्न कार्यशालाओं के माध्यम से सक्रियकरण, सम्भाव्यता एवं आवश्यकता विश्लेषण किए गए।
- 'सर्वेक्षण आँकड़ों के विश्लेषण के लिए सॉफ़्टवेयर का विकास' नामक परियोजना के अन्तर्गत नवीनतम .नेट प्रौद्योगिकी की अतिरिक्त

सुविधाओं के साथ C++ लैंग्वेज की उद्देश्योन्मुख प्रोग्रामिंग संकल्पनाओं का प्रयोग किया गया।

- वर्तमान परमिसनेट को सुदृढ़ बनाने एवं नेट प्रौद्योगिकी के उपयोग द्वारा, मानव-शक्ति नियोजन की आवश्यकतानुसार नए मॉडल जोड़ने के उद्देश्य से 'परमिसनेट-।। का विकास' नामक एक परियोजना आरम्भ की गई।
- कृषि क्षेत्र परीक्षण सूचना तंत्र (ए.एफ.ई.आई.एस.) के लिए एक नया वेब-इनेबल सॉफ़्टवेयर विकसित किया गया जो भा.कृ.सां.अ.सं की वेबसाइट पर उपलब्ध है।
- भारतीय कृषि अनुसंधान परिषद् के बागवानी, फ़सल विज्ञान एवं एन.आर.एम. प्रभागों के अन्तर्गत विभिन्न संगठनों में चल रहे/समाप्त हो चुके दीर्घकालीन उर्वरक परीक्षणों के आँकड़ों के भण्डारण एवं उनके रखरखाव के लिए 'दीर्घकालीन उर्वरक परीक्षणों पर राष्ट्रीय सूचना तंत्र' विकसित किया गया।
- संस्थान के वार्षिक दिवस समारोह में दो, सांख्यिकीय पैकेज- 'स्टैटिस्टिकल पैकेज फ़ॉर एग्रिकल्चरल रिसर्च (स्पार 2.0)' और 'स्टैटिस्टिकल पैकेज फ़ॉर ऑगमेन्टेड (एस.पी.ए.डी.)' जारी किए गए।

संस्थान के वैज्ञानिकों द्वारा राष्ट्रीय एवं अन्तरराष्ट्रीय स्तर के जर्नलों में 57 शोध-पत्र, 08 पुस्तकों में अध्याय तथा 12 परियोजना/तकनीकी रिपोर्टें प्रकाशित की गईं।

वर्ष के दौरान संस्थान के कुछ वैज्ञानिकों ने अकादमिक सम्मान प्राप्त किए। डॉ. वी.के. गुप्ता ने कृषि सांख्यिकी के क्षेत्र में अपने योगदान के लिये 'एकल कारक एवं बहु-कारक परीक्षणों के लिए अभिकल्पनाएँ और कृषि प्रणाली अनुसंधान में उनका अनुप्रयोग' नामक परियोजना में कार्य हेतु भा.कृ.अनु.प. का राष्ट्रीय प्रोफ़ेसर सम्मान प्राप्त किया। डॉ. वी.के. गुप्ता को कृषि सांख्यिकी में उनके उत्कृष्ट योगदान के लिए भारतीय कृषि सांख्यिकी संस्था द्वारा वर्ष 2004 एवं 2005 के लिए प्रोफ़ेसर पी.वी. सुखात्मे स्वर्ण पदक (द्विवर्षी) प्रदान किया गया। डॉ. राजेन्द्र प्रसाद, राष्ट्रीय अध्येता को भारतीय कृषि सांख्यिकी संस्था की ओर से द्विवर्षी 2004 एवं 2005 के लिए डॉ. डी.एन. लाल स्मृति व्याख्यान पुरस्कार प्रदान किया गया।

संस्थान के वैज्ञानिकों को अनेक राष्ट्रीय/अन्तरराष्ट्रीय सम्मेलनों में अपने शोध-पत्र प्रस्तुत करने के लिए प्रतिनियुक्त किया गया। हिन्दी को प्रोत्साहन देने के लिए संस्थान में एक 'शोध-पत्र पोस्टर प्रस्तुति' प्रतियोगिता आयोजित की गई जिसमें श्रेष्ठ हिन्दी पोस्टर तैयार करने के लिए वैज्ञानिकों को पुरस्कृत किया गया।

किसानों के आकलों की सहायता से लघु क्षेत्र स्तर पर फसल उपज का आकलन करने के लिए पद्धति तथा मृदा परीक्षण फ़सल अनुक्रिया सह-संबंध पर अखिल भारतीय समन्वित अनुसंधान परियोजना के लिए एक परीक्षणात्मक अभिकल्पना विकसित कर पणधारियों को स्थानान्तरित की गई। संस्थान के वैज्ञानिकों द्वारा राष्ट्रीय कृषि अनुसंधान प्रणाली (नार्स) के लिए सलाहकारी सेवाएँ उपलब्ध कराईं गईं। भारतीय कृषि अनुसंधान संस्थान, केन्द्रीय आलू अनुसंधान संस्थान, राष्ट्रीय मूंगफली अनुसंधान केन्द्र, राष्ट्रीय तोरिया एवं सरसों अनुसंधान केन्द्र, सी.सी.एस. हरियाणा कृषि विश्वविद्यालय और राष्ट्रीय पादप आनुवंशिकी संसाधन ब्यूरो में कार्यरत शोध-कर्मियों को परीक्षण अभिकल्पनाओं और परीक्षणात्मक आँकड़ों के विभिन्न विश्लेषण पक्षों पर सलाह दी गई।

कृषि भवन, नई दिल्ली में आयोजित एक अलग बैठक में फ़ार्म यांत्रिकीकरण परियोजना की अंतिम रिपोर्ट, कृषि मंत्रालय के सचिव, कृ. एवं स. वि., भा. कृ. अनु. प. के वरिष्ठ अधिकारियों तथा विशेषज्ञों के समक्ष प्रस्तुत की गई।

शेर-ए-कश्मीर कृषि विज्ञान एवं प्रौद्योगिकी विश्वविद्यालय, जम्मू में आयोजित भारतीय कृषि सांख्यिकी संस्था के 59वें वार्षिक सम्मेलन में प्रोफेसर एस.डी. शर्मा, सम्मेलन के सत्रीय अध्यक्ष ने 'सूचना, ज्ञान प्रबंधन तथा बौद्धिकता के लिए आई.सी.टी. पर तकनीकी भाषण प्रस्तुत किया। इस सम्मेलन में 'स्टैटिस्टिक्स एण्ड कम्प्यूटेशनल इश्यूज़ इन रेनफेड एग्रिकल्चर' तथा 'एनर्जी इश्यूज़ इन एग्रिकल्चर' पर दो सगोष्ठियां आयोजित की गईं।

डिक्लाइनिंग क्रॉप रेस्पॉन्सेस टु फ़र्टिलाइज़र्स पर ब्रेनस्टॉर्मिंग सत्र में एक प्रमुख-शोधपत्र (लीड पेपर) जिसमें देश के विभिन्न क्षेत्रों में विभिन्न फसलों के लिए फसल-उर्वरक अनुपात का विश्लेषण 'फ़र्टिलाज़र रेस्पॉन्स रेशियो' प्रस्तुत किया गया ।

विभिन्न कृषि जलवायवीय क्षेत्रों/राज्यों के लिए दीर्घकालीन यांत्रिकीकरण नीतियों पर एक दो-दिवसीय राष्ट्रीय कार्यशाला आयोजित की गई जिसमें राज्य सरकारों/कृषि एवं सहकारिता विभाग, कृषि मंत्रालय/भा.कृ.अनु.प., आर्थिक एवं सांख्यिकी निदेशालय, केन्द्रीय कृषि अभियांत्रिकी संस्थान के अधिकारियों, नीति संबंधी पेपर तैयार करने में शामिल विशेषज्ञों, संबद्ध वैज्ञानिकों, पुरस्कृत किसानों और विभिन्न संस्थानों व निजी संगठनों के अधिकारियों के साथ विभिन्न कृषि जलवायवीय क्षेत्रों/राज्यों के लिए दीर्घकालीन यांत्रिकीकरण नीतियों पर विचार-विमर्श हुआ।

भारतीय कृषि अनुसंधान परिषद के ए.पी.सैस फ़ंड द्वारा वित्तपोषित 'मौसम संबंधी प्राचलों और कृषि-निविष्टियों के उपयोग द्वारा फ़सल उपज के पूर्वानुमान हेतु मॉडलिंग' नामक परियोजना के परिणामों के प्रसार के लिये एक प्रसार-कार्यशाला आयोजित की गई।

'भारतीय कृषि अनुसंधान परिषद् में कार्मिक प्रबंधन सूचना तंत्र (परमिसनेट) पर प्रशिक्षण एवं कार्यान्वयन' पर दो एक-दिवसीय कार्यशालाएँ आयोजित की गईं जिसमें 84 नोडल अधिकारियों ने सहभागिता की।

7-8 जून 2005 के दौरान संस्थान में निसजनेट के लिए सक्रियकरण एवं आवश्यकता विश्लेषण पर एक कार्यशाला, आयोजित की गई। इस कार्यशाला में उत्तरी क्षेत्र के नोडल अधिकारियों के साथ-साथ उन नोडल अधिकारियों ने सहभागिता की जिन्होंने अपने-अपने क्षेत्रों में हुई पूर्व तीन कार्यशालाओं में सहभागिता नहीं की थी।

कृषि सांख्यिकी एवं संगणक अनुप्रयोग में उच्च अध्ययन केन्द्र के तत्वाधान में नार्स के शोधकर्मियों के लिए चार प्रशिक्षण कार्यक्रम चलाए गए।

संस्थान की शिक्षा एवं प्रशिक्षण से संबंधित गतिविधियों, जिसमें समस्त स्नातकोत्तर अध्यापन कार्यक्रमों का नियोजन, आयोजन एवं समन्वयन सम्मिलित है, पी.जी. स्कूल, भा.कृ.अनु.सं. के सहयोग से चलाई गईं। इस वर्ष कुल 10 छात्रों {3 पीएच.डी. (कृषि सांख्यिकी), 4 एम.एससी. (कृषि सांख्यिकी) तथा 3 एम.एससी. (संगणक अनुप्रयोग)} ने अपना डिग्री पाठ्यक्रम पूरा किया। 15 नए छात्रों {4 पीएच. डी. (कृषि सांख्यिकी), 5 एम.एससी. (कृषि सांख्यिकी) और 6 एम.एससी. (संगणक अनुप्रयोग)} को प्रवेश दिया गया। एम.एससी. तथा पीएच.डी. पाठ्यक्रमों के पाठ्य-विवरण में संशोधन करने के लिए गहन प्रक्रिया अपनाई गई।

भारत एवं दक्षेस देशों सहित विदेश के अनुसंधान संस्थानों/विश्वविद्यालयों में सांख्यिकीय आँकड़ों के संकलन, प्रसंस्करण एवं विवेचना के कार्य में लगे शोधकर्ताओं के लाभार्थ एक 'कृषि सांख्यिकी एवं संगणन में उच्च प्रमाण-पत्र पाठ्यक्रम' आयोजित किया गया। इस पाठ्यक्रम में 6 अधिकारियों ने सहभागिता की।

संस्थान का पुस्तकालय राष्ट्रीय कृषि अनुसंधान प्रणाली (एन.ए.आर.एस.) के अन्तर्गत देश का एक क्षेत्रीय पुस्तकालय है जो संस्थान के प्रयोक्ताओं के साथ-साथ अन्य अनुसंधान संगठनों के प्रयोक्ताओं की सूचना संबंधी आवश्यकताओं को पूरा करने में महत्वपूर्ण भूमिका निभा रहा है। पुस्तकालय की सेवाओं को पूरी तरह से डिजिटाइज़्ड कर दिया गया है जो पुस्तकालय की वेबसाइट (http://lib.iasri.res.in) पर उपलब्ध है। इस पुस्तकालय में उपलब्ध सभी संसाधनों और सेवाओं के लिंक दिए गए हैं।

Executive Summary

Indian Agricultural Statistics Research Institute (IASRI) established in 1959 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 30 research projects in the Institute, of which 17 were Institute funded, 8 AP Cess funded and 5 funded by outside agencies in various thrust areas. Out of these 30 projects, 5 projects (2 Institute funded, 3 AP Cess funded) were completed. This year, 4 new projects (2 Institute funded and 2 CSO funded) were initiated.

Some of the salient research achievements were:

- In a bid to evolve efficient design of experiments for quality agricultural research, a comprehensive catalogue of α - designs was prepared along with lower bounds to A and D efficiencies.

- A new method of construction of nested block designs for making test treatment-control treatment comparisons was developed which yielded minimally connected designs with respect to sub-blocks.
- On the recommendation of the task force on "Balanced Use of Fertilizer" constituted by Ministry of Agriculture, Govt. of India, a comprehensive study on evaluation of fertilizer response ratios for different crops for various nutrients using On-Farm trials was undertaken and response ratios for cereals, pulses, oilseeds at state and country level, were obtained.
- To study the yield trends in relation to different soil characteristics viz. available N, P, K, pH and OC, soil data were transcripted. Statistical analysis of experiments on determining level and frequency of phosphorus application in different cropping systems revealed that for judicious use of phosphorus, its application at the rate of 30 kg P_2O_5 per hectare applied in either season in alternate years might be economical.
- For agroforesty experiment, a series of circular neighbour balanced complete block designs with v tree species and (v-1) crop species balanced for tree effects were obtained using a complete set of mutually orthogonal latin squares.
- A series of pair-wise uniform designs with even block size balanced for all the error correlation structures was also obtained.
- For examining masking effect in the presence of many outliers, a newly developed statistic was employed in various experimental situations and it was concluded that individually some observations were not influential, but jointly with some other observations, they were found to be influential.
- With a view to collect Agricultural Statistics in Meghalaya, the use of remote sensing based methodology was advocated and suitable estimators for area under paddy crop were developed using the estimate obtained by road survey and classified images obtained through remote sensing. Besides this various methods of estimation like ratio estimators, grid based sampling etc. were used to estimate the paddy area covered by clouds/cloud shadows in the image.
- Based on several indicators and physical verification, the survey capabilities of private sector were assessed through a sponsored study.
- In a study on editing and imputation using Neural Networks, the back propagation algorithm for imputing the missing data was developed in command line interface in Java.
- Under the crop revenue insurance, premium rates were estimated with the help of existing yield approach methodologies for different crops of various districts of Karnataka state.
- From the study on Dietary pattern and nutritional status of rural households, a general trend of reduction was observed in consumption of cereal in favour of non cereal foods. The consumption of other non cereal foods like milk and milk products, egg, meat and fish, fruits and vegetables groups tend to increase in most of the states under study. However, the shift from cereal based to non cereal based diet was not visible in all categories of socio-economic groups uniformly. An effort was also made to study the rural households deficient in different nutrients including important vitamins and minerals. It was observed that the proposition of deficient households in different nutrients varied from state to state and among different categories of land holdings. In most of the states the proportion of deficient rural households was higher in landless, sub-marginal and marginal class and it decreased with the size of holdings. The analysis was suggestive that the landless, sub-marginal and marginal category of households in most of the states should be treated as target groups to raise their income, to maintain their nutritional status.
- The study on Lac marketing in India was undertaken with a view to provide a practical solution of the problem of declining trend in total lac production in the country during past decades. Accordingly an integrated approach was adopted where the three aspects namely lac cultivation, lac marketing and lac processing was examined in the major producing states of Jharkhand, West Bengal, Chhattisgarh, Madhya Pradesh and Maharashtra by primary survey data.
- Information pertaining to agricultural research, education and related aspects available from different sources were compiled together in the form of Agricultural Research Data Book 2005 which was ninth in the series and was an attempt to put together main components/indicators of such information.

- Under Statistical investigation on the performance of non-parametric stability measures when the genotype x environment data is non-normal, the merits of different non-parametric stability measures were examined.
- Some investigations on stable and robust clustering procedures were undertaken with the aim to study exhaustively and critically the important clustering methods used in most emerging fields in agriculture and allied sciences.
- The identification of different methods for studying precise estimation of genetic variance components was taken up and the bias of the estimates of heritability were examined under different situations.
- Under the project Statistical Package for Animal Breeding 2 (SPAB 2), different models were developed.
- For the project Development of expert system on wheat crop management, multimedia effects were added to the system for felicitating the user with its voice for identification for disease, insects and weeds.
- For the NISAGENET project, sensitization, feasibility and requirement analysis were carried out by conducting different workshops at various State Agricultural Universities and Research Institutions.
- Under the project development of Software for the analysis of survey data, the object oriented programming concepts on the language C^{++} with added advantages of the latest .NET technology was used.
- A new project Development of PERMISnet-II was initiated with a view to maintain and strengthen the existing PERMISnet and to add new models as per the requirement of manpower planning using .NET technology.
- New web-enable software for Agricultural Field Experiments Information System (AFEIS) was developed and is now available at IASRI website.
- National information system on long term fertilizer experiments was developed to store and maintain the data generated under long term fertilizer experiments in progress/concluded at various organizations under the Horticulture, Crop Sciences and NRM Divisions of ICAR.
- Two statistical packages Statistical Package for Agricultural Research (SPAR 2.0) and Statistical Package for Augmented Designs (SPAD) were released on the Annual Day Function of the Institute.

Scientists of the Institute published 57 research papers in National and International refereed journals along with 8 book chapters, and 12 project/technical reports.

Some scientists of the Institute received academic distinctions during the year. Dr. VK Gupta received ICAR National Professor Award for his contributions in the field of Agricultural Statistics to work in the project entitled 'Designs for single factor and multi-factor experiments and their applications in agricultural systems research'. Dr. VK Gupta was also awarded Prof. PV Sukhatme Gold Medal Award for outstanding contribution in Agricultural Statistics for the biennium 2004-05 from Indian Society of Agricultural Statistics. Dr. Rajender Parsad, National Fellow was awarded Dr. DN Lal Memorial Lecture Award from Indian Society of Agricultural Statistics, New Delhi for the biennium 2004-05.

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 scientists were also awarded for their outstanding contributions in preparation of Hindi posters.

The methodology for crop yield estimation at smaller area level using farmers' estimates and an experimental design for AICRP on STCR were developed and transferred to the stake holders. The scientists of the Institute also rigorously pursued the Advisory Services for the NARS. The research personnel from Indian Agricultural Research Institute, Central Potato Research Institute, National Research Centre for Groundnut, National Research Centre on Rapeseed and Mustard, CCS Haryana Agricultural University and National Bureau of Plant Genetic Resources, New Delhi were advised on various aspects of designing of experiments and analysis of experimental data.

In a separate meeting, the presentation of Final Report of Farm Mechanization project was made before the Secretary, Ministry of Agriculture, Senior Officials of DOAC, ICAR, and Experts at Krishi Bhavan, New Delhi

In the 59th Annual Conference of Indian Society of Agricultural Statistics held at Sher-e-Kashmir University of Agricultural Sciences & Technology, Jammu, the technical address entitled 'ICT as tool for Information, Knowledge Management and Intelligence' was delivered by Prof. SD Sharma, Sessional President of

the Conference. During this conference two symposia 'Statistical and Computational Issues in Rainfed Agriculture' and 'Energy Issues in Agriculture' were also convened.

A lead paper entitled 'Fertiliser Response Ratios' analysing the crop-fertiliser ratios for various crops in different regions of the country, was presented during Brainstorming Session on Declining Crop Responses to Fertilisers.

A two-days National Workshop on Long Term Mechanization Strategies for different Agro Climatic Zones/ States was organized for discussing the long term mechanization strategies for different agro climatic zones/States with officials of State Govt.(s)/DOAC, Ministry of Agriculture/ICAR, DES, CIAE, experts involved with the preparation of the strategy papers, associate scientists, award winning farmers and officials from different institutions and other private organizations.

In order to disseminate the findings of the project Modeling for forecasting of crop yield using weather parameters and agricultural inputs financed by AP Cess Fund of ICAR, a dissemination workshop was organized.

Two one-day workshops were also organized on 'Training and Implementation of Personnel Management Information System in ICAR (PERMISnet)'. Eighty-four Nodal Officers attended these workshops.

A workshop on Sensitization-cum-Requirement Analysis for NISAGENET project was organized at IASRI, New Delhi during 7-8 June 2005. The workshop was attended by Nodal Officers of the project of North zone and by Nodal Officers who did not attend the earlier three workshops held in their respective zones.

Four training programmes under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Application were organized for the research personnel of NARS.

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 this year, a total of 10 students {3 Ph.D.(Agricultural Statistics), 4 M.Sc. (Agricultural Statistics) and 3 M.Sc. (Computer Application)} completed their degrees. 15 new students {4 Ph.D. (Agricultural Statistics), 5 M.Sc. (Agricultural Statistics) and 6 M.Sc. (Computer Application)} were admitted. An intensive exercise was undertaken to revise the course curriculum of M.Sc. and Ph.D. courses.

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.

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 paraphernelia 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, Geo-media 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.

The LAN at IASRI has steadily been strengthened and the three buildings of IASRI have been connected using fiber optics cable as backbone and connectivity has been established for 265 nodes, of which 208 are active nodes, the LAN being switch manageable. This year 152 more nodes have been added. LAN has been extended to National Centre for Agricultural Economics and Policy Research (NCAP), an ICAR Institute located in the IASRI Campus. E-mail and Internet facilities are being provided to the scientists/technical/administrative staff of IASRI and NCAP. The Intranet services consisting of E-mail, notice board, details of the account holders, search facility, etc. are also available over the LAN to all the users. The notice board facility is being used for information dissemination among the users of the Institute.

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, new software and upgrades. Currently the internet services are being provided through three secure servers, two of them being high-end servers with multiple CPU capabilities on a 2 Mbps leased line with 1.5 Mbps band width provided under the NATP projects. The computing environment in the Institute has latest PCs, note book computers, laser printers both colour and B/W inkjet printers, scanners, CD-writers and video projectors. Software packages that are needed for application development, statistical data analysis, network securities, etc. 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, GLIM, Data warehouse software-Cognos, SPSS clementine, Irwin, MS Office, MS Office 2000, MS Visual Studio, Macro-Media, MS Project, STAR3, E-views, Gauntlet Active Firewall, Trend Micro Antivirus, etc. The latest versions of software package STATISTICA NEURAL NETWORKS, Gauss Software, Minitab 14, Maple 9.5, Eviews Std 5.0, Systat, Statistica, Sigma Plot and Lingo Super have been recently added to the library of software packages. MATLAB software package has also been added to the list of software packages. All the administrative and accounts sections of the Institute have been provided with PCs, printers and UPS.

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.

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. (CA) from the session 1993-94. The Institute has so far produced 159 Ph.D. and 272 M.Sc. students in the discipline of Agricultural Statistics and 70 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 and SCC courses were of one year duration while JCC was of six months duration. The Post Graduate Diploma Course was of one year duration, in which 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. 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 keeping in view the demand of trained manpower in Agricultural Statistics having adequate knowledge in 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 has approved the X Plan budget of the Institute. The total outlay of Rs. 825 lakhs has been sanctioned under the X Plan budget of the Institute.

Organisational Set-up

The Institute has following six Divisions, one unit and a cell to undertake research, training, consultancy, documentation and dissemination of scientific output:

Divisions

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

Unit

- Research Co-ordination and Management

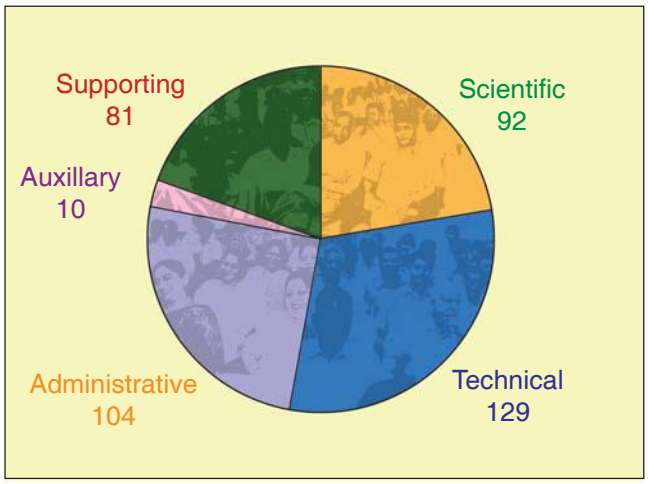
Cell

- Training Administration

Staff Position (as on 31.03.2006)

Sr. No.	Manpower	No. of posts sanctioned	No. of posts filled
1.	Director	1	1
2.	Joint Director	1	1
3.	Scientific	130	90
4.	Technical	234	129
5.	Administrative	109	104
6.	Auxiliary	14	10
7.	Supporting	85	81
	Total	**574**	**416**

*After reduction the cadre strength of three administrative posts (three Steno Grade-III) would be effective from the date of superannuation.



Staff strength in position as on 31 March 2006

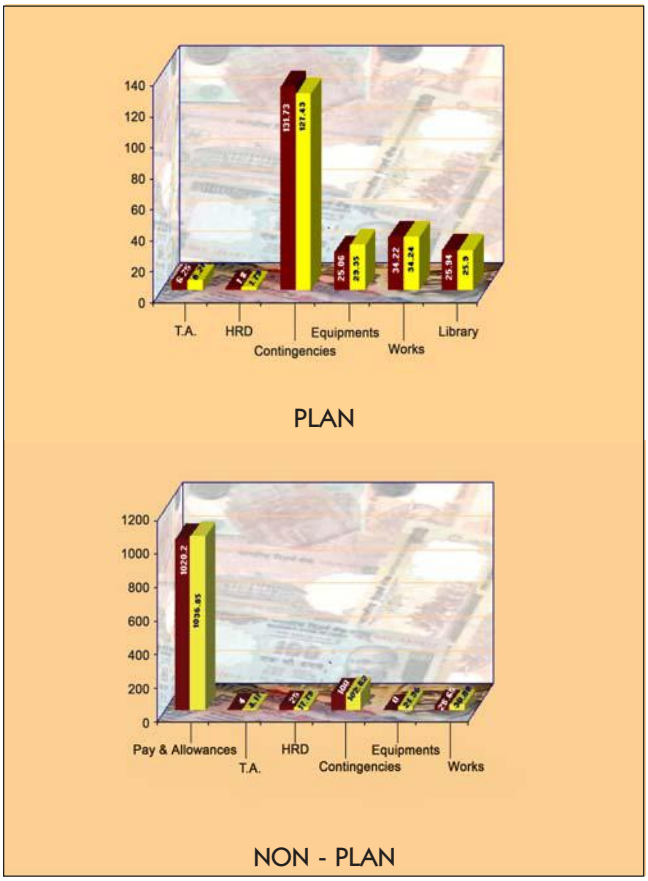
Financial Statement

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 (2005-06)

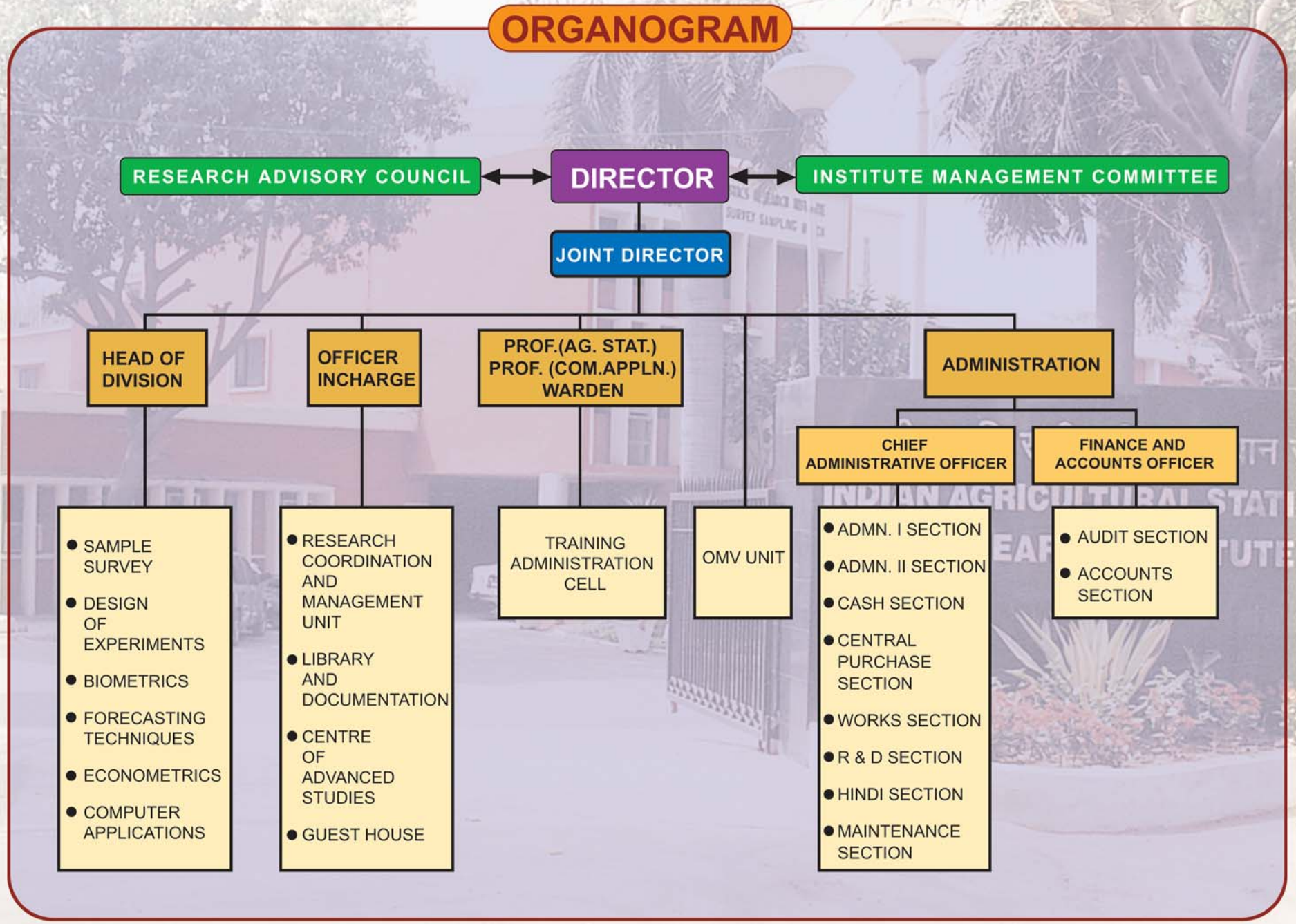
(Rupees in Lakhs)

Head of Account	Allocation		Expenditure	
	Plan	Non-Plan	Plan	Non-Plan
Pay & Allowances	0.00	1020.20	0.00	1036.85
T.A.	6.25	4.00	6.21	4.17
HRD	1.80	25.00	1.79	17.79
Contingencies	131.73	100.00	127.43	102.62
Equipments	25.06	-	29.35	21.36
Works	34.22	26.65	34.24	30.88
Library	25.94	0.00	25.90	0.00
Total	**225.00**	**1175.85**	**224.92**	**1213.67**



Budget for the year 2005-06

ORGANOGRAM


RESEARCH ADVISORY COUNCIL
DIRECTOR
INSTITUTE MANAGEMENT COMMITTEE
JOINT DIRECTOR
HEAD OF DIVISION
OFFICER INCHARGE
PROF.(AG. STAT.)
PROF. (COM.APPLN.)
WARDEN
ADMINISTRATION
CHIEF ADMINISTRATIVE OFFICER
FINANCE AND ACCOUNTS OFFICER
SAMPLE SURVEY
DESIGN OF EXPERIMENTS
BIOMETRICS
FORECASTING TECHNIQUES
ECONOMETRICS
COMPUTER APPLICATIONS
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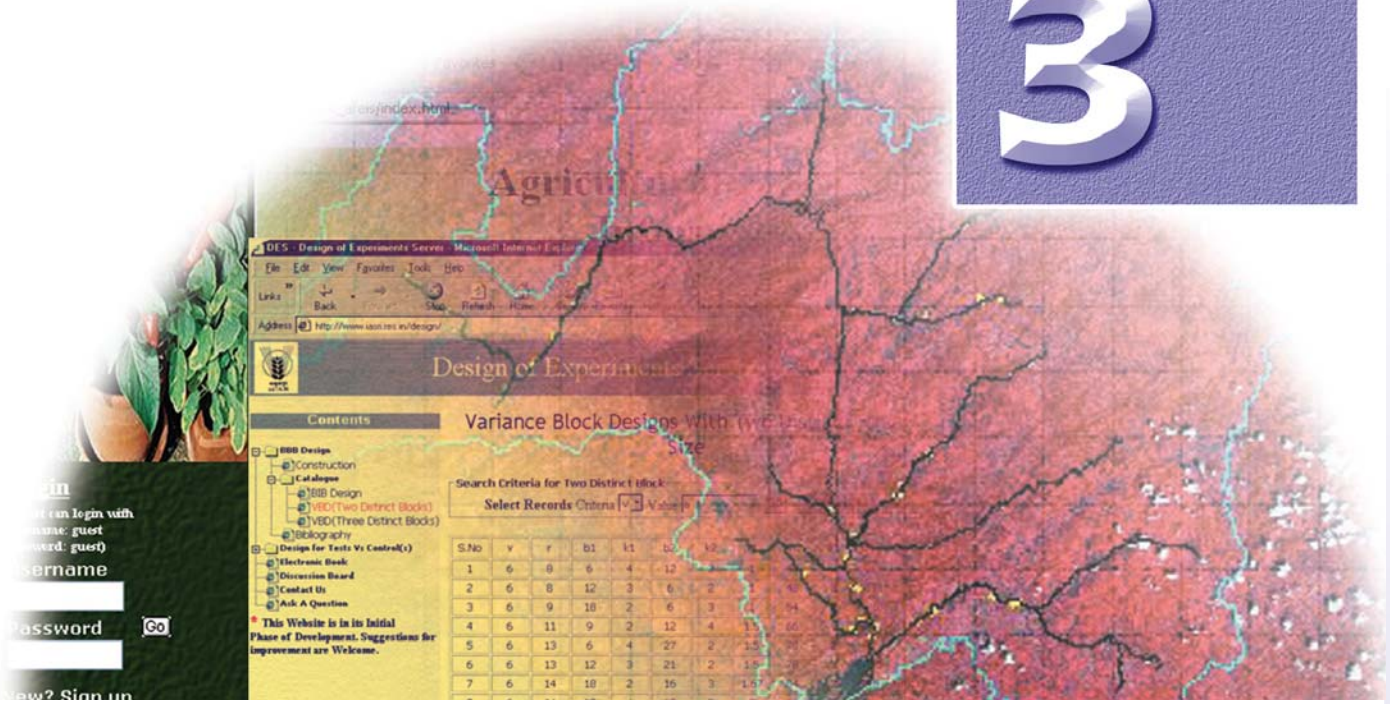


Research Achievements

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 systems research
2. Forecasting and remote sensing techniques and statistical applications of GIS in agricultural systems
3. Development of techniques for planning and analysis of survey data including economic problems of current interest
4. Modelling and simulation techniques in biological systems
5. Development of information technology in agricultural research
6. Teaching and training in Agricultural Statistics and Computer Application

PROGRAMME 1: DEVELOPMENT AND ANALYSIS OF EXPERIMENTAL DESIGNS FOR AGRICULTURAL SYSTEMS RESEARCH

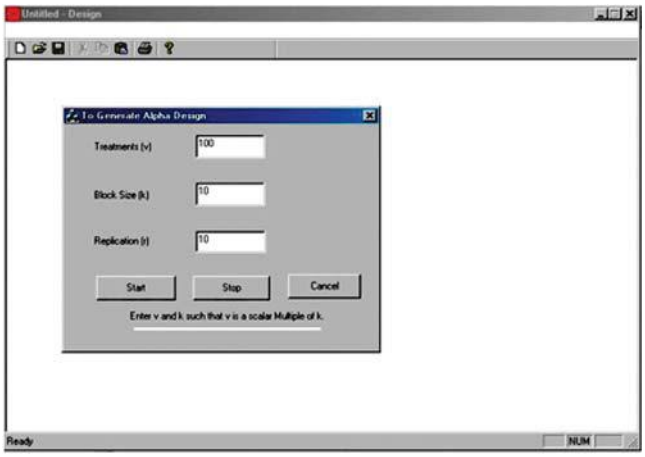
Efficient Design of Experiments for Quality Agricultural Research (National Fellow Scheme)

In field trials, large number of crop varieties cannot always be laid out in a single location or a single season. Therefore, it is desired that variation due to location or time periods may also be controlled along with controlling within location or time period variation. This can be handled by using resolvable block designs. α-designs are essentially resolvable block designs. In a resolvable block design, the blocks can be grouped such that in each group, every treatment appears exactly once. Resolvable block designs allow performing an experiment with one replication at a time.

