भाकृअनुप
ICAR

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ANNUAL REPORT
2004-05

भारतीय कृषि सांख्यिकी अनुसंधान संस्थान, भा.कृ.अनु.प., लाइब्रेरी एवेन्यू, पूसा, नई दिल्ली 110 012

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Preface

It gives me immense pleasure in bringing out the Annual Report 2004-2005 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 funded by **AP Cess Fund** of the ICAR. These are - 'Combined analysis of experiments on long range effect of continuous cropping and manuring on soil fertility and yield stability', 'Outliers in designed experiments', 'National information system on agriculture education network in India', 'Statistical investigation on the performance of non-parametric stability measures when the genotype by environment data is non normal', and 'Some investigations on stable and robust clustering procedures'. The Institute also initiated some studies/projects supported by the Institute. These are**-** 'Design and analysis of agro-forestry experiments', 'A study on editing and imputation using neural networks', 'Software for analysis of survey data', 'Statistical analysis of experiments on determining level and frequency of phosphorous application in different cropping systems', 'Effect of selection of incomplete model specification on heritability; and **Outside Institute (Funded by DST)**: 'Statistical and algorithmic approach for improved estimation of treatment effects in repeated measurements designs' and 'Design and analysis of experiments for spatially correlated experiments'.

I am happy to note that some of our colleagues received academic distinctions during the year. Dr. Rajender Parsad received ICAR National Fellow Award for his contributions in the field of Agricultural Statistics to work in the project entitled 'Efficient design of experiments for quality agricultural research'. Many scientists received awards for their published papers as Best Paper Award from the Indian Society of Agricultural Statistics, New Delhi.

Two scientists of the Institute were deputed for presentation of their papers in the 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.

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 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 A P 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 develop software on windows platform released 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

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.अ.प.) की स्थापना सन 1959 में कृषि सांख्यिकी अनुसंधान संस्थान के रूप में हुई और तभी से यह संस्थान कृषि सांख्यिकी में अनुसंधान को बढावा देने 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 - कृषि सांख्यिकी में मौलिक, व्यावहारिक और अनुकूली अनुसंधान करना, राष्ट्रीय कृषि सांख्यिकी प्रणाली को विकसित करने एवं सुदृढ़ बनाने में सहायता करना, कृषि सांख्यिकी एवं संगणक अनुप्रयोग में स्नातकोत्तर और सेवाकालीन पाठ्यक्रम चलाना, परामर्श सेवाएं प्रदान करना, अनुसंधान हेतु कृषि सांख्यिकी में सूचना कोष के रूप में कार्य करना, कृषि सांख्यिकी एवं संगणक अनुप्रयोग में एक उन्नत और श्रेष्ठ शिक्षा व प्रशिक्षण केन्द्र के रूप में संस्थान को विकसित करना, भा.कृ.अ.प. के संस्थानों एवं राज्य कृषि विश्वविद्यालयो, राज्य कृषि/पशुपालन विभागों के साथ सम्पर्क बढ़ाना 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 परियोजनाएं चलाई गईं। कुल 44 अनुसंधान परियोजनाओं के अन्तर्गत अनुसंधान किया गया जिनमें से 20 संस्थान द्वारा वित्त पोषित (09 संस्थान आधारित, 07 राष्ट्रीय कृषि अनुसंधान प्रणाली (एन.ए.आर.एस.) के अन्तर्गत अन्य संस्थाओं के सहयोग से तथा 04 सहयोगी अध्ययन), 12 ए.पी. सेस फ़ण्ड द्वारा वित्त पोषित, 06 बाह्य ऐजेंसियों द्वारा वित्त पोषित और 06 राष्ट्रीय कृषि प्रौद्योगिकी परियोजना (एन.ए.टी.पी.) द्वारा वित्त पोषित थीं। इन 44 परियोजनाओं में से 20 परियोजनाएं (07 संस्थान द्वारा, 04 ए.पी. सेस फण्ड, 03 बाह्य ऐजेंसियों और 06 एन.ए.टी.पी. द्वारा वित्त पोषित) पूरी हो चुकी हैं। इस वर्ष 11 नई परियोजनाएं (04 संस्थान द्वारा वित्त पोषित, 05 ए.पी. सेस फ़ण्ड और 02 विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार द्वारा वित्त पोषित) आरम्भ की गईं।

कुछ प्रमुख अनुसंधान उपलब्धियाँ निम्नानुसार है :

- जैव आमापन ऐसी तकनीकों का एक सेट है जो वैकल्पिक परन्तु समरूपी जैव उद्दीपकों (पीड़कनाशी, कवकनाशी, दवा, पादप अर्क, रासायनिक संरूपण इत्यादि) की किसी वस्तु (पशु ऊतक, पौधे, जीवाणुज संवर्धन, नाशीकीटों अथवा विलागित पौधों एवं जीवों इत्यादि) पर प्रभाव की तुलना करने के लिए उपयुक्त है। ऐसे परीक्षणों के लिए समानान्तर पंक्ति आमापनों (बहु समानान्तर पंक्ति आमापन सहित) और आमापनों के लिए दक्ष ब्लॉक अभिकल्पनाएं विकसित की गईं तथा उन्हें कैटेलॉगबद्ध किया गया। यें अभिकल्पनाएं सूक्ष्मजैविक परीक्षणों, मिट्टी में डाले गए खरपतवारनाशी की अपशिष्ट विषाक्तता इत्यादि के लिए अत्यंत उपयोगी हैं। विशेषरूप से दवा/टीका सृजन में उपयुक्त जैव आमापन अभिकल्पनाओं में किए गए परीक्षण उनके आंकड़े के सांख्यिकीय विश्लेषण द्वारा संपुष्ट परीक्षण परिणामों को पेटेण्ट मिलने की अधिकांश संभावना होती है।
- ट्रेण्ड मुक्त द्वि-आधारी संतुलित ब्लॉक अभिकल्पना, ट्रेण्ड मुक्त समावेशी संतुलित अपूर्ण ब्लॉक अभिकल्पना और डायलल क्रॉसेस के लिए ट्रेण्ड मुक्त ब्लॉक अभिकल्पनाएँ प्राप्त की गई और उन्हें कैटेलॉगबद्ध किया गया। ये अभिकल्पनाएँ पहाड़ी क्षेत्रों, कुक्कुट पालन और ग्रीन हाउस परीक्षणों के लिए अत्यन्त ही उपयोगी है।
- विभिन्न व्यत्यस्त अभिकल्पनाएँ (विलियम स्क्वेयर अभिकल्पनाएँ, द्विउपचार व्यत्यस्त अभिकल्पनाएँ, पूर्णतया संतुलित व्यत्यस्त अभिकल्पनाएँ और न्यूनतम संतुलित व्यत्यस्त अभिकल्पनाएँ) बनाने के लिए कम्प्यूटर प्रोग्राम विकसित किए गए। ये अभिकल्पनाएँ पशु-पोषण परीक्षणों के लिए अत्यन्त उपयोगी हैं।
- दक्ष अभिकल्पनाएँ तैयार करने के लिए विनिमय एवं अन्तर परिवर्तन प्रक्रियाओं पर आधारित कम्पयूटर एल्गोरिथ्म विकसित किए गए। एल्गोरिथ्म में A- और D- दक्षताओं के न्यूनतम बाउण्डों की संगणना प्रक्रिया को सम्मिलित किया गया है।

सभी संभव युग्मानुसार उपचार तुलनाएँ करने के लिए अनेक नई दक्ष अभिकल्पनाएँ प्राप्त की गई। जिन प्राचलिक संयोजनों के लिए संतुलित अपूर्ण ब्लॉक अभिकल्पनाएँ उपलब्ध नहीं है अथवा संरचना ज्ञात नही है उनके लिए भी दक्ष अभिकल्पनाएँ प्राप्त की गई हैं। परीक्षण उपचारों- नियंत्रण उपचार (रों) की तुलना भिन्नात्मक परशुद्धता से करने के लिए कम्प्यूटर एडिड सर्च द्वारा दक्ष अभिकल्पनाएँ, प्राप्त की गईं।

- दीर्घकालीन उर्वरक परीक्षणों पर अखिल भारतीय समन्वित अनुसंधान परियोजना तथा फसल प्रणाली (केन्द्र एवं खेत पर अनुसंधान) पर अखिल भारतीय समन्वित अनुसंधान परियोजना से प्राप्त आंकड़ों का विश्लेषण उपयुक्त सांख्यिकीय तकनीकों द्वारा किया गया।
- चावल, गन्ना, अरहर, कपास, सरसों और मूंगफली के महत्वपूर्ण नाशीकीटों, नाशीपीड़कों और रोगों की पूर्वचेतावनी प्रणाली के लिए मौसम सूचकों पर आधारित मॉडलों को विकसित एवं वैधीकृत किया गया। यह कार्य केन्द्रीय बारानी कृषि अनुसंधान संस्थान, हैदराबाद के सहयोग से किया गया।
- मिश्रित काल श्रृंखला मॉडलों (गासियन मिक्सचर ट्रांज़िशन डिस्ट्रीब्यूशन मॉडल एवं मिक्सचर ऑटोरिग्रेसिव मॉडल) का अध्ययन किया गया तथा उदाहरण के रूप में प्याज की नासिक किस्म के साप्ताहिक मूल्य आंकडों पर इनका उपयोग करके विस्तृत व्याख्या की गई।
- उपलब्ध जिला स्तर के मॉडलों तथा पद्धति को परिष्कृत करके उत्तर प्रदेश में चावल, गेहूँ एवं गन्ने की उपज का पूर्वानुमान प्राप्त करने के लिए मौसम प्राचलों और कृषि निवेशें पर आधारित पूर्वानुमान मॉडल विकसित किए गए।
- मेघालय राज्य के री-बोई जिले में किए गए एक मार्गदर्शी अध्ययन के अन्तर्गत मेघालय में धान की फसल का क्षेत्रफल व धान की उपज का आकलन करने के लिए सुदूर संवेदन, भौगोलिक सूचना तंत्र एवं सर्वेक्षण आंकडों पर आधारित एक प्रतिचयन पद्धति विकसित की गई। इस पद्धति को इस जिले तथा राज्य के अन्य जिले में फसल क्षेत्रफल और उपज का आकलन करने के लिए वैधीकृत किया जाएगा।
- देश के 120 चयनित जिलों से प्राप्त परीक्षणों के सर्वेक्षण आंकड़ों और फार्म यांत्रिकीकरण विशेषज्ञों के अनुभवों के आधार पर विभिन्न सस्य जलवायवीय क्षेत्रों/ राज्यों के लिए फार्म यांत्रिकीकरण नीति पत्र तैयार किए गए।
- राजस्थान के बीकानेर और कर्नाटक के कोलार जिलों में किए गए एक मार्गदर्शी अध्ययन द्वारा ऊन उत्पादन के आकलन की एक पद्धति विकसित की गई।
- खुले फूलों के आकलन के लिए बाजार आगमन आधारित प्रतिचयन पद्धति विकसित की गई।
- केरल में नारियल पर उत्पादन लागत के आकलन पर किए गए अध्ययन से निष्कर्ष निकला कि साधारणतया किसान बेसिन ओपनिंग और कच्ची खाद का उपयोग करते हैं और पादप सुरक्षा उपायों से संबंधित प्रौद्योगिकियों, इष्टतम पादप घनत्व के लिए पौधों के बीच उपयुक्त अंतर रखने तथा संकर/उच्च उत्पादकता वाली किस्मों को कम अपनाया जा रहा है।
- पंजाब के मनसा और लुधियाना जिलों में अण्डा उत्पादन में प्रौद्योगिकीय द्वैतवाद पर किए गए एक अर्थमितीय अध्ययन के अन्तर्गत चयनित कुक्कुट फार्मो के सर्वेक्षण आँकडों के विश्लेषण से पता चला कि पिंजरा प्रणाली फार्मो से प्राप्त शुद्ध लाभ डीप लिटर प्रणाली फार्मो की तुलना में अधिक थे। डीप लिटर फार्मों में निवेश (चुग्गा, मजदूरी, दवा और बिजली) उपयोग दक्षता, पिंजरा प्रणाली फार्मो की अपेक्षा कम थी।
- पंजाब में चावल-गेहूं चक्र के तकनीकी दक्षता विश्लेषण से पता चला है कि पंजाब में अधिकांश किसान प्रौद्योगिकी सीमांत से दूर नही थे परन्तु वहां चावल और गेहूं का उत्पादन बढाने की दिशा में उत्पादन कारकों की विस्तार तकनीकी दक्षता से उपयोग में सुधार करने की संभावनाए हैं।
- "जय-विज्ञान राष्ट्रीय विज्ञान एवं प्रौद्योगिकी मिशन परियोजना" में आदिवासी, पिछड़े और पहाड़ी क्षेत्रों में भोजन एवं पोषण सुरक्षा पर आधार वर्ष 2001 और 2004 के लिए एकत्रित आँकड़ों के विश्लेषण से यह पाया गया कि प्रौद्योगिकीय हस्तक्षेप के फलस्वरूप प्रतिभागी किसानों की भेड़ पालन की लागत घटी, प्रति पशु ऊन की औसत उपज बढ़ी और भेड़ की मृत्यु एवं रूग्णता की दर में कमी आई।
- अर्ध-सहोदर मॉडलों के अन्तर्गत जब आँकड़ों को सभी निहित प्रभावों के लिए समायोजित किया गया तो वंशागतित्व के आकलों की अभिनति घटी।