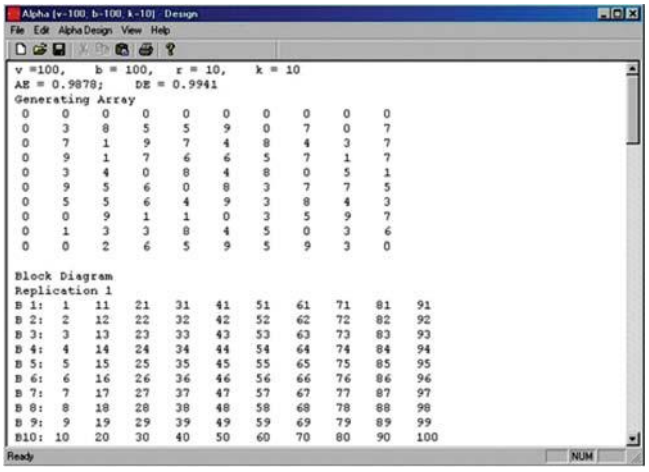
Here, locations or time periods may be taken as replications and the variation within a location or a time period can be taken care of by blocking. In an agricultural field experiment, the land may be divided into a number of large areas corresponding to the replications and then each area is subdivided into blocks. These designs are also quite useful for varietal trials conducted in the National Agricultural Research System (NARS) and will help in improving the precision of treatment comparisons. A critical look at the experimentation in the NARS reveals that α-designs have not found much favour from the experimenters. It may possibly be due to the fact that the experimenters find it difficult to lay their hands on α-designs. The construction of these designs is not easy. An experimenter has to get associated with a statistician to get a randomized layout of this design. For the benefit of the experimenters, a comprehensive catalogue of α-designs for $6 \le v\,(=sk) \le 150$, $2 \le r \le 5$, $3 \le k \le 10$ and $2 \le s \le 15$ has been prepared along with lower bounds to A and D efficiencies and generating arrays. The layout of these designs along with block contents has also been prepared. The designs obtained have been compared with corresponding square lattice, rectangular lattice, resolvable two-associate class partially balanced incomplete block {PBIB(2)} designs and the α-designs obtainable from basic arrays given by Patterson, Williams and Hunter (1978, *J. Agric. Sci.*, **90**, 395-499). Eleven designs are more efficient than the corresponding resolvable PBIB(2) designs (S11, S38, S69, S114, LS8, LS30, LS54, LS76, LS89, LS126 and LS140). It is interesting to note here that for the PBIB(2) designs based on Latin Square association scheme, the concurrences of the treatments were 0 or 2 and for singular group divisible designs the concurrences are either 1 or 5. Further all the designs LS8, LS30, LS54, LS76, LS89, LS126 and LS140 were obtained by taking two copies of a design with 2-replications. 10 designs were found to be more efficient than the designs obtainable from basic arrays. 48 designs (29 with $k = 4$ and 19 with $k = 3$) are more efficient than the designs obtainable by dualization of basic arrays. 25 designs have been obtained for which no corresponding resolvable solution of PBIB(2) designs is available in the literature. The list of corresponding resolvable PBIB(2) designs is S28, S86, SR18, SR41, SR52, SR58, SR66, SR75, SR80, R42, R70, R97, R109, R139, T14, T16, T20, T44, T48, T49, T72, T73, T86, T87 and M16. Here X# denotes the design of type X at serial number # in Clatworthy, W. H. (1973, *Table of Two-associate Partially Balanced Designs*. NBS Applied Maths Series No. **63**, Washington D.C.).

In some experimental situations, the user may be interested in getting designs outside the above parametric range. To circumvent such situations, a β-version of user friendly module for generation of α-designs has been developed. This module generates α-array along with lower bounds to A and D efficiency. α-array and the design along with block contents is generated once the user enters the number of treatments (v), number of replications (r) and the block size (k), provided v is a multiple of k.

A nested block design is defined as two systems of



The Screen for entering the parameters for generation of α-designs



Generated α-array and α-design for the parameters

blocks such that the second system of blocks is nested within the first system of blocks. These designs are quite useful in many experimental situations. For example, consider a field experiment conducted using a block design and harvesting is done block wise. Harvested samples are to be analyzed for their contents either by different technicians at same time or by a technician over different periods of time. The variation due to technicians or time periods may be controlled by another blocking system. Technicians or time periods form a system of blocks that are nested within blocks. Such experimental situations are also common in post harvest value addition of horticultural and vegetable crops. Nested block designs are also quite useful in agricultural field experiments where the plots with similar fertility occur in patches rather than in a uniform direction. Preece, D.A. (1967, *Biometrika*, **54**, 479-486) was the first to introduce nested block designs and termed them as nested balanced incomplete block (NBIB) designs. In a NBIB design block classification ignoring sub-blocks is a balanced incomplete block (BIB) design and sub-block classification ignoring blocks is also a BIB design. A complete catalogue of NBIB designs with number of replications $r \leq 30$ has also been prepared. The catalogue contains a total of 299 designs. Out of 299 designs, 8 designs are non-existent. A new method of construction of NBIB designs has been obtained. Using this method and trial and error solutions, block layouts of 22 new NBIB designs have been obtained. The layout of 199 designs with block contents has been completed. The solution for the block layout for remaining 92 designs is unknown and the statisticians need to develop methods of construction of these NBIB designs. The designs catalogued have also been identified for 1-resolvable and 2-resolvable sets.

A NBIB design may not exist for all parametric combinations or even if it exists may require a large number of replications, which the experimenter may not be able to afford. To deal with such situations, nested partially balanced incomplete block (NPBIB) designs have been introduced in the literature. Some new methods of construction of NPBIB designs based on group divisible association scheme have been given using these methods of construction. 31 new NPBIB designs based on group divisible association scheme with $r \leq 15$ have been obtained.

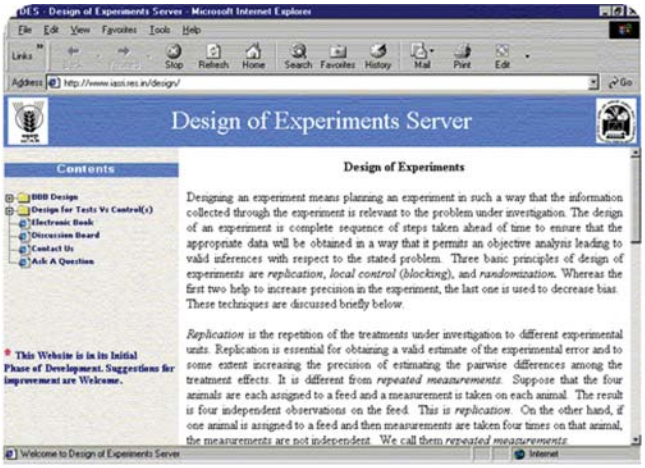
Nested block (NBIB and NPBIB) designs are useful for experimental situations where the experimenter is interested in making all possible pairwise treatment comparisons with as high a precision as possible. However, there do occur experimental situations where the experimenter is interested in comparing several new treatments (called test treatments) with existing practice (a control treatment) with high precision and the comparisons among the test treatments are not of much importance. To deal with such situations, nested balanced treatment incomplete block (NBTIB) designs have been introduced. Some new methods of construction of NBTIB designs making use of NBIB designs, initial block solutions, etc. have been developed. A new method of construction of nested block designs for making test treatments-control treatment comparisons has been developed which yields minimally connected designs with respect to sub-blocks. The design with respect to bigger blocks is a group divisible treatment design.

A new method of construction of efficient block designs for making test treatments-control treatment comparisons by making use of triangular association scheme has been developed. The number of replications of test treatments developed through this method is always 2.

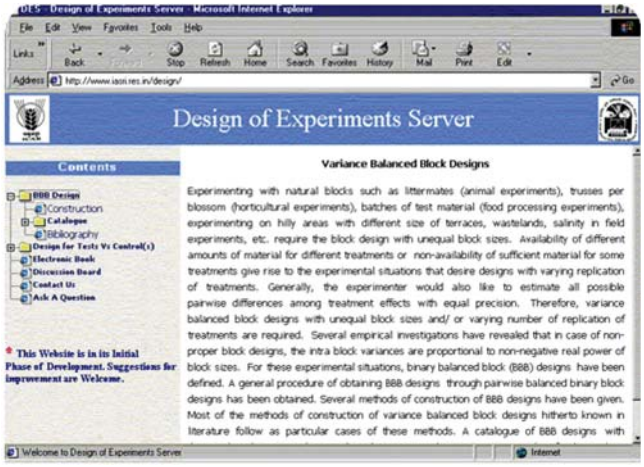
A new method of construction of semi-Latin Squares based on initial column solution has been developed. This method yields semi-regular group divisible designs after ignoring the row and column classifications. Preece and Freeman (1983*, J. Roy. Statist. Soc.*, **28**, 154-163) reported that for $k = 2, n = 6, 8, 10$ could not be obtained by rearrangement in semi-regular group divisible designs. These three semi-Latin Squares can be obtained from the proposed method of construction.

A catalogue of block designs with $n = v+b-1+i$, i=1, 2, 3 observations has been prepared, where v is the number of treatments; b is the number of blocks; k is the block size and n is the total number of experimental units. Block contents along with lower bounds to A and D efficiencies are also given. The lower bounds to A-efficiencies for making test treatments-control treatment comparisons are being obtained.

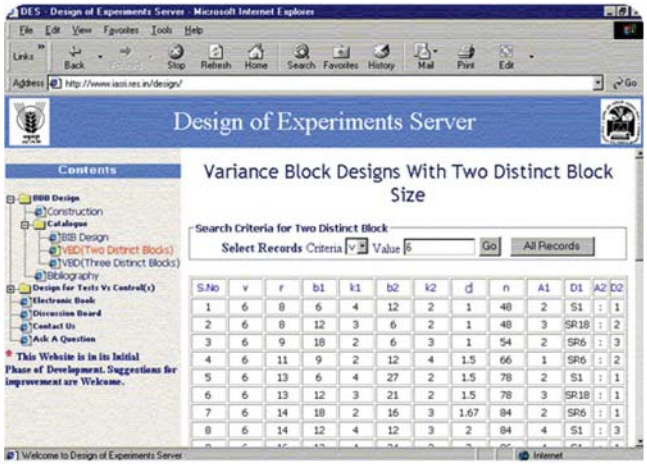
The design resources server has been initiated and launched on the website of the Institute. The main objective of this design resources server is to develop a WEB DESIGN in NARS. At present material on binary balanced block designs and designs for making test treatments-control treatment comparisons along with Electronic Book on Design and Analysis of Agricultural Experiments are available on this site. A discussion



First Screen of Design of Experiments Server



Binary Balanced Block Designs



Catalogue of Binary Balanced Block Designs with two Distinct Block Sizes

board has been created. Some screens are given in the Sequel.

Cropping Systems Research

In the project 'Planning, designing and analysis of experiments planned on-station under the Project Directorate for Cropping Systems Research', four types of research programmes are in operation viz. (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 of about 320 experiments pertaining to 2004-05 crop year were received during 2005-06. Designs adopted for conduct of experiments during this year were RBD, split-plot, split-split plot, strip plot, factorial RBD, 3^2x2 partially confounded with one control in each of the three blocks per replication, BIB design and unreplicated design. For unreplicated experiments, data were analysed taking years as replications. For concluding experiments statistical analysis over years was taken up. At one of the CSR centre Jabalpur, an experiment on tillage and planting management in rice-wheat cropping system has been conducted during 2004-05. Four vertical treatments in rice viz. P_1 - zero till direct seeding (lime sowing) on dry fields, P_2 - direct seeding of sprouted seeds in puddled field by drum seeder, P_3 - manual transplanting and P_4 - transplanting by transplanter and 4 horizontal treatments in wheat viz., T_1 - conventional sowing, T_2 - zero till sowing, T_3 - strip till sowing and T_4 - bed planting were tested in strip plot design with three replications with regard to total productivity of entire cropping system in terms of wheat equivalent yield (WEY). P_2 produced maximum yield (87.86q/ha) followed by P_3 (85.49q/ha), P_4 (83.52q/ha) and P_1 (82.57q/ha). Among different methods of sowing of succeeding crop, T_3 produced the highest WEY (91.32q/ha) followed by T_2 (85.10q/ha), T_1 (82.33q/ha) and T_4 (80.19q/ha). The combination of P_3T_3 (manual transplanting of rice and strip till sowing of wheat) produced the highest WEY (93.06q/ha) while P_1T_4 (Direct seeding of rice and bed planting of wheat) (76.48q/ha) was the lowest yielder.

Preparation of instruction manual which is required to give guidelines for proper conduct of various types of experiments in the project is initiated.

Under the "On Farm Research" programme, mainly 3 types of experiments viz. (Expt. 1 : Response of Nutrients, Expt. 2 : Diversification and/or Intensification of Cropping System and Expt. 3 : Sustainable

Production System) have been undertaken at 32 On-Farm Centres. The data of 135 experiments (at 2223 farmers' field) conducted during 2004-05 at 32 on-farm centres have been processed for statistical analysis.

Under "Diversification/Intensification of cropping system experiment", in the rice based cropping sequence, trials have been conducted with different cropping systems at various centres. At Bankura (W.B.), Rice-Potato-Rice have fetched higher net returns (Rs. 54296/ha) in comparison to other crop sequences such as Rice-Mustard-Rice (Rs. 35537/ha) and Rice-Mustard-Bhindi (Rs. 36276/ha) etc. At Haridwar centre (Uttranchal), Rice-Wheat-Moong recorded higher net returns (Rs. 33476/ha) in comparison to Rice-Lentil-Urd (Rs. 30829/ha). In Southern Konka coastal region at Ratnagiri (Maharashtra), Rice-Wheat (Veg.) has reported a net return of Rs.17084/ha and Rice-Marigold has a net return of Rs.12558/ha. In low hills sub tropical zone at Dhaula Khua (H.P.) centre different vegetables such as Potato, Onion, Cabbage, Frenchbean have grown with Rice in *kharif* season. Rice-Wheat-Frenchbean, Rice-Onion, Rice-Cabbage and Rice-Potato have reported net return of the order of Rs.129303, Rs.108841, Rs.106998 and Rs. 93768/ha respectively.

Task Force on "Balanced use of fertilizer" constituted by Ministry of Agriculture, Govt. of India, requested for evaluation of fertilizer response ratios for different crops for various nutrients using on-farm trials, consequently data generated from the Expt. 1 (Response of nutrients) for 4 years 1999-2000 to 2002-03 have been used for the computation of various fertilizer response ratios (N over control, NP over control, NK over control, NPK over control, P over N, P over NK, K over N and K over NP) for various crops. Response ratios for cereals, pulses, oilseeds at state and country level have also been evaluated and are given in table below:

Crop group	Area 000 ha (2000-01)	Average control yield (kg/ha)	Average Response Ratio							
			N	NP	NK	NPK	P over		K over	
			Over control				N	NK	N	NP
Cereal	99757	1803	8.56	8.97	8.66	8.63	10.02	11.29	9.16	10.85
Oilseed	23250	897	8.53	5.19	6.91	5.27	4.48	5.48	6.02	7.88
Pulses	20026	586	8.11	7.53	8.97	7.12	7.22	5.95	12.09	5.32
Overall		1485	8.50	8.15	8.42	7.89	8.73	9.60	9.06	9.59

It is observed from the table that response ratio varies depending upon the crop group and nutrient combination applied. The highest response ratio is found to be 12.09 of K over N for pulses whereas minimum 4.48 is observed for P over N for oilseed crops. Also for overall, crops response ratio of NPK over control is less than the response ratio of N over control.

At all the centres under the AICRP on LTFE, 100%NPK+FYM treatment has been found most sustainable producing maximum yield or equivalent to that obtained with 150%NPK. With the well recognized role of organic manure in maximizing the yield responses so as to break off the yield barriers, mid course superimposition of FYM levels at 0, 2.5, 5 and 10 t per ha per year in one of the replications of 150%NPK treatment under nested two way set up has been planned at each of the locations for implementing mid course changes *w.e.f. kharif/rabi* 2005-06 as per the recommendation of the last workshop of the project held at PAU, Ludhiana in November, 2004.

The analysis of technological interventions treatments data like increasing the optimal NPK doses by 50%, incorporation/blending of Zinc/Lime/Hand Weeding(HW)/S and FYM with the optimal NPK doses of the crops were carried out on five yearly intervals as well as over the years (1972-2004) to see their effect on the crop productivity and soil fertility.The salient results obtained are as follows:

HW: Adoption of Hand Weeding over weedicides proved to be effective for maize at Ludhiana, for wheat at Pantnagar and for both the rice crops at Bhubneswar increasing their average yields over the years by 15, 7, 8.5 and 8% respectively. At rest of the locations significant decrease in crop yields were noticed. HW failed to improve soil fertility at any of the locations.

Zinc: Incorporation of zinc with optimal NPK showed its beneficial effect at Ludhiana and Pantnagar only after 10-12 years of experimentation. At Ludhiana its application increased maize yield by 4.2 q per ha during 1981-85 and by 12.4 q per ha during 1996-2000 over the average yield of 22 q per ha obtained without zinc. At Pantnagar the increase was about 6 q per ha for rice and ranged from 3 to 5.5 q per ha for wheat during different five yearly intervals. Application of zinc increased its availability in soils in all the groups of years as well as over the years vis-à-vis optimal NPK.

Lime: Soil application of lime under 100% NPK treatment taken up in Alfisol (Acid) soils increased the maize and wheat yields by 28 and 24% respectively at Palampur, by 19 and 12% for soybean and wheat crops

at Ranchi and by 6% for maize at Banglore whereas at Bhubneswar its significant effect was noticed only after 10 years increasing the kharif and rabi rice yields by 29 and 21% respectively. Lime application helped in improving and maintaining the pH value of soils at all the four locations.

FYM: Blending of organic manure FYM @ 10-15 per ha per year to the inorganic 100% NPK proved to be beneficial at all the locations giving the highest yield increase of 44 and 41% for maize crop at Palampur and Ludhiana, 27% for kharif rice at Bhubneswar, 23% for soybean at Ranchi and between 6 to 19% at rest of the locations and crops. Its residual effect on the succeeding crops was highest for wheat at Palampur (32%), for rabi rice at Bhubneswar (24%) and ranged between 5 to 19% at rest of the locations. Incorporation of FYM improved the soil fertility (N, P, K) in all the years at each of the locations.

Sulphur: Supplementing the optimal NPK through the fertilizers with sulphur content was effective for both the crops at Palampur and Jabalpur centres and for kharif rice at Barrackpore and Bhubneswar. The respective yields increase over the optimal level were 32% for maize and 24% for wheat at Palampur, 9% for soybean and wheat at Jabalpur, 26% for kharif rice at Barrackpore and 13% for kharif rice at Bhubneswar. Sulphur application did not contribute in raising the soil fertility at any of the locations.

150%NPK: Enhancement of the optimal NPK dose by 50% resulted with overall yield increase of 12% for both the crops at Ludhiana, 15 and 8% respectively for maize and wheat at New Delhi, 15% for both ragi and maize crops at Bangalore, 10% for both the rice crops at Bhubneswar, 22% for wheat and 11% for both rice and jute crops at Barrackpore centre. Enhanced dose of NPK did not result in any increase in the yields over the optimum NPK at Ranchi, Palampur and Coimbatore centres. Application of 150% NPK increased the build up of P in soils over those obtained at optimal NPK level at all the locations.

Under the project 'Combined analysis of experiments on long range effect of continuous cropping and manuring on soil fertility and yield stability', bivariate and over years analysis taking grain and straw yield of each cropping system have been done. Treatment response and variability in terms of grain yield and monetary returns for both the rabi and kharif seasons have been calculated. In some centres where yields were missing, the yields were interpolated by taking best fitted models.

At Rewa centre, in kharif season (1978-79 to 2003-04), Treatment T_{18} (N:P:K::120:80:40) was maximum productive giving highest mean grain yield as 41.23 q/ha followed by T_{17} (120:80:0) (mean grain yield=40.06 q/ha). Treatment T_{19} (Control) gave lowest mean grain yield (19.3 q/ha). But if one examines the consistency of the treatment responses, treatment T_{10} (80:40:40) was most consistent (C.V. =22.64) followed by treatment T_6 (40:80:40) (C.V. =23.29). T_{19} (Control) was most inconsistent treatment having C.V. = 30.35. In terms of monetary return, treatment T_{17} (120:80:0) gave maximum return (Rs. 11510.29) followed by T_{18} (120:80:40) (Rs. 11065.35). In rabi season treatment T_{17} was maximum productive having mean grain yield as 33.48 q/ha followed by T_{18} (30.06 q/ha), but if one observes the consistency of the treatment, T_3 (40:40:0) was most consistent followed by T_2 (40:0:40). In terms of monetary return, T_{18} gave maximum return (Rs.11270.23) followed by T_{17}.to remove/reduce the multi-collinearity among the explanatory variables (mean number of total tillers, mean number of ear bearing tillers/s.u., mean plant height in cm., mean number of grain/penicle, mean number of sterile spikelet/ panicle and number of days taken for 50% flowering) at Rewa centre, various methods like dropping variable, ratio approach and Ridge regression were attempted. Among all the methods, Ridge regression method has provided satisfactory results. The signs of the regression coefficients obtained by Ridge regression are theoretically plausible. Results showed that plant height is not significantly contributing to the grain yield whereas number of grains/panicles followed by number of ear bearing tillers/s.u. is significantly contributing to the grain yield.

To study the yield trends in relation to different soil characteristics viz. available N, P, K; pH and OC, soil data have been transcripted. For fitting different models SAS codes have been written and analysis has been completed. The results are being examined for the validity of the various fitted models. SAS codes for fitting response surface have been written to determine optimum doses of N,P and K at each location under study.

Statistical analysis of experiments on determining level and frequency of phosphorus application in different cropping systems revealed that for judicious use of Phosphorus, its application at the rate of 30 kg P_2O_5 per hectare applied in either season in alternate years might be economical. Under rice-wheat sequence application of 30 kg P_2O_5 per hectare at Banswara and

60 kg P_2O_5 per hectare at Palampur to both the crops in alternate years proved to be beneficial for higher returns and both these treatments were insensitive to the hange in the selected price ratios. At Varanasi and R.S. Pura, the maximum returns were obtained from 90 kg of P_2O_5 per hectare applied during kharif and rabi both every year which was sensitive to different price ratios examined. Under rice-gram sequence at Rewa, maximum returns were obtained with 60 kg P_2O_5 per hectare applied during kharif or rabi every year or during both the seasons in alternate years. This treatment was sensitive to the different price ratios tried. From pigeonpea-wheat sequence, at Rahuri the highest returns were obtained when 90 kg of P_2O_5 per hectare was applied to both the crops every year, whereas, at Bichpuri, its application at the rate of 30 kg P_2O_5 per hectare during kharif or rabi every year was observed to be the optimum. Application of P at the rate of 60 kg P_2O_5 per hectare to soybean crop followed by sorghum crop every year at Parbhani gave the maximum returns, whereas, when sorghum was replaced by sunflower and 30 kg P_2O_5 per hectare was given to either soybean or sunflower every year proved to be beneficial. Maize followed by soybean and pearlmillet followed by mustard gave the maximum returns when 60 kg of P_2O_5 per hectare was applied during kharif or rabi in alternate years and to both the seasons every year at Coimbatore and S.K. Nagar centres, respectively.

High cost-benefit ratio was observed when phosphorus was applied at the rate of 30 or 60 kg P_2O_5 per hectare during kharif or rabi in alternate years at different locations. The analysis further revealed that available nitrogen in the soil got depleted in all the plots at Navsari, Palampur, Rewa, Bichpuri, Coimbatore and S.K. Nagar. The available P content in the soil in all the plots increased over the cycles at Bichpuri and Rahuri whereas at Navsari and S.K. Nagar built up was observed only upto the first cycle and thereafter the soil got depleted in P. At Rewa, application of P could not enhance the P content of the soil which remained at the same level between 11 and 13 kg P_2O_5 per hectare throughout the experiment. The available K content in the soil increased only at Palampur and Coimbatore, whereas there was a marginal depletion in the available organic carbon in the soil at Rewa and S.K. Nagar.

Experimental Designs for Agricultural, Animal, Agroforestry and Fisheries Research

An agroforestry experiment 'Evaluation of fodder trees with and without crops under rainfed arable farming for semi-arid conditions' consisting of 4 tree species (siris, neem, shisham, babul) with 2 crops (gram and barley) giving rise to 14 treatment combinations (siris, siris+barley, siris+gram, neem, neem+barley, neem+gram, shisham, shisham+barley, shisham+gram, babul, babul+barley, babul+gram, gram and barley) is being conducted at the collaborating centre (IGFRI, Jhansi) since 1999. The data on crops and trees are collected regularly. The crop data is analysed considering the four factors affecting the yield of the crops (trees, location of the trees in the plot, direction of the crop on the either side of the tree and distance of the crop from the tree). The data of the tree component from 12 treatment combinations is analysed as RBD with 2 replications. Contrast analysis technique is applied for identifying the significant factors. In kharif 2004, cowpea for fodder was introduced as a common treatment in all the 14 plots of the experiment.

The analysis of data on gram and barley for rabi 2004-05 has been performed separately considering five treatments (with four tree species and one without tree) in RBD with two replications. A significant difference has been observed between the control treatment (without tree) and other treatments. The analysis revealed that performance of the understorey crop was affected by the tree species and the distance of the crop from the tree base.

The cowpea data was analysed for all the characters as RBD with 14 treatments in 2 replications. The results showed a significant difference between the treatments for all the characters except plant population. The crude protein yield of stem and leaf of the tree component for the year 2004 from 12 treatment combinations (siris, siris+barley, siris+gram, neem, neem+barley, neem+gram, shisham, shisham+barley, shisham+gram, babul, babul+barley, babul+gram) was analyzed along with the within group comparisons (4 groups from 4 tree species).

Further the data on growth parameters of four tree species with and without crop biomass yield (dry and fresh leaves) and crude protein were also analysed. The within group comparisons for crude protein showed that the crude protein yield was significantly different in case of groups containing babul indicating the effect of crops.

A series of circular neighbour balanced complete block designs for agroforestry experiments with *v* levels of tree and *v-1* levels of crop balanced for tree effects

have been obtained using a complete set of mutually orthogonal latin squares. The *v(v-1)* combinations of factor T (tree) and C (crop) have each of the levels of factor T as left and right neighbour once.

The coefficient matrix of the reduced normal equations for estimating the effects of *vn* factorial treatment combinations arising from *v* treatments and *n* experimental units has been derived using calculus for factorial arrangements considering a balanced uniform class of repeated measurements designs (RMDs) with a pre-period (treatments in the pre-period are same as those in the first period and no observations are taken from these treatments) under a non-additive model set up. Also, computer programs have been written for obtaining joint information matrix of direct and first residual effects and information matrices, separately, for direct effects and first order residual effects, for a given RMD. Computer program has been written for simulating RMD data under an additive fixed effects model considering direct and residual effects of treatments, period effects and unit effects as fixed and error effects as random. Also, computer program has been written for generating RMD data under mixed effects model, where direct, residual and period effects are treated as fixed and unit and error effects are treated as random. Program has been written for simulating RMD data under a non-additive model considering direct, residual and period effects as fixed effects and unit and treatment × unit interaction effects as random effects. Assuming AR1 correlation structure among observations, computer program has been written to simulate RMD data. Again, SAS programs have been written to estimate variance components of random effects under mixed model set up of RMD by using different methods like ML, REML, MIVQUE0. Another program has been written in WINBUGS to estimate treatment effects in a 2×2 repeated measurements design without residual effects.

In the case of multiple outliers, a well-known problem known as 'masking' hinders the identification problem. In masking, effect of one outlier is masked by the presence of another outlier, hence cannot be detected as outlier if we apply single outlier detection procedure. A new statistic was developed for tackling the problem of masking. The developed statistic was applied to experimental data from AFEIS. It was found in some experiments that individually some observations were not influential, but jointly with some other observations, they are influential, that is, some observations were masked by some other outlying observations and therefore, were not detected when we apply single diagnostic procedure. Robust methods for data analysis were thoroughly reviewed. A number of robust techniques are available in the literature for analyzing data generated by linear regression models. These techniques are explored for application into designed experiments. A robust regression procedure is one that dampens the effect of observations that would be highly influential if least squares were used. That is a robust procedure tends to leave the residuals associated with outliers large, thereby making the identification of influential points much easier. The motivation for much of the work in robust estimation was due to Huber (1964). One of the most popular robust methods is M-estimation. A good number of objective functions to be minimized are proposed. To begin with Huber's t-function has been applied to experimental data obtained from "Agricultural Field Experiments Information System (AFEIS)". Relevant computer programs are written.

The usual method of analysis requires that the errors in the observations are independently and normally distributed with constant variance. In the situations when errors are likely to be correlated, it is desirable to obtain designs and perform analysis in which the correlations are taken into account. If the observations are adequately modeled, it is expected that there will be increase in precision. The knowledge of correlation structure is advantageous in planning the experiment. In case of block design, it is assumed that there is no between-block dependence, and that the within-block dependence between plots is the same in each block. Nearest neighbour correlation structure, first order autocorrelation structure and equi-neighbour correlation structure have been considered.

A block design is called pairwise uniform on the plots if each treatment i, (i =1,...,v) occurs equally often in each plot position l, (l=1,...,k_j) and each pair of treatments i and i', $i \neq i'$ (=1,...,v) occurs equally often (λ_{ii} times) within the same block in each unordered pair of plot labels l and l', $l \neq l'$(=1,...,k_j) and a pairwise uniform design, whenever existent, is universally optimal.

A method of construction of universally optimal pair-wise uniform incomplete proper block design has been obtained for even block size through the initial block solution.

A SAS code using PROC IML has been made to

obtain the information matrix of a block design for a given correlated error structures with specific value of correlation coefficient.

Combining the blocks of p equi-neighboured balanced block design in v treatments with block size k_m (m=1,2,...,p) would result in a equi-neighboured balanced block design with unequal block sizes.

Methods of constructing equi-neighboured balanced block designs with unequal block sizes in lesser number of units is being attempted. Development of some methods of construction of row-column designs to guard against the effects of correlated observations, possibly with minimum number of experimental units is being explored.

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

Developing Remote Sensing Based Methodology for Collecting Agricultural Statistics in Meghalaya

The study is in collaboration with Space Application Center (SAC), Ahmedabad and North Eastern Space Application Center (NE-SAC), Shillong.

The basic aim of this project is to develop a survey methodology for estimation of crop area and crop yield in Meghalaya using Remote Sensing and GIS. The main problem of hilly regions is its undulating topography and non-accessibility of vast area. Further, the relative percentage area under the crops is also less. The remote sensing satellite data alone with conventional approach used till date may not be applicable to this type of regions for retrieving crop information due to these reasons. Therefore, major concern till date is to use satellite data supported with ground survey data for reliable estimation of the above parameters. In this project development of statistical methodology to tackle such problem is attempted. In the absence of any satisfactory objective technique for crop acreage and production estimation, the present study has been divided in two phases. In the first phase, pilot study was conducted in one district of Meghalaya for estimating area under paddy. In the second phase to test and validate the methodology developed during the first phase the study has been repeated in the same district and another new district.

The satellite data of IRS-1D, LISS-III sensor is used for district Ri-bhoi and that of IRS-1D, LISS-III and IRS-P6 LISS- III was used for the district of Jantia Hills. The satellite data was rectified and classified using Maximum Likelihood supervised classification technique in ERDAS Imagine software. Survey was conducted along the major roads of both the districts. A buffer of 250 m was generated along both sides of the road in GIS environment using ARC GIS software. To obtain a reliable estimate of area under paddy along a buffer of 500 meter, the roads are conceptually divided into segments of 500 m. A sample of segments is selected randomly on each of the road and a grid of 500 x 500 m^2 has been observed for recording the area under paddy which was measured by Global Positioning System (GPS). The area under paddy crop in these selected grids was also recorded by eye estimate. Huge data was collected during the survey. Regression analysis was performed to develop relationship between the eye estimates and GPS readings. Suitable estimators for area under paddy crop, for both the districts, were developed using the estimate obtained by road survey, classified image. Besides this, various methods of estimation like ratio estimators, grid based sampling etc. were used to estimate the paddy area covered by clouds/cloud shadows in the image.

The area estimated under winter paddy crop for Ri-Bhoi district is 7506 ha with a standard error of 1.93% for the year 2005-06. First-cut estimates of winter paddy area in Jantia Hills district based on image analysis and GPS correction was about 8000 ha. But, corrections made for missing data (due to coarse resolution of the sensor, hill shadow etc.) gave an estimate of 5956 ha. The study will be extended for more crops and more districts will be covered in future.

Assessment of Survey Capabilities of Private Sector Methodology

The study sponsored by Ministry of Statistics and Programme Implementation for evaluating survey capabilities of private sector is based on assigning scores to the various measurable indicators developed for the purpose. The indicators are based on the items on which information is collected through the questionnaire followed by physical verification of the items in the filled-in questionnaire. Broadly, five types of indicators are considered, Projects handled in the past, Manpower, Infrastructure, Experience and expertise, and Annual turn-over on survey related activities.

Besides this every agency need to meet the basic eligibility criteria (which are non-negotiable) before it

can be considered for inclusion in the database such as should have a PAN number, using probability sampling design, one statistician on regular basis, and connectivity in any of the three ways namely Telephone, Fax, E-mail. The survey agencies satisfying non-negotiable criteria would be listed. Based on the importance of each indicator type, the weight would be assigned for working out overall score of the survey agency.

A study on editing and imputation using Neural Networks is undertaken with ultimate objectives as to examine the performance of artificial neural network technology for editing of statistical records, to investigate the accuracy of imputing missing values using neural network and hot deck imputation procedure, and to develop software for the imputation of missing data.

The back propagation algorithm for imputing the missing data is complete. It was developed in command line interface in Java to test the working. Now it is implemented in graphical user interface using Java Swing. The model is predicting the missing data after the training of model. The system is using Java technology, it is platform independent. Different options in entry form has been done like cut/copy/paste, sort by category. The software development module for zero imputation is complete. Hot deck and mean imputation is being done.

PROGRAMME 3: DEVELOPMENT OF TECHNIQUES FOR PLANNING AND ANALYSIS OF SURVEY DATA INCLUDING ECONOMIC PROBLEMS OF CURRENT INTEREST

An Econometric Approach for Measurement of Indemnity and Premium Rates under Crop Revenue Insurance

The study is undertaken with objectives as (i) to examine the sources of instability for identifying critical variables for Crop Revenue Insurance, (ii) to estimate indemnity and premium rate of selected crops in different states of India for Crop Revenue Insurance, and (iii) to explore the feasibility of Revenue Insurance approach vis-à-vis Yield Insurance approach in Indian agriculture.

To measure the instability of economic variables (area, yield and price), Cuddy-Della Valle index (corrected coefficient of variation) is used which takes into consideration the long-term trend.

Premium rates have been estimated with the help of existing yield approach methodologies for different crops of various districts of Karnataka state. Data sets have been subjected to normality test wherever required. Premium rates were calculated by the normal curve technique with some exceptions indicating for the instability in the yield for that particular crop. For the nonparametric kernel approach, the window width has been estimated which are found in the range of 120 to 230. The premium estimation under crop revenue insurance using gross return in lieu of yield is also taken up.

Dietary Pattern and Nutritional Status of Rural Households: State wise Analysis

The objectives of the project are (i) to study the change in dietary pattern and nutritional status of different socio-economic groups of rural households due to change in economic environment, (ii) to identify the socio-economic factors influencing the dietary pattern and nutritional status of rural households and (iii) to identify the target groups for prioritization for improving the nutritional status.

The study showed that in 55th round (1999-2000) over 43rd round (1987-88), the dietary pattern of rural households, in almost all states a general trend of reduction was observed in consumption of cereal in favour of non cereal foods. The consumption of other non cereal foods like milk and milk products, egg, meat and fish, fruits and vegetables groups tend to increase in most of the states. However the shift from cereal based to non cereal based diet was not visible in all categories of socio-economic groups uniformly. An effort was also made to study the rural households deficient in important nutrients including important vitamins and minerals. It was observed that the proportion of deficient households in different nutrients varied from state to state and among categories of landholdings. In most of the states the proportion of deficient rural households was higher in landless, sub-marginal and marginal class and it decreased with the size of holdings. This showed that the balanced diet was not only dependent on expenditure of food items but also depended on the dietary pattern and the choice of the foods. It was observed that Assam and Orissa were the most deficient state in most of the nutrients. Punjab and Haryana were at a better situation in terms of nutrients intake in the diet.

The analysis of determinants of nutritional status showed that in most of the states and land holding categories of rural households the key factor influencing

nutritional status was per capita expenditure on food. In all the states the coefficients of unit calorie cost and non-food expenditure were found negative and significant at 1 percent of level of significance indicating that higher prices of food items and excess expenditure on non-food items affected the nutritional status of rural households adversely. In most of the cases coefficient of education level was not found significant. In some cases the coefficient of education level was positive and significant indicating the positive impact of education on nutritional status while in some cases it was also found negative and significant indicating that either due to lack of knowledge about nutritive values of various kinds of foods or the selection of food items based on traditional or taste based and not knowledge based. In most of the cases the coefficient of household size was found to be negative and significant which indicated that bigger the family size the lower the nutritional status of the household.

The analysis suggested that the landless, sub-marginal and marginal category of households in most of the states should be treated as target groups to raise their income to maintain their nutritional status.

Study of Lac Marketing in India

The study on "Lac Marketing in India" was undertaken with a view to provide a practical solution of the problem of declining trend in total lac production in the country during past decades. Accordingly an integrated approach was adopted where the three aspects namely Lac cultivation, Lac marketing and Lac processing was examined in the major producing states of Jharkhand, West Bengal, Chhattisgarh, Madhya Pradesh and Maharashtra by primary survey data.

Lac Cultivation: Palas tree was identified as the major lac host in all the producing states and minor hosts were Ber and Kusum trees. The extent of lac host exploitation of the major host tree was observed to be about 50 percent in almost all the states despite of attractive returns from lac cultivation. This is the critical factor which is responsible for low crop production. The study of constraint analysis was carried out to find out possible factors for low production. The correlation coefficients obtained among the identified constraints revealed the shortage of funds to purchase critical inputs like brood lac is the most important factor. Principal Component Analysis using extraction method, however, suggested shortage of owned funds, non-availability of cheap credit and distance of lac host from home (guarding) are the important factors for low production.

Lac Marketing: The crop output i.e. scrap lac is mainly sold in the village/local markets. The marketing channels identified in the study are

Channel- I	Lac Cultivator to Primary Purchaser
Channel- II	Primary Purchaser to Wholesale Purchaser
Channel- III	Primary Purchaser to Local Processing Unit
Channel- IV	Wholesale Purchaser to Wholesale Market

The pattern of marketing is area specific, in the areas where local processing units are situated bulk quantity of scrap lac is supplied to them by the primary purchasers and little quantity is sold to wholesale purchasers. The wholesale purchasers sold their major part of scrap lac in the wholesale market and little quantity to the processing units.

The marketing cost computed for different markets ranges between Rs. 0.35 to Rs. 0.88 per kg depending upon the location of the market. The major items of marketing cost are cost of jute bag (about 50 percent), transportation cost (about 30 percent) followed by loading/un-loading charges, weighing charges and market fees etc.

The nature of price spread or share of each channel in the profit earned in marketing largely depends upon the pattern of marketing. In the areas where bulk of the quantity is sold to the processing units major share in rupee profit is earned by primary purchasers otherwise the whole sale purchasers have significant profit sharing.

The regression estimates of Price Spread Model are obtained using retail price, wholesale price, product of quantity traded & retail price and time (week) as influencing variables. All the independent variables except for product of quantity & retail price significantly influenced price spread in most of the markets. Bivariate market co-integration analysis suggested that lac markets located at distant places are weekly co-integrated.

Lac Processing: Lac processing units situated in Chhattisgarh, Maharashtra, Jharkhand and West-Bengal were surveyed. The average number of labour employed in the units varied between 14 to 18 per shift. The processing unit produced mainly Shellac, Seedlac and Button lac. The response of the processing units for the declining trend of total output revealed that demand of output was not constant because it was largely governed by export demand. The violent fluctuation in scrap lac prices affected crop production.

Agricultural Research Data Book 2005

Agricultural research is a vital input for planned growth and sustainable development of agriculture in the country. The Council being an apex scientific organisation at national level, plays a crucial role in promoting and accelerating use of science and technology programme relating to agricultural research and education. It also provides assistance and support in demonstrating the use of new technologies in agriculture.

Information pertaining to agricultural research, education and related aspects available from different sources is scattered over various types of published and unpublished records. The Agricultural Research Data Book 2005, which is ninth in the series, is an attempt to put together main components/indicators of such information. The Data Book comprising of 240 Tables, is organized for the purpose of convenience of the users into eleven sections namely, Natural Resources, Environment, Agricultural Inputs, Fisheries, Horticulture, Production and Productivity, Produce Management, Export & Import, Indian Position in World Agriculture, Investment in Agricultural Research & Education and Human Resources under National Agricultural Research System (NARS). It also contains at the end, list of important National and International Agricultural Research Institutions associated with agricultural research and education along with their addresses, telephone numbers and e-mail addressses. The Data Book has been compiled through the joint efforts of the Indian Agricultural Statistics Research Institute (IASRI) and Indian Council of Agricultural Research (ICAR). This edition contains the latest information/ data as available in the country at the end of April, 2005. Accordingly, the Agricultural Research Data Book 2005 was published and released by the Hon'ble Union Minister of Agriculture during the 76th Annual General Meeting of ICAR, held at NASC Complex, New Delhi on 15 July, 2005. It was distributed among the members of the Governing Body, senior-level officers of the Council, Vice-Chancellors of SAUs, Directors of ICAR Institutes and other senior level officials under NARS as well as other organisations.

The preparation of Agricultural Research Data Book 2006 is under process.

PROGRAMME 4: MODELLING AND SIMULATION TECHNIQUES IN BIOLOGICAL SYSTEMS

A study entitled "Statistical investigation on the performance of non-parametric stability measures when the genotype × environment data is non-normal" was taken up with objectives as to statistically evaluate the merits of different non-parametric stability measures when the basic data/variables are non-normal, compare the performance of non-parametric measures with parametric measures under the non-normal situations, and to explore the possibility of developing new measures of stability/simultaneous selection measures.

Type-1 errors and the power for different nonparametric stability measures in case of normal as well as non normal distributions, gamma and log normal for different combinations of genotypes and environments *i.e.* genotypes 8, 12, 16, 20, 24 and environments 5, 10, 15, 20 are obtained for given values of level of significance *i.e.* .01, .025, .05 and .1.

Simulation was also done for different stability measures in case of Weibull distribution according to the value of shape parameter c of Weibull distribution. If $c < 3.602$ the distribution has a long right tail. If $c = 3.602$, it closely approximates to normal. If $c > 3.602$ it has a long left tail. The results so far obtained revealed that three measures are showing good performance in terms of power of the test.

Some Investigations on Stable and Robust Clustering Procedures was undertaken with the aim to study exhaustively and critically the important clustering methods which are being used in most emerging fields in agriculture and allied sciences, to simulate several multivariate normal populations for investigating the performance of commonly used clustering procedures, to develop suitable technique for obtaining stable and representative clusters, to identify stable and robust clustering procedures especially for missing data situations, and to evaluate the performance of the clustering procedures so identified on real data.

Samples of small size 25 for tall, medium and dwarf rice varieties were generated with the help of estimated mean vectors, dispersion matrices through SAS program developed for this purpose. Percentage misclassifications were compiled, calculated and tabulated for different combinations of clustering methods and distance measures under total nine variables as well as on different combinations of selected variables. The percentage misclassifications were calculated under two methods of standardization viz. z-score of variables and range of variables. The whole percentage misclassifications were brought together by providing different codes against method-distance combinations, clustering methods, distance measure, Z-scores and range of variables for the further

analysis in order to draw inference on the spitted data set. In order to validate its performance over large sample size, three samples each of size 100 have been generated from specified multivariate normal population and have been mixed for carrying out further study.

Effect of selection and incomplete model specification on heritability estimates was taken up to catalogue different methods of estimation for heritability with respect to selection pressures, to identify different procedures of estimation of heritability in the presence of non-normality and abnormal observations, and to study the effect of incomplete models on the heritability estimates.

The identification of different methods for studying precise estimation of genetic variance components has been taken up. The work on simulation of populations having effect of the selection as well as incomplete model specification has also been taken up. The bias of the estimates of heritability have been examined under different situations.

PROGRAMME 5: DEVELOPMENT OF INFORMATION TECHNOLOGY IN AGRICULTURAL RESEARCH

Under the Institute project 'Development of Statistical Package for Animal Breeding 2 (SPAB2)' six modules as per RPF-I were developed. These modules were thoroughly tested and their workings in the window environment were examined. In addition, some general class modules like, Matrix inversion, Matrix and Vector multiplication, Vector multiplication, Floating number printing and calculation of probability for F test have also been developed.

Under the Institute project 'Development of Expert System on Wheat Crop Management' four modules viz. variety selection, plant protection, cultural practices and harvest have been developed and ensured its smooth working. In addition to these two separate sub modules for wheat machinery and for data management have been developed and integrated with the system. The data management module takes care of data entry for all the modules and helps in addition, updating and deletion of data and in creation, updating and deletion of rules for the expert system. Multimedia effects have been added to the system. It guides the user with its voice for identification of disease, insects and weeds.

An AP Cess funded project 'National Information System on Agricultural Education Network in India (NISAGENET)' was started to develop a database management system that will provide the required information. The sensitization, feasibility and requirement analysis have been carried out by conducting different workshops at various State Agricultural Universities and Research Institutions.

Under the project development of 'Software for the Analysis of Survey Data' the object oriented programming concepts on the language C++ with added advantages of the latest .NET Technology are being used. The Data management module of the application software has the features of creating and saving a new data file with all data editing tools in spreadsheet form. It can also import data from already existing files, which are either from MS-Excel text files, or MS Access database files. Coding for imputation techniques for the missing data has also been done for Imputation Module. Imputation of missing data has been given with three different options namely Zero imputation, Mean imputation and Mean of the neighbouring units. The module also takes care of imputation within the sample data; within the sample from the defined stratum, within the sample from the defined cluster as well as within the sample from the defined stratum and clusters both.

A new institute project 'Development of PERMISnet-II' has been initiated from 01 July 2005 with the objectives to maintain and strengthen the PERMISnet system, to add new modules/reports as per the manpower planning requirements and to design and develop the software PERMISnet-II with .NET framework.

Information System for Agricultural and Animal Experiments

New web-enable software for Agricultural Field Experiments Information System (AFEIS) has been developed and is now available at IASRI website. The system caters to four types of users viz. **Un-registered users** - who can access the reports developed to give a flavour of vast information and create an interest to view details by getting registered with the system. **Registered Users** - who can generate reports by making choice on one or more of important characteristic of experiment and can view the details of the desired experiment. **Administrator** - who can update and validate the database and view the reports. **Super Administrator** - who has overall controls of the database and has right to update the status of other users.

Some of the salient features of the system are:

a. Users can build/automate their queries about agricultural experiments based on location (state), research station, crop, season, soil type, factors, agro climatic regions and crop group etc.
b. The details of each experiment have been divided into eight divisions and each division into several data items. The system provides choice to user to view experiment in full or a part thereof (division) as per his interest. Attempt is being made to provide the user with analysis of data, wherever plot-wise data is available.
c. From administrator's point of view several forms for on-line data entry have been developed.
d. The system has details of about 20,000 experiments.

National Information System on Long Term Fertilizer Experiments

National Information System on Long Term Fertilizer Experiments has been developed to store and maintain the data generated under long term fertilizer experiments in progress/concluded at various organizations under the Horticulture, Crop Sciences and NRM divisions of ICAR.

It is a user friendly web-based information system for on-line data entry and retrieval of information of long term fertilizer experiments and has been developed with Java Server Pages at front end and Structured Query Language Server at back end and has been hosted on website of IASRI http://www.iasri.res.in:8081/nisltfe.

The Home Page of the NISLTFE consists of five modules viz. (i) Introduction, (ii) Data Management module, (iii) Reports module, (iv) Contact Us module, and (v) Help.

The Data Management module handles the on-line data entry and updating tasks for experiment related information through a number of forms. The system provides a login form as a security barrier before entering into the module. Only the authorized users (System Administrators/Nodal Officers) of the system can enter into the Data Management module after entering their user Id and password.

The Reports module handles the information retrieval tasks from the database and its display to the user. The reports are both of fixed and user-customized type. Different types of users would be able to generate reports of their own interest in a proper and structured manner. However, the Guest User would not be allowed to view character-wise experiment data value reports. For this the guest user will have to secure an Id and password from any of the persons under Contact Us module. The reports option form provides the user with various options for generating different types of reports viz. Help in the form of User manual has also been provided for accessing various modules and how to enter, update and retrieve the information from the information system.

PROGRAMME 6: TEACHING AND TRAINING IN AGRICULTURAL STATISTICS AND COMPUTER APPLICATION

Another important activity of the Institute is to impart education and to conduct post graduate and in-service training courses in Agricultural Statistics and Computer Application. The achievements made under this programme are outlined separately under Education and Training.

4

Library and Documentation

The Library of the Institute is a Regional Library under National Agricultural Research System of the country. It plays a vital role in meeting the information needs of the In-house users as well as users from the NARS. It provides library, documentation and information services to the Scientists, Staff, Students and Researchers of the Institute as well as users from ICAR Institutes and State Agricultural Universities.

The Library Advisory Committee plays an important role in the Management of the Library and clears proposals relating to enrichment of resources of the Library such as books, journals, CD-ROMs as well as Infrastructural Development etc. The Library Advisory Committee for the year 2005-06 has been as under:

1. Dr. S.D. Sharma	Chairman
2. Dr. V.K. Gupta	Member
3. Dr. H.V.L. Bathla	Member
4. Dr. V.K. Sharma	Member
5. Dr. P.K. Malhotra	Member
6. Dr. Ranjana Agrawal	Member
7. Dr. V.T. Prabhakaran	Member (Upto Feb., 2006)
8. Dr. Prajneshu	Member (Since Feb., 2006)
9. Dr. S.S. Kutaula	Member
10. Dr. V.K. Bhatia	BOS Member
11. Dr. Rajender Parsad	National Fellow, Invitee
12. Dr. A.K. Paul	BOS Member
13. Capt. Mehar Singh	Member
14. Sh. K.K. Hamza	Member
15. Sh. Ananta Sarkar	Student Rep. (Upto Feb., 2006)
16. Sh. Sushil Sarkar	Student Rep. (Since Feb., 2006)
17. Dr. P. Visakhi	Member Secretary

The internal administration and organisation of the library and documentation is supervised by Dr. P. Visakhi.

During the year the Library provided following services to its users:

- Reprographic Service (Manual)

Home page of library information system

- Computerized Services
  1. Computerized Circulation
  2. Bibliographical Database
  3. Archival Database - 2
  4. On-line Journals - 53 (through Internet)
  5. On-line Database - 6 (through Internet)
  6. CD-Rom Database (both on-line as well as off-line) - 13
  7. Current Content Service (JCC) - 1
  8. Internet Search
  9. On-line Enquiry (OPAC)
  10. Current Awareness Service (New Arrivals)
  11. On-line Reservation of Documentation

During the year, the Library Reading Room has been air conditioned. To avoid dust and heat, double windows with anti glare glass have been fixed in the library. For easy search and location of a document, the arrangement of publications holding by each stacks in the library has been signaged in bilingual by showing main subject heading with call number and shelf number as a "Shelf panel" on respective racks. Each shelf has been highlighted with shelf number and signaged with call number so that this arrangement can be reflected on OPAC of Library to retrieve.

The following Computer Activities were done in the Library:

1. All resources added in the library have been bar-coded and updated in the bibliographical database.
- All library users were given Hands-on training on the use of library computerised services/ resources.
- All bonafide members have been issued electronic, bilingual and barcoded membership cards with photo.
- 51 e-Journals have been subscribed for on-line access in the Institute.
- All trainees of the Institute were given lectures and Hands-on-Training on "On-line Library Information System.
- Library subscribed the following on-line Bibliographical, Statistical, Abstracting on-line and CD-ROM Databases:
  - MathSciNet (http://www.ams.orgmathscinet.com)
  - Ingenta (http://www.gateway.ingenta.com)
  - Indiastat.com (http://indiastat.com)
  - Indian Harvest (http://www.cmie.com)
  - J-gate Custom Content
  - MathSci. Disc on CD-Rom
  - National Accounts Statistics (1950-51 to 2002-03) on CD-Rom

The Library Physical Stock Verification 2004 was conducted and reported by the committee and further necessary action was initiated by the library during the year.

Brief statistics relating to the library is as under:

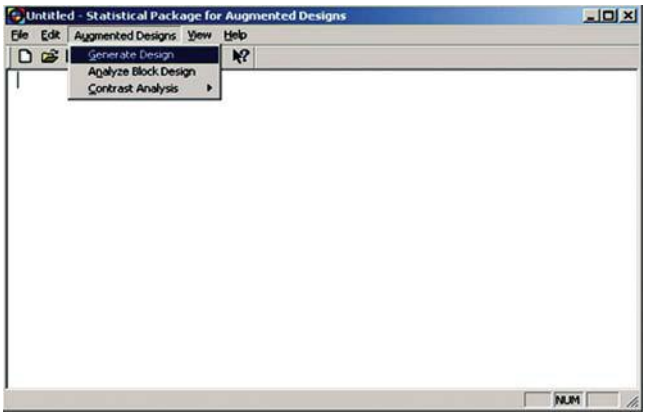
S.No.	Item	Number
1.	Books added (English)	181
2.	Books added (Hindi)	334
3.	Grey literature added	290
4.	Indian and foreign periodicals subscribed	122
5.	Publication issued from the library	10500
6.	Publication borrowed or lent out on Inter-Library-Loan	52
7.	Readers visited and consulted the library	14200
8.	Scientific and technical papers reprographed (Pages)	21000
9.	CD-ROM Databases acquired	02
10.	Internet/Databases Access, Searches	1850
11.	Number of computers added	02
12.	Number of book racks and shelves added	16

Technology Assessed and Transferred

Two software packages were finalized for commercial release. These packages were released by Prof. Mangala Rai, Secretary, DARE and Director General, ICAR on the Institute's Annual Day on July 02, 2005.

Statistical Package for Augmented Designs (SPAD)

SPAD is useful for designing agricultural experiments conducted for comparing existing practices/check varieties, called controls, with new practices/varieties/ germplasm collections, called tests, where the experimental material for the tests is limited and it is not possible to replicate them in the design. The package generates a randomized layout of an augmented randomized complete block design and augmented complete block design with equal or unequal block sizes. The optimal replication number of the control treatments in every block is obtained by maximizing the efficiency per observation for making tests versus controls comparisons. User has a flexibility to choose the replication number of the control(s) in each of the blocks. The package generates randomized layout of the design as per the procedure of Federer (1956), which is generally overlooked while conducting such experiments. The package also performs the



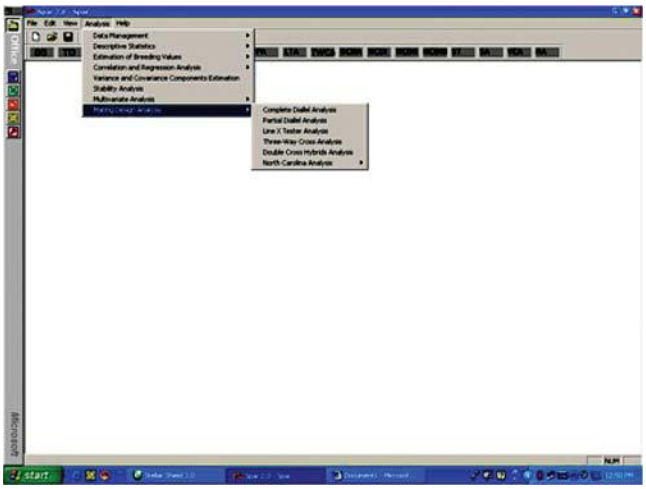
A window depicting different features of SPAD

analysis of data generated from augmented block designs (complete or incomplete). The treatment sum of squares is partitioned into different components of interest viz. (i) among test treatments, (ii) among control treatments and (iii) among test treatments and control treatments. Multiple comparison procedures for making all possible pairwise treatment comparisons can also be employed through this package. A null hypothesis on any other contrast of interest can also be tested.

Statistical Package for Agricultural Research (SPAR 2.0)

SPAR 2.0 is useful for the analysis of experimental research data in Plant Breeding and Genetics. The package consists of eight modules (i) Data Management, (ii) Descriptive Statistics, (iii) Estimation of Breeding Values, (iv) Correlation and Regression Analysis, (v) Variance and Covariance Components Estimation, (vi) Stability Analysis, (vii) Multivariate Analysis and (viii) Mating Design Analysis.

The cost of each of these packages is Rs. 1000+ Rs. 50 for postage for National Agricultural Research System (NARS) and Rs. 2500 + Rs. 50 for postage for the organizations outside NARS. For each additional license, the organization from NARS has to pay Rs. 500 and the organization from outside the NARS has to pay Rs. 1000.



A window depicting the different features of SPAR 2.0

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 the 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)**
Four students were admitted and three students completed the Ph.D. (Agricultural Statistics) degree.

(b) **M.Sc. (Agricultural Statistics)**
Five students were admitted and four students completed the M.Sc. (Agricultural Statistics) degree.

(c) **M.Sc. (Computer Application)**
Six students were admitted and three students completed the M.Sc. (Computer Application) degree.

Details of students completed various courses during 2005-06 is as follows:

Ph.D. (Agricultural Statistics)

(i) Dinesh Kumar Pateria—A study on designs for investigating competition from neighbouring units

In agricultural field experiments, the treatment applied to one experimental plot may affect the response on neighbouring plots besides the response on the plot to which it is applied. For example, in a **varietal trial** with tall and dwarf varieties of a species, plots with dwarf varieties may have low yield as compared to the normal yield because of the shading effect of the tall varieties in the adjoining plots. As a result, the estimates of treatment effect differences may be biased due to interference or competition from the neighbouring units. In the planning and analysis of such trials, it is therefore important to ensure that the effect of neighbouring plots is taken care of. Some analytical techniques, like analysis of covariance, can be useful for these situations, but in order to estimate the treatment effects as well as neighbouring competition effects, experimental designs are needed to be developed. It is important to ensure that no treatment is unduly disadvantaged by its neighbour. This is done by using the **neighbour-balanced designs** wherein the allocation of treatments is such that every treatment occurs equally often with every other treatment as neighbours(left and right). Some methods of constructing self-neighboured strongly balanced block designs for estimation of direct and neighbour effects have been obtained. Methods of obtaining circular neighbour balanced block designs have been described. Series of partially neighbour balanced block design has also been obtained. A method of constructing non-circular neighbour balanced block designs is also given. A class of block designs for competition effects with unequal block sizes has also been constructed. A list of the designs obtained giving parameters and efficiency has also been prepared. The joint information matrix for estimating direct and neighbour effects in block design set-up under mixed effects model has been derived and the conditions for the design to be universally optimal under different classes have been obtained. The class of designs that are universally optimal have also been obtained. Agroforestry and intercropping are a particular case of experiments where competition is suspected between different components. Concept of neighbour balanced designs for agroforestry experiments have been described and some series of designs have been obtained that are balanced for tree effects. The competition effects between different species in intercropping experiments have been studied. A SAS code using PROC IML is written for generation of information matrix of the block design for competition effects.

Guide: Dr. Seema Jaggi

(ii) Amitava Dey—A study on estimation of multi-equation statistical models

Multi-equation models also known as Seemingly Unrelated Regression Equations (SURE) models are a set of statistical equations in which random errors associated with these equations are correlated with each other. In time series modeling the errors are generally correlated, and as such the sample residuals contain some information about the future observations. This information, which is often ignored, has been used here in improving the precision of predicting the post-sample observations. The best linear unbiased predictor (BLUP) for given values of explanatory variables and known variance-covariance matrix of error term has been obtained by classical approach for an m-equation linear SURE model. The gain in efficiency of the proposed predictor over the usual generalized least-squares predictor has been obtained. Two particular cases, *viz.* (i) when the errors in each equation are independently and identically distributed and contemporaneous errors in different equations are correlated, and (ii) when error term in each equation follow AR(1) process, have been investigated. To observe the effect of sample size and magnitude of correlation between explanatory variables across the equations and of covariance between the error terms of different equations on the prediction efficiency, a Monte-Carlo experiment has been carried out using a two-equation model. Best linear unbiased predictor of the total of post-sample observations in a single draw

has also been proposed and it has been proved that best linear unbiased predictor of total of post sample observations is the sum of the best linear unbiased predictions of the individual commodities. Also, best linear unbiased predictors have been proposed for a 2-equation linear regression model with unequal numbers of observations. Estimation of SURE model has been investigated for two-equation linear regression models with three different patterns of missing observations having practical significance. The estimators and the variances of the estimators have been proposed. Consistent estimators of the regression parameters have been suggested when the variance-covariance matrix of the error vector is unknown and the small sample properties of these estimators have been studied through Monte-Carlo experiments.

Guide: Dr. VK Sharma

(iii) Ramesh Kolluru—Statistical investigation on molecular marker based classification of crop varieties

Knowledge about classification among breeding materials is an invaluable aid in crop improvement strategies. Thorough knowledge of the genetic diversity of a crop is necessary for parental selection that maximizes genetic improvement. More accurate and complete description of genotypes and patterns of genetic diversity could help in determining future breeding strategies and facilitate introgression of diverse germplasm into the current commercial genetic base of any crop. Quite often DNA markers along with cluster analysis are used to assess genetic diversity of different crops. Choice of genetic distance measures and clustering methods are the major issues in cluster analysis. It will be quite interesting to identify a suitable clustering procedure that could classify genotypes with greater accuracy, for a given crop. Many a times, it is very expensive to go for large number of molecular markers in classifying the crop genotypes. The sampling variance is used to determine how large a sample of markers is required to provide a given level of precision. Thus, it would be desirable to estimate genetic relationships using optimum number of polymorphic bands. Analysis of Molecular Variance (AMOVA) is used to summarize the population structure with the marker data from different genotypes, while remaining flexible enough to accommodate different types of assumptions about the evolution of the genetic system. Thus, it is desirable to estimate correlation of molecular diversity in AMOVA. Keeping in view of these points, the present investigation was focussed on the identification of suitable clustering procedure, which would render more accurate classification of crop genotypes, determination and identification of the effective number of polymorphic markers in genetic diversity estimation and identification of suitable procedure for the estimation of correlation of molecular diversity in the Analysis of Molecular Variance. Among different clustering methods and distance measures, a combination of Fuzzy clustering method and Modified Roger's distance was identified as the most suitable procedure for clustering rice cultivars using STMS marker data, whereas for the sugarcane crop and AFLP marker data a combination of Fuzzy clustering method and Nei & Li distance was identified as the best. The optimum number of STMS markers in rice was determined to be around 35, with minimum sampling variance (10% coefficient of variation), which gives the same genetic relationships as would have been obtained from large number of markers. Further these 35 markers were identified. In a similar way, for sugarcane crop a total of 300 AFLP markers were determined as optimum number of markers. For rice and sugarcane cultivars, the correlations of molecular diversity along with their standard errors were estimated as 0.37 ± 0.039 and 0.013 ± 0.011 respectively. Also, the minimum number of restriction sites required for testing the significance of correlation of molecular diversity was found to be 65 and 300 in rice and sugarcane respectively.

Guide:. Dr. VT Prabhakaran

M.Sc. (Agricultural Statistics)

(i) Madan Gopal Kundu—Genetic analysis of growth curves in pigs

Growth studies serve as aid in assessing the maximum production potential of livestock. Growth studies have been performed on pig-growth data along with computation of the genetic parameters of estimated growth curve parameters and body weight to determine whether growth curve parameters can be used or not for selection purpose. Richards' model has been fitted to each of the 698 pigs. The estimate of inflection parameter, *m*, indicates that the logistic model is the best fit. The parameter estimates of logistic model are 79.67 kg, 2.67 kg per week and 23 weeks for asymptotic body weight, maximum growth rate and age at point of inflection respectively. Heritability and genetic

correlations have been estimated for the body-weight data and estimated growth curve parameters (logistic) using full sib mixed model and half sib mixed model considering sex as fixed effect. It has been found that body weights are moderately heritable from 4th weeks of age. The heritability estimate of age at point of inflection is moderate whereas the other two parameters of logistic model viz., mature body weight and maximum growth rate are poorly heritable. The body weights were almost always negatively correlated with the age at the point of inflection and mature body weight. Again the age at point of inflection is strongly and positively correlated with the mature body weight. It seems that it is possible to have pigs with higher body weight at the age of 20th or 24th week which is very closure to slaughtering time and decreased mature body weight (mature body weight should be lower to decrease the maintenance cost of the animal in the parental stocks) through selecting animals on the basis of early ages at point of inflection. Besides this selection efficiency are also favorable for selecting animal at the early ages, namely at 7th and 8th weeks of ages, for the increased body weight at later ages, namely 20th and 24th weeks of age which may be a great weapon for maximizing profit for those farms which are devoted to commercial pig production. A data set has been generated for 756 animals using full-sib model and number of sires is taken as 63. The results obtained through analyzing the simulated data are in agreement with the results obtained through analyzing the real data.