- एन.ए.टी.पी. की मिशन मोड परियोजना "समेकित राष्ट्रीय कृषि संसाधन सूचना तंत्र" के अन्तर्गत देश के कृषि संसाधनों का एक केन्द्रीय डाटा वेयर हाउस (CDW) विकसित किया गया। परिषद द्वारा विकसित प्रौद्योगिकियों, चल रही अनुसंधान परियोजनाओं तथा कम से कम सन् 1990 से आगे जिला स्तर पर प्रकाशित अधिकारिक सूत्रों में उपलब्ध कृषि सांख्यिकी के 59 डाटाबेसों को डाटा वेयरहाउस में समेकित किया गया। डाटा वेयरहाउस भा.कृ.अ.प. के 13 अन्य संस्थानों के सहयोग से तैयार किया गया है। विषयानुसार डाटा मार्ट तैयार किए गए और बहुआयामी क्यूब्स विकसित कर इण्टरनेट पर प्रकाशित किए गए। यह डाटा वेयरहाउस, वैज्ञानिकों, योजनाकारों, निर्णयकर्ताओं और विकास एजेंसियों को ऑनलाइन एनालिटिकल प्रॉसेसिंग डिसीज़न सपोर्ट सिस्टम के रूप में क्रमबद्ध और सावधिक सूचना उपलब्ध कराता है।
- किसानों को उपयुक्त निर्णय लेने में सहायता करने और लाखों किसानों के बीच आवश्यकतानुसार अनुसंधान निष्कर्षों का प्रसार करने के लिए एक "प्रसार विशेषज्ञ तंत्र" विकसित किया गया। ऐसा कर पाना परम्परागत प्रसार प्रणाली द्वारा न तो सम्भव है और न ही व्यवहारिक। विकसित किया गया प्रसार विशेषज्ञ तंत्र जेनेरिक प्रकृति का है और इसमें किसी भी फसल तथा देश के किसी भी क्षेत्र से सम्बंधित सूचना की प्रविष्टि की जा सकती है। सीमित संसाधनों और समय के कारण, केवल चुनी गई सात फसलों की सूचना ही इसमें दी गई है।
- कृषि अनुसंधान से सम्बंधित आँकड़ों के विश्लेषण के लिए सांख्यिकीय पैकेज (स्पार 2.0) तैयार हो चुका है और ज़ारी करने के लिए इसे अन्तिम रूप दिया जा रहा है।
- भा.कृ.अ.प. के संस्थानों द्वारा चलाई जा रही परियोजनाओं के ऑन-लाइन मॉनीटरिंग एवं मूल्यांकन के लिए पिम्सनेट विकसित किया गया है। एन.ए.टी.पी. की परियोजना कार्यान्वयन एकक द्वारा अपेक्षित रिपोर्ट पिम्सनेट के माधयम से तैयार की गई। पिम्सनेट के कार्यान्वयन के लिए छः सक्रियकरण एवं प्रशिक्षण कार्यशालाएं चलाई गईं।

संस्थान के वैज्ञानिकों द्वारा राष्ट्रीय एवं अन्तरराष्ट्रीय स्तर के जर्नलों में 43 शोध-पत्र, 7 पुस्तक अध्याय, 13 परियोजना/तकनीकी रिपोर्ट प्रकाशित की गईं। संस्थान द्वारा "कृषि अनुसंधान डाटा पुस्तिका-2004" भी प्रकाशित की गई जो इस श्रृंखला की आठवीं कड़ी है। कृषि एवं सहकारिता विभाग, कृषि मंत्रालय, भारत सरकार के सहयोग से एक पुस्तक "इन्फॉरमेशन सपोर्ट फॉर दी स्टेट ऑफ इन्डियन फारमर - ए मिलिनियम स्टडी" प्रकाशित की गई। "डिज़ाइन ऐण्ड ऐनालिसिस ऑफ एग्रीकल्चरल एक्सपेरीमेन्ट्स" नामक एक इलेक्ट्रॉनिक पुस्तक तैयार की गई, जो संस्थान की वेबसाइट के एक लिंक पर उपलब्ध है। एन.ए.आर.एस. के अनेक शोधकर्ताओं द्वारा इस इलेक्ट्रॉनिक पुस्तक का उपयोग किया गया। संस्थान के वैज्ञानिकों द्वारा विभिन्न अन्तरराष्ट्रीय एवं राष्ट्रीय सम्मेलनों में 79 शोध-पत्र प्रस्तुत किए गए।

भारतीय कृषि अनुसंधान परिषद की "राजर्षि टण्डन राजभाषा पुरस्कार योजना" के अन्तर्गत संस्थान ने द्वितीय पुरस्कार प्राप्त किया।

प्रतिवेदनाधीन अवधि में संस्थान के कुछ वैज्ञानिकों ने शैक्षणिक सम्मान प्राप्त किए। डा. राजेन्द्र प्रसाद ने कृषि सांख्यिकी के क्षेत्र में अपने योगदान एवं "कृषि में गुणवत्ता पूर्ण कृषि अनुसंधान के लिए परीक्षणों की दक्ष अभिकल्पनाएँ" नामक परियोजना पर कार्य करने के लिए भा.कृ.अ.प. राष्ट्रीय अध्येयता सम्मान प्राप्त किया। परीक्षण अभिकल्पना, सांख्यिकीय आनुवंशिकी, सांख्यिकीय विधियाँ और अनुप्रयुक्त सांख्यिकी के क्षेत्र में "जर्नल ऑफ इण्डियन सोसाइटी ऑफ एग्रीकल्चरल स्टैटिस्टिक्स" में प्रकाशित शोध-पत्रों के लिए संस्थान के चार वैज्ञानिकों ने "उत्कृष्ट शोध-पत्र पुरस्कार" प्राप्त किए।

संस्थान के दो वैज्ञानिकों को अन्तरराष्ट्रीय सम्मेलन में अपने शोध -पत्र प्रस्तुत करने के लिए प्रतिनियुक्त किया गया। संस्थान में हिन्दी के प्रगामी प्रयोग के लिए एक "शोध-पत्र-पोस्टर प्रस्तुति" प्रतियोगिता का आयोजन किया गया और जिसमें श्रेष्ठ हिन्दी पोस्टर तैयार करने के लिए वैज्ञानिकों को पुरस्कृत भी किया गया।

किसानों के आकलों की सहायता से लघु-क्षेत्र स्तर पर फसल उपज आकलन के लिए पद्धति तथा मृदा परीक्षण फसल अनुक्रिया सह-सम्बन्ध पर अखिल भारतीय समन्वित अनुसंधान परियोजना के लिए एक परीक्षणात्मक अभिकल्पना विकसित कर पणधारियों को स्थानान्तरित की गई। संस्थान के वैज्ञानिकों द्वारा एन.ए.आर.एस. के लिए सलाहकारी सेवाएँ उपलब्ध कराई गईं। भारतीय कृषि अनुसंधान संस्थान, केन्द्रीय आलू अनुसंधान संस्थान, राष्ट्रीय मूंगफली अनुसंधान केन्द्र, राष्ट्रीय तोरिया और सरसों अनुसंधान केन्द्र, चौधरी चरण सिंह हरियाणा कृषि विश्वविद्यालय और राष्ट्रीय पादप आनुवंशिकी संसाधन ब्यूरो के शोध

कर्ताओं को परीक्षणों की अभिकल्पना और परीक्षणात्मक आंकड़ों के विश्लेषण के विभिन्न पहलुओं पर सलाह दी गई।

केन्द्रीय रूप से प्रायोजित योजना "स्ट्रेन्थनिंग ऑफ डाटाबेस ऐण्ड इन्फॉरमेशन नेटवर्किंग फॉर फिशरीज़ सेक्टर" पर एक बैठक आयोजित की गई। कृषि मंत्रालय, भारत सरकार द्वारा प्रायोजित "पशु-पालन एवं डेयरी सांख्यिकी के सुधार के लिए मार्गनिर्देशन तकनीकी समिति" की एक बैठक संस्थान में आयोजित की गई।