Guide: Dr. AK Paul

(ii) Pabitra Biswas—A study on resolvable block designs

Resolvable block designs are important in practice since it is often useful to perform an experiment replicated at a time. Many of Balanced Incomplete Block designs, Partially Balanced Incomplete Block designs, and Cyclic designs provide resolvable designs for various parametric combinations. The á-design introduced by Patterson and Williams (1976) exist for $v = ks$ in blocks of size k with r replications and each replication having s blocks is also resolvable. These designs are computer generated and software available for generating these designs are either not available or cost prohibitive to the experimenter. Also sometimes it is desirable to make use of the layout of the field in conducting the trial and replications may have to be placed contiguous to each other. For this purpose John and Williams (1995) introduced the concept of Latinized á-designs. These designs are also computer intensive and generations of layouts of such designs are also not readily available. Thus it is of importance to develop algorithm and software for generation of efficient á-designs and efficient Latinized á-designs. This will help in easy access of these designs to researchers in our country. Algorithm for the construction of efficient á-designs and Latinized á-design has been developed using Exchange and Interchange procedures to array generated randomly for the construction of designs rather to the design itself. Lower bounds to A and D efficiency of block designs have been also computed. A computer program in Visual C++ and also in SAS has been developed for this purpose. A catalogue of over 400 á-designs for $v \leq 200$, $3 \leq k \leq 10$, $2 \leq r \leq 5$ has been prepared and out of these 267 designs have lower bound to A-efficiency > 90%. A catalogue of Latinized á-designs for $v \leq 25$ and for which long block is a complete replicate has also been prepared.

Guide: Dr. PK Batra

(iii) Dwijesh Chandra Mishra—Some investigations on the method of ranked set sampling in the context of finite population

The method of Ranked Set Sampling (RSS) proposed by McIntyre provides samples which are representative of the population. The RSS is useful in situations where the exact measurement of selected units is either difficult or expensive in terms of time, money or labour, but where the ranking of small sets of selected units according to characteristics of interest is possible with reasonable success on the basis of visual inspection or through other rough measurements. The method involves selecting 'n^2' units from a population of size 'N' and randomly partitioning the n^2 units into 'n' sets of size 'n'. Each member of a set is ranked relative to one another and on the basis of ranking exactly one member of each group is chosen for quantification. Thus from the first set first ranked unit is chosen and quantified, from the second set the second ranked unit is chosen and like wise from the n^{th} set the n^{th} ranked unit is chosen. The theoretical framework for RSS procedure has also been developed for finite population sampling. The RSS procedure has been extended to the case of two stage sampling design when the population under study is finite. An estimator of population mean has

been proposed when the sampling design under question is two-stage random sampling. Three different cases have been considered i.e. SRS applied at the first stage of sampling and RSS applied at the second stage of sampling; RSS applied at the first stage of sampling and SRS applied at the second stage of sampling; and RSS applied at both the stages of sampling. The proposed estimators are shown to be unbiased. Relative efficiencies of RSS based estimators over Simple Random Sampling based estimator have been empirically evaluated using the data of an experimental station on wheat field. The results of the study revealed that the RSS based estimator was more precise than the SRS estimator. Gain in precision of RSS based estimator varied from 4.5 to 17 per cent. Further, a Double Ranked Set Sampling (DRSS) procedure has been proposed for estimation of finite population mean. The theoretical framework is limited to samples of size '2'. Expressions for the inclusion probability of a unit and joint inclusion probabilities of two different units have been derived. With the help of an artificial data efficiency comparison of DRSS based estimator of finite population mean over an estimator based on RSS and SRS has been made. The DRSS based estimator was found to be more precise than the RSS and SRS based estimators. Percent gain in precision of DRSS based estimator over RSS and SRS based estimator was found to be 112.76 and 144.73 respectively.

Guide: Dr. UC Sud

(iv) Shiv Kumar Choudhary—Statistical investigation on simultaneous selection of genotypes for yield and stability under incomplete genotype × environment data on groundnut

In any crop improvement programme it is quite common to assess the performance of the improved varieties when raised over a wide range of locations. The basic purpose here is to identify varieties that show high performance for yield and other agronomic traits over wide range of environmental conditions. This indicates the importance of stability performance, apart from mean performance, while recommending varieties for general/ specific adaptation. Integration of stability performance with high yield performance through some suitable measures is therefore necessary for selecting varieties under multi-environmental trials. Many a times, the statistical techniques appropriate to complete data do not directly apply to incomplete genotype x environment data. Normal tendency is to restrict the analysis only to those trials for which the data are complete. Any deliberate culling of incomplete data would render the comparison of genotypic performance for yield and stability over different environments unreliable. Also, the genotypes real merit is hardly been considered simultaneously for both high-yield and stability that too when the genotype x environment data is incomplete. So far, not much work has been done on studying the influence of missing observations on the performance of different simultaneous selection measures. Zone-V being the largest zone of groundnut crop under AICRP trials, few varieties that are performing well in one part of zone-V are unable to get selected due to their poor performance in another part of the zone.

Keeping in view these points, the study deals with cataloguing of different procedures available for selecting genotypes simultaneously for yield and stability, examining the influence of missing observations on the performance of different simultaneous selection measures and sub-zonalizing zone-V of AICRP trials and thereby identify genotypes simultaneously for high yield and stability. Under this investigation, different simultaneous selection indices available in literature have been catalogued. A new simultaneous selection index has also been proposed to select varieties for high yield and stabilty under incomplete data situation. Further, the performance of the proposed index has been tested on groudnut data and it was observed that the proposed index shows significant correlations with both high yield and stability as well as selects large proportion of high yielders and stable performers when the incompleteness in the data is upto 10% of the total sample size. The influence of missing observations on performance of simultaneous selection measures has been examined and it was observed that all the indices were performing well upto around 10% of incompleteness in the data. Beyond 10% incompleteness, the Rao *et al.* (2004) index and proposed index perform consistently over other indices in terms of selection of high yielders and stable performers. Zone-V of AICRP trials has been subzonalized based on yield performance of groundnut varieties in different locations by adopting different clustering techniques.

Guide: Dr. AR Rao

M.Sc. (Computer Application)

(i) Aparna Kumari—Information system for major fruit crops (apple, banana & mango) of India

The present era has seen an exponential growth and diversification in all forms of information, sometimes called, an information explosion. It has been made possible due to the impact of computer technology on the modern society. Computerized information systems have influenced nearly all domains of agriculture and the domain of horticulture is no exception. India has a good horticultural resource base and related research and development infrastructure, which resulted in increased production and productivity of several fruits. At present, India is the second largest producer of fruits next only to China and the fruit production has tripled over the last fifty years. Total production of fruits has been estimated at 45.49 million tonnes (10% of total world production) from 3.79 million hectare in the year 2002. Fruit Crop Information System (FruitCIS) is a web based user-friendly, information system for major fruit crops of India, developed using Java Server Pages (JSP). It is developed as a comprehensive information system for apple, banana and mango fruit crops. The information, which is available in the form of books, journals, popular magazines, etc., is beyond the reach to each and every person across the world. Therefore in the electronic era the FruitCIS may help progressive farmers, policy planners, researchers, students and extension workers for rapid dissemination of knowledge and benefit humankind. Information system has the potential to help farmers to run their business more economically and get the information at every stage of fruit growth and storage. FruitCIS has a three-layered architecture. Client Side Interface Layer is implemented in HTML and JavaScript. Server Side Application Layer is implemented using Java Server Pages and Java Database Connectivity. Database Layer is implemented in Microsoft Access 2000. FruitCIS can be implemented as a network-based system with a server at IASRI so that information is available on-line. FruitCIS runs at any node of the Internet through a browser. Security features are provided in such a way that only person concerned can access the database. There is provision to insert and update the information. FruitCIS provides information on fruit distribution, family, genus, species, origin, chromosome number, nutritional value etc. statistics (area, production & productivity) of major growing states for the past/recent ten years, ambient environment requirement (temperature, rainfall, humidity etc.) for growing these crops, varieties (cultivars, hybrids and their state, yield etc.), planting material & planting system (systems detail & spacing detail), fertilizers and manure being used (types of fertilizers, methods, amount & time of application etc.), micro nutrient requirement (name, importance & deficiency symptoms), irrigation management (systems & its detail, time & frequency of watering etc), training/ pruning details (time, methods, importance etc.), diseases, physiological disorder and pests management (common name, causal organism, description symptoms, control, IDM/IPM etc.), weeds (common & botanical name and their control), harvesting (maturity index & technique, equipment needed etc.), storage details, location of domestic markets/international markets, processing detail (processed products, methods, uses) and company details. FruitCIS provides search facility for fruit statistics, variety, soil type, fertilizer, irrigation, maturity index, planting system type, disease, pest, disorder, nutrient type, weed, storage, processed product and company wise information. The software also provides facility for search using keyword and search using different search engines. Users can also view customized reports on fruit statistics. User can interact with subject specialists through e-mail, which has been developed using Java mail feature. On-line help is provided for both administrator and user. There is also a facility for image uploading in database. The feature of providing information to users through frequently asked questions has also been included in this software.

Guide: Dr. SD Sharma

(ii) Chhawi Saurabh—Information system on intercropping experiments

Information Systems are assuming an ever-increasing importance in the agriculture development and playing an important role for changes in socio-economic development of the country. Information System on Intercropping Experiments (ICEIS) is an attempt to develop a web based user-friendly, integrated solution for all the Intercropping Experiments related with On-Farm and Off-Farm activities conducted all over the country. It has a three-layered architecture. Client Side Interface Layer is implemented using HTML and JavaScript, Server Side Application Layer using Java Server Pages (JSP) and Java Database Connectivity. Database Layer is implemented using

Microsoft Access 2000. ICEIS can be implemented as a network-based system with a server at a central location (IASRI) so that information is available on-line. ICEIS runs at any node of the Internet through a browser. Security features are provided in such a way that only authorized person can access the database. There is provision to insert, update and delete the information.

ICEIS provides information regarding Intercropping experiments including experimental site history, location details, design details, objective of the experiment, treatment details, soil types and its texture, season in which the experiment was conducted, basal condition details which in turn will include sowing dates, seed rates, spacing, basal manuring, preparatory cultivation, planting methods, irrigation details, date of harvest for both main crop and inter crop and some general informations like disease and pest attack, crops condition etc. It also has the provision to search information related to conducting centre, experiment, treatments applied, main crop and inter crop informations, fertilizer doses, design information, experimental data in case of unanalyzed experiments and results in case of analyzed experiments. The users can view customized results on various aspects of the intercropping experiments as well as they can also interact with concerned people through e-mail. On-line help is also available to help both administrators and users.

Guide: Dr. VK Mahajan

(iii) Soumen Pal—Decision support system for nutrient management in crops

Information services to the farmers can be improved through the creative use of IT. Farmers use information on weather conditions, markets, agricultural developments and practices. IT with its various tools such as Internet, GIS, ESs and DSSs can play a vital role in providing the decision support to the farmers. Decision Support System on Nutrient Management in Crops (DSSNMC) is a web-based Decision Support System (DSS) to assist farmers in taking decisions related to nutrient management in crops. DSS has great importance in agriculture, as experts are not always available to answer farmers' query. DSSNMC has three modules to provide decision support to farmers. First module is based on soil test values. In this module, user provides soil test values along with desired crop to be grown, variety of that crop, season for that particular variety, soil type and targeted yield within a particular range. Based on the input provided by the user the system recommends application of chemical fertilizers for supplying the requirement of major nutrients such as nitrogen, phosphorus and potassium to the crop. The second module provides decision support on the basis of location such as district. If a farmer could not get the soil tested, the system will take input such as the location of the farm in the district, targeted yield and rest of the parameter values such as available nitrogen, phosphorus, potassium and the soil pH are obtained from the system database where standard values for a particular district are stored. The decision support to the farmers is provided in the same way as in the first module.

Another module is based on nutrient deficiency symptom of the crop. The basis here is the observation of the farmers, which they compare with the images already stored in the system. After identification of the type nutrient deficiency of the crop, the farmer can apply the treatment measures provided by the system.

The software has only one level of authentication i.e. Administrator. Administrator has the privilege to add, modify or delete information from the database. Users can interact and get decision support from the software without any authentication. They can also ask questions regarding the crop related problem by sending e-mails to the concerned experts. Users can also view some frequently asked questions (FAQs) regarding various queries.

DSSNMC is developed using ASP.NET, which is a new web-based technology. Database part is developed using Microsoft Access (MS Access). It is the database widely used for its simplicity and ease in operation.

Guide: Dr. IC Sethi

NATIONAL/ INTERNATIONAL TRAINING PROGRAMME

Senior Certificate Course in Agricultural Statistics and Computing

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 Institute of the Council, State Agricultural Universities and State Government Departments, etc. and 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 organised during the period 04 July 2005 to 31 Dec. 2005. The Course comprise of two independent modules of three months duration each. Six officials including one Departmental participated in both the modules. Module-I was organized during 04 July 2005 to 24 September 2005.Two officials participated in Module-I only.

Module-II was organised during 03 Oct 2005 to 31 December 2005. One officer participated in Module-II only. The course 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.

The valedictory function for the course was held on 31 December 2005 in which Dr. SD Sharma, Director, IASRI distributed the certificates to successful participants.

Programme under Centre of Advanced Studies

- A 21 days training programme on 'Data Driven Web Solutions using Open Source Technology' was organised during 17 September to 07 October 2005 under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Applications. The training programme was attended by 13 participants from various ICAR Institutes and State Agricultural Universities. Sh. Vipin Kumar Dubey was the Course Director.

Inauguration of a Training Programme on
'Data Driven Web Solutions using Open Source Technology'

This training programme offered sufficient practical knowledge to develop and host a database server on Linux operating system with Apache web server using MySQL as RDBMS and PHP server side script for database connectivity. In brief the practical was divided into four modules. Installation of Linux, Apache, MySQL and PHP.

Major areas covered were Introduction to Open Source Technology, An Overview of Open Source Software Licenses, Data Warehousing in Agriculture, IT Innovations and Challenges for NARS, Introduction to Linux OS, Basic File System Security, Administrative Issues in Linux, Introduction to Web Server, Introduction to Apache, Global Environment Directives, Main Server Configuration Directives, Virtual Hosts Directives, Concepts of RDBMS, Introduction to MySQL, MySQL Administration, MySQL GUI, HTML, Introduction to PHP and XML, etc.

Guest Lectures on Administrative Issues in Linux, System and Network Management and Cyber Security were also organised.

- A 21-days training programme under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Applications on 'Recent Advances in the Analysis of Survey Data', was organised for the scientists of ICAR Institutes/SAUs during 18 November to 08 December 2005. The training programme was attended by 20 participants from various ICAR Institutes and State Agricultural Universities. Dr. KK Tyagi was the

Inauguration of a Training Programme on
'Recent Advances in the Analysis of Survey Data'

Course Director for the training programme.

During the training, the participants were exposed to recent advances in the field of Sample Surveys like Historical Perspective of Sample Surveys, Simulation Techniques, Small Area Estimation, Model Based Approach in Survey Sampling, Regression Analysis, Categorical Data Analysis, Variance Estimation, Remote Sensing, Current Status of Crop Surveys, Qualitative Aspect in Sample Surveys, Imputation Techniques, GIS, Current Status of Livestock Surveys etc. The participants were also given exposure to working on computers and use of different statistical packages.

Joint Director delivering the lecture to the participants of a Training Programme

- A 21-days training programme on 'Statistical Techniques for Agricultural Research with Emphasis on Use of Software' was organised during 21 December 2005 to 10 January, 2006 under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Applications. The training programme was attended by 21 participants from various ICAR Institutes and State Agricultural Universities. Dr. Seema Jaggi was the Course Director for the training programme.

Inauguration of a Training Programme on 'Statistical Techniques for Agricultural Research with Emphasis on Use of Software'

A participant receiving the certificate during Valedictory Function of CAS Training Programme on 'Statistical Techniques for Agricultural Research with Emphasis on Use of Software'

The training programme was aimed at providing the participants opportunity to study and learn some sophisticated techniques of data analysis using softwares which may help them in analysis and interpretation of their results more meaningfully, with better sense of reliability and confidence. In particular, this course was designed to acquaint researchers with the techniques of data collection, statistical analysis, interpretation and presentation of results. The course was oriented towards application and a combination of lectures, exercises, and hands-on exercises on SPSS/ SAS/ MS-EXCEL. A web page was designed regarding the details of the training and was attached in our Institute's website. This course was intended primarily for scientists undertaking agricultural research. In all 21 participants from various disciplines of Agriculture representing different ICAR Institutes (12) and State Agricultural Universities (9) attended this training. The topics were covered under following four modules (i) Statistical Softwares and Information Systems in Agricultural Research, (ii) Statistical Methods in Agricultural Research, (iii) Planning of Agricultural

Experiments/ Surveys and (iv) Modern Approaches to the Analysis of Agricultural Data. Concepts were explained largely without using much of mathematics using computer software and the course emphasized on understanding that which analysis is appropriate to use and correct interpretation of the results. 23 faculty members from the institute and 4 guest speakers (Prof. Prem Narain, Dr. P.R. Sreenath, Dr. R.N. Sahoo and Dr. G.K. Jha) delivered lectures during this training. Course material in the form of Reference Manual and Electronic Manual was provided to all the participants.

- A 21-days training programme on 'Development of Portals using LAMP Technology' was organized during 01-21 February 2006 under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Applications. The topics covered

Inauguration of a Training Programme on
'Development of Portals using LAMP Technology'

were Introduction to Portals, Linux Operating System, Apache Web Server, MySQL Database Server and PHP Server Side Script. The training programme was attended by 15 participants from various ICAR Institutes and State Agricultural Universities. Sh. K.K. Chaturvedi was the Course Director.

This training programme offered sufficient practical knowledge to develop and host Portal on Linux operating system with Apache web server using MySQL as RDBMS and PHP server side script for database connectivity.

In brief the practical was divided into four modules: Installation of Linux, Apache, MySQL and PHP.

Major areas covered are Enlighten LAMP Technology in NARS, An Overview of Portals, Data Warehousing in Agriculture, Library Information System, Cyber Security and IT Laws, Working with Linux and Shell, Files & Directories Structure in Linux, Basic File System Security, Administrative Issues in Linux, Introduction to Apache and Global Environment Directives, 'Main' Server Configuration and Virtual Hosts Directives, Concepts of RDBMS, Working with MySQL, MySQL Administration, MySQL GUI, HTML (Formatting and Images), HTML (Links, Frames and Forms), Introduction to PHP, Building Blocks of PHP & Flow Control, Loops & Functions, Array & Times and Dates, Files Handling, Working with Forms, PHP and MySQL Integration and Development of Portal using Zope, etc.

Guest Lectures on Administrative Issues in Linux, Mail Server Configuration, Issues in Development of Portals and Monitoring of N/W activities were also organised.

OTHER TRAINING PROGRAMMES

Training Programme for Visitors

- A training programme on SPSS for two persons from NBRI, Lucknow during 13-18 June 2005 was organised under resource generation programme and an earning of Rs.10000/- was made. Dr. V.K. Mahajan organized the training.

Inauguration of a Training Programme on
'Small Area Estimation Techniques'

- One day training programme was organised on 30 January 2006 for the visitors on 'Large Sample Survey' sponsored by Ministry of Statistics & Programme Implementation. The training was attended by twenty participants.

A participant receiving the certificate from Chief Guest during Valedictory Function of Training Programme on 'Small Area Estimation Techniques'

- A refresher training programme on 'Small Area Estimation Techniques' for ISS Officers sponsored by CSO, Ministry of Statistics and Programme Implementation was organised during 25-30 July, 2005. Dr. Randhir Singh was the Course Director. The training programme was inaugurated by Dr. S. Ray, D.G. and CEO, NSSO, Ministry of Statistics and Programme Implementation. Dr. Ray emphasized the need of such programmes to enable the ISS officers working in important positions to make use of the latest techniques for decision-making. The course was planned for 15 participants but only 9 participants could join the course. The course has been organised in the form of lectures, practicals and group discussions. The reference manual of the course was prepared and provided to the participants in the beginning of the course. The topics covered included the classical techniques and their application and recent technologies like remote sensing, GIS and their application in small area estimation. Lectures were mainly delivered by the scientists of the Institute working on the problems related to small area estimation. Two experts namely, Dr. Padam Singh, Former Additional Director General, ICMR and Dr. A.K. Srivastava, Former Joint Director, IASRI were also invited to deliver the lectures. The valedictory function of the course was held on 30th July in the afternoon. Shri P.S. Rana, Secretary, Govt. of India, Ministry of Statistics and Programme Implementation was the Chief Guest on the occasion and distributed the certificates to the participants. Shri Rana was very happy with the smooth conduct of the course and expressed his views that the number of participants in such courses should be large and this number should be around 25 in each such course and suggested that CSO may like to take necessary steps in this direction. A number of participants also expressed their views on the course in the function. Most of the participants appreciated the conduct of the course and expressed gratitude to all the lecturers. All the participants felt that their performance will improve after attending the course and they will be able to provide more precise answers to the need of information at small area levels.
- An International study tour/training programme on 'Development of Agricultural Statistics System' for the participants from Timor Leste was organised at the Institute during 06-11 March 2006. The programme was sponsored by Food & Agriculture Organisation. The introductory session of the programme was held on 06 March, 2006. Scientists and Technical Officers of the Division attended this session. Dr. HVL Bathla was the Course Director. One participant was Director of Policy, Planning and Programme, Ministry of Agriculture, Forestry and Fisheries and another was Senior Statistician (Statistics Agriculture), Ministry of Planning and Finance, Timor Leste. Participants were visited NSSO, RK Puram, New Delhi and a lecture on Statistical System in India was arranged there. Lectures on area, yield and production statistics, Land use statistics and cost of cultivation was arranged at DES, Krishi Bhawan, New Delhi. A lecture on Official statistics and crop forecasting was delivered at NCFC, Krishi Bhawan, New Delhi. Participants visited to National Sample Survey Organisation (FOD), Faridabad for demonstration of girdawari operation, sample check, preparation of data schedules, tabulation programmes and preparation of estimates of yield rates. Participants also visited the Office of Land Records, Gwalior (Madhya Pradesh) for demonstration of land record

system of one of the State i.e. Madhya Pradesh and field visit for demonstration of actual crop cutting experiments and socio economic surveys.

Research Fellowship

During 2005–06, 12 Ph.D. and 28 M.Sc. students received research fellowship. 12 Ph.D. students received IARI Scholarship at the rate of Rs. 7000/- p.m. in addition to Rs.10,000/- per annum as the contingent grant. 14 M.Sc. students received ICAR Junior Research Fellowship at the rate of Rs. 5760/- p.m. besides Rs. 6000/- per annum as the contingent grant and 14 M.Sc. students received IARI Scholarship at the rate of Rs. 5040/- p.m. besides Rs. 6000/- per annum as the contingent grant.

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

S. No.	Name	Year of induction
1.	Dr VK Gupta, Joint Director	1984
2.	Dr VK Sharma, Professor (Agricultural Statistics)	1984
3.	Dr Randhir Singh, Principal Scientist	1974
4.	Dr Prajneshu, Principal Scientist	1984
5.	Dr VT Prabhakaran, Principal Scientist	1987
6.	Dr VK Bhatia, Principal Scientist	1987
7.	Sh SD Wahi, Principal Scientist	1987
8.	Dr Ranjana Agrawal, Principal Scientist	1988
9.	Dr HVL Bathla, Principal Scientist	1991
10.	Dr R Srivastava, Principal Scientist	1993
11.	Dr UC Sud, Principal Scientist	1995
12.	Dr KK Tyagi, Principal Scientist	1995
13.	Dr Chandrahas, Principal Scientist	1996
14.	Dr PK Batra, Principal Scientist	1996
15.	Dr Jagbir Singh, Principal Scientist	1996
16.	Mrs Asha Saxena, Principal Scientist	1998
17.	Dr Amit Kumar Vasisht, Principal Scientist (at IARI)	1998
18.	Dr Rajender Parsad, National Fellow	1995
19.	Dr Anil Rai, Senior Scientist	1995
20.	Dr Seema Jaggi, Senior Scientist	1995
21.	Dr MS Narang, Senior Scientist	1998
22.	Dr Aloke Lahiri, Senior Scientist	1998
23.	Dr Lal Mohan Bhar, Scientist (Sr. Scale)	1998
24.	Dr Amrit Kumar Paul, Scientist (Sr. Scale)	1998
25.	Dr Tauqueer Ahmad, Scientist (Sr. Scale)	1998
26.	Dr AR Rao, Scientist (Sr. Scale)	1998
27.	Dr Ramasubramanian V., Scientist (Sr. Scale)	1999
28.	Dr Girish Kumar Jha, Scientist (Sr. Scale)	1999
29.	Dr Cini Varghese, Scientist (Sr. Scale)	2000
30.	Dr RL Sapra, Principal Scientist (at IARI)	2002
31.	Dr Prachi Misra Sahoo, Scientist	2002
32.	Dr Krishan Lal, Senior Scientist	2003
33.	Sh Hukum Chandra, Scientist	2003
34.	Sh Amrender Kumar, Scientist	2003
35.	Md Wasi Alam, Scientist	2003
36.	Dr Prawin Arya, Scientist (Sr. Scale)	2003
37.	Dr Himadri Ghosh, Scientist	2004

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

S. No.	Name	Year of induction
1.	Dr SD Sharma, Director	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.	Sh Harnam Singh Sikarwar, Scientist (SG)	1997
7.	Dr DK Agarwal, Principal Scientist	1999
8.	Md Samir Farooqui, Scientist	2001
9.	Ms Alka Arora, Scientist	2001
10.	Ms Shashi Dahiya, Scientist	2001
11.	Ms Sangeeta Ahuja, Scientist (Study Leave)	2002
12.	Sh Sudeep, Scientist (Study Leave)	2002
13.	Sh Vipin Kumar Dubey, Scientist	2002
14.	Sh KK Chaturvedi, Scientist	2002
15.	Sh SN Islam, Scientist	2004
16.	Sh SB Lal, Scientist	2004
17.	Ms Anshu Dixit, Scientist (Study Leave)	2004
18.	Ms Anu Sharma, Scientist	2004

Code	Title	Course Instructors
	Courses taught during the Academic Year 2004–05	
	Trimester – III	
	Agricultural Statistics	
AS-103	Elementary Sampling and Non-Parametric Methods (2+1)	Asha Saxena, Jagibir Singh and Prachi Misra
AS-163	Statistical Inference (4+1)	Rajender Parsad and LM Bhar
AS-164	Design of Experiments – I (3+1)	Seema Jaggi and VK Gupta
AS-166	Statistical Genetics – I (3+1)	VT Prabhakaran and AR Rao
AS-299	Seminar (1+0)	Ramasubramanian V
AS-302	Advanced Design of Experiments – II (2+1)	R Srivastava and PK Batra
AS-304	Advanced Sample Survey – II (2+1)	UC Sud and Prachi Misra
AS-307	Forecasting Techniques (1+1)	Chandrahas and Ramasubramanian V
CS-299	Seminar (1+0)	Ramasubramanian V
	Computer Application	
CS-132	Data Structures and Structured Programming (2+1)	Shashi Dahiya and KK Chaturvedi
CS-133	Numerical Algorithms Analysis and Software (2+1)	HS Sikarwar and Pal Singh
CS-134	Modeling and Simulation (2+1)	PK Malhotra and Anshu Dixit
CS-135	Computer Communication Networks (2+0)	Alka Arora and SN Islam
CS-299	Seminar (1+0)	Ramasubramanian V
	Courses taught during the Academic Year 2005–06	
	Agricultural Statistics	
	Trimester – I	
AS-101	Elementary Statistical Method (2+1)	VT Prabhakaran and SD Wahi
AS-150	Mathematical Methods in Statistics – I (4+0)	Cini Varghese and Himadri Ghosh
AS-160	Probability Theory (2+0)	LM Bhar
AS-161	Statistical Methods – I (2+1)	VT Prabhakaran and GK Jha
AS-161(Old)	Statistical Methods – I (3+1)	VT Prabhakaran, GK Jha and LM Bhar
AS-167	Applied Multivariate Analysis (2+1)	Ranjana Agrawal and AR Rao
AS-168	Econometrics(2+1)	VK Sharma and Sivaramane N
AS-169	Planning of Surveys/Experiments (2+1)	MS Narang, RS Khatri and MR Vats
AS-200	Design of Experiments – II (1+1)	Rajendra Parsad and Cini Varghese
AS-201	Sampling Techniques – II (1+1)	KK Tyagi and GK Jha
AS-202	Statistical Genetics – II (1+1)	VK Bhatia and AK Paul
AS-203	Regression Analysis (1+1)	LM Bhar and Ramasubramanian V
AS-204	Linear Models (2+0)	VK Sharma and R Srivastava
AS-206	Optimization Techniques (1+1)	UC Sud and Amrendra Kumar
AS-370	Recent Advances in the Field of Specialisation	Prajneshu and VK Gupta
AS-299	Seminar (1+0)	Seema Jaggi
	Trimester – II	
AS-102	Elementary Design of Experiments (2+1)	Aloke Lahiri and Krishan Lal
AS-151	Mathematical Methods in Statistics – II (4+0)	PK Batra and NK Sharma
AS-162	Statistical Methods – II (2+1)	Seema Jaggi
AS-165	Sampling Techniques – I (3+1)	Tauqueer Ahmad, Anil Rai
AS-170	Statistical Modeling (2+1)	Prajneshu
AS-171	Bioinformatics – I (3+1)	VK Bhatia, Rajender Parsad, AR Rao and KV Bhatt (NBPGR)
AS-205	Advanced Statistical Inference (1+1)	Krishan Lal and UC Sud
AS-207	Stochastic Processes (3+0)	Himadri Ghosh
AS-301	Advanced Design of Experiments – I (2+1)	R Srivastava and VK Gupta
AS-303	Advanced Sample Survey – I (2+1)	HVL Bathla and Jagbir Singh
AS-305	Advanced Statistical Genetics – I (2+1)	VK Bhatia
AS-299	Seminar (1+0)	Seema Jaggi

Computer Application

Trimester – I

CS-100	Introduction to Computer Application (1+1)	Balbir Singh
CS-111	Introduction to Computer Organization and Architecture (3+0)	Shashi Dahiya
CS-112	Fundamentals of Computer Programming in C (2+1)	KK Chaturvedi
CS/CA-114	Discrete Mathematics (2+0)	PK Batra and HS Sikarwar
CS-211	Compiler Construction (2+1)	SB Lal and VK Dubey
CS-212	Operating System (2+1)	HO Agarwal and IC Sethi
CS-215	Software Engineering (2+0)	Alka Arora and Anu Sharma
CS-216	Object Oriented Analysis and Design (2+1)	VK Dubey and SB Lal
CS-299	Seminar (1+0)	SN Islam

Trimester–II

CA-101	Computer Fundamentals & Programming (3+1)	Alka Arora
CA-121	Object Oriented Programming & Design (2+1)	VK Dubey and SB Lal
CA-122	Operating System (2+1)	HO Agarwal
CS-123	Fundamental of Computer Programming & its Applications (2+1)	KK Chaturvedi and Pal Singh
CA-124	System Analysis & Design (2+1)	IC Sethi and MS Farooqi
CA-225	Data Analysis in Agriculture (1+2)	VK Mahajan and MS Farooqi
CS-227	Data Base Management System (2+2)	RC Goyal and Vipin Dubey
CS-228	GIS and Remote Sensing Techniques (2+1)	Anil Rai and Prachi Mishra
CA-299	Seminar (1+0)	SN Islam

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

7

Awards and Recognitions

AWARDS

- Dr. VK Gupta, Joint Director received Prof. PV Sukhatme Gold Medal Award for outstanding contribution in Agricultural Statistics from Indian Society of Agricultural Statistics.

Dr. VK Gupta, Joint Director receiving Prof. PV Sukhatme Gold Medal Award from Janab Muzaffar Hussain Baig, Deputy Chief Minister, J&K

- Dr. Rajender Parsad, National Fellow received Dr. DN Lal Memorial Lecture Award from Indian Society of Agricultural Statistics for the biennium 2004-05 for significant contribution in Agricultural Statistics.

Dr. Rajender Parsad, National Fellow receiving Dr. DN Lal Memorial Lecture Award from Dr. SD Sharma, Director, IASRI and Secretary, ISAS

- Dr. Rajender Parsad, National Fellow received Prize for Special Contributions in Scientific Work during Hindi Chetna Mass on 30 September 2005.
- Dr. AR Rao was awarded the Biotechnology Overseas Associateship 2004-05 (Long Term) at Cold Spring Harbor Laboratory, New York, USA.
- Md. Wasi Alam was selected for Commonwealth Scholarship and Fellowship Plan-2005, United Kingdom, (Award Number-INCS-2005-147).
- Smt. Susheela Kaul received Prashasti Patra and Smariti Chinha by Bhartiya Krishi Anusandhan Samiti, Karnal on 17 May 2005.
- Dr. GK Jha, Scientist (SS) got first prize and Dr. Ramasubramanian, Scientist (SS) got second prize in the Scientists Declamation Contest entitled, "Statistics and Information Technology for Disaster Management" on the Annual Day of the Institute held on 02 July 2005.
- Sh. SK Singh, Assistant Engineer got first prize and Sh. Rajender Singh Tomar got second prize in the Debate Contest for technical and administrative staff entitled, "VAT Strengthens Indian Economy" on the Annual Day of the Institute held on 02 July 2005.

Head, Division of Design of Experiments and Head, Division of Forecasting Techniques jointly receiving the first prize for significant contributions in doing work in Hindi

- Division of Design of Experiments and Division of Forecasting Techniques jointly won the first prize – प्रभागीय चल शील्ड for significant contributions in doing work in Hindi.