भा.कृ.अ.प. के संस्थानों, परियोजना निदेशालयों, राज्य कृषि विश्वविद्यालयों एवं कृषि पशु-पालन, वानिकी एवं मात्स्यिकी के राज्य विभागों के कृषि अनुसंधान सांख्यिकीविदों का चौदहवां राष्ट्रीय सम्मेलन जवाहर लाल नेहरू कृषि विश्वविद्यालय, जबलपुर में आयोजित किया गया। सम्मेलन का विषय था - "कृषि सांख्यिकी एवं संगणक अनुप्रयोग की राष्ट्रीय प्राथमिकताएं"। "जैव आमापन के लिए ब्लॉक अभिकल्पनाओं का अध्ययन" नामक अनुसंधान परियोजना की उपलब्धि यों का प्रसार करने हेतु एक प्रसार कार्यशाला आयोजित की गई। कार्यशाला में अनुसंधान कार्यों में जैव आमापन का उपयोग कर रहे अनेक प्रतिष्ठित शोधकर्ताओं तथा विभिन्न ख्यातिप्राप्त संस्थानों के सांख्यिकीविदों ने प्रतिभागिता की। कार्यशाला की मुख्य अनुशंसा थीं - जैव आमापन के लिए अभिकल्पनाएं तैयार करने और आंकड़ों के विश्लेषण के लिए सॉटवेयर तैयार किया जाना चाहिए। यह भी अनुशंसा की गई कि पी.जी. स्कूल, भा.कृ.अ.सं. के छात्रों के लिए जैव आमापन पर एक पाठ्यक्रम तैयार किया जाए और इसे सांख्यिकीविदों तथा परीक्षणकर्ताओं द्वारा संयुक्त रूप से पढ़ाया जाए। इसके अतिरिक्त, भा.कृ.अ.प. में कार्मिक प्रबन्धन सूचना प्रणाली नेटवर्क के प्रशिक्षण एवं कार्यान्वयन पर एक-दिवसीय दो कार्यशालाएँ आयोजित की गईं।

एन.ए.आर.एस. के शोधकर्ताओं के लिए "कृषि सांख्यिकी एवं संगणक अनुप्रयोग में उच्च अध्ययन केन्द्र" के तत्वावधान में दो प्रशिक्षण कार्यक्रम तथा "कृषि अनुसंधान में प्रतिचयन सर्वेक्षण तकनीक" पर एक शीतकालीन स्कूल आयोजित किए गए। प्रशुल्क आयोग, वाणिज्य एवं उद्योग मंत्रालय, भारत सरकार के वरिष्ठ अधिकारियों के लिए "कृषि की लागत सम्बंधी प्रतिदर्श सर्वेक्षण एवं पद्धत्यात्मक पक्ष पर अध्ययन" नामक एक प्रशिक्षण कार्यक्रम आयोजित किया गया। ई.आई. ड्यूपोण्ट इण्डिया प्राईवेट लिमिटेड के कार्मिकों के लिए "परीक्षणात्मक सांख्यिकी" पर एक प्रशिक्षण कार्यक्रम आयोजित किया गया। इस प्रशिक्षण कार्यक्रम में 12 प्रतिभागी थे। निजी क्षेत्र के कर्मियों को प्रशिक्षण देने का यह संस्थान का प्रथम प्रयास था।

संस्थान की शिक्षा एवं प्रशिक्षण से सम्बंधित गतिविधियॉ, जिसमें समस्त स्नातकोत्तर अध्यापन कार्यक्रमों का नियोजन, आयोजन और समन्वयन सम्मिलित है, पी.जी. स्कूल, भा.कृ.अ.सं. के सहयोग से चलाई जा रही हैं। इस वर्ष में कुल 12 छात्रों {4 पीएच.डी. (कृषि सांख्यिकी), 5 एम.एससी. (कृषि सांख्यिकी) तथा 3 एम.एससी. (संगणक अनुप्रयोग)} ने अपना डिग्री पाठ्यक्रम पूरा किया। 16 नए छात्रों {5 पीएच.डी. (कृषि सांख्यिकी), 6 एम.एससी. (कृषि सांख्यिकी) और 5 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 तथा विदेश (सार्क देश सम्मिलित) के अनुसंधान संस्थानों/विश्वविद्यालयों में सांख्यिकीय ऑकड़ों के संकलन, प्रॉसेसिंग, विवेचना के कार्य में लगे शोधकर्ताओं के लाभार्थ एक "कृषि सांख्यिकी एवं संगणन में उच्च प्रमाण-पत्र पाठ्यक्रम" आयोजित किया गया। इस प्रमाण-पत्र पाठ्यक्रम में गाम्बिया के दो अन्तरराष्ट्रीय सहभागियों सहित आठ अधिकारियों ने प्रतिभागिता की।

संस्थान का पुस्तकालय एन.ए.आर.एस. के अन्तर्गत देश का एक क्षेत्रीय पुस्तकालय है। यह संस्थान के प्रयोक्ताओं के साथ-साथ एन.ए.आर.एस. के प्रयोक्ताओं की सूचना सम्बन्धी आवश्यकताओं को पूरा करने में विशेष भूमिका निभा रहा है। पुस्तकालय की सेवाओं को पूरी तरह से डिजिटाइज्ड कर दिया गया है जो पुस्तकालय की वेबसाइट (http://lib.iasri.res.in) पर उपलब्ध हैं। इसमें पुस्तकालय में उपलब्ध सभी संसाधनों और सेवाओं के लिंक दिए गए हैं।

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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 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 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 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 were carried out under 44 research projects in the Institute, of which 20 were Institute funded (09 Institute based, 07 in collaboration with other institutions under National Agricultural Research System (NARS), 04 collaborative studies), 12 AP-Cess Funded, 06 funded by outside agencies and 06 National Agricultural Technology Project (NATP) in various thrust areas. Out of these 44 projects, 20 projects (07 Institute funded, 04 AP-Cess funded, 3 funded by outside agencies and 06 NATP) were completed. This year, 11 new projects (04 Institute funded, 05 AP-Cess funded and 02 DST funded) were initiated.

Some of the salient research achievements are:

- Biological assays (bioassays) are a set of techniques relevant to the comparisons between the strengths of alternative but similar biological stimuli (a pesticide, fungicide, a drug, plant extract, chemical formulations, etc.) based on the response produced by them on the subjects (an animal tissue, a plant, a bacterial culture, insects, plants or isolated organisms, etc.). For such experiments, efficient block designs for parallel line assays (including multiple parallel line assays) and slope ratio assays have been obtained and catalogued. These designs have useful applications in microbial experiments, residual toxicity of the soil applied herbicides, etc. The experimental findings corroborated by sound statistical principles of design and analysis of bioassays particularly in drug/vaccine formulation have better chances of getting patents.
- Trend free binary balanced block designs, trend free nested balanced incomplete block designs and trend free block designs for diallel crosses have been obtained and catalogued. These designs will be quite useful for experiments conducted in hilly areas, poultry experiments and green house experiments.
- Computer programs have been developed for the generation of various types of change over designs which included William Square designs, two treatment change over designs, totally balanced change over designs and minimal balanced change over designs. These designs are quite useful for animal nutrition experiments.
- Computer algorithms for generation of efficient designs based on exchange and interchange procedures have been developed. The procedure of computing lower bounds to A- and D-efficiencies has been incorporated in the algorithm. Several new efficient designs for making all possible pairwise treatment comparisons have been obtained. The efficient designs for the parametric combinations for which Balanced incomplete block designs are non-existent or solutions are unknown have also been obtained. The efficient designs for making test treatments-control treatment(s) comparisons with differential precision have been obtained through the computer aided search.
- The data received from AICRP on Long Term Fertilizer Experiments, AICRP on Cropping Systems (On Stations and on On-Farm Research) were analyzed using appropriate statistical techniques.
- Models based on weather indices were developed and validated for forewarning system for important insects, pests and diseases for rice, sugarcane, pigeon pea, cotton, mustard and groundnut in collaboration with Central Research Institute for Dryland Agriculture, Hyderabad.
- The performance of mixture time-series models viz. Gaussian Mixture Transition Distribution models and Mixture Autoregressive models have been studied and illustrated through real data sets on weekly onion price data of Nasik variety.
- Forecast models based on weather parameters and agricultural inputs have been developed for forecasting the rice, wheat and sugarcane yields in UP state by extending the existing district level models and refining the existing methodology.
- A sampling methodology based on Remote Sensing, Geographical Information System and survey data for the estimation of area under paddy crop and paddy yield in Meghalaya has been developed in a pilot study taken up in Rhi-boi district of the State. The methodology is being tested in this and one more district of the state for estimating the crop acreage and yield for the entire state.
- Farm Mechanization Strategy papers for different Agro-climatic zones/States have been prepared on the basis of the results of the survey data from 120 selected districts of the country and the experience of farm mechanization experts.
- Methodology for estimation of wool production has been developed through a pilot study that was taken up in two districts Bikaner of Rajasthan and Kolar of Karnataka.
- Sampling methodology for the estimation of loose flowers on the basis of market arrivals has also been developed.
- The study on estimation of cost of production on coconut in Kerala revealed that basin opening and application of organic manures are the most commonly adopted practices among the farmers and the technologies pertaining to plant protection measures, spacing for optimum plant density and cultivation of hybrids/high yielding varieties were at the low level of adoption.

- An econometric study of technological dualism in egg production based on primary survey data of selected poultry farms in Mansa and Ludhiana districts of Punjab revealed that the net returns from Cage System farms were more than the Deep Litter System farms. The inputs (feed, labour, medicines and electricity) use efficiency is low in Deep Litter farms as compared to the Cage System farms.
- A technical efficiency analysis of rice-wheat system in Punjab revealed that the majority of farmers in Punjab did not appear very far from frontier technology but there existed possibilities of increasing rice and wheat output with better use of technical skills at least in deployment of factors of production.
- From analysis of the primary data collected for the base year 2001 and the year 2004 on household food and nutritional security for tribal, backward and hilly areas under "Jai-Vigyan National Science and Technology Mission Project", it was found that the cost of rearing sheep decreased, average yield of wool per animal increased and the rate of mortality and morbidity of sheep decreased for the participating farmers as a result of technological intervention.
- The bias in the estimates of heritability reduced when the data was adjusted for all the fixed effects present in the data under half-sib model.
- A Central Data Warehouse (CDW) of the Agricultural Resources of the Country has been developed under the NATP Mission Mode project "Integrated National Agricultural Resources Information System". In all 59 databases on agricultural technologies generated by the council, research projects in operation and related agricultural statistics from published official sources at least from the year 1990 onwards at the district level were integrated for the development of the data warehouse. The data warehouse has been created with the collaboration from 13 other ICAR Institutes. Subject-wise data marts were created and multi-dimensional cubes have been developed and published on Internet. This data warehouse provides systematic and periodic information to scientists, planners, decision makers and developmental agencies in the form of On-Line Analytical Processing decision support system.
- An 'Expert System on Extension' has been developed to help the farmers to take appropriate decisions and disseminate need based research findings to the millions of the farmers at a time, which is neither possible nor practicable by the conventional system of extension. The expert system developed is generic in nature and allows the entry of any crop and for any region of the country. Due to limited resources and time, only information on seven selected crops has been considered.
- The development of Statistical Package for Agricultural Research (SPAR 2.0) has been completed and is being finalized for release.
- PIMSNET has been developed for Online Monitoring and Concurrent Evaluation of Projects being undertaken at ICAR Institutions. Reports required by Project Implementation Unit, NATP were generated through PIMSNET. Six Sensitization and training workshops for PIMSNET Implementation were organised.

Scientists of the Institute published 43 research papers in National and International refereed journals, 7 book chapters, 13 project/technical reports. Institute also published Agricultural Research Data Book 2004 which is eighth in the series. One book on 'Information Support for the State of Indian Farmer – A Millennium Study' was published in association with Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. One electronic book on Design and Analysis of Agricultural Experiments has also been designed and developed with a link on the Institute Website. This electronic book has been referred by several research personnel of NARS. 79 research papers were presented during several International and National Conferences by the scientists of the Institute.

Institute received second prize under the aegis of 'Rajrishee Tondon Rajbhasha Puraskar Yojna' of Indian Council of Agricultural Research.

Some scientists of the Institute received academic distinctions during the year. Dr. Rajender Parsad received ICAR National Fellow Award for his contributions in the field of Agricultural Statistics to work in the project entitled 'Efficient Design of Experiments for Quality Agricultural Research'. Four scientists received 'Best Paper Awards' for their published papers in Journal of the Indian Society of Agricultural Statistics in the fields of Design of Experiments, Statistical Genetics, Statistical Methods and Applied Statistics.

Two scientists of the Institute were deputed for presentation of their papers in the 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.

A meeting of Centrally Sponsored Scheme on 'Strengthening of Database and Information Networking for Fisheries Sector' was organised. A meeting of Technical Committee for Directions for 'Improvement of Animal Husbandry and Dairying Statistics' sponsored by Ministry of Agriculture, Government of India was also organised at the Institute.

The XIV National Conference of Agricultural Research Statisticians of the ICAR Institutes, Project Directorates, State Agricultural Universities and State Departments of Agriculture, Animal Husbandry, Forestry and Fisheries was organised by the Institute at Jawahar Lal Nehru Krishi Vishwa Vidyalaya, Jabalpur. The theme of the Conference was 'National Priorities in Agricultural Statistics and Computer Applications'. In order to disseminate the findings of the research project 'Studies on Block Designs for Biological Assays' a dissemination workshop was organised. The participants of the workshop included many eminent research workers actually engaged in using bio-assays in their research endeavours and the statisticians from various reputed institutions. Major recommendation of the workshop was that software should be prepared for obtaining designs for bioassays and analysis of data. It was also recommended that a course on bioassays be prepared for students of PG School IARI to be taught jointly by statisticians and experimenters. Besides these, two one day workshops on Training and Implementation of PERMISNET (Personnel Management Information System Network) in ICAR were also organised.

Two training programmes under the aegis of 'Centre of Advanced Studies in Agricultural Statistics and Computer Application', one Winter School on 'Sampling Survey Technique in Agricultural Research' were organised for the research personnel of NARS. One training programme was organised on 'Sample Surveys and Methodological Aspects relating to Cost of Cultivation Studies' for senior officers of Tariff Commission, Government of India. One training programme on 'Experimental Statistics' was organised for the personnel of E.I.DuPont India Private Limited. This training programme was attended by twelve participants. This was the first interface of the Institute with the private sector.