- श्री पाल सिंह ने हिन्दी चेतनामास में आयोजित हिन्दी अन्ताक्षरी प्रतियोगिता एवं हिन्दी प्रश्नमंच प्रतियोगिता में द्वितीय पुरस्कार प्राप्त किया।
- हिन्दी चेतनामास के अन्तर्गत "शोध-पत्र पोस्टर-प्रदर्शन प्रतियोगिता" में संस्थान के वैज्ञानिकों तथा तकनीकी कर्मियों ने अपने-अपने शोध-पत्र पोस्टर प्रदर्शित किए जिसमें से सर्वश्रेष्ठ निम्न शोध-पत्रों को पुरस्कृत किया गया:
  - राजेन्द्र कुमार, जे.के. कपूर एवं एन.पी. सिंह "कृषि से संबंधित कार्यों में उर्वरक प्रयोग की दक्षता पर सांख्यिकीय अन्वेषण" शोध पत्र के लिए प्रथम पुरस्कार मिला।
  - सत्यपाल, ए.के. गुप्ता एवं एम.एस. नारंग "भैसों के दूध की मात्रा में अंतर का पथ-गुणांक विश्लेषण विधि द्वारा अध्ययन" शोध पत्र के लिए द्वितीय पुरस्कार मिला।
  - ए.के. गुप्ता, एम.एस. नारंग, वी.के. जैन, यू.सी. सूद एवं के.के. त्यागी "बाजार में आगमन के आधार पर मुख्य फूलों का दिल्ली में उत्पादन" शोध पत्र के लिए तृतीय पुरस्कार मिला।

RECOGNITION

Dr. VK Gupta was recognised for his contribution to Agricultural Statistics and was awarded the position of ICAR National Professor. In the past, he had occupied the position of Joint Director at Indian Agricultural Statistics Research Institute (IASRI), Head, Division of Design of Experiments, at IASRI; Professor (Agricultural Statistics) of P.G. School, IARI and has been the National Fellow of the ICAR. He has made significant contributions in both theoretical and applied aspects of Agricultural Statistics in general and Design of Experiments and Sampling Techniques in particular. Research carried out by him has received wide appreciation.

Dr. Gupta has guided 11 research students of Ph.D. and 3 students of M.Sc. in the discipline of Agricultural Statistics. He has also provided leadership in dissemination of research findings. These efforts have led to the use of many efficient designs and analytical techniques in the National Agricultural Research System. Dr. Gupta not only has been an outstanding researcher, he has been an outstanding teacher. He has taught several courses to the M.Sc. and Ph.D.

students of Agricultural Statistics. He has received 'IARI Best Teacher Award' for excellence in teaching in the discipline of Agricultural Statistics. He also received the first Dr. DN Lal Memorial Lecture Award and Prof. PV Sukhatme Gold Medal Award from Indian Society of Agricultural Statistics.

He has published more than 80 research papers in International and National Journals of repute, two books on design of experiments, several technical reports, popular articles, book chapters and one electronic book. The books written by Dr. Gupta are being used as Text Books in many Universities. He has been an author of three monographs and has handled more than 20 research projects funded by the Institute, AP Cess Fund of the ICAR and the DST. The Statistical Package for Block Designs (SPBD) Release 1.0; Statistical Package for Factorial Experiments (SPFE 1.0) and Statistical Package for Augmented Designs (SPAD) developed by him are found to be very useful to research workers.

(a) Affiliation with Professional Societies/ Institutions

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

- Indian Society of Agricultural Statistics
- Society of Statistics, Computer and Applications
- Indian Society of Agricultural Sciences
- Indian Science Congress Association
- Indian Dairy Association (IDA)
- Indian Society of Agricultural Economics
- Indian Society of Agricultural Marketing
- Computer Society of India
- Indian Statistical Association
- Indian Econometric Society
- Agricultural Economics Research Association
- Indian Society for Medical Statistics
- Farming System Research and Development Association
- Indian Society for Sheep and Goat Production and Utilization
- Indian Association of Statistics and Applied Research
- Indian Society of Genetics and Plant Breeding
- Andaman Science Association
- Indian Society of Remote Sensing
- Indian Society of Geometrics
- Indian Economics Association
- Bhoovigyan Vikas Foundation
- Indian National Science Association
- IARI Alumini
- Calcutta Mathematical Society
- Allahabad Mathematical Society
- Ramanujan Mathematical Society
- Indian Academy of Mathematics
- Indian National Science Academy for Indian Journal of Pure and Applied Mathematics
- Sankhya
- International Biometric Society (Indian Region)
- Statistical Publishing Society
- Association of Commonwealth Universities
- Indian Society of Extension Education

(b) Offices in Professional Societies

Indian Society of Agricultural Statistics

Prof. SD Sharma	Honorary Secretary, Member, Executive Council, Member, Editorial Board
Dr. VK Bhatia	Honorary Joint Secretary, Member, Executive Council, Member, Editorial Board
Sh. RS Khatri	Honorary Joint Secretary, Member, Executive Council
Dr. Rajender Parsad	Honorary Joint Secretary, Member, Executive Council, Member, Editorial Board
Dr. HVL Bathla	Member, Executive Council
Dr. VK Gupta	Member, Executive Council, Member, Editorial Board
Dr. Prajneshu	Member, Editorial Board
Dr. PK Malhotra	Member, Executive Council, Member, Editorial Board
Dr. VK Sharma	Member, Executive Council, Member, Editorial Board
Dr. Randhir Singh	Member, Editorial Board

Society of Statistics, Computer and Applications

Prof. SD Sharma	Vice President, Member, Executive Council
Dr. VK Gupta	Secretary and Managing Editor, Statistics and Applications
Dr. VK Bhatia	Member, Editorial Board
Dr. Aloke Lahiri	Joint Secretary, Member, Executive Council

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

Journal of Statistical Planning and Inference

Dr. VK Gupta	Associate Editor

Journal of Statistical Theory and Practice

Dr. VK Gupta	Member, Editorial Board
Dr. Prajneshu	Member, Editorial Board

Statistics and Applications

Dr. VK Gupta	Managing Editor

The 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, Executive Council
Dr. VK Sharma	Member, Editorial Board

Indian Society of Agricultural Sciences

Dr. Rajender Parsad	Member, Editorial Board (Basic Sciences) for Annals of Agricultural Research

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 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

IARI Alumni Association

Dr. Rajender Parsad	Member, Executive Council

Indian Society of Agricultural Marketing

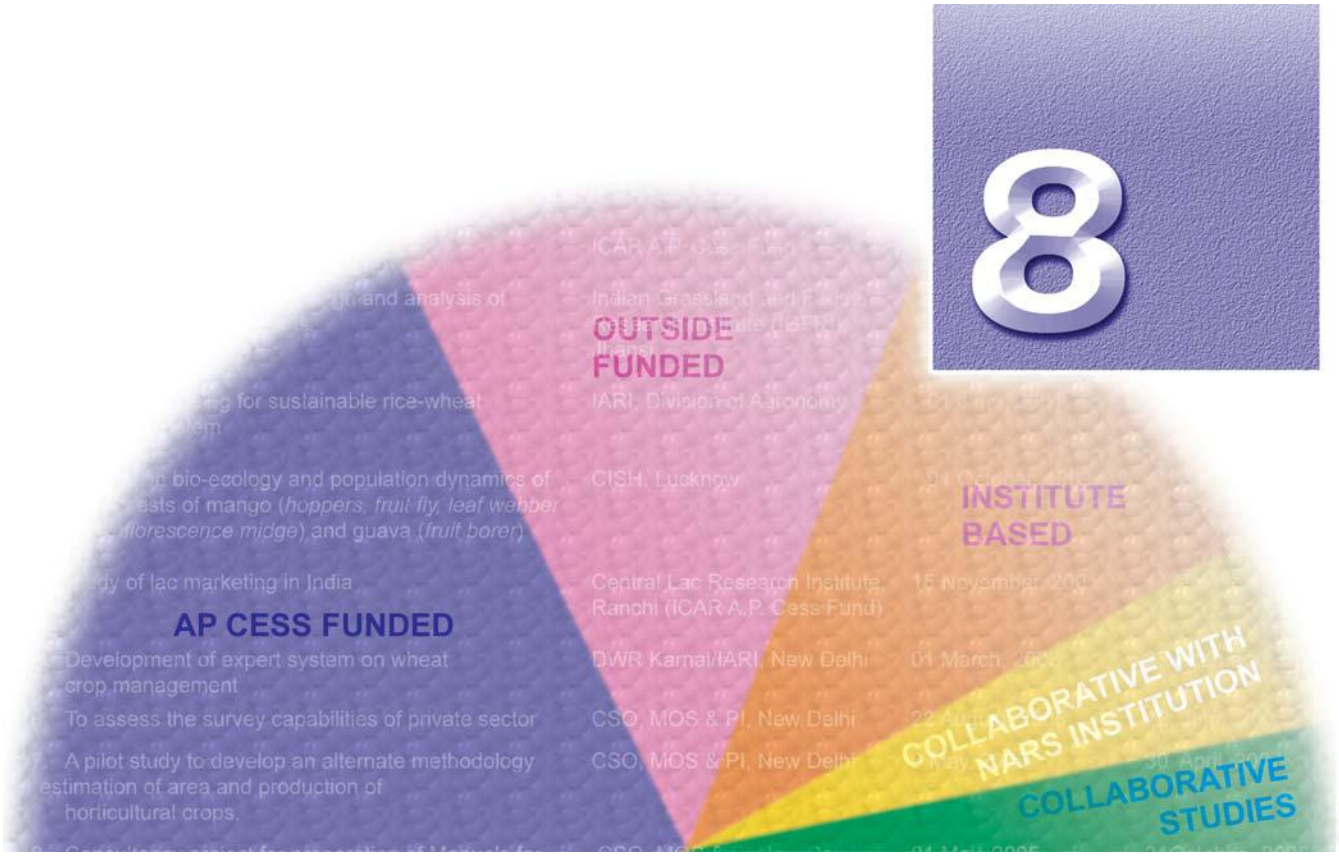
Dr. SP Bhardwaj	Member, Executive Council

Board of Studies of Department of Statistics at N.E.H.U., Shilong

Dr. Prajneshu	Member

(c) Offices of Recognition in Professional Societies/ Institution

Dr. SD Sharma	Sessional President of the 59th Annual Conference of Indian Society of Agricultural Statistics



Linkages and Collaboration in India and Abroad including Outside Funded Projects

S. No.	Title	Collaborative/ Funding Agency	Start	Completion
1.	Developing remote sensing based methodology for collecting Agricultural Statistics in Meghalaya	SAC, Ahmedabad and NESAC, Shillong	01 April, 2003	31 March, 2006
2.	Survey on agricultural accidents for the year 2004-05 in a large sample of villages on the basis of statistical considerations	AICRP on HESA (Human Engineering & Safety in Agriculture) located at CIAE, Bhopal	01 July, 2004	31 December, 2005
3.	Planning, designing and analysis of experiments planned ON STATION under PDCSR	Project Directorate of Cropping System Research, Modipuram	01 April, 2002	31 March, 2007
4.	Planning, designing and analysis of ON-FARM experiments under PDCSR	Project Directorate of Cropping System Research, Modipuram	01 April, 2002	31 March, 2007
5.	Planning, designing and analysis of data relating to experiments conducted under AICRP on LTFE	Project Coordinator (LTFE) IISS, Bhopal	01 April, 2002	31 March, 2007
6.	Design and analysis of experiments for spatially correlated observations	Department of Science and Technology (DST)	27 September, 2004	26 September, 2007
7.	Statistical and algorithmic approach for improved estimation of treatments effects in repeated measurements designs	Department of Science and Technology (DST)	18 May, 2004	17 April, 2007

S. No.	Title	Collaborative/ Funding Agency	Start	Completion
8.	Combined analysis of experiments on long-range effect of continuous cropping and manuring on soil fertility and yields stability	ICAR AP Cess Fund	01 May, 2004	30 April, 2007
9.	National information system on long-term fertilizer experiments	ICAR AP Cess Fund	01 June, 2003	31 May, 2005
10.	Outliers in designed experiments	ICAR AP Cess Fund	01 August, 2004	31 July, 2007
11.	Some investigations on design and analysis of agro-forestry experiments	Indian Grassland and Fodder Research Institute (IGFRI), Jhansi	01 September, 2004	31 August, 2006
12.	Precision farming for sustainable rice-wheat cropping system	IARI, Division of Agronomy	01 June, 2001	31 May, 2006
13.	Studies on bio-ecology and population dynamics of major pests of mango (*hoppers, fruit fly, leaf webber and inflorescence midge*) and guava (*fruit borer*)	CISH, Lucknow	01 October, 1999	31 March, 2006
14.	Study of lac marketing in India	Central Lac Research Institute, Ranchi (ICAR AP Cess Fund)	15 November, 2001	14 November, 2005
15.	Development of expert system on wheat crop management	DWR Karnal/IARI, New Delhi	01 March, 2003	28 February, 2006
16.	To assess the survey capabilities of private sector	CSO, MOS & PI, New Delhi	22 August, 2005	22 June, 2006
17.	A pilot study to develop an alternate methodology for estimation of area and production of horticultural crops	CSO, MOS & PI, New Delhi	01 May, 2005	30 April, 2007
18.	Consultancy project for preparation of Manuals for – Area and Crop Production Statistics –Animal Husbandry Statistics –Agricultural Prices and Marketing –Cost of Cultivation Surveys –Horticulture and Spices Statistics	CSO, MOS & PI, New Delhi	01 May, 2005	31 October, 2005
19.	Statistical investigation on the performance of non-parametric stability measures when the Genotype x Environment data is non-normal	ICAR AP Cess Fund	01 August, 2004	31 July, 2007
20.	Some investigations on stable and robust clustering procedures	ICAR AP Cess Fund	01 September, 2004	31 August, 2007

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 organises 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 Council (RAC) and Quinquennial Review Team (QRT) and is responsible for correspondence with ICAR, ICAR Institutes, SAUs and other organisations in India and abroad. The other functions of the Unit are: to examine the new research project proposals before these are considered by the SRC in respect of importance of problems, 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 etc., to maintain the Research Project Files (RPF), revision of Combined SFC Memo of IASRI and NCAP for Tenth Plan, 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 2004-05
- IASRI Newsletters
- Monitoring Progress Reports: Half-yearly summary of progress of on-going research projects ending 31 March 2005 and 30 September 2005

Communication of Research Material to

(i) Indian Council of Agricultural Research

- Material for preparation of DARE-ICAR Annual Report for the year 2005-06

Dr. Mangala Rai, Secretary, DARE and DG, ICAR releasing the Annual Report of the Institute during the Annual Day Function

- Copies of Annual Report of the Institute, for review of Annual Report 2004-05 for giving the Trophy to the Best Annual Report
- Half yearly information regarding programme of Conferences, Seminars, Symposia, Workshops, Meetings, etc. in Agricultural and Allied Sciences proposed
- Information for organization of Summer School/ Winter School/Short Course – regarding proposal etc. during 2005-06
- A special one page pull out giving achievements made including the information relating to all the new technology developed, highlights and future thrust areas during the year 2005 for the Annual General Meeting of the ICAR
- Information regarding Good Management Practice (GMP) for receiving visitors to the Institute
- Correspondence regarding V and VII Regional Committees of the ICAR
- Particulars of training (short-term/ long-term) imparted by the Centres of CGIAR, exchange of germplasm, release of the new varieties and collaborative projects under taken between ICAR and CGIAR centres for preparation of database - quarterly return for the period ending March 2005 and June 2005 and annual interim return for the year 2004
- Information for the last three years in respect of total number of research papers published/ accepted in refereed national/international journals
- Information regarding commercialization of IPRs and segregation of ICAR technologies for transfer to public/farmers directly and to private sectors
- Information for Creation of Chair on Official Statistics in Universities under the Plan Scheme entitled 'Award and fellowships for outstanding and meritorious research work in statistics - regarding for onwards transmission to CSO
- Review of position of patent application of ICAR as on 31st December 2004
- Information in respect of organisation of II international Rice Research Congress 2006 to be organised at Delhi in 09-13 October 2006
- Material for quarterly publication, 'ICAR Newsletter' and 'ICAR Reporter'
- Material for 'Monthly Progress Report' for the Cabinet Secretariat
- Monitorable targets Annual/ Five years in respect of various programmes being implemented at the Institute
- Information of different Research Project Files (RPF I, II, III) of various Divisions of the Institute
- Quarterly/Half yearly Performance Review (QPR/HPR) of Central Schemes by Planning Commission
- Monthly targets and progress of the Institute
- Half yearly Scientific targets and achievement
- Quarterly Progress Report (QPR)
- Monthly progress of identified thrust areas required by Planning Commission
- Other miscellaneous correspondence with respect to the Institute

(ii) National Centre for Agricultural Economics and Policy Research (NCAP), New Delhi

- Information required for the project 'Agricultural Science and Technology Indicators (ASTI) for India', jointly implementing by ICAR, New Delhi and IFPRI, Washington

(iii) Information Supplied to CSO

- Information for publication 'Statistical System in India - 2005
- Quarterly information for CSO Newsletter
- Miscellaneous correspondence with respect to the Institute

(iv) National Research Development Corporation (A Govt. of India Enterprise)

- Miscellaneous correspondence for supply of IPR CD Version 2.0 regarding

(v) Department of Personnel, and Training, Ministry of Personnel, Public Grievances & Pension, Govt. of India, New Delhi

- Information for Compendium of Training Programme for the year 2006-2007

(vi) National Academy of Agricultural Research Management, Hyderabad

- Filled in questionnaire in respect of Scientists and Technical Officers (T-5) and above for the Survey on Organizational Climate in ICAR

(vii) Others

- Information for sixth edition of Dairy India Year Book 2005, New Delhi

Organisation of Meetings

- The Unit organised meetings of Staff Research Council (SRC)
- Thirteen Senior Officers Meetings (SOM) of the Institute to discuss the monthly achievements, shortfalls, if any, and 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 06 April 2005, 06 May 2005, 13 June 2005, 08 July 2005, 09 August 2005, 13 September 2005, 10 October 2005 07 November 2005, 06 December 2005 & 01, 07 January 2006, 04 February 2006 and 04 March 2006. The meetings were chaired by the Director

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. It assisted in transcribing the lectures write-ups on transparencies. More than 800 photographs of important occasions of research and extension activities of the Institute were undertaken and also some slides were prepared. A Digital Still Camera of Sony Model No. MVC-CD 500 is available for covering important events organised at the Institute. A Sony Handy Cam DCR PC 350E camera and HP Scanjet 4070 Photosmart Scanner were also procured. On Gestetner Copy Printer 5327 and Rex Rotary Copy Printer 1560 machines about 3.27 lakhs copies of 4554 pages for 252 jobs were multi-copied and supplied to various users of the Institute. This photocopy need of the Institute was fulfilled by 5 photocopy machines installed at the Reprographic Lab working under the Unit. A colour photocopier was also added to Reprographic Lab. A Lab for Senior Artist (T-9) for Graphic Designing with Macintosh Computer system was also maintained.

Miscellaneous Activities

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

- Miscellaneous correspondence for the forthcoming International Conference on Statistics and Informatics in Agricultural Research on the occasion of 60th Diamond Jubilee Conference of Indian Society of Agricultural Statistics proposed to be held during 27-30 December 2006
- Supplying the information about training programmes/ research activities received from ICAR and various organisations from time to time among the HDs and Principal Scientists of the Institute
- Proposals for deputation of scientists of the Institute for various conferences/ symposia/ workshops etc.
- Correspondence/ Initiation for procuring various useful softwares and other equipments at the Institute
- In view of request received from Scientists/ Divisions the procedure of procurement of various statistical software packages was finalised
- Arrangement of demonstration of procured and other software packages
- 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


ESTIMATION OF WOOL PRODUCTION - EMERGING DATA NEEDS AND A METHODOLOGICAL REAPPRAISAL
(AP CESS FUND PROJECT)
बागवानी फसलों व मसाले सांख्यिकी पर मैनुअल
Manual on Horticulture and Spices Statistics
REQUIREMENT ANALYSIS DOCUMENT
ए.पी. सेस. द्वारा वित्त पोषित परियोजना
AP CESS FUNDED PROJECT
'भारत में कृषि– शिक्षा नेटवर्क पर राष्ट्रीय सूचना तंत्र
{ निसेजनेट }
National Information System
on
Agricultural Education Network in India
{ NISAGENET }
NIS AgEnet
ISAS
भारतीय कृषि सांख्यिकी संस्था की पत्रिका
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INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE
(ICAR)
LIBRARY AVENUE, PUSA, NEW DELHI- 110 012

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List of Publications

Research Papers

1. Ahmad, T, Singh, R and Rai, A (2003). A bootstrap technique for variance estimation using imputed survey data for missing observations. *Ind. J. Appl. Statist.*, **7**, 40-48.
2. Ahmad, T, Singh, R and Rai, A (2006). Comparison of bootstrap methods for missing survey data-A simulation study. *Int. J. Model Assisted Statist. App.*, **1(1)**, 43-49.
3. Arora, Alka, Singh, Balbir, Dahiya, Shashi and Farooqi, Mohd. Samir (2005). Planning and distribution of manpower of ICAR using PERMISnet. *J. Ind. Soc. Agril. Statist.*, **59(2),** 141-145.
4. Chandran, KP and Prajneshu (2005). Nonparametric regression with autocorrelated errors methodology for describing country's marine fish production data. *Ind. J. Fish.*, **52**, 151-158.
5. Chandran, KP and Prajneshu (2005). Nonlinear statistical models for plant disease. *Ind. J. Agril. Sci.*, **75**, 361-363.
6. Chandran, KP and Prajneshu (2005). Nonparametric regression with jump points methodology for describing country's oilseed yield data. *J. Ind. Soc. Agril. Statist.*, **59(2),** 126-130.
7. Chattopadhyay, C, Agrawal, R, Kumar, Amrender, Bhar, LM, Meena, PD, Meena, RL, Khan, SA, Chattopadhyay, AK, Awasthi, RP, Singh, SN, Chakravarthy, NVK, Kumar, A, Singh, RB and Bhunia, CK (2005). Oilseed *Brassica alternaria* blight epidemiology and forecasting in India – A case study. *Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz (J. Plant Diseases Pro.),* **112**, 351-365.
8. Chattopadhyay, C, Agrawal, R, Kumar, Amrender, Singh, YP, Roy, SK, Khan, SA, Bhar, L, Chakravarthy, NVK, Srivastava, A, Patel, BS, Srivastava, B, Singh, CP and Mehta, SC (2005). Forecasting of *Lipaphis erysimi* on oilseed *Brassica* in India – A case study. *Crop Prot.*, **24**, 1042-1053.

9. Chaudhary, RK, Bathla, HVL and Sud, UC (2004). Non-response in sampling over two occasions. *J. Ind. Soc. Agril. Statist.*, **58(3)**, 331-343.

10. Dash, RC, Sirohi, NPS and Tyagi, KK (2005). Selection of optimum sizes of agricultural machinery - A case study. *J. Agril. Engg.,* **42(4)**, 32-41.

11. Deshpande, SN, Varma, PG, Semwal, P, Rao, AR**,** Bhatia, T, Nimgaonkar, V, Lerer, LB and Thelma, BK (2005). Serotonin receptor gene polymorphisms and their association with tardive dyskinesia among schizophrenia patients from north India. *Psy. Genet.*, **15**, 157-158.

12. Farooqi, Mohd. Samir, Singh, Balbir, Dahiya, Shashi and Arora, Alka (2005). PERMISnet: E-solution for the management of agricultural research personnel in ICAR. *Agril. Extn. Rev.*, May-June 2005, 3-5.

13. Ghosh, H and Das, A (2005). Optimal designs for best linear unbiased prediction in diallel crosses. *Comm. Statist.-Theory Methods,* **37**, 1579-1586.

14. Ghosh, H, Sunilkumar, G and Prajneshu (2005). Mixture nonlinear time-series analysis: Modelling and forecasting. *Cal. Stat. Assoc. Bull.*, **57**, 95-108.

15. Gupta, AK and Narang, MS (2005). Effect of fertilizer, irrigation and insecticides on the yield of vegetables. *Int. J. Agril. Statist. Sci.,* **1(1&2)**, 35-40.

16. Islam, SN, Farooqi, Mohd. Samir and Agarwal, Hariom (2005). Expert systems: A boon for the farming community. *Agric. Extn. Rev.,* January-February 2005, 3-6.

17. Kar , Abhijit, Chandra, Pitam, Parsad, Rajender and Dash,SK (2004). Microwave drying of button mushroom (*Agaricus biosporus*). *J. Food Sci. Tech.,* **41(6)**, 636-641.

18. Kar, Abhijit, Chandra, Pitam, Parsad, Rajender and Dash, SK (2005). Mass transfer during osmotic dehydration of banana slices (*Dwarf Cavendish*). *J. Agril. Engg.,* **42(3)**, 42-49.

19. Kaur, Rajinder, Kumar, Anil and Farooqui, Mohd. Samir (2005). Statistical assessment of different rice (*Oryza sativa*) varieties-based crop sequences. *Ind. J. Agril. Sci.,* **75(8)**, 501-503.

20. Khatri, RS, Goyal, JP, Bathla, HVL, Jayasankar and Geethalakshmi, V (2005). Review article on sampling methodology for estimation of sheep population and wool production. *Ind. J. Anim. Sci.*, **75(8)**, 1013-1019.

21. Khurana, GL, Tomer, RS, Kumar, Rajendra and Garg, RN (2004). Pictorial presentation of bivariate data of intercropping experiments. *New Botanist,* **31(4),** 209-225.

22. Kiran, PS, Bhatia**,** VK and Rao, AR (2004). A robust method of estimation of heritability. *J. Ind. Soc. Agril. Statist.*, **57**, 116-128.

23. Kumar, Amrender and Bhar, LM (2005). Forecasting model for yield of Indian mustard (*Brassica juncea*) using weather parameter. *Ind. J. Agril. Sci.,* **75(10)**, 688-690.

24. Kumar, Pramod, Singh, NP, Bhar, LM and Shinde, GS (2005). Relationship study between diameter and height of agroforestry species to predict volume growth. *Ind. J. Forestry*, **28**, 349-352.

25. Kumar, Rajendra and Kapoor, JK (2004). Statistical survey for cultural cum manurial experiments conducted on various crops in the country. *New Botanist,* **13(1-4)**, 253-257.

26. Kumar, Rajendra and Kapoor, JK (2005). Methodological study of composite yardsticks of additional production from the use of cultural practices at optimum level of fertilizer. *Ann. Agril. Res.,* **26(2)**, 185-189.

27. Menon, Pramila, Gopal, Madhuban and Parsad Rajender (2005). Effects of chlorpyrifos and quinalphos on dehydrogenase activities and reduction of Fe^{3+} in the soils of two semi-arid fields of tropical India. *Agril. Ecosystems Environment*, **108**, 73-83.

28. Narang, MS, Sud, UC and Gupta, AK (2005). Estimation of finite population regression coefficient in repeat surveys. *Int. J. Agril. Statist. Sci.*, **1(1&2)**, 1-9.

29. Narang, MS, Sud, UC and Gupta, AK (2005). Estimation of seemingly unrelated regression in random coefficient model with unequal numbers of observations. *Int. J. Agril. Statist. Sci.,* **1(1&2)**, 101-105.

30. Parsad, Rajender, Gupta, VK and Gupta, S (2005). Optimal designs for experiments on two-line and four-line crosses. *Utilitas Mathematica*, **68**, 11-32.

31. Parsad, Rajender and Satpati, SK (2005). Nested block designs for comparing test treatments with a control. *Utilitas Mathematica,* **68**, 271-281.

32. Panda, DK, Sharma, VK and Parsad, Rajender (2005). Robustness of optimal block designs for triallel crosses experiments against interchange of a pair of cross. *J. Ind. Soc. Agril. Statist.*, **59(1)**, 83-91.

33. Pateria, DK, Jaggi, Seema, Batra, PK and Gill, AS (2005). Modelling the impact of fruit trees on crop productivity. *Ind. J. Agril. Sci.,* **75(4)***,* 222-224.

34. Prajneshu and Chandran, KP (2005). Computation of compound growth rates in agriculture: Revisited. *Agril. Eco. Res. Rev.*, **18**, 317-324.

35. Prajneshu (2005). Statistical modelling in fisheries: A review. *Ind. J. Anim. Sci.*, **75**, 1008-1012.

36. Prajneshu and Kandala, VM (2005). Fitting of nonlinear Schaefer model. *Ind. J. Fish.*, **52**, 33-36.

37. Rai, Anil, Jha, GK and Srivastava, AK (2003). Conditional ratio estimator under successive sampling. *Ind. J. Appl. Statist.*, **7**, 22-32.

38. Rai, SC and Bhatia, VK (2004). Dimensions of regional disparities in socio economic development of Assam. *J. Ind. Soc. Agril. Statist.*, **57(Special Volume)**, 178-190.

39. Rai, Anil, Ahmad, T and Singh, R (2003). A bootstrap technique for variance estimation using imputed survey data for missing observations. *Ind. J. Appl. Statist.*, **7**, 40-48.

40. Rao, AR and Prabhakaran, VT (2005). Use of AMMI in simultaneous selection of genotypes for yield and stability. *J. Ind. Soc. Agril. Statist.,* **59(1)**, 76-82.

41. Rao, AR, Varghese, Cini and Sharma, VK (2005). Robustness of repeated measurements designs against missing observation(s)**.** *Ind. J. Dairy Sci.***, 58(4)**, 281-286.

42. Rathore, Abhishek, Parsad, Rajender and Gupta, VK (2004). Computer aided construction and analysis of augmented designs. *J. Ind. Soc. Agril. Statist.,* **57(Special Volume)**, 320-344.

43. Ravichandran, S and Prajneshu (2005). On the modelling of seasonal fluctuations in fish landings using structural time-series approach - A case study. *Ind. J. Anim. Sci.*, **75**, 982-984.

44. Sarker, Subhra, Parsad, Rajender and Gupta, VK (2005). Outliers in block designs for diallel crosses. *Metron - Int. J. Statist.*, **63(2)**, 177-191.

45. Sethi, SC, Dass, B and Sud, UC (2005). A note on the regression estimator. *Haryana Eco. J.,* **25,** 153-155.

46. Sethi, SC, Mathur, DC and Sharma, SK (2005). Price spread and marketing pattern of vegetable crops in Pune. *Haryana Eco. J.,* **25,** 137-138.

47. Sharma, Anu, Varghese, Cini, Jaggi, Seema and Sharma, VK (2005). A computer software for PBIB(3) designs and partial diallel crosses. *J. Ind. Soc. Agril. Statist.,* **59(1)**, 67-75.

48. Singh, N Okendro, Wahi, SD and Kumar, Basant (2005). Study of different bootstrap strategies for estimating the precision of heritability in half-sib analysis. *Ind. J. Anim. Prod.,* **37(1&2)**, 36-39.

49. Sud, UC, Sethi, SC, Mathur, DC and Sharma, SK (2005). A comparative study of crop cut estimates and farmer's estimates in Sirsa district of Haryana state. *Haryana Eco. J.*, **25(1&2)**, 77-82.

50. Tiwari, AK, Deshpande, SN, Rao, AR, Bhatia, T, Mukhit, SR, Sriharsh, V, Lerer, B, Nimagaonkar, V and Thelma, BK (2005). Genetic susceptibility to Tardive Dyskinesia in chronic schizophrenia subjects: III. Lack of association of CYP3A4 and CYP2D6 gene polymorphisms. *Schizophrenia Res.*, **75**, 21-26.

51. Tiwari, Arun K, Deshpande, Smita N, Rao, AR, Bhatia, Triptish, Mukhit, Sabiha R, Sriharsh, Vandana, Lerer, Bernard, Nimagaonkar, Vishwajit and Thelma, BK (2005). Genetic susceptibility to Tardive Dyskinesia in chronic schizophrenia subjects: I. Association of CYP1A2 gene polymorphism. *The Pharmacogenomics J.,* **5**, 60-69.

52. Varghese, Cini, Jaggi, Seema, Sharma, VK and Singh, UV (2005). On use of partially balanced incomplete block designs in partial diallel crosses. *Ind. J. Genet.*, **65(1)**, 37-40.

53. Wahi, SD, Singh, Pal, and Chand, Lal (2005). An improved measure of distances among different genetic groups of Indian goats. *Ind. J. Dairy Sci.*, **58,** 211-213.