The activities relating to education and training which include planning, organization and coordination of the entire Post-graduate teaching programmes of the Institute are undertaken in collaboration with PG School, IARI. During this year, a total of 12 students {4 Ph.D.(Agricultural Statistics), 5 M.Sc. (Agricultural Statistics) and 3 M.Sc. (Computer Application) } completed their degrees. 16 new students {5 Ph.D.(Agricultural Statistics), 6 M.Sc. (Agricultural Statistics) and 5 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. Eight officials including two international participants from Gambia participated in this Certificate Course.

The Library of the Institute is a Regional Library under NARS 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. The library services are totally transformed into digitalized 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.

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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 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 land mark 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 have 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), software like ER Mapper, PC ARC/INFO, Microstation 95, Geo-media Professional, ARC/INFO Workstation, 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. 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, ink jet 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. 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 156 Ph.D. and 268 M.Sc. students in the discipline of Agricultural Statistics and 67 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. The committee also approved the proposal of having a common RAC and QRT of IASRI and NCAP as both the Institutes being located at the same campus.

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

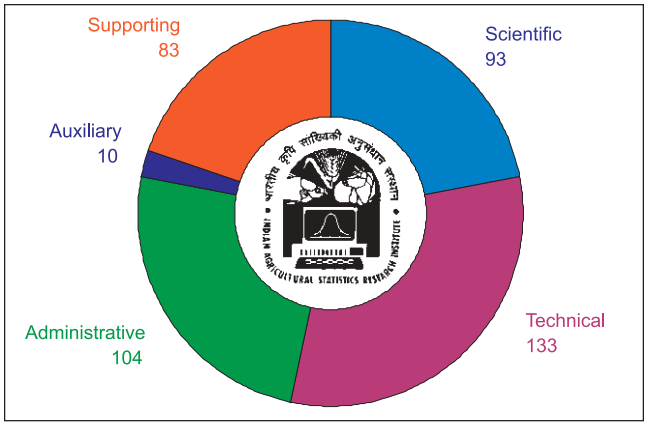
Cell

- Training Administration

Staff Position (as on 31.03.2005)

Sr. No.	Manpower	No. of posts sanctioned	No. of posts filled
1.	Director	1	1
2.	Joint Director	1	1
3.	Scientific	130	91
4.	Technical	248	133
5.	Administrative	110 (3*)	104
6.	Auxiliary	14	10
7.	Supporting	98	83
	Total	602 (3*)	423

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



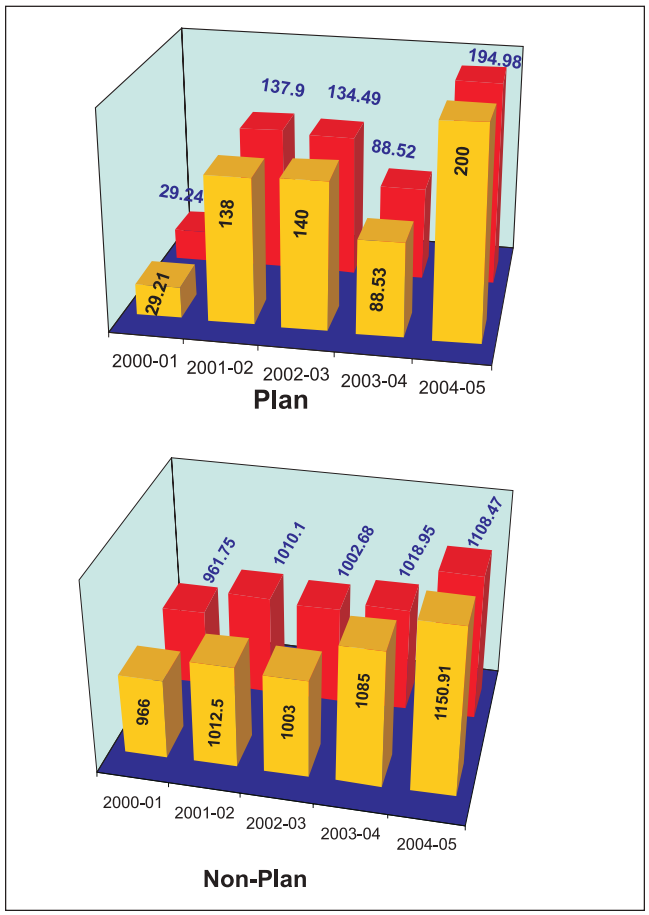
Staff Strength in Position as on 31 March 2005

Financial Statement

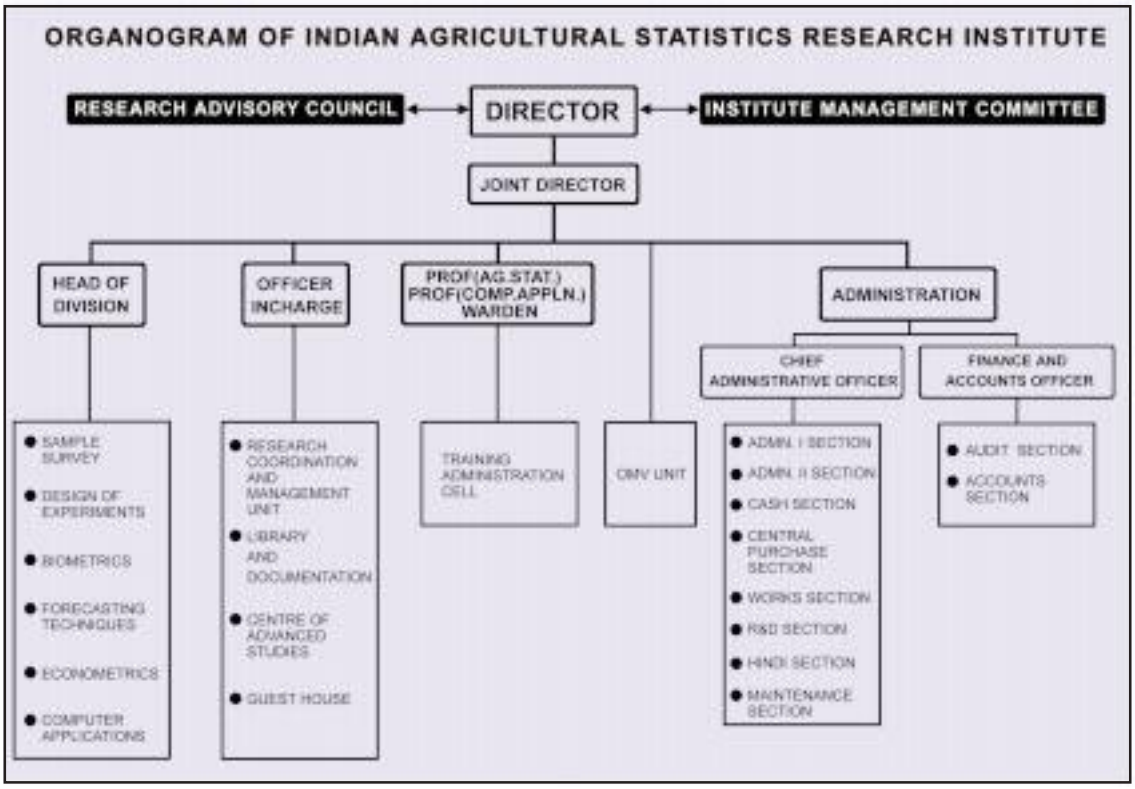
Through regular monitoring, the Institute was able to ensure optimal utilization of funds available in the budget. The actual utilization of the budget both under the plan and non-plan is furnished below:

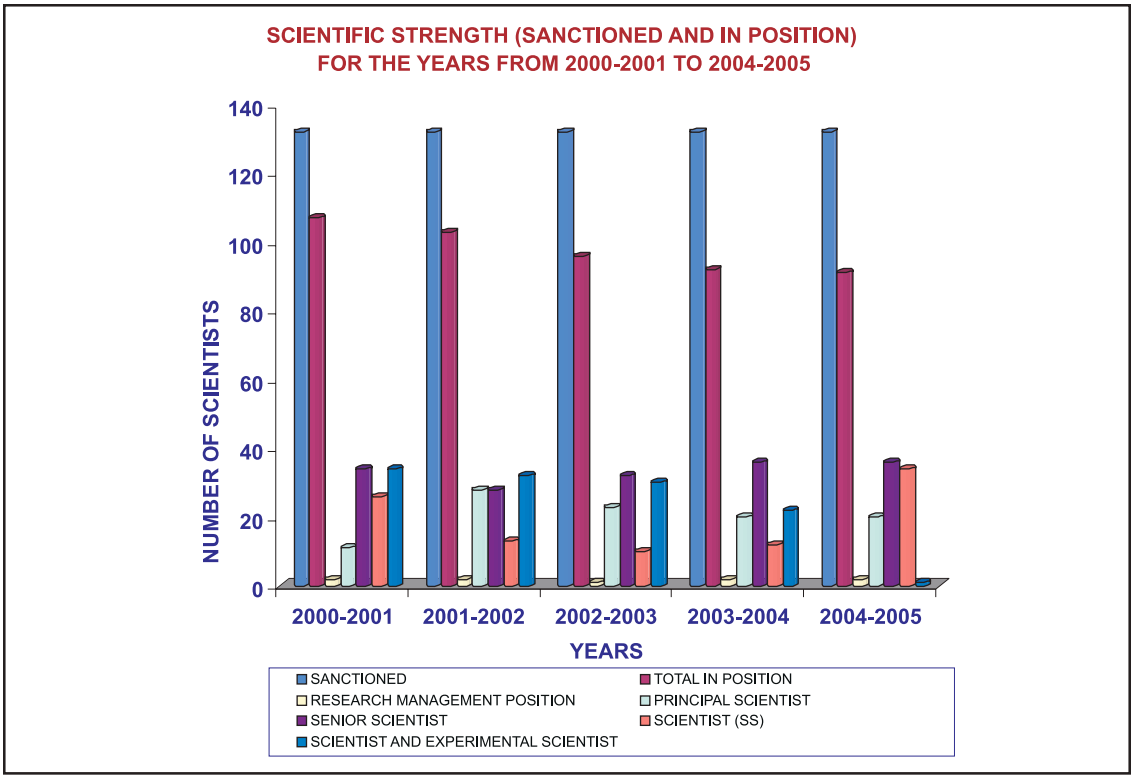
Budget Allocation vis-à-vis Utilization (2004-05)
(Rupees in Lakhs)

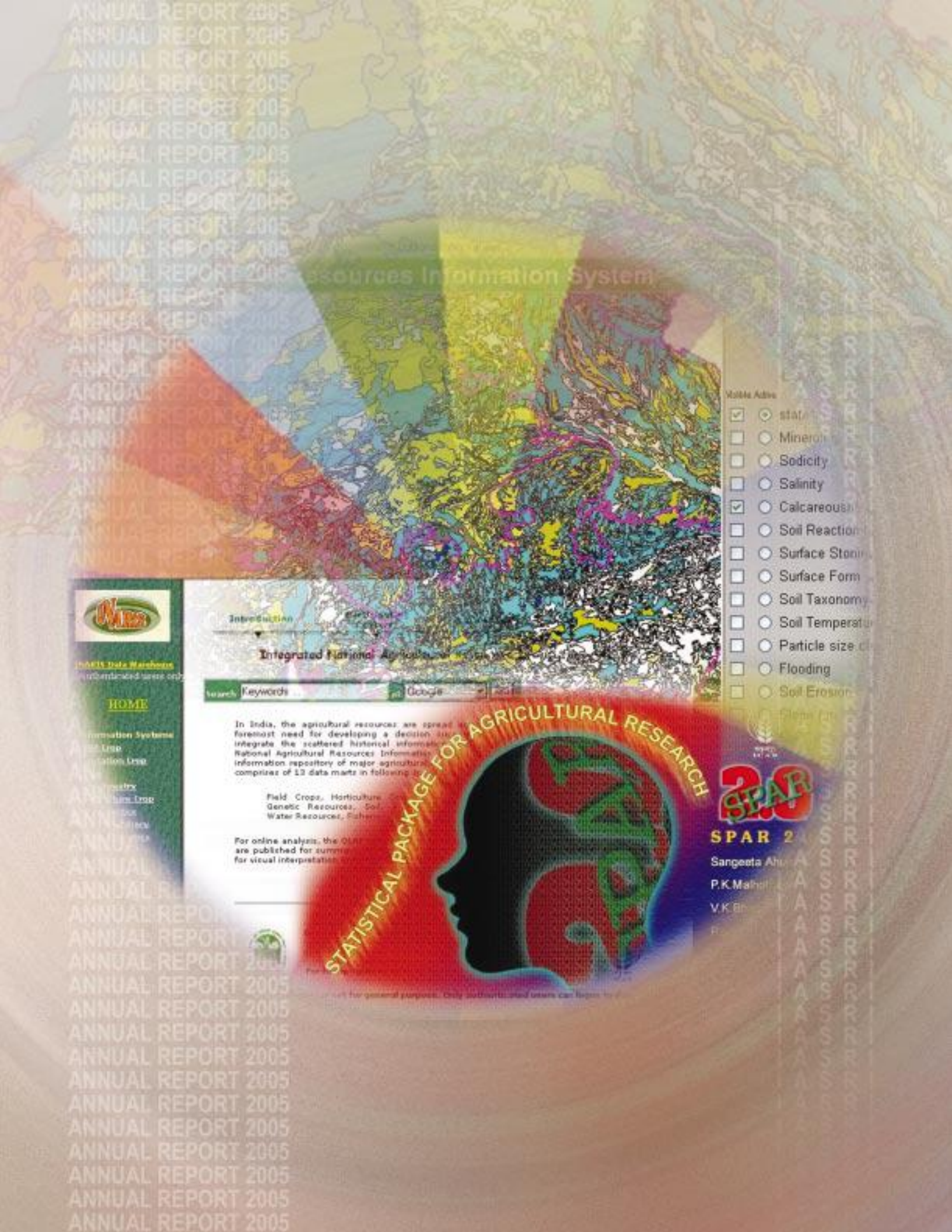
Head of Account	Allocation		Expenditure	
	Plan	Non-Plan	Plan	Non-Plan
Establishment charges	-	989.30	-	963.63
Overtime allowance	-	0.90	-	0.90
Traveling expenses	5.25	3.75	5.24	3.73
Other charges	147.95	110.00	142.53	93.71
Works	45.00	21.90	45.41	21.87
Fellowships etc.	1.80	25.06	1.80	24.63
Grand Total	200.00	1150.91	194.98	1108.47