54. अनुपम, कुमार, राजेश, कुमार, अनिल एवं परमार, बलराज सिंह (2005)। पानी सोखने की अदभुत क्षमता है हाईड्रांजैल्स में। *कृषि चयनिका,* जनवरी-मार्च, 18-19।

55. जग्गी, सीमा, हांडा, डी पी, गिल, ए एस एवं सिंह, एन पी (2005)। कृषिवानिकी परीक्षण का सांख्यिकीय मूल्यांकन। *भारतीय कृषि अनुसंधान पत्रिका,* 20(2एवं3), 40-45।

56. सिंह, डी आर एवं कौल, सुशीला (2005)। अजमेर जिले में प्रवासी भेड़ पालन प्रौद्योगिकी हस्तक्षेप का मूल्यांकन। *भारतीय कृषि अनुसंधान पत्रिका*, 20(2एवं3), 30-39।

57. कौल, सुशीला एवं पान्डेय, आर के (2005)। भारत में खाद्य उपलब्धता का तथा खाद्य सुरक्षा पर इसका प्रभाव । *भारतीय कृषि अनुसंधान पत्रिका*, 20(4), 188-194।

Popular Articles

1. Nigam, AK, Parsad, Rajender and Gupta, VK (2006). Design and analysis of On-Station and On-Farm agricultural research experiments: A Revisit. Workshop Series 0, IASRI, New Delhi.
2. Jaggi, Seema and Pateria, DK (2005). Multivariate analysis of data from agroforestry experiments. *Proceedings of the National Symposium on Agroforestry in 21st Century*, 71-75.
3. Srivastava, R, Parsad, Rajender and Gupta, VK (2006). Studies on block designs for biological assays. Workshop Series 2, IASRI, New Delhi.
4. वर्गिस, सिनी, जग्गी, सीमा, शर्मा, विजय कुमार एवं सिंह, निर्भय पाल (2006)। थ्री-एसोसिएट क्लास पार्शियली बैलेंस्ड ब्लॉक अभिकल्पनाएँ और उनका पार्शियल डायलल क्रॉसेस में अनुप्रयोग। भारतीय कृषि सांख्यिकी अनुसंधान संस्थान की हिन्दी पत्रिका *सांख्यिकी-विमर्श:* 2005-06, 72-76।
5. प्रसाद, राजेन्द्र, निगम, अरुण कुमार, गुप्ता, विनोद कुमार एवं कुमार, अजीत (2006)। अनुसंधान केन्द्रों और किसानों के खेतों पर किये गये कृषि परीक्षणों की अभिकल्पना एवं विश्लेषण: एक पुनरावलोकन। भारतीय कृषि सांख्यिकी अनुसंधान संस्थान की हिन्दी पत्रिका *सांख्यिकी-विमर्श:* 2005-06, 49-53।
6. नारायण, प्रेम, शर्मा, एस.डी., राय, एस.सी. एवं भाटिया, वी.के. (2006)। आर्थिक विकास की दृष्टि से प्रदेशों का वर्गीकरण तथा अल्प विकसित क्षेत्रों की पहचान । भारतीय कृषि सांख्यिकी अनुसंधान संस्थान की हिन्दी पत्रिका *सांख्यिकी-विमर्श:* 2005-06, 39-48।

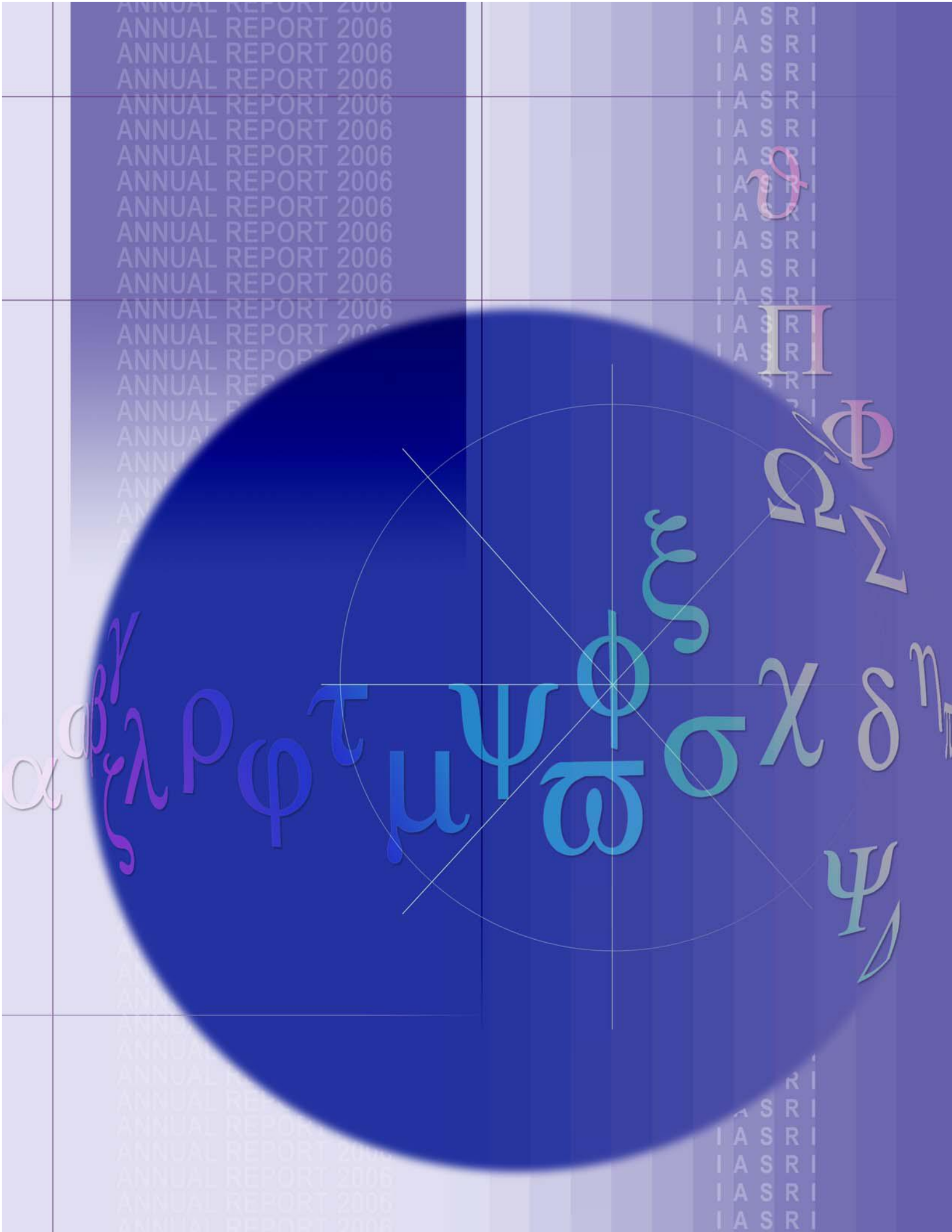
Book Chapters

1. Bhatia, VK (2005). Biometrical procedures for estimation of genetic components of variance under different mating designs. In: *Recent Advances in Mating Designs*, published by L.S. Kaushik and R.C. Hasija, Dhanpat Rai & Co.(P) Ltd., New Delhi, 7.1-7.25.
2. Gupta,VK and Parsad, Rajender (2005). Statistical designing of experiments with emphasis on hill agriculture research. In: HS Gupta(Eds.), *Sustainable Production from Agricultural Watershed in NWHR.*
3. Parsad, Rajender, Dixit, Anshu, Malhotra, PK and Gupta, VK (2005). Geoinformatics in precision farming: An overview. In: *Geoinformatics Applications for Sustainable Development.*
4. Paul, Amrit Kumar (2006). Some study of heritability of all or none traits in livestocks. In: A.K. Roy, A. Antony and N. Sarangi (Eds.), *Bioinformatics and Statistics in Fisheries Research, Vol-II* published by Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar-751002, **(2),** 467-482.
5. Paul, Amrit Kumar (2006). Selection strategies for more than one characters in livestock. In: A.K. Roy, A. Antony and N. Sarangi (Eds.), *Bioinformatics and Statistics in Fisheries Research, Vol-II* published by Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar-751002, **(2)**, 445-457.
6. Sahoo, N, Rajput, TBS, Rao, AR and Behera, D (2005). Estimation of watershed sediment yield through geomorphological parameters. In: *Technical Manual, 46th Session of Inst. Eng. India (India),* 149-156.
7. Jaggi, Seema (2006). Experimental designs and data analysis in agroforestry. *Production Technology and Management of Agroforestry,* Agrotech Publishing Academy, Udaipur, 185-196.
8. Prabhakaran, VT (2005). On probability of inadmissible estimates of heritability from different mating designs and procedures for improved estimation. In: *Recent Advances in Mating Designs.* L.S. Kaushik, and R.C. Hasija, Dhanpat Rai & Co. (P) Ltd., New Delhi.

Research Project Reports

1. A study on trend free designs by *Krishan Lal, Rajender Parsad and VK Gupta*
2. Statistical study on competition effects among neighbouring units in field experiments (AP Cess fund, ICAR) by *Seema Jaggi and VK Gupta*
3. Forecasting sugarcane yield using multiple markov chains by *V Ramasubramanian, Ranjana Agrawal and LM Bhar*

4. Pilot sample survey for developing sampling methodology for estimation of poultry meat production in Gurgaon district of Haryana state by *Mahender Singh*
5. Determinants of performance of self help groups in rural micro finance by *Lakshmi Prasanna and Ashok Kumar*
6. Development of software for on-line information system for personnel management for ICAR (PERMISnet) by *Balbir Singh, Alka Arora, Mohd. Samir Farooqi and Shashi Dahiya*
7. Requirement analysis document (EXOWHEM) by *SN Islam, Mohd. Samir Farooqi, Hariom Agarwal, Vipin Dubey, KK Chaturvedi and HS Sikarwar*
8. Pilot sample survey to develop sampling methodology for estimation of area, production and productivity of important flowers on the basis of market arrivals by *AK Gupta, VK Jain, MS Narang, KK Tyagi and UC Sud*
9. Status of farm mechanization in India, document prepared as a part of the project entitled "Study relating to formulating long term mechanization strategy for each agro-climatic zone/state", compiled and prepared by *KK Tyagi, HVL Bathla and SD Sharma*
10. A study of land use statistics through integrated modelling using GIS by *Anil Rai, AK Srivastava, Randhir Singh and VK Jain*
11. Assessment of harvest and post harvest losses (Inland Fisheries) by *HVL Bathla, T Ahmad, DL Khasim, K Srinath, GR Unnithan, and JC Jeeva*
12. Assessment of harvest and post harvest losses (Marine Fisheries) by *HVL Bathla, T Ahmad, K Srinath, GR Unnithan, N Gopal, and VR Nair*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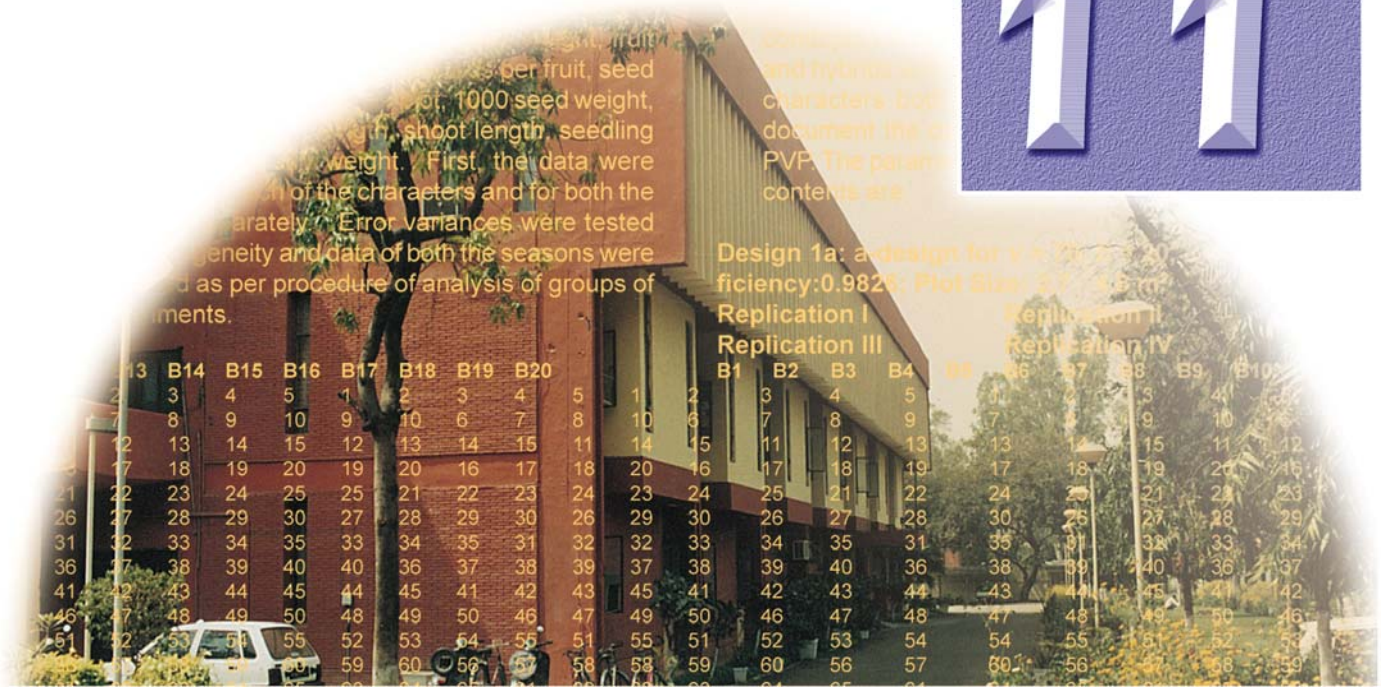

Consultancy and Advisory Services

Consultancy/ Advisory Services Provided

- Sh. Rakesh Kumar, Ph.D. student from Department of Animal Breeding, CCS HAU, Hissar was advised on the analysis of data pertaining to an experiment conducted with 100 genotypes/hybrids of field pea conducted in a simple lattice design at 5 environments. He was also advised on obtaining the genetic parameters *viz.* genotypic variance, phenotypic and heritability coefficient. For this purpose the procedure developed under the project "A Diagnostic Study of Design and Analysis of Field Experiments" was used. He was also advised on the stability analysis, path analysis and genetic divergence analysis.
- For the **task force on balanced use of fertilizers**, fertilizer response ratios were obtained using the data pertaining to an experiment conducted to find out the response of nitrogen (N), phosphorus (P) and potassium (K) under different sub agro-ecological zones/ NARP zones under the aegis of Project Directorate of Cropping Systems Research, Modipuram 1999-2000. The experiment is being conducted with following five treatments:

Treatment Number	**Treatment Details**
T_1	Control
T_2	Recommended Dose of N
T_3	Recommended Dose of NP
T_4	Recommended Dose of NK
T_5	Recommended Dose of NPK

Data generated from this experiment for the years 1999-2000, 2000-01, 2001-02 and 2002-03 has been used for the computation of 8 different fertilizer response ratios *viz*. N over control; NP over control; NK over control; NPK over control; P over N; P over NK; K over N; and K over NP. Response ratios for cereals, pulses, oilseeds and foodgrains at state and country level have been evaluated for different nutrients and their

Table 1: Response ratios for different crop groups (All India)

Crop groups	Area 000 ha (2000-01)	Average control yield (kg/ha)	% Increase in yield due to							
			N	NP	NK	NPK	P over		K over	
			Over control				N	NK	N	NP
Cereal	99757	1803	8.56	8.97	8.66	8.63	10.02	11.29	9.16	10.85
Oilseed	23250	897	8.53	5.19	6.91	5.37	4.48	5.48	6.02	7.88
Pulses	20026	586	8.11	7.53	8.97	7.12	7.22	5.95	12.09	5.32
Foodgrains		**1485**	**8.50**	**8.15**	**8.42**	**7.89**	**8.73**	**9.60**	**9.06**	**9.59**

Table 2: Percentage increase in yield for different crop groups (All India)

Crop groups	Area 000 ha (2000-01)	Average control yield (kg/ha)	% Increase in yield due to							
			N	NP	NK	NPK	P over		K over	
			Over control				N	NK	N	NP
Cereal	99757	1803	46.76	74.27	65.80	96.34	18.38	18.09	12.74	12.51
Oilseed	23250	897	30.74	63.39	50.59	87.57	24.02	24.17	14.62	14.48
Pulses	20026	586	33.38	99.24	58.08	116.97	48.23	37.75	18.62	9.70
Foodgrains		**1485**	**42.28**	**75.99**	**62.25**	**97.80**	**23.48**	**21.83**	**13.87**	**12.44**

combinations and response ratio at country level are as given in Table 1.The percentage increase in yield were also obtained and are given in Table 2. The response ratios, percentage increase in production due to a specified micro-nutrients over and above the recommended dose of NPK have been obtained using the data from the experiments conducted to study the effect of removal of certain location specific constraints in improving the productivity of major crops and cropping systems under existing farmers' field conditions since 1990-2000 (PDCSR, Modipuram).

- Sh. Naval Kishor Sepat, Ph.D. (Agronomy) student was advised on the analysis of yield data pertaining to an experiment conducted to study the direct and residual effect of organic amendments and levels of NPK on soil health and productivity of rice-wheat cropping system. The experiment was conducted using a split plot design with four main plot treatments as control, green manure/ green leaf manure, FYM @10 t/ha and crop residue @5 t/ha. The sub plot treatments for kharif rice were control (no NPK), 50%, 100% and 150% recommended doses of NPK each replicated twice in a main plot. For rabi wheat, there were 7 distinct treatment combinations viz. control, residual effects of treatments applied as 50%, 100% and 150% NPK to kharif rice and direct application of 50%, 100% and 150% recommended doses of NPK to rabi wheat crop. The analysis was carried out using the concepts of contrast analysis.
- A second order response surface design for 4 factors each at 4 equispaced levels in 80 design points has been suggested for an experiment related to development of rotating screen grader for selected orchard fruit crops (Ber, Lemon and Aonla) planned to obtain the optimum combination of levels of rotating speed, diameter of screen, input and length of screen at Division of Agricultural Engineering, Indian Agricultural Research Institute, New Delhi.
- Dr. Ravinder Kaur, National Fellow, IARI, New Delhi was advised on fitting of exponential decay model and interpretation of results.
- Dr. S.C. Dube, Senior Scientist, Division of Pathology, IARI, New Delhi was advised on the use of multiple comparison procedure.
- Dr. B.S. Tomar, Senior Scientist, Division of Seed Technology, IARI, New Delhi was advised on the analysis of data of the experiment conducted to study the effect of season, planting time and plant density on seed yield and quality of cucumber. The experiment was conducted in factorial randomized

complete block design (4 dates of planting and 4 plant densities in 3 replications). The experiment was conducted in two seasons viz. spring summer and kharif to study the seasonal variation in seed yield and its quality. Observations were recorded on the following characteristics: days to first female flower, number of fruits per plant, fruit weight, fruit length and number of seeds per fruit, seed yield per fruit, seed yield per plot, 1000 seed weight, germination %, root length, shoot length, seedling length and seedling dry weight. First, the data were analyzed for each of the characters and for both the seasons separately. Error variances were tested for heterogeneity and data of both the seasons were analyzed as per procedure of analysis of groups of experiments.

- In the meeting of the Committee constituted to finalize the Bt. cotton entries into AICRP, discussions were held on the problem of using randomized complete block designs in the agricultural experiments. As a follow up action, scientists from Division of Crop Improvement, Central Institute of Cotton Research, Nagpur, were advised on the designing of four experiments to be conducted with cotton varieties. First two of these experiments are to be conducted to morphologically characterize varieties and hybrids with respect to about 45 morphological characters both qualitative and quantitative and document the database as a part of DUS test for PVP.

Design 1a: α-design for $v = 70$, $b = 20$, $k = 14$; A-efficiency:0.9826; Plot Size: 2.7 × 4.8 m²

Replication I					Replication II					Replication III					Replication IV				
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6	7	8	9	10	9	10	6	7	8	10	6	7	8	9	7	8	9	10	6
11	12	13	14	15	12	13	14	15	11	14	15	11	12	13	13	14	15	11	12
16	17	18	19	20	19	20	16	17	18	20	16	17	18	19	17	18	19	20	16
21	22	23	24	25	25	21	22	23	24	23	24	25	21	22	24	25	21	22	23
26	27	28	29	30	27	28	29	30	26	29	30	26	27	28	30	26	27	28	29
31	32	33	34	35	33	34	35	31	32	32	33	34	35	31	35	31	32	33	34
36	37	38	39	40	40	36	37	38	39	37	38	39	40	36	38	39	40	36	37
41	42	43	44	45	44	45	41	42	43	45	41	42	43	44	43	44	45	41	42
46	47	48	49	50	48	49	50	46	47	49	50	46	47	48	47	48	49	50	46
51	52	53	54	55	52	53	54	55	51	55	51	52	53	54	54	55	51	52	53
56	57	58	59	60	59	60	56	57	58	58	59	60	56	57	60	56	57	58	59
61	62	63	64	65	63	64	65	61	62	62	63	64	65	61	64	65	61	62	63
66	67	68	69	70	70	66	67	68	69	68	69	70	66	67	67	68	69	70	66

Design 1b: α-design for $v = 70$, $b = 28$, $k = 10$; A-efficiency: 0.9785; Plot Size: 2.7 × 4.8 m²

Replication I							Replication II							Replication III							Replication IV						
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23	B24	B25	B26	B27	B28
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
8	9	10	11	12	13	14	9	10	11	12	13	14	8	11	12	13	14	8	9	10	12	13	14	8	9	10	11
15	16	17	18	19	20	21	17	18	19	20	21	15	16	16	17	18	19	20	21	15	18	19	20	21	15	16	17
22	23	24	25	26	27	28	27	28	22	23	24	25	26	24	25	26	27	28	22	23	23	24	25	26	27	28	22
29	30	31	32	33	34	35	35	29	30	31	32	33	34	31	32	33	34	35	29	30	33	34	35	29	30	31	32
36	37	38	39	40	41	42	37	38	39	40	41	42	36	41	42	36	37	38	39	40	39	40	41	42	36	37	38
43	44	45	46	47	48	49	49	43	44	45	46	47	48	47	48	49	43	44	45	46	48	49	43	44	45	46	47
50	51	52	53	54	55	56	53	54	55	56	50	51	52	56	50	51	52	53	54	55	55	56	50	51	52	53	54
57	58	59	60	61	62	63	61	62	63	57	58	59	60	62	63	57	58	59	60	61	59	60	61	62	63	57	58
64	65	66	67	68	69	70	66	67	68	69	70	64	65	67	68	69	70	64	65	66	70	64	65	66	67	68	69

Design 2: α-design for $v = 84$, $b = 24$, $r = 4$, $k = 14$; A-efficiency:0.9830; Plot Size: 2.7 × 4.8 m²

Replication I						Replication II						Replication III						Replication IV					
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23	B24
1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
10	11	12	7	8	9	9	10	11	12	7	8	7	8	9	10	11	12	12	7	8	9	10	11
16	17	18	13	14	15	17	18	13	14	15	16	13	14	15	16	17	18	15	16	17	18	13	14
21	22	23	24	19	20	24	19	20	21	22	23	19	20	21	22	23	24	20	21	22	23	24	19
26	27	28	29	30	25	30	25	26	27	28	29	25	26	27	28	29	30	29	30	25	26	27	28
32	33	34	35	36	31	34	35	36	31	32	33	31	32	33	34	35	36	35	36	31	32	33	34
41	42	37	38	39	40	42	37	38	39	40	41	37	38	39	40	41	42	38	39	40	41	42	37
45	46	47	48	43	44	46	47	48	43	44	45	43	44	45	46	47	48	44	45	46	47	48	43
54	49	50	51	52	53	53	54	49	50	51	52	49	50	51	52	53	54	52	53	54	49	50	51
60	55	56	57	58	59	56	57	58	59	60	55	55	56	57	58	59	60	58	59	60	55	56	57
62	63	64	65	66	61	64	65	66	61	62	63	61	62	63	64	65	66	63	64	65	66	61	62
70	71	72	67	68	69	68	69	70	71	72	67	67	68	69	70	71	72	72	67	68	69	70	71
77	78	73	74	75	76	75	76	77	78	73	74	73	74	75	76	77	78	78	73	74	75	76	77
83	84	79	80	81	82	80	81	82	83	84	79	79	80	81	82	83	84	81	82	83	84	79	80

Design 3: α-design for $v = 28$, $b = 12$, $r = 3$, $k = 7$; A-efficiency: 0.9603; Plot Size: 2.7 × 6.0 m²

Replication I				Replication II				Replication III			
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
1	2	3	4	1	2	3	4	1	2	3	4
5	6	7	8	6	7	8	5	7	8	5	6
9	10	11	12	10	11	12	9	12	9	10	11
13	14	15	16	15	16	13	14	14	15	16	13
17	18	19	20	19	20	17	18	20	17	18	19
21	22	23	24	24	21	22	23	22	23	24	21
25	26	27	28	28	25	26	27	27	28	25	26

Design 4: α-design for $v = 14$, $b = 6$, $r = 3$, $k = 7$; A-efficiency: 0.9684; Plot Size: 2.7 × 6.0 m²

Replication I		Replication II		Replication III	
B1	B2	B3	B4	B5	B6
1	2	1	2	1	2
3	4	4	3	4	3
5	6	5	6	6	5
7	8	8	7	7	8
9	10	10	9	9	10
11	12	11	12	12	11
13	14	14	13	14	13

- Ms Poonam Singh from Division of Genetics, IARI, New Delhi was advised on the analysis of data pertaining to characterization of lentil germplasm through morphological and molecular marker. The experiment was conducted at Research Farm of Indian Agricultural Research Institute using augmented randomized complete block design with 97 accessions and 3 checks in three blocks of sizes 36, 36 and 34 respectively. The data on morphological characters viz. days to flowering, days to maturity, plant height, number of primary branches, number of secondary branches, pods/plant, number of seeds/pod, 100 seed weight, grain yield, bio-mass score and harvest index were recorded. The data were analyzed using Statistical Package for Augmented Designs.

- Dr. Jitendra Kumar, Division of Agricultural Chemicals, IARI, New Delhi was advised on the development of polymer based seed coats containing azadirachtin for soybean. The objectives of the experiment were (i) to prepare the seed coats incorporating azadirachtin, (ii) seed treatment and monitoring fungal growth vis-à-vis estimation of residual azadirachtin in the coats and (iii) evaluation of seed quality parameters (germination, field emergence etc.) by coating seed with polymer with and without azadirachtin. The experiment was conducted with 29 treatments (26 treatment combinations of 13 polymers with and without azadirachtin, azadirachtin without polymer, thiram and absolute control). The data on %infected seeds, %germination, %field emergence, seed vigour and soil moisture were collected over months. The data were analyzed for each month separately as per procedure of completely randomized design taking month and treatment month as covariates. The significance of differences between average of 26 treatments and thiram, absolute control and azadirachtin were tested using contrast analysis. All possible pairwise treatment comparisons were made using Tukey's multiple comparison procedure. Arc sine transformation was used for %germination, %field emergence and %infected seeds. Also advised on the determination of the diffusion exponents of the carbofuran in formulations from release data using semi-empirical power law equation and computations of half-life period. Also advised on the computation of rate of removal of the pesticide and half-life period using first order kinetics.
- Dr. Geeta Singh, Sr. Scientist from Division of Micro Biology, IARI, New Delhi was advised on the analysis of data pertaining to an experiment conducted to find out the optimum combination of time period, temperature and organisms each at four levels.
- Dr. R.K. Mahajan and Dr. Hanuman Lal Raiger from National Bureau of Plant Genetic Resources were advised on the combined analysis of data from augmented designs conducted at different locations and/or years.

Preparation of Manuals for the project entitled "Preparation of Manuals" Funded by CSO, MOS & PI, GOI, New Delhi

The objective is to write a comprehensive manual on Area and Crop Production Statistics, Animal Husbandry Statistics, Agricultural Prices and Marketing, Cost of Cultivation Surveys, Horticulture and Spices Statistics, Fishery Statistics with emphasis on their concepts, definitions and classification, sources and systems, quality standards, methodological development etc.

The following Manuals were further revised in the light of suggestions given by Editorial Committee and submitted to funding agency:

- Area and Crop Production Statistics
- Animal Husbandry Statistics
- Agricultural Prices and Marketing
- Cost of Cultivation Surveys
- Horticulture and Spices Statistics
- Fishery Statistics

Computer Services

(i) Resource utilization

The Division of Computer Applications provided computing facilities to scientists/ research workers and students to work on various computers in different labs. A break up of the time utilized in various laboratories is as given:

Laboratories	No. of user's visits	Time utilized (hrs)
ARIS-Lab. (111A)	1956	9128
Bio-Informatics-Lab. (118)	459	2389
Divisional Scientist-Lab. (129)	1180	5426
Total	**3595**	**16943**

(ii) Selective dissemination of information

Bio-informatics Centre provided services to scientists in NARS in terms of searching from the bibliographic databases. The scientists of the Institute were also provided services for colour output of certificates, cover pages and laser outputs for various documents. It received two requests from other institutes of ICAR and output of 1170 abstracts were provided to them.


18 अगस्त
AUGUST


बैठक
2005


बैठक


STAFF RESEARCH COUNCIL MEETING

12

Management Committee and SRC

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. SD Sharma, Director, IASRI (ICAR), New Delhi-110 012 — Chairman
2. Dr. VK Bhatia, Principal Scientist and In-charge (RCMU), IASRI (ICAR), New Delhi-110 012 — Member
3. Dr. KK Tyagi, Principal Scientist, IASRI (ICAR), New Delhi-110 012 — Member
4. Dr. VK Sharma, Principal Scientist and Acting Head (DE), IASRI (ICAR), New Delhi-110 012 — Member
5. Dr. DK Agarwal, Principal Scientist, ICAR, KAB II, New Delhi-110 012 — Member
6. Dr. JP Mishra, Assistant Director General (ES&M), ICAR, Krishi Bhawan, New Delhi-110 001 — Member
7. Director (Agriculture), Government of Delhi, Delhi — Member

8. Director (Agriculture), Government of Uttar Pradesh, Lucknow, Uttar Pradesh — Member
9. Joint Director (Research), IARI, New Delhi-110 012 — Member
10. Sh. Radhey Shayam, Senior Finance and Accounts Officer, ICAR, Krishi Bhawan, New Delhi-110 001 — Member
11. Sh. Vijay Sardana, Acting Director, International Business Centre in Agriculture and Agriculture Related Industries, 82-83, Baikunth, Nehru Place, New Delhi-110 019 — Non Official Member
12. Dr. SK Dorge, 81, Shivaji Housing Society, Sonipat Bapat Road, Pune-16 — Non Official Member
13. Chief Administrative Officer IASRI (ICAR), New Delhi-110 012 — Member-Secretary

The 51st meeting of the Management Committee was held on 24 June 2005 under the Chairmanship of Prof. SD Sharma, Director, IASRI. The following agenda items were discussed:

- Confirmation of proceedings of the 50th meeting of the Management Committee held on 17 August 2004
- Review of action taken on the recommendations of the 50th meeting of the Management Committee held on 17 August 2004

51st Management Committee meeting in progress

- Consideration of proceedings of the Staff Research Council meeting held on 18-19 February 2005
- Allotment of funds for works/equipments to be purchased/executed during 2005-06
- Airconditioning facilities for Library
- Approval of the proceedings of the meeting of SRC of the Institute held on 18-19 February 2005
- Expenditure statement of IASRI budget estimates for the year 2004-05
- Payment of renumeration for evaluation of new projects/proposals

The 52nd meeting of the Management Committee was held on 01 March 2006 under the Chairmanship of Prof. SD Sharma, Director, IASRI.

The following agenda items were discussed:

- Confirmation of proceedings of the 51st meeting of the Management Committee held on 24 June 2005
- Review of action taken on the recommendations of the 51st meeting of the Management Committee held on 24 June 2005
- Presentation of activities/achievements of the Institute during 24 June 2005 to till date

52nd Management Committee meeting in progress

- Expenditure statement of IASRI budget estimates for the year 2004-05
- Approval of Constitution of grievance committee
- Change in the rules, 1999 in the staff quarter allotment rules of the Institute
- Presentation of the progress made in development of software on cost of cultivation of crops/livestock at farm level
- Re-appropriation of funds under plan head

Staff Research Council

The Staff Research Council (SRC) of the Institute 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. SD Sharma, Director is the Chairman and Dr. VK Bhatia, Principal Scientist and In-charge (RCMU) is the Member Secretary of the SRC. As per the guidelines of SRC, the new research project proposals were sent to outside experts.

Two meetings of the Staff Research Council (SRC) were held during 17-18 August 2005 and 17 February 2006. In the first meeting one Institute funded new research project was approved and progress of 28 ongoing research projects were discussed. In the second meeting one research project funded by Central Statistical Organisation (CSO) was approved and review of progress of 27 ongoing research projects and one research study were discussed.

Member Secretary, SRC, Director and Chairman, SRC and Joint Director at SRC Meeting (Left to Right)

A view of SRC Meeting

Presentation of progress of research project at SRC meeting


Different Agro Climatic Zones / States
Organised by
Symposium Hall, NASC Complex, PUSA, New Delhi


डा० एस डी शर्मा
डा० मंगला राव


डा० एस डी शर्मा


राधा सिंह
चम्पक चटर्जी


चम्पक चटर्जी


प्रेम


शर्मा


MAJOR OBJECTIVES FOR MECHANISATION

13

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

PAPERS PRESENTED

55th Session of International Statistical Institute, Sydney, Australia 05-12 April 2005

- A Das, H Ghosh, and CK Midha. A and D efficient partial diallel cross designs
- H Ghosh, A Das and CK Midha. Designs for estimation of heritability in diallel crosses

National Symposium on Biopesticides held at IARI, New Delhi during 20-21 April 2005

- S Jayakrishnan, Madhuban Gopal, KL Srivastava, SK Jha, R Niwas, A Helal and VK Mahajan. Comparison of bio and synthetic pesticide for the management of shoot and fruit borer of eggplant *Solonum melongene L*
- Ram Niwas, Madhuban Gopal, Irani Mukerjee and VK Mahajan. Quality control of neem seed kernel powder (NSKP) by estimation of azadirachtin-A and improving its extraction

2-days Workshop on Improvement of Agricultural Statistics at Vigyan Bhavan, New Delhi during 01-02 July 2005

- UC Sud. Methodology and related issued for small area statistics
- KK Tyagi, HVL Bathla and SD Sharma. Long term mechanization strategies for different agro climatic zones/states

12th Annual Group Meeting of AICRP on Rapeseed and Mustard at GBPUA&T, Pantnagar during 11-13 August 2005

- Rajender Parsad and VK Gupta. Statistical designing and analytical techniques useful for varietal trials

Poster Presentation Hindi Chetna Maas at IASRI, New Delhi during 01-30 September 2005

- अमरेन्द्र कुमार, सुभाष मैहता, रंजना अग्रवाल एवं विश्व धर । अरहर के कीटों व रोगों के लिये पूर्वानुमान मॉडल।

- सिनी वरगीस, सीमा जग्गी, वी के शर्मा एवं एन पी सिंह। रिज़ोलवेबल नेस्टेड ग्रुप डिविज़िबल डिजाइन्स ।
- राजेन्द्र कुमार, जे के कपूर एवं एन पी सिंह। कृषि से संबंधित कार्यों में उर्वरक प्रयोग की दक्षता पर सांख्यिकीय अन्वेषण।
- रंजना अग्रवाल, लाल मोहन भर एवं एस एस वालिया। मत्स्य उत्पादन का पूर्वानुमान – कुछ विधियाँ ।
- त्रिभुवन राय एवं चन्द्रहास । मौसम चरों के आधार पर धान की उपज का पूर्वानुमान लगाने हेतु विविक्तकर फलन पद्धति का उपयोग ।
- प्रेम नारायण, एस डी शर्मा, एस सी राय एवं वी के भाटिया । आर्थिक विकास की दृष्टि से प्रदेशों का वर्गीकरण तथा अल्प विकसित क्षेत्रों की पहचान ।
- वी के भाटिया, विजय बिन्दल एवं एस सी राय । उड़ीसा के जनपदों का सामाजिक-आर्थिक वर्गीकरण ।
- एस डी वाही, पाल सिंह, वी पी सिंह एवं प्रकाश लाल । भारतीय बकरियों में विभिन्न अनुवांशिक समूहों के बीच अन्तर मापने की बेहतर विधियाँ ।

International Conference and Exhibition on Soilless Culture organised by International Society of Horticultural Science, Fort Canning Rise, Singapore during 05-08 September 2005

- Anupama, MC Singh, Rajesh Kumar, BS Parmar and A Kumar. Performance of a new superabsorbent polymer on seedling and post planting growth and water use pattern of *Chrysanthemum* grown under controlled environment

8th International Biometric Society (Indian Region) Conference, Department of Agricultural Statistics, University of Agricultural Sciences, Bangalore during 04-07 October 2005

- Krishan Lal, Rajender Parsad and VK Gupta. Trend-free nested balanced incomplete block designs with applications in designs for diallel cross experiments

59th Annual Conference of the Indian Society of Agricultural Statistics held at Sher-e-Kashmir University of Agricultural Sciences & Technology, Jammu during 11-13 November 2005

- Ananta Sarkar, Rajender Parsad and DK Mehta. Trends of soil available nutrients and their prediction in long-term fertilizer experiments
- Anil Kumar, Sanjeev Panwar, Dharmandra and Prawin Arya. Variability in treatment responses under rice-wheat sequence
- AK Gupta, VK Jain, MS Narang, UC Sud and KK Tyagi. Production of important flowers on the basis of market arrivals in Delhi
- Jagbir Singh. Estimation of small, moderate and large area level
- N Okendro Singh, VK Bhatia and Amrit Kumar Paul. Estimation of variance components when errors are correlated by autoregressive of order one
- Rajender Parsad (Dr. D.N. Lal Memorial Lecture). Designing experiments for cropping systems research
- Rajender Parsad and VK Gupta. Statistical designing of experiments for hill agriculture
- Rajni Jain, S Minz and V Ramasubramanian. Performance of machine learning techniques vis-à-vis logistic regression in forewarning incidence of crop diseases
- Sangeeta Ahuja, PK Malhotra, VK Bhatia and Rajender Parsad. Statistical Package for Agricultural Reserach (SPAR 2.0)
- Susheel Kumar Sarkar and Krishan Lal. A multivariate approach to the analysis of growth data on pigs
- Sanjeev Panwar, Anil Kumar and N Sivaramane. Non-linear modelling of banana production of different states in India
- Soumen Pal, IC Sethi and Alka Arora. Decision support system for nutrient management in crops
- T Rai, Ranjana Agrawal and Madan Mohan. Growth model of weeds grown with soybean
- VK Sharma and Sandipan Bhattcharyya. Partially balanced change-over designs with first residual

Brain Storming Session on Statistical Issues in Rapeseed-Mustard Trials at IASRI, New Delhi on 19 November 2005

- Rajender Parsad. Statistical issues in rapeseed-mustard trials
- VK Bhatia. Some statistical issues in stability of crop varieties

2nd Global Conference on Plant Health-Global Wealth at MPUAT, Udaipur, Rajasthan during 25-29 November 2005

- Amrender Kumar, Ranjana Agrawal, C Chattopadhyay, YG Prasad and YS Ramakrishna. Artificial neural network approach for forecasting pests and diseases in mustard
- Amrender Kumar, Ranjana Agrawal, AK Srivastava, C Chattopadhya, YG Prasad and YS Ramakrishna. Logistic model for forewarning pests and diseases using weather parameters

8th Annual Conference of Society of Statistics, Computer and Applications at Department of Statistics and Computer Science, Government Vidarbha Institute of Science and Humanities, Amravati during 28-30 November 2005

- Aloke Lahiri. Finding eigen values related to precision of gca effects estimated using diallel crossing plans
- Lalmohan Bhar and VK Gupta. Detection of multiple outliers in designed experiments
- Rajender Parsad and VK Gupta (Invited Talk). Current status of experimental designs in agricultural research-I
- V Ramasubramanian, MK Sharma and SS Walia. Statistical models for forewarning incidence of major pests of paddy

National Seminar on Entrepreneurship Development for Livelihood Security - Experiences, Prospects and Strategies for Rural India organized at IVRI, Izatnagar, Bareilly, U.P. during 29 November to 01 December 2005

- Shahnawazul Islam, Hari Om Agarwal, JP Sharma and Mohd. Samir Farooqi. Role of information technology for entrepreneurship development in agriculture

National Symposium on Efficient Water Management for Eco-friendly Sustainable and Profitable Agriculture at IARI, New Delhi during 01-03 December 2005

- RN Garg, RK Tomar, Ranjana Agrawal, Rajender Kumar, D Chakraborty, RN Sahoo, VK Gupta, N Kalra and S Singh. Response of wheat to different planting schedules moisture regime and N-fertilization in semi-arid regions

93rd Session of Indian Science Congress, ANGRAU, Hyderabad during 03-07 January 2006

- Amrender Kumar and Ranjana Agrawal. Forewarning model for pests in cotton
- Amrit Kumar Paul and Mir Asif Iquebal. Some aspects of estimation of heritability of herdlife
- Prajneshu. Statistical modelling techniques for describing India's marine production data

9th Annual International Conference and Exhibition in the field of Geographic Information Science, Technology and Application Map India 2006 at New Delhi during 30 January to 01 February 2006

- Prachi Misra Sahoo, Anil Rai, Randhir Singh, BK Handique, Markand Oza and JS Parihar. Remote sensing based sampling methodology for estimation of crop acreage in north-eastern hilly region

International Conference on Social Science Perspectives in Agricultural Research and Development held at IARI, New Delhi during 15-18 February 2006

- Anil Rai, SD Sharma, Prachi Misra Sahoo and PK Malhotra. Development of livelihood index for different agro-climatic zones in India
- Shahnawazul Islam, Hari Om Agarwal, Vipin K Dubey and JP Sharma. Expert system on wheat crop management: An effective tool for transfer of technology and information management
- Mohd. Samir Farooqi, Shahanawazul Islam, KK Chaturvedi, Kirti Sharma and Harnam Singh Sikarwar. Identifying insects through expert system on wheat crop management

National Symposium on Technology Interventions for Livestock Improvement and Production at National Academy of Agricultural Sciences, Pusa Campus, New Delhi during 17-19 February 2006

- Sarika, SD Wahi and AR Rao. A study on estimation of genetic correlation

PARTICIPATION

- Agriculture Summit-2005 on "Reforms for Raising Farm Income" on 09 April 2005 at Vigyan Bhawan, New Delhi. Dr. Manmohan Singh, Hon'ble Prime

Minister inaugurated the Summit. Shri Sharad Pawar, Hon'ble Union Minister for Agriculture, Food, Civil Supplies, Consumer Affairs and Public Distribution delivered the Keynote Address.

- National Workshop on "Long-term Mechanization Strategies for Different Agro-climatic Zones/ States" for presentation of final report of the project organised by IASRI at NASC Complex, New Delhi during 15-16 April 2005. The Workshop was inaugurated by Smt. Radha Singh, Secretary, Department of Agriculture & Co-operation, Ministry of Agriculture, Govt. of India.
- National Seminar on "Food Quality and Safety Standards of Agricultural Raw and Processed Produce" organised by CIPHET, Ludhiana at NASC Complex, New Delhi during 26-27 April 2005. Dr. Mangala Rai, Secretary, DARE & Director General, ICAR inaugurated the Seminar. Dr. G. Kalloo, DDG (Hort. & Crops), ICAR presided. Dr. S. Ayyappan, DDG (Fy.) and Dr. Nawab Ali, DDG (Engg.), ICAR were Guests of Honour.
- Brainstorming Session to design an effective structure and mechanism of M&E system including finalization of indicators and their bench-marking in connection with the preparation of World Bank assisted National Agricultural Innovation Project (NAIP) held at NATP Office, ICAR, KAB-II, New Delhi on 04 May 2005.
- Seminar on "Constraints of Becoming an Economic Super Power: Some Reflections on India's Growth Potential" at NCAP, New Delhi on 05 May 2005.
- Dissemination Workshop of the A P Cess funded project on "Modeling for Forecasting of Crop Yield Using Weather Parameters and Agricultural Inputs" at the Institute on 20 May 2005.
- Sensitization-cum-Requirement Analysis Workshops of NISAGENET project held at i) Rajendra Agricultural University, Pusa during 28-29 April 2005, ii) Maharana Pratap University of Agriculture & Technology, Udaipur during 17-18 May 2005, iii) Tamil Nadu Agricultural University, Coimbatore during 25-26 May 2005 and iv) IASRI, New Delhi during 07-08 June 2005.
- Hindi Workshop for ISM Software at IASRI, New Delhi during 16-18 June 2005.
- Workshops on "National Forestry Database Management System" organized by Ministry of Forest and Environment at New Delhi from 02-05 July 2005.
- 3rd Workshop of AICRP on ESA (Ergonomics & Safety in Agriculture) at MPUAT, Udaipur during 07-08 July 2005.
- The Mission-2007 - 2nd Convention of National Alliance on 11 July 2005 at New Delhi. The Chief Guest was Dr. APJ Abdul Kalam, His Excellency the President of India.
- Brainstorming Workshop for Component-I of National Agricultural Innovative Project, ICAR on 13 July 2005.
- Two days Hindi Workshop organized by Hindi Section at IASRI, New Delhi on 23-24 August 2005.
- National Symposium on "Aromatic Rice and Medicinal Rice: Trade Related Issues" held at IARI, New Delhi on 29 August 2005. The Chief Guest was Dr. MS Swaminathan, FRS, UNESCO-Cousteau Professor in Ecotechnology and Chairman, National Commission on Farmers.
- Brainstorming Session for discussing various issues related with International Rice Congress-2006 under the Chairmanship of Dr. Mangala Rai, Secretary, DARE & Director General, ICAR held at NASC Complex, New Delhi on 08 September 2005.
- Brainstorming Session for Discussion on "Improving the Quality of Indian Journals in Agricultural Research, Education & Development" under the Chairmanship of Dr. Kirti Singh, Former Chairman, ASRB held at NASC Complex, New Delhi on 12 September 2005.
- Workshop on "Capacity Building Program for Indian Agriculture Research, Extension and Development (RED) Organizations in Globalized Agricultural Economy" at IARI, New Delhi during 15-16 September 2005.
- Group meeting of AICRP on "Cropping System" at AAU, Jorhat during 28-30 September 2005.
- Two Workshops one on "Methodological Issues in Clinical Trials" and the other on "Linear Models"

at University of Agricultural Sciences, Bangalore during 04-05 October 2005.

- World Food Day celebrations organized by ICAR at NASC Complex, New Delhi on 14 October 2005.
- The 4th International Food Legumes Research Conference on "Food Legumes for Nutritional Security and Sustainable Agriculture" at National Physical Laboratory, New Delhi on 18 October 2005. The Chief Guest was Shri Bhairon Singh Shekhawat, His Excellency the Vice-President of India. Shri Arjun Singh, Hon'ble Minister for Human Resource Development, GOI was the Guest of Honour.
- National Conference of Krishi Vigyan Kendras held at NASC Complex, Pusa, New Delhi on 27 October 2005. The Chief Guest was Dr. Manmohan Singh, Hon'ble Prime Minister of India. Shri Sharad Pawar, Hon'ble Minister for Agriculture, GOI presided the Conference. Shri Kanti Lal Bhuria, Minister of State for Agriculture, GOI was Guest of Honour.
- Workshop on "Initiating Network Programme on Conservation Agriculture" at PDCSR, Modipuram on 10 November 2005.
- Seminar on "Anticipating Change: Targeting Investments in Livestock Research for the Poor" at International Livestock Research Institute, NASC Complex, New Delhi on 14 November 2005.
- Workshop to finalize the M&E arrangement under NAIP, as a part of NAIP Progress Review Mission held at PIU, NATP, KAB-II, Pusa, New Delhi on 21 November 2005.
- Workshop on Research Potential on "Cost of Cultivation Data" held at Institute of Economic Growth, University of Delhi, Delhi on 22 November 2005. The workshop was jointly organized by Institute of Economic Growth and Indian Society of Agricultural Economics.
- Two days Hindi Workshop organized by Hindi Section at IASRI, New Delhi on 15-16 December 2005.
- Global Land Cover Network (GLCN) Workshop organized by FAO, Rome and UNEP at IIRS, Dehradun from 19-23 December 2005.
- Biotech-2005 - 3rd National Conference of Biotechnology Society of India at Manesar, Gurgoan during 22-24 December 2005.
- Brainstorming Session on "WTO and Indian Agriculture: Implications for Policy and R&D" on 23 December 2005 at National Academy of Agricultural Sciences, New Delhi.
- Two days International Workshop on "Smallh-older Livestock Production in India: Opportunities and Challenges" held at NASC Complex, New Delhi during 31 January and 01 February 2006. At the Inaugural Function, Prof. Abhijit Sen, Member, Planning Commission, GOI was the Chief Guest. Dr. Mangala Rai, Secretary, DARE & Director General, ICAR, and Dr. Carlos Sere, Director General, International Livestock Research Institute, Nairobi, Kenya presided.
- The 44th Convocation of IARI, New Delhi on 10 February 2006. Prof. MGK Menon, Former Minister of State for Science & Technology, GOI and presently Senior Advisor, Department of Space, Indian Space Research Organisation delivered the Convocation Address.
- Brainstorming Session on "Low and Declining Crop Response to Fertilizers" at National Academy of Agricultural Sciences, NASC Complex, New Delhi during 20-21 February 2006. Prof. MS Swaminathan, President, National Academy of Agricultural Sciences and Chairman, National Commission on Farmers, GOI inaugurated the Session.
- Two days National Conference on "Agriculture for Kharif Campaign 2006" organised by DOAC, Ministry of Agriculture at NASC Complex, New Delhi during 21-22 February 2006.
- Pusa Krishi Vigyan Mela of IARI, New Delhi on 23 February 2006. The Theme of the Mela was "IARI's March Towards Second Green Revolution". Shri Kanti Lal Bhuria, Hon'ble Minister of State for Agriculture, GOI was the Chief Guest. Dr. Mangala Rai, Secretary, DARE & Director General, ICAR presided.
- National Workshop-cum-Seminar on "Commercial Goat and Sheep Farming and Marketing Farmer - Industry - Research - Interface" at CIRG, Makhdoom during 04-05 March 2006.

- The 6th Annual Baramati Initiative on ICT & Development entitled "The Potential of E-Agriculture" was held at Vidyapratishthan Institute of Information Technology (VIIT), Baramati (Maharashtra) during 10-11 March 2006. Director of the Institute made his presentation on "IASRI Initiatives on E-Agriculture" in one of the Technical Sessions.
- National Convention on "Knowledge-Driven Agricultural Development: Management of Change" organized by Agriculture Research Service Scientists' Forum during 24-26 March 2006 at IARI, New Delhi. The Chief Guest at the Inaugural Function was Shri Sharad Pawar, Hon'ble Union Minister for Agriculture, Food, Public Distribution & Consumer Affairs. Dr. Mangala Rai, Secretary, DARE & Director General, ICAR presided. Dr. CD Mayee, Chairman, ASRB was the Guest of Honour.
- Release of Commemorative Postage Stamp on IARI by Dr. Shakeel Ahmad, Hon'ble Minister of State for Communications and Information Technology, GOI on 30 March 2006 at IARI, New Delhi. Shri Sharad Pawar, Hon'ble Minister for Agriculture, Food, Public Distribution & Consumer Affairs, GOI was the Chief Guest.

Participation in Training Programmes

- "Library Access Demonstration" at IARI, New Delhi during April 2005
- "Library Information System" organised at IASRI, New Delhi during 28-30 April 2005
- "Information Technology in Agriculture" at NAARM, Hydrabad during 01-21 June 2005
- Short course on "Genetic Algorithms for Engineering Optimization" held at Indian Institute of Technology, Kanpur during 20-22 July 2005
- "Networking Essential for Information Management in Agriculture" Organised by NAARM, Hyderabad during 01-11 August 2005
- "Data-Driven Web Solution using Open Source Technology" organized under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Applications at IASRI, New Delhi from 17 September 2005 to 07 October 2005
- "Recent Advances in the Analysis of Survey Data" organized at IASRI, New Delhi under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Applications from 18 November to 08 December 2005
- ARC-IMS, a Web Based GIS Software at NIIT, ESRI India, New Delhi during 29-30 December 2005
- "Statistical Techniques for Agricultural Research with Emphasis on Use of Software" organized under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Application at IASRI, New Delhi from 21 December 2005 to 10 January 2006.
- "Development of Portals using LAMP Technology" under the aegis of Centre of Advanced Studies in Agricultural Statistics and Computer Application (CAS) at IASRI, New Delhi during 01-21 February 2006
- "Management Development Programme - Performance Assessment of Agricultural Research Organisations" at NAARM, Hyderabad during 23-28 February 2006
- "Effective Technical Assistance in Management of Agricultural Research" at NAARM, Hyderabad during 24-30 March 2006
- Net Technologies by New Horizons India Ltd. organized at IASRI, New Delhi in the month of March 2006

Participation in Various Meetings/ Discussions/ Functions, etc.

- Meeting with Asstt. Director General (Engg.) and Dr. SM Ilyas, Director, CIPHET regarding a survey to be undertaken on assessment of harvest and post-harvest losses under the All India Coordinated Research Project on Post Harvest Technology, held on 02 April 2005.
- 4th, 5th, 6th and 7th Meetings of the Task Force on Balanced Use of Fertilizer held on 05 April 2005, 14 April 2005, 30 April 2005 and 16 May 2005 respectively at Krishi Bhawan, New Delhi. In these meetings the response ratio of N, P, K and micro-nutrient obtained from the experiments conducted on farmers' fields were discussed.

- Coordination Committee Meeting of the All India Coordinated Research Project on "Post Harvest Technology" held at CIPHET, Ludhiana during 11-13 April 2005.
- Meeting with DDG (Engg.) and ADG (Engg.) for discussions on NASM on 05 May 2005.
- Discussions with the World Bank Team on 06 May 2005.
- Meeting with DDG (Engg.) for reviewing the progress of Agricultural Research Data Book 2005 on 12 May 2005.
- The 4th Meeting of Steering Committee for Preparation of Manuals on Various Statistical Indicators/Statistics under the Chairmanship of Dr. S Ray, Director General & CEO, NSSO held at Sardar Patel Bhawan, New Delhi on 06 June 2005.
- Meeting of the Empowered Committee for the implementation of "Awards and Fellowships for Outstanding and Meritorious Research Work in Statistics" under the Chairmanship of Secretary, Ministry of Statistics & Programme Implementation, Govt. of India at Sardar Patel Bhawan on 07 June 2005.
- Meeting of the High Level Co-ordination Committee of Orissa State on Revision of Sampling Design under EARAS for the purpose of R.K.B.Y. in Orissa held at Bhubaneswar on 09 June 2005.
- Meeting at Coconut Development Board, Kochi on 22 June 2005 and paper presentation on "Methodology and Other Related Issues in Estimating Cost of Cultivation of Coconut".
- Presentation Ceremony of National Awards in Statistics in honour of Prof. CR Rao for the year 2004-05 to Prof. Probal Chaudhuri and distribution of prizes to the winners of Essay Competition by Shri Oscar Fernandes, Hon'ble Minister of State for Statistics and Programme Implementation, Government of India at SCOPE Complex, New Delhi on 29 June 2005. Also to celebrate the Birth Anniversary of Prof. PC Mahalanobis, a lecture was delivered by Prof. BLS Prakasa Rao in his memory on this occasion.
- The 1st Meeting of "Expert Group for Establishment of National Forestry Database Management System" organized by the Ministry of Forest and Environment during 11-13 July 2005 at New Delhi.
- HP Solutions meet at Oberoi Hotel on 12 July 2005.
- Meeting with World Bank Mission member Shri Ghazali Raheem along with colleagues at IASRI on 18 July 2005.
- Meeting under the Chairmanship of Dr. Mangala Rai, Secretary, DARE & Director General, ICAR on 01 August 2005 at NASC Complex, New Delhi to discuss Mashelkar Committee Recommendations.
- Meeting of the Working Group for developing guidelines on "Project Components 2 & 3 under National Agricultural Innovative Project" under the Chairmanship of Dr. KV Raman held at NAARM, Hyderabad during 05-06 August 2005.
- Meeting of the High Level Co-ordination Committee on "Agricultural Statistics of Karnataka State" held on 11 August 2005 at Bangalore.
- Meeting of the Working Group for developing guidelines of Component-I entitled "Strengthening ICAR as a Catalyzing Agent of Indian Agricultural Innovation System" under National Agricultural Innovation Project at New Delhi on 12 August 2005.
- Meeting with Dr. KD Singh, Former FAO Expert regarding Agro-forestry Project on 20 August 2005.
- Meeting regarding TCD meeting and a training course on 22 August 2005 with the Advisor (Statistics), Department of Animal Husbandry & Dairying.
- Felicitation Function of Dr. MS Swaminathan, FRS on his 80th Birthday on 29 August 2005 at IARI, New Delhi.
- Meeting of the sub group no. 1 on "Earning and Capacity Building" under the Working Group for Component-I of NAIP held on 29 August 2005 at KAB-II, New Delhi.

- Meeting of the team constituted to review the "Results Framework and Monitoring Indicators" for NAIP held on 30 August 2005 at KAB-II, New Delhi.
- Meeting of the Task Force for Study on "Assessment of Survey Capabilities of Private Sector: World Bank assisted India Statistical Strengthening Project under the Chairmanship of Dr. RC Panda, Additional Secretary, Ministry of Statistics & Programme Implementation, GOI held at Patel Bhawan, New Delhi on 01 September 2005.
- Meeting of the Editorial Committee of the project "Formulation of Long Term Mechanization Strategy for each Agro-climatic Region/State" at the Institute on 02-03 September 2005.
- Discussions with Dr. Jacques Diouf, Director General, Food and Agriculture Organization, Rome on his visit to the National Agricultural Science Museum on 05 September 2005 and took him round the Museum.
- The 5th Meeting of the Steering Committee for Preparation of Manuals on Various Statistical Indicators/Statistics under the Chairmanship of Dr. S Ray, Director General & CEO, NSSO held at Patel Bhawan, New Delhi on 06 September 2005.
- The 3rd Meeting of the Working Group for developing guidelines on Project Components 2&3 under National Agricultural Innovative Project under the Chairmanship of Dr. KV Raman held at KAB-II, New Delhi on 08 September 2005.
- Meeting with Dr. SK Goyal, Commissioner, Commissionerate of Agriculture, Maharashtra, and other officers of the Commissionerate, to sort out current problems in the implementation of the project "Pilot Study to Develop an Alternative Methodology for Estimation of Area and Production of Horticultural Crops" in Maharashtra held at Pune on 13 September 2005.
- The 3rd Meeting of the Technical Monitoring Committee for CSS on "Strengthening of Database and Information Networking for the Fisheries Sector" of the Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GOI, held at Chandigarh on 26 September 2005. Director of the Institute chaired the meeting.
- The 1st Rao Bahadur Dr. B. Viswanath Award Ceremony held on 28 September 2005 at IARI, New Delhi. This Biennial Award was given to Dr. CD Mayee, Chairman, ASRB by the Chief Guest, Shri Sharad Pawar, Hon'ble Union Minister for Agriculture, Government of India.
- The 1st Rao Bahadur Dr. B Viswanath Award Lecture delivered by Dr. Charudatta Digambar Mayee, Chairman, ASRB at IARI, New Delhi on 28 September 2005. The Lecture was presided by Dr. Kirti Singh, Former Chairman, ASRB.
- Regional meetings of the project entitled "Assessment of Post Harvest Losses" held at i) CIPHET, Ludhiana during 28-29 October 2005, ii) CIAE, Bhopal on 08 November 2005 and iii) West Bengal University of Animal and Fishery Sciences, Kolkata during 28-29 November 2005.
- Meeting of the Task Force for Study on Assessment of Survey Capabilities of Private Sector: World Bank assisted entitled "India Statistical Strengthening Project" under the Chairmanship of Dr. RC Panda, Additional Secretary, Ministry of Statistics & Programme Implementation, GOI at Sardar Patel Bhawan, New Delhi on 03 October 2005.
- Meeting of the Empowered Committee for Implementation of Awards and Fellowships for outstanding and meritorious research work in Statistics under the Chairmanship of Shri PS Rana, Secretary, Ministry of Statistics & Programme Implementation, GOI at Sardar Patel Bhawan, New Delhi on 24 October 2005.
- Meeting of the Steering Committee of the Project "A Pilot Study to Develop an Alternative Methodology for Estimation of Area and Production of Horticultural Crops" held at IASRI on 25 October 2005. Director of the Institute chaired the meeting.
- Meeting of Working Group for developing guidelines on Project Components 2&3 under National Agricultural Innovative Project under the Chairmanship of Dr. KV Raman held at NATP, ICAR, New Delhi on 26 October 2005.

- Inauguration of the "Krishi Vistar Sadan" building, Pusa Campus, New Delhi, of the Directorate of Extension, Department of Agriculture & Co-operation, Ministry of Agriculture, GOI by Shri Sharad Pawar, Hon'ble Minister for Agriculture, Government of India on 27 October 2005.
- Valedictory Function of the Consultation on "Ten Years after Beijing: Gender, Science & Technology" at National Academy of Agricultural Sciences, New Delhi on 19 November 2005. The Chief Guest was HRH Princess Maha Chakri Sirindhorn of Thailand and Awardee of 2005 Indira Gandhi Prize for Peace, Disarmament and Development. Dr. MS Swaminathan, President, NAAS & Chairman, National Commission on Farmers chaired the function.
- Meetings of the Editorial Committee of the Project entitled "Study Relating to Formulating Long Term Mechanization Strategy for each Agro-climatic Zone/State" at the Institute on 23-24 November 2005. The Chairman was Prof. BS Pathak, Director, SPRERI, Vallabh Vidyanagar.
- Lecture by Dr. Mangala Rai, Secretary, DARE & Director General, ICAR on 05 December 2005 at IARI Auditorium, New Delhi. The topic of the lecture was "Agricultural Research and Education - Marching Ahead". The Lecture was organized by ARS Scientists Forum.
- Discussions with Dr. Nienke Beintema, Head, Agriculture Science & Technology Indicators (ASTI) initiative, from IFPRI, Dr. PS Birthal, National Fellow and Dr. P Adhiguru, Senior Scientist both from NCAP, at IASRI on 09 December 2005. The team visited the Institute to get further insight of the organization and about agricultural R&D.
- Launch ceremony of "BrightStor 11.5 - Data Storage Management Solutions" on 21 December 2005 at Hotel Hayat Regency, New Delhi. This was organized by C.A. Computer Associates India Pvt. Ltd.
- Discussions with Dr. Shashi K Gadia, Professor, Department of Computer Science, Iowa State University, USA and Dr. Navneet Goel, Professor, BITS, Pilani, who visited the Institute on 22 December 2005.
- Meeting regarding evaluation/continuation of Centrally Sponsored Scheme on Improvement of Agricultural Statistics under the Chairmanship of Economic & Statistical Advisor, Department of Agriculture & Co-operation, Ministry of Agriculture, GOI at Krishi Bhawan, New Delhi on 03 January 2006.
- Inaugural Function of ICAR Inter-Zonal Sports Meet at IARI, New Delhi on 10 January 2006. The Chief Guest of the Inaugural Function was Dr. CD Mayee, Chairman, ASRB.
- The 5th Meeting of the Task Force of the project "Study on Assessment of Survey Capabilities of Private Sector: World Bank assisted India Statistical Strengthening Project" under the Chairmanship of Dr. RC Panda, Addl. Secretary, Ministry of Statistics & Programme Implementation, GOI at Sardar Patel Bhawan, New Delhi on 16 January 2006.
- Meeting regarding cotton project with Dr. SM Jharwal, Principal Advisor, Govt. of India at Krishi Bhawan, New Delhi on 18 January 2006.
- Two days meet on "Agricultural Transformation through Public-Private Partnership - An Interface" at NASC Complex, New Delhi on 19-20 January 2006. Shri Sharad Pawar, Hon'ble Union Minister for Agriculture, GOI was the Chief Guest. Dr. Mangala Rai, Secretary, DARE & Director General, ICAR presided.
- The 6th Meeting of the Steering Committee for preparation of manuals on various statistical indicators/ statistics held at Sardar Patel Bhawan, New Delhi on 23 January 2006.
- The 5th Meeting of High Level Co-ordination Committee of State in the Directorate of Economics and Statistics Bhubneswar on 28 January 2006.
- High Level Technical Co-ordination Committee Meeting in the Board of Revenue Office, Jaipur on 30 January 2006.
- Meeting concerning Presentation of Report of the "Study Relating to Formulating Long-Term Mechanization Strategies for each Agro-Climatic Zone/State" project chaired by Dr. Radha Singh,

Secretary, Department of Agriculture & Cooperation, Ministry of Agriculture, GOI at Krishi Bhawan, New Delhi on 06 February 2006.

- Meeting to consider setting up a centre with a view of research, training and development in the areas of genomic science and bio-informatics under the chairmanship of Dr. Prem Narain on 13 February 2006.
- Steering Committee Meeting for evaluating the project proposals under the chairmanship of Additional Director General, Sardar Patel Bhawan, New Delhi on 14 February 2006.
- Interactive Discussion and Meeting on the "Feasibility of using Cost Study Data for Generation of Quick Estimates of Production of Principal Crops" under the Chairpersonship of Dr. Radha Singh Secretary, Department of Agriculture, Ministry of Agriculture, GOI, at Krishi Bhawan, New Delhi on 15-16 February 2006.
- Meeting of Second Advisory Committee of "Development of India Protection Index" on 23 February 2006 at NCAER, New Delhi.
- Meeting of the Empowered Committee for Implementation of Awards and Fellowships for outstanding and meritorious research work in Statistics under the Chairmanship of Shri PS Rana, Secretary, Ministry of Statistics & Programme Implementation, GOI at Sardar Patel Bhawan, New Delhi on 27 February 2006.
- 37th Meeting of the Programme Advisory Committee on "Mathematical Sciences of DST" to review the progress of ongoing projects funded by DST at B.M. Birla Science and Technology Centre, Jaipur during 03-04 March 2006.
- Meeting at the Institute held on 08 March 2006 with the Non-responding Agencies under the project Assessment of Survey Capabilities of the Private Sector. Director of the Institute chaired the meeting.
- Technical Advisory Committee Meeting for implementation of NAIS at Krishi Bhawan, New Delhi on 21 March 2006.
- Meeting with Dr. LP Gite, Project Coordinator, AICRP on ESA held at IASRI in which the future course of action relating to conduct of the Agricultural Accident Survey in three more States namely Arunachal Pradesh, Rajasthan and West Bengal by AICRP's newly created centres was discussed on 23 March 2006.
- Meeting of the Directors of Agricultural Engineering Division, under the Chairmanship of Dr. Nawab Ali, Dy. DG (Engg.), ICAR on Presentation of Documents prepared in support of ICAR document on "Food Prospects in India by 2011-12" at KAB-II, New Delhi on 24 March 2006. A presentation of the IASRI on "Increasing Food Production to 300 million tonnes by 2011-12" at the meeting was made.
- Mahindra & Mahindra, Farm Equipment Sector, Mumbai on 28 March, 2006, invited IASRI scientists for participating in a meeting with its officials on 04 April 2006 for preliminary discussion possibly leading to public private partnership.
- Release of Commemorative Potage Stamp on IARI by Dr. Shakeel Ahmad, Hon'ble Minister of State for Communications and Information Technology, GOI on 30 March 2006 at IARI, New Delhi. Shri Sharad Pawar, Hon'ble Minister for Agriculture, Food, Public Distribution & Consumer Affairs, GOI was the Chief Guest.

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Workshops, Conferences, Meetings, Seminars and Annual Day Organized

Workshops

- In order to disseminate the findings of the research project a two-days National Workshop on Long Term Mechanization Strategies for different Agro Climatic Zones/ States, for discussing the long term mechanization strategies for different agro climatic zones/states with the officials of State Govt.(s), was organized at NASC Complex, Pusa, New Delhi during April 15-16, 2005. Dr.(Mrs.) Radha Singh, Secretary, DOAC inaugurated the Workshop. Dr. Mangala Rai, Secretary, DARE & DG, ICAR presided over the Inaugural Function, top officials of the State Govt.(s)/DOAC, Ministry of Agriculture/ ICAR, DES, CIAE, Experts involved with the preparation of the strategy papers, associate scientists, award winning farmers and officials from different institutions and other private organizations participated in the workshop.
- Dissemination Workshop on the findings of the project 'Modeling for forecasting of crop yield using weather parameters and agricultural inputs' financed by AP Cess Fund of ICAR was organized on 20 May

A View of Inauguration Session of National Workshop on 'Long Term Mechanization Strategies for different Agro Climatic Zones/ States'

2005 at IASRI, New Delhi. The workshop was inaugurated by Shri M.M. Nampoothiry, ESA, Directorate of Eco. & Stat., Ministry of Agriculture and presided over by Dr. Nawab Ali, D.D.G. (Engg), ICAR. Director, IASRI welcomed the participants.

The workshop consisted of two technical sessions. The first session was chaired by Dr. Padam Singh, Ex-Addl. D.G., ICMR. The Principal Investigator, Dr. Ranjana Agrawal made a

A View of Dissemination Workshop on the findings of the project 'Modeling for Forecasting of Crop Yield using Weather Parameters and Agricultural Inputs'

comprehensive presentation on methodologies developed at IASRI in relation to crop production forecast system, forewarning system for crop pests and diseases, fisheries and market projections.

The second technical session was focused on the findings of the project 'Modeling for forecasting of crop yield using weather parameters and agricultural inputs'. The session was chaired by Dr. S.K. Raheja, ex-Director of IASRI. While presenting the detailed findings of the project, the Principal Investigator explained that the project has been taken up on one important kharif crop (rice), one important rabi crop (wheat) and one long duration crop (sugarcane) in the state of U.P. Models at district level were developed using weather indices and year as regressors. At agro-climatic zone level, deviations of data from respective district averages were used. District forecasts obtained from these models were aggregated to get forecasts for agro-climatic zones and state as a whole taking area under the crops in different districts as weights. These forecasts were compared with the actual observed yields at district, agro-climatic zone and state level. The methodology is simple, adoptable, does not involve use of very detailed data collection/sophisticated statistical tools and at the same time it provides reasonably good forecast. The methodology is suitable at district, agro-climatic zone as well as state level. There were 33 participants in the workshop.

- Two one-day workshops were organized on 09 March and 15 March 2005 on 'Training and Implementation of Personnel Management Information System in ICAR (PERMISnet)' at IASRI, New Delhi. Eighty-four Nodal Officers attended these workshops.
- A workshop on 'Sensitization-cum-Requirement Analysis for NISAGENET' project was organized at

A View of Workshop on'Training and Implementation of Personnel Management Information System in ICAR (PERMISnet)'

IASRI, New Delhi during 7-8 June 2005. The workshop was attended by Nodal Officers of the project of North zone and by Nodal Officers who did not attend earlier three workshops in their respective zones.

A View of Workshop on
'Sensitization-cum-Requirement Analysis for NISAGENET'

- First meeting of Steering Committee under the project entitled 'Pilot study to develop an alternative methodology for estimation of area and production of horticultural crops' was organized on 25 October, 2005 at IASRI, New Delhi.
- Two meetings of the Editorial Committee of the project entitled "Study relating to formulating long term mechanization strategy for each agro-climatic zone/state" along with associate scientists were organized under the chairmanship of Dr. BS Pathak, Director, SPRERI & Chairman, Editorial Committee, during September 02-03, 2005 and during 23-24 November, 2005 at the Institute.
- 59th Annual Conference of Indian Society of Agricultural Statistics held at Sher-e-Kashmir, University of Agricultural Science & Technology of Jammu, Jammu during November 11-13, 2005. Two Symposiums one on Statistical and Computational Issues in Rainfed Agriculture and other on Energy Issues in Agriculture were also organised during the Conference.

  The conference was inaugurated by Janab Muzaffar Hussain Baig, Deputy Chief Minister, Jammu & Kashmir.

Prof. Mangala Rai, Secretary, DARE and DG, ICAR delivering Dr. Rajendra Prasad Memorial Lecture during the 59th Annual Conference of Indian Society of Agricultural Statistics

Being a Session President Dr. SD Sharma, Director, IASRI delivered a Technical Address entitled "ICT as a tool for Information, Knowledge Management and Intelligence" during the Inaugural Function of 59th Annual Conference of Indian Society of Agricultural Statistics.

Dr. SD Sharma, Director, IASRI delivering Technical Address during the 59th Annual Conference of Indian Society of Agricultural Statistics

- Brainstorming Session on 'Statistical Issues in Rapeseed-Mustard Trials' in collaboration with National Research Centre on Rapeseed-Mustard was organised on 19 November 2005 at IASRI, New Delhi.

A view of Brainstorming Session on 'Statistical Issues in Rapeseed-Mustard Trials'

- Symposium on 'Role of Women in Rural Development' was convened during 8th Annual Conference of the Society of Statistics, Computer and Applications held at Department of Statistics and Computer Science, Government Vidarbha Institute of Science and Humanities, Amravati during 28-30 November 2005.
- A meeting was organized at Krishi Bhavan, New Delhi on 06 February 2006 in which presentation of Final Report of Farm Mechanization project was made

before the Sr. Officials of DOAC, ICAR, Experts under the chairpersonship of Secretary (A&C).

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 proposed. 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 74 seminar talks were delivered. Out of these, 48 were student seminars, 15 by scientists of the Institute and 11 by guest speakers.

Annual Day Celebrations

The Annual Day of the Institute was celebrated on 2 July 2005. As part of the celebrations a debate contest for technical and administrative staff was held on 1 July 2005. The topic of the contest was 'VAT strengthens Indian Economy'. Prizes were given to the following speakers:

Prize	Name	Designation
I	Sh. S.K. Singh	Assistant Engineer
II	Sh. Rajender Singh Tomar	Technical Officer (T-5)

On 2 July 2005 in the forenoon session, another declamation contest for scientists and students was held. The topic of the contest was 'Statistics and Information Technology for Disaster Management'.

The first and the second prizes were won by the following speakers:

Prize	Name of the Scientist(s)	Designation
I	Dr. G.K. Jha	Scientist
II	Dr. Ramasubramanian V	Scientist

Prize	Name of Student(s)	Course
I	Ms. Priya Kohli	M.Sc. (Ag. Stat.)
II	Sh. Ranjeet Kumar Paul	M.Sc. (Ag. Stat.)

In the afternoon session, the main Annual Day Function was celebrated in which Dr. R.B. Singh, Member, National Commission for Farmers was the Chief Guest. Dr.Mangala Rai,Secretary, DARE, Ministry of Agriculture,Government of India & Director General, ICAR delivered the Nehru Memorial Lecture entitled, "Information Techonolgy in Agriculture".

Nehru Memorial Gold Medals for the year 2002-04 were awarded to Nilbarata Goswami, M.Sc. (C.A.) and Mir Asif Iquebal, M.Sc.(Ag.Stat.) students.

The late Shri V.V.R. Murthy prize for the year 2002-04 was awarded to Mir Asif Iquebal, M.Sc. (Ag.Stat.) student.

A View of Declamation Contest for Scientists and Students during Annual Day Celebrations

A Student receiving the late Shri V.V.R. Murthy Prize during Annual Day Celebrations

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Distinguished Visitors

INDIAN

Dr. Mangala Rai,
Secretary, DARE and DG,
Indian Council of Agricultural Research (ICAR), New Delhi

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

Prof. RB Singh,
Member,
National Commission on Farmers, New Delhi

Dr.(Mrs.) Radha Singh,
Secretary,
DOAC, Ministry of Agriculture, New Delhi

Dr. BS Pathak,
Director,
Sardar Patel Renewable Energy Research Institute,
(SPRERI), Ahmedabad

Dr. MS Grewal,
Member,
Commission on Agricultural Costs & Prices,
Ministry of Agriculture,
Government of India, New Delhi

Dr. RC Agrawal,
Senior Scientist,
NBPGR, New Delhi

Dr. Aloke Dey,
Professor,
Indian Statistical Institute, New Delhi

Dr. AK Nigam,
Director, IASDS,
B-16/1, First Floor, Rajajipuram, Lucknow, Uttar Pradesh

Prof. Rajeev L. Krandikar,
Head,
Indian Statistical Institute, New Delhi

Dr. AK Srivastava,
Former Joint Director,
IASRI, New Delhi

Dr. Padam Singh,
Former Additional Director General,
ICMR, New Delhi

Dr. MC Agarwal,
Professor (Statistics),
Delhi University, Delhi

Sh. S Maitra,
Addl. Statistical Adviser,
DES, Krishi Bhawan, New Delhi

Sh. BK Tyagi,
Director (Ag. Census),
Ministry of Agriculture,
GOI, New Delhi

Dr. PS Birthal,
National Fellow,
NCAP, New Delhi

Dr. P Adhiguru,
Senior Scientist,
NCAP, New Delhi

Dr. Navneet Goel,
Professor,
BITS, Pilani, Rajasthan

Dr. S Ray,
DG and CEO, NSSO,
Ministry of Statistics and Programme Implementation,
New Delhi

Sh. PS Rana,
Secretary,
Government of India,
Ministry of Statistics and Programme Implementation,
New Delhi

Prof. Rajendra Prasad,
Ex. National Professor,
ICAR, New Delhi

Prof. Anupam Verma,
Ex. National Professor,
ICAR, New Delhi

Dr. Rita Sharma,
Financial Advisor,
ICAR, New Delhi

Prof. Prem Narain,
Ex-Director,
IASRI, New Delhi

Dr. PR Sreenath,
Ex-Principal Scientist,
IASRI, New Delhi

Shri Vijay K Bansal

FOREIGN

Dr. Sat Gupta,
Professor of Statistics and Director Statistics Division,
University of North Carolina at Greensboro,
327, Bryans Building, Greensboro, NC 27402

Dr. Nienke Beintema,
Head,
Agriculture Science & Technology Indicators (ASTI) Initiative,
International Food Policy Research Institute (IFPRI),
2033 K Street, NW,
Washington, DC 20006-1002 USA

Dr. Sudesh Srivastava,
Professor (Statistics),
Zulaine University, New Orleans, USA

Dr. Shashi K. Gadia,
Professor,
Dept. of Statistics, Iowa State University, Iowa, USA

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IASRI Personnel

Dr. S.D. Sharma, Director
Dr. V.K. Gupta, Joint Director

NATIONAL FELLOW
Dr. Rajender Parsad

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

Principal Scientists
Dr. K.K. Tyagi
Dr. U.C. Sud
Sh. R.S. Khatri
Dr. Jagbir Singh

Senior Scientists
Dr. M.S. Narang
Dr. Ashok Kumar Gupta

Scientists (Selection Grade)
Sh. D.C. Mathur
Sh. J.P. Goyal
Sh. S.C. Agarwal
Sh. Satyapal
Sh. V.K. Jain
Sh. K.K. Kher
Sh. R.M. Sood

Scientists (Senior Scale)
Sh. Bhagwan Dass
Dr. Tauqueer Ahmad
Dr. (Smt.) Prachi Mishra Sahoo
Sh. Hukum Chandra

DIVISION OF DESIGN OF EXPERIMENTS
Dr. V.K. Sharma,
Principal Scientist and Head

Principal Scientists
Dr. R. Srivastava
Dr. P.K. Batra

Senior Scientists
Dr. Aloke Lahiri
Dr. Krishan Lal
Dr. (Smt.) Seema Jaggi

Scientists (Selection Grade)
Smt. Rajinder Kaur
Sh. M.R. Vats
Sh. N.K. Sharma
Sh. D.K. Mehta
Sh. D.K. Sehgal

Smt. Ajit Kaur Bhatia
Sh. Rajender Kumar
Sh. O.P. Khanduri

Scientists (Senior Scale)
Dr. L.M. Bhar
Sh. Anil Kumar
Dr. (Smt.) Cini Varghese

Experimental Scientist
Dr. S.M.G. Saran

DIVISION OF BIOMETRICS
Dr. Prajneshu
Principal Scientist and Head

Principal Scientists
Dr. V.T. Prabhakaran
Sh. S.D. Wahi

Scientists (Selection Grade)
Sh. S.C. Sethi

Scientists (Senior Scale)
Sh. Inder Singh
Dr. Amrit Kumar Paul
Dr. A. Ramakrishna Rao
Sh. R.M. Bhasin

Scientists
Md. Wasi Alam
Sh. Pal Singh

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

Principal Scientists
Dr. Chandrahas
Smt. Asha Saksena

Scientists (Selection Grade)
Sh. S.S. Walia
Sh. S.C. Mehta
Sh. Tribhuwan Rai

Scientists (Senior Scale)
Sh. Madan Mohan
Dr. Ramasubramanian V.
Dr. Himadri Ghosh

Scientist
Sh. Amrender Kumar

DIVISION OF ECONOMETRICS
Dr. S.S. Kutaula,
Principal Scientist and Acting Head

Principal Scientist
Dr. S.P. Bhardwaj

Senior Scientists
Dr. Ashok Kumar
Dr. (Smt.) Sushila Kaul

Scientist (Selection Grade)
Sh. Mahender Singh

Scientist (Senior Scale)
Dr. Prawin Arya
Dr. Dharam Raj Singh

Scientists
Sh. Shivramane N.
Sh. Sanjeev Panwar

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

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

Senior Scientist
Dr. Anil Rai

Scientists (Selection Grade)
Sh. H.S. Sikarwar
Sh. Hari Om Agarwal
Sh. Balbir Singh
Sh. V.H. Gupta

Scientist (Senior Scale)
Smt. Alka Arora

Scientists
Ms. Sonali Das (on leave)
Smt. Shashi Dahiya
Md. Samir Farooqi
Sh. Sudeep
Sh. Krishan Kumar Chaturvedi
Sh. Vipin Kumar Dubey
Ms. Anshu Dixit (on leave)
Md. S.N. Islam
Smt. Anu Sharma
Sh. Shashi Bhushan Lal
Ms. Sangeeta Ahuja (on leave)

RESEARCH COORDINATION AND MANAGEMENT UNIT
Dr. V.K. Gupta, Joint Director
Dr. V.K. Bhatia, Principal Scientist and In-charge

TRAINING ADMINISTRATION CELL
Dr. V.K. Gupta, Joint Director
Dr. V.K. Sharma, Professor (Agricultural Statistics)
Dr. P.K. Malhotra, Professor (Computer Application)

LIBRARY
Dr. V.K. Gupta, Joint Director
Dr. P. Visakhi, Head (T-6)

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

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Any Other Relevant Information

National Agricultural Science Museum

National Agricultural Science Museum(NASM) is situated at NASC Complex, Dev Prakash Shastri Marg, opposite Dasghara village, Pusa Campus, New Delhi-110012. The management of museum is done by the Indian Agricultural Statistics Research Institute (IASRI) by duly constituted management committee as under:

Dr. S.D. Sharma	Chairman
Dr. V.K. Gupta	Member
Sh. R.S. Khatri	Convenor
Dr. P.K. Malhotra	Member
Dr. H.V.L. Bathla	Member
Capt. Mehar Singh	Member
Sh. K.K. Hamza	Member

Under the guidance of this committee the day to day activity of museum is looked after by the following:

Sh. R.P. Jain, Incharge & Scientist (S.G.)
Sh. B.J. Gahlot, Technical Officer (T-6)
Sh. O.P. Singh, Technical Officer (T-6)
Sh. Rajesh Kumar, Technical Officer (T-5)
Sh. Vinod Kumar, U.D.C.
Sh. Sunil Kumar, L.D.C.
Sh. Bhoop Singh, S.S.Gr.II

During period under report many persons visited the museum. The visitors included VVIPs, VIPs, farmers and students from various schools and universities in India & abroad. The functioning of museum was appreciated by all the visitors especially by high dignitaries and foreigners, to name a few Prof. JS Rustagi, USA; Prof. Norman E Borlaug, International Maize and Wheat Improvement Centre (CIMMYT), Maxico; Prof. Jucojucas Diouf, DG, FAO, Rome; Dr. ME Tusneam, Chariman, Pakistan Agriculture Research Council (PARC).

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 was as under:

Prof. S.D. Sharma	Director	Chairman
Official-side Representatives		
Dr. V.K. Gupta	Joint Director	Member
Dr. H.V.L. Bathla	Principal Scientist and Acting HD (SS)	Member
Dr. P.K. Malhotra	Principal Scientist and Acting HD (CA)	Member
Sh. R.S. Khatri	Principal Scientist and Welfare Officer	Member
Sh. K.K. Hamza	F&AO (Ex-Officio)	Member
Sh. A.K. Chaturvedi	O.S.D.	Member-Secretary
Staff-side Representatives		
Sh. Anil Kumar Bhalla	Assistant	Secretary
Sh. D.P.S. Mann	Assistant	Member
Sh. M.M. Morya	AECO (T-4)	Member
Sh. Satya Pal Singh	Technical Officer (T-5)	Member
Sh. Gabar Singh Rana	S.S. Gr.II	Member
Sh. Raj Nath	S.S. Gr.II	Member

Two meetings of the Institute Joint Staff Council were held on 19 July 2005 and 29 September 2005 under the Chairmanship of Prof. S.D. Sharma, Director to resolve various matters for the benefit of IASRI staff.

IASRI Employees Co-operative Thrift and Credit Society Limited

The society which is registered with the Registrar, Co-operative Societies, Delhi Administration continue its activities during 2005-06 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/- only per month from each member). The present strength of the members of the society is 395.

The Management Committee of the society for the year 2005-06 is as follows:

Sh. D.C. Pant	President
Sh. R.S. Tomar	Vice-President
Sh. U.C. Bandooni	Secretary
Sh. Sunil Dutt Sharma	Treasurer
Sh. V.K. Mishra	Internal Auditor
Sh. G.M. Pathak	Member
Sh. Arbind Kumar	Member
Sh. Sheo Raj Singh	Member
Sh. Manoj Kumar	Member
Sh. Sudershan Kumar	Member
Sh. S.K. Sablania	Member
Sh. Pratap Singh	Member
Smt. Meena Nanda	Member
Ms. Vijay Bindal	Member

Main Achievements

- The society advanced Rs. 80,13,000/- (Rupees eighty lakhs and thirteen thousand only) to its members as loan.
- An amount of Rs. 751/- (Rs. seven hundred fifty one only) each was given as gift to members on their retirement from the Institute.
- The financial help of Rs. 5000/- (Rs. five thousand only) to each was extended from member welfare fund of the society to the families of (Late) Sh. Balraj Singh and Sh. Heera Lal 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. July 2003 as follows:

Official-side Representative	
Prof. S.D. Sharma	Chairman
Dr. V.K. Gupta	Member
Sh. A.K. Chaturvedi	Member
Sh. K.K. Hamza	Member
Sh. D.N. Bhatia	Member
Staff-side Representative	
Sh. Mahendar Singh	Member
Sh. Sunil Dutt Sharma	Member
Sh. Prem Narain	Member
Sh. Purushottam Sharma	Member

Four meetings of the Grievance Committee of the Institute were held on 06 July, 29 September 2005, 21 January and 28 February 2006 under the Chairmanship of Prof. S.D. Sharma, Director.

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. 8370/- was collected from members. This year, gifts of Rs. 3000/- were distributed to five retiring personnel of the Institute. A relief of Rs. 1,000/- to the grieved family of (Late) Sh. Balraj Singh, T-6 and that of Rs. 1500/- to the grieved family of (Late) Sh. Hira Lal, Assistant were provided on their 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. Women cell, reconstituted on 5 February 2004, comprises of the following members:

Dr. Ranjana Agrawal	Principal Scientist and Acting HD (FT)	Chairperson
Dr. Seema Jaggi	Sr. Scientist	Member
Ms. Vijay Bindal	Tech. Officer	Member
Smt. Sushma Banati	Sr. P.A.	Member
Smt. Seeta Malhotra	Asstt. Admn. Officer	Convenor

Two meetings of the women cell were held on 01 August 2005 and 01 February 2006.

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. 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 2005-06 were:

Prefect	Susheel Kumar Sarkar
Mess Secretary/Asstt. Prefect	Dwijesh Chandra Mishra
Sports Secretary	Vinayanand Kandala
Maintenance Secretary	Ranjit Kumar Paul
Cultural Secretary	Lokesh Dwivedi & Divyendu Dev
Health Secretary	Baidyanath Mandal
Computer Lab Secretary	Sumit Sharma
Common Room Secretary	Sanjay Prasad & Subrat K. Behra
Auditor	Ram Kumar Chaudhary
Cashier	Ram Kumar Choudhary
Warden's Nominee	Ananta Sarkar

On the eve of the Annual Day on 02 July 2005, 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.

A friendly cricket match between staff and students have been played on 18 March 2006.

Boarding and lodging arrangements were made in Panse Hostel-cum-Guest House for the participants of various training programmes organised at the Institute. Similar arrangements were made for the guests who stayed in Guest House from different departments/ organisations.

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 e.g. table tennis, carrom, volleyball, playing cards games, etc. The sport tournaments for the year 2005 were organised during 2005-06.

The functioning of the Recreation and Welfare Club is monitored by the following Executive Committee:

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

Sports Activities

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

Prof. S.D. Sharma	Patron
Dr. V.K. Gupta	President
Dr. K.K. Tyagi	Vice President
Sh. R.S. Khatri	Member
Capt. Mehar Singh	Member
Sh. K.K. Hamza	Member
Dr. (Smt.) Seema Jaggi	Member
Sh. G.M. Pathak	Member
Sh. R.S. Tomar	Member
Smt. Vijaya Laxmi	Member
Sh. D.P.S. Mann	Member
Sh. Krishan Kumar	Member
Sh. Amar Singh	Member
Sh. Rambhool	Member
Sh. K.B. Sharma	Member
Sh. Ashok Kumar	Member
Sh. K.K. Hans	Member
Sh. A.K. Bhalla	Member
Sh. M.S. Verma	Convenor

ICAR Inter-Zone Sports Meet (2004-05)

IASRI sports contingent comprising of 21 participants including, Chief-de-mission Sh. M.S. Verma, Convenor, Institute Sports Committee and Manager Shri D.P.S. Mann, participated in ICAR, Inter-Zone Sports Meet (year 2004-05) held at National Dairy Research Institute, Karnal during 27-30 September 2005.

The Institute's participants achieved prestigious position: runner up position in Table Tennis women singles and doubles events.

ICAR Zone-II (Central Zone) Sports Meet (2005-06)

IASRI sports contingent comprising of 65 participants including, Chief-de-mission Sh. M.S. Verma, Convenor, Institute Sports Committee, Managers Sh. A.K. Bhalla, Sh. D.P.S. Mann, Sh. K.K. Hans and seven lady participants participated in various games/events in the ICAR Zone-II (Central Zone) Sports Meet (year 2005-06) held at IARI, New Delhi during 10-14 January, 2006.

The Institute's participants achieved prestigious positions: Champion Trophy in Kabaddi. In individual events our Institute had winner and runner up positions in Table Tennis singles (Women) and runner up position in Table Tennis doubles (Women).

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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 । संस्थान का समस्त प्रशासनिक कार्य शत-प्रतिशत हिन्दी में और यथा आवश्यक द्विभाषी रूप में ही हो रहा है ।

संस्थान के शोध कार्यों से संबंधित "शोध उपलब्धियाँ 2002-2004" का प्रकाशन हुआ जिसका विमोचन दिनांक 02 जुलाई, 2005 को संस्थान के वार्षिक दिवस समारोह के अवसर पर भारतीय कृषि अनुसंधान परिषद् के महानिदेशक एवं कृषि अनुसंधान एवं शिक्षा विभाग के सचिव डॉ. मंगला राय के कर-कमलों द्वारा हुआ ।

प्रतिवेदनाधीन अवधि में संस्थान में राजभाषा कार्यान्वयन समिति की तिमाही बैठकें नियमित रूप से आयोजित की गईं । उनमें लिए गए निर्णयों पर कार्यान्वयन सुनिश्चित करने के लिए हर तिमाही में पहले से ही संस्थान में गठित राजभाषा निरीक्षण समिति द्वारा निरीक्षण किया गया । इस समिति द्वारा राजभाषा कार्यान्वयन समिति की बैठक में लिए गए निर्णयों के कार्यान्वयन पर निगरानी रखी जाती है । स्थिति के अनुसार समिति द्वारा अपने सुझाव एवं सिफ़ारिशें निदेशक महोदय के समक्ष प्रस्तुत की गईं तथा निदेशक महोदय द्वारा दिये गये आदेशों को विभिन्न प्रभागों/अनुभागों में प्रचारित किया गया ।

हिन्दी चेतनामास के दौरान आयोजित प्रतियोगिता के लिए मुख्य अतिथि से पुरस्कार ग्रहण करते हुए विद्यार्थी

प्रतिवेदनाधीन वर्ष के दौरान संस्थान के कर्मियों के लिए चार कार्यशालाएँ आयोजित की गईं । इनमें से एक प्रशिक्षण कार्यशाला "आई.एस.एम.-2000 सॉफ्टवेयर" पर, दो कार्यशालाएँ "हिन्दी प्रगति रिपोर्ट के प्रपत्र भरने" के संबंध में तथा एक कार्यशाला "कार्यालय-प्रक्रिया एवं आँकड़ों का रखरखाव" पर आयोजित की गईं ।

संस्थान में कार्यरत सभी हिन्दी-भाषी अधिकारियों, कर्मचारियों द्वारा हिन्दी ज्ञान संबंधी प्रशिक्षण पूरा किया जा चुका है । आज तक की स्थिति के अनुसार, संस्थान में अब कोई ऐसा हिन्दी भाषी अधिकारी/ कर्मचारी शेष नहीं रह गया है जिसे हिन्दी ज्ञान संबंधी

"आई.एस.एम.-2000 सॉफ्टवेयर" पर आयोजित की गई प्रशिक्षण कार्यशाला का एक दृश्य

प्रशिक्षण दिया जाना शेष हो । इसके अलावा, हिन्दी शिक्षण योजना के अन्तर्गत संस्थान में हिन्दी आशुलिपि एवं हिन्दी टंकण के प्रशिक्षण का लक्ष्य भी संस्थान द्वारा पूरा कर लिया गया है ।

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 अंग्रेजी में प्राप्त पत्रों के उत्तर भी शत-प्रतिशत हिन्दी में अथवा द्विभाषी रूप में दिए गए । "क" तथा "ख" क्षेत्रों की राज्य सरकारों एवं उनके कार्यालयों और गैर-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 किए गए ।

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

प्रतिवेदनाधीन अवधि में संस्थान के वैज्ञानिकों ने अपने शोध-पत्र, परियोजना-प्रस्ताव तथा सेमिनार हिन्दी में भी प्रस्तुत किए । वैज्ञानिकों द्वारा अपनी परियोजना रिपोर्टों के सारांश भी द्विभाषी रूप में प्रस्तुत किए गए ।

"कार्यालय-प्रक्रिया एवं आँकड़ों का रखरखाव" पर आयोजित की गई प्रशिक्षण कार्यशाला का एक दृश्य

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

इस वर्ष से संस्थान द्वारा एक हिन्दी पत्रिका, "सांख्यिकी-विमर्श" का प्रकाशन आरम्भ किया गया है । इस प्रवेशांक में संस्थान के इतिहास, संस्थान के कीर्ति-स्तम्भ, संस्थान द्वारा किए गए अनुसंधानों एवं अन्य कार्यों का संक्षिप्त विवरण, संस्थान में राजभाषा से संबंधित कार्यों इत्यादि के अतिरिक्त कृषि-सांख्यिकी एवं कृषि में संगणक अनुप्रयोग से संबंधित विभिन्न लेख व शोध-पत्र संग्रहित हैं ।

संस्थान में दिनांक 01 से 30 सितम्बर, 2005 के दौरान हिन्दी चेतनामास मनाया गया । इस दौरान अनेक कार्यक्रम एवं प्रतियोगिताएँ आयोजित की गईं जैसे - काव्य पाठ, शिक्षक दिवस, डॉ. दरोगा सिंह स्मृति व्याख्यान, शोध-पत्र-पोस्टर-प्रदर्शन प्रतियोगिता (हिन्दी में), प्रश्न मंच, वाद-विवाद, हिन्दी आशुलिपि, हिन्दी टंकण इत्यादि ।

इस वर्ष से हिन्दी चेतनामास के कार्यक्रमों में "शिक्षक दिवस" को भी जोड़ा गया । इस अवसर पर मुख्य अतिथि एवं संस्थान के पूर्व निदेशक, प्रो. प्रेम नारायण को सम्मानित किया गया ।

संस्थान में हर वर्ष हिन्दी दिवस के अवसर पर डॉ. दरोगा सिंह

हिन्दी चेतनामास के दौरान निदेशक महोदय मुख्य अतिथि एवं संस्थान के पूर्व निदेशक, प्रो. प्रेम नारायण का सम्मान करते हुए

स्मृति व्याख्यानमाला का आयोजन किया जाता है। इस वर्ष यह वैज्ञानिक व्याख्यान भारतीय कृषि अनुसंधान परिषद् के पूर्व राष्ट्रीय प्रोफ़ेसर, प्रो. राजेन्द्र प्रसाद द्वारा "पर्याप्त संतुलित उर्वरक तथा कार्बनिक खादों का समेकित उपयोग: बढ़ती खाद्यान्न माँग की आपूर्ति का एकमात्र सहारा" विषय पर दिया गया । भारतीय कृषि अनुसंधान परिषद् के पूर्व राष्ट्रीय प्रोफ़ेसर, प्रो. अनुपम वर्मा, इस अवसर पर मुख्य अतिथि थे ।

दिनांक 23 सितम्बर, 2005 को संस्थान के वैज्ञानिकों/ तकनीकी कर्मियों/ छात्रों के लिए शोध-पत्र-पोस्टर-प्रदर्शन प्रतियोगिता का आयोजन हुआ। इसमें वैज्ञानिकों/ तकनीकी कर्मियों द्वारा 13 पोस्टर लगाए गए । बाहर से आमंत्रित निर्णायकों द्वारा तीन श्रेष्ठ शोध-पत्र-पोस्टरों का चयन किया गया । हिन्दी चेतनामास के दौरान आयोजित विभिन्न प्रतियोगिताओं/ कार्यक्रमों के सफल प्रतियोगियों को समापन समारोह की मुख्य अतिथि, भारतीय कृषि अनुसंधान परिषद् की वित्तीय सलाहकार डॉ. रीता शर्मा, के कर-कमलों द्वारा पुरस्कृत किया गया । मुख्य अतिथि ने संस्थान में हिन्दी की प्रगति की भूरि-भूरि प्रशंसा की ।

List of Approved On-going Research Projects

Remote Sensing and Geographic Information System

1. Developing remote sensing based methodology for collecting agricultural statistics in Meghalaya. **Prachi Misra Sahoo**, Anil Rai, Randhir Singh
2. A study on editing and imputation using Neural Networks.
   GK Jha, HVL Bathla, SB Lal, Vipin Kumar Dubey

Assessment and Evaluation Studies

3. Assessment of survey capabilities of private sector (Funded by Ministry of Statistics and Programme Implementation, C.S.O).
   UC Sud, SD Sharma, HVL Bathla, RC Goyal, MS Narang, DC Mathur, AK Gupta, Satya Pal, VK Jain, Bhagwan Dass, Alka Arora

Production and Area Estimation

4. Estimation of wool production – emerging data needs and a methodological reappraisal (AP Cess Fund, ICAR).
   RS Khatri, JP Goyal, J Jayasankar (CSWRI, Avikanagar), V Geethalakshmi (CSWRI, Avikanagar)
5. Pilot study to develop an alternative methodology for estimation of area and production of horticultural crops (Funded by Ministry of Statistics and Programme Implementation, C.S.O., New Delhi).
   GK Jha, HVL Bathla,Anil Rai, Tauqueer Ahmad, DC Mathur, RM Sood

Cropping Systems Research

6. Planning, designing and analysis of experiments planned ON STATION under the Project Directorate of Cropping Systems Research.
   Rajinder Kaur, Ajit Kaur Bhatia, Anil Kumar
7. Planning, designing and analysis of ON FARM research experiments planned under Project Directorate of Cropping Systems Research.
   NK Sharma, PK Batra
8. Planning, designing and analysis of data relating to experiments conducted under AICRP on long-term fertilizer experiments.
   MR Vats, DK Sehgal, DK Mehta
9. Some investigations on design and analysis of agro-forestry experiments.
   Seema Jaggi, VK Sharma, AS Gill (IGFRI, Jhansi), Cini Varghese

Information System for Agricultural and Animal Experiments

10. Agricultural field experiments information system.
    PK Batra, OP Khanduri, DK Sehgal
11. National information system on long term fertilizer experiments (AP Cess Fund, ICAR).
    MR Vats, DK Sehgal, Krishan lal, Anshu Dixit, Shashi Dahiya

Experimental Design for Agricultural, Animal, Agroforestry and Fisheries Research

12. Combined analysis of experiments on long range effect of continuous cropping and manuring on soil fertility and yield stability (Funded through AP Cess Fund, ICAR).
    Anil Kumar, Ajit Kaur, Rajinder Kaur, GC Sharma, B Gangwaar
13. Outliers in designed experiments. (Funded through AP Cess Fund, ICAR).
    LM Bhar, Rajender Parsad, VK Gupta

14. Statistical and algorithmic approach for improved estimation of treatments effects in repeated measurements designs (Funded by DST).
Cini Varghese, AR Rao, VK Gupta, Sanjeev Kumar

15. Design and analysis of experiments for spatially correlated observations (Funded by DST).
Seema Jaggi, VK Gupta, Rajender Parsad

16. Statistical analysis for experiments on determining level and frequency phosphorous application in different cropping systems.
Ajit Kaur, VK Sharma, SK Sharma

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

17. Statistical investigation on the performance of non-parametric stability measures when the genotype by environment data is non-normal (Funded through AP Cess Fund, ICAR).
AK Paul, Inder Singh, VT Prabhakaran

18. Some investigations on stable and robust clustering procedures (Funded through AP Cess Fund, ICAR).
Wasi Alam, AR Rao, SD Wahi, VT Prabhakaran

19. Effect of selection and incomplete model specifications on heritability estimates.
VK Bhatia, AR Rao, SD Wahi

Forecasting Techniques in Agricultural System

20. Studies on bioecology and population dynamics of major pests of mango (hoppers, fruitfly, leaf webber and inflorescene midge) and guava (fruit borer) – Collaborative study.
RP Shukla (CISH, Lucknow), SC Mehta, Shashi Sharma (CISH, Lucknow)

21. Crop forecasting using state space models
Ramasubramanian V, Chandrahas

Study of Technological Change, Risk and Uncertainity in Agriculture

22. An Econometric Study of Estimation of Elasticities of Demand and Supply of major Fruits and Vegetables in India.
Mahender Singh, Ashok Kumar, Sivaramane N., DR Singh

23. An econometric approach for measurement of indeminity and premium rates under Crop Revenue Insurance.
Prawin Arya, Sivaramane N, DR Singh, Sanjeev Panwar, Mahendra Singh

Study on Food Security and Poverty Alleviation

24. Dietary pattern and nutritional status of rural households: State-wise analysis.
Ashok Kumar, DR Singh, Mahendra Singh

Modelling for Agricultural Marketing

25. Study of lac marketing in India (AP Cess Fund, ICAR).
SP Bhardwaj, Sanjeev Panwar, Sushila Kaul, VK Bhatia

Development of Databases and Information System for National Agricultural Research System

26. Development of PERMISnet-II.
Balbir Singh, Alka Arora,Mohd. Samir Farooqui, Shashi Dahiya

27. Statistical package for animal breeding.
IC Sethi

28. Development of expert system on wheat crop management.
SN Islam, HS Sikarwar, Samir Farooqui, Vipin Kumar Dubey, KK Chaturvedi, Hari Om Agarwal, Randhir Singh, AK Sharma, RK Sharma (DWR, Karnal), JP Sharma, Kirti Sharma, KD Srivastava (IARI, New Delhi)

29. Software for the analysis of survey data.
VK Mahajan, GK Jha, SB Lal, Anu Sharma

30. National Information System on Agricultural Education Network in India (NISAGENET) (Funded through A.P. Cess Fund, ICAR).
RC Goyal, VH Gupta, VK Dubey, SB Lal, Sudeep