Budget for the years from 2000–2001 to 2004–2005
(Rupees in lakh)


ORGANOGRAM OF INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE
RESEARCH ADVISORY COUNCIL
DIRECTOR
INSTITUTE MANAGEMENT COMMITTEE
JOINT DIRECTOR
HEAD OF DIVISION
OFFICER INCHARGE
PROF(AG.STAT.) PROF(COMP.APPLN.) WARDEN
ADMINISTRATION
CHIEF ADMINISTRATIVE OFFICER
FINANCE AND ACCOUNTS OFFICER
SAMPLE SURVEY
DESIGN OF EXPERIMENTS
BIOMETRICS
FORECASTING TECHNIQUES
ECONOMETRICS
COMPUTER APPLICATIONS
RESEARCH COORDINATION AND MANAGEMENT UNIT
LIBRARY AND DOCUMENTATION
CENTRE OF ADVANCED STUDIES
GUEST HOUSE
TRAINING ADMINISTRATION CELL
CMV UNIT
ADMN. I SECTION
ADMN. II SECTION
CASH SECTION
CENTRAL PURCHASE SECTION
WORKS SECTION
R&D SECTION
HINDI SECTION
MAINTENANCE SECTION
AUDIT SECTION
ACCOUNTS SECTION


SCIENTIFIC STRENGTH (SANCTIONED AND IN POSITION)
FOR THE YEARS FROM 2000-2001 TO 2004-2005
NUMBER OF SCIENTISTS
0
20
40
60
80
100
120
140
2000-2001
2001-2002
2002-2003
2003-2004
2004-2005
YEARS
SANCTIONED
TOTAL IN POSITION
RESEARCH MANAGEMENT POSITION
PRINCIPAL SCIENTIST
SENIOR SCIENTIST
SCIENTIST (SS)
SCIENTIST AND EXPERIMENTAL SCIENTIST


Sodicity
Salinity
Soil Reaction
Surface Form
Soil Taxonomy
Flooding
HOME
Keywords
Google
STATISTICAL PACKAGE FOR AGRICULTURAL RESEARCH
SPAR 2.0
SPAR 2

3

Research Achievements

The research targets set by the Institute were implemented by six Divisions of the Institute viz. Sample Survey, Design of Experiments, Biometrics, Forecasting Techniques, Econometrics and Computer Application. The basic, applied adaptive and strategic research in Agricultural Statistics and Computer Applications 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 execution of surveys and analysis of data including economic problems of current interest
4. Modeling and simulation techniques in biological systems
5. Development of informatics in agricultural research
6. Teaching and training in agricultural statistics and computer application.

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

Cropping Systems Research

- Yearly and combined analysis (1994-2003) of data from experiments conducted at Ludhiana under AICRP on Long-Term Fertilizer Experiments revealed that in the presence of residual P fertility of 82 kg ha^{-1} (1994) the reduction of P application by half under 100% NPK original treatment proved to be effective in sustaining the respective average yield levels of 31.85 and 48.71 q ha^{-1} of maize and wheat in comparison to the corresponding yields of 30.4 and 48.8 q ha^{-1} obtained with optimal

P application. With complete P omission under 100% NPK(-S) treatment the sustainable average maize and wheat yields obtained were 28.8 and 45.10 q ha^{-1} vis-à-vis 31.1 and 46.1 q ha^{-1} obtained with optimal P application.

The depletion of available zinc from the initial level of 2.7 mg kg^{-1} to 0.62 mg kg^{-1} over the years 1972-93 at Pantnagar became a yield limiting factor under the 150% NPK+S treatment. Its replenishment @ 25 kg $ZnS0_4$ ha^{-1} from 1993 onwards significantly enhanced the average rice and wheat yields by 6.0 and 7.8 q ha^{-1} respectively over the corresponding yields of 36.9 and 34.3 q ha^{-1} obtained without zinc application.

The trend analysis of available phosphorus in soils under optimal and super optimal NPK treatments over the years 1972-2003 indicated its huge build up of 169.7 kg ha^{-1} over its initial value of 12 kg ha^{-1} at Palampur and of 200.7 kg ha^{-1} over the initial level of 49 kg ha^{-1} at Barrackpore thus indicating the need of management intervention for rescheduling P application so as to enhance efficient fertilizer use and economic profitability of the fertilizer added to the cropping systems.

- Summarization of results of experiment "Performance of crop varieties and their nutrient requirement conducted under the planning, designing and analysis of "ON FARM" research experiments planned under Project Directorate for Cropping Systems Research during 1990-2000 for Rice, Wheat, Jowar, Bajra, Maize, Oilseed and Pulse crops were completed. On the basis of trials conducted on farmers' field adopting only the improved varieties and continuing with existing practices for Rice and Wheat crops, the increase in productivity was observed to be 10.89% and 10.30%, respectively. In case when farmers had adopted improved varieties along with recommended dose of fertilizer, the increase in rice and wheat production was noted as 25.71% and 28.85%, respectively. The estimates of increase in productivity for rice crop due to adoption of new varieties varied from low of 2.38% for Punjab to a high of 16.61% in Maharashtra state under farmer's existing practices.

  In case of adoption of new varieties of rice along with recommended fertilizer doses, Punjab has shown decrease in production of the magnitude of 1.07%. This is due to farmers applying higher fertilizer dose 150 kg/ha of N + 40 kg/ha of P than the recommended dose of fertilizer 120 kg/ha of N.
- A database of Experiments on Long Range Effect of Continuous Cropping and Manuring on Soil Fertility and Yield Stability for online storing and retrieving the data for different centres has been prepared. The database has been developed in the Microsoft Access 2000 with front end in Hyper Text Markup Language (HTML) and JavaScript.
- Database for the project on Statistical and Algorithmic Approach for Improved Estimation of Treatments Effects in Repeated Measurements Designs has been designed and parameters of 50 repeated measurements designs (RMDs) catalogued from literature have been entered into it. Computer softwares have been developed in Visual Basic for the generation of various types of RMDs which included Williams square designs, [Sharma (1981), Berenblut (1964)], 11 two-treatment RMDs, [RMDs (v, p=v, n=v (v-1)] obtained using Mutually Orthogond Latin Squares [MOLS] for prime v, circular totally balanced RMDs (v, p=2v-1, n=v), [Varghese and Sharma (2000), RMDs Sharma (1977)] extra- period Williams Square RMDs, two classes (type II and type III) of partially balanced RMDs, [Saha (1970)] two-period RMDs [Balaam (1968)] totally balanced RMDs, [Dey and Balachandran (1976)] Balanced RMDs, [Lawless (1971)] and minimal balanced RMDs, [Sharma *et al.* (2003)].
- Experiments having non-normal and heterogeneous errors retrieved from Agricultural Field Experiments Information System (AFEIS) were investigated. The presence of outlier(s) were examined through a specially developed program in SAS/IML. The statistics like Cook Statistics, AP-statistic, Q-statistic were applied and it was observed that these experiments contain outliers.
- Under design and analysis of experiments for spatially correlated observations in block design setup, the coefficient matrix of reduced normal equations for estimating treatments contrasts has been obtained for a nearest neighbour correlation error structure and first order autocorrelation error structure. A series of Balanced Incomplete Block (BIB) designs that are neighbour balanced with parameters $v=m(\lambda-1)+1$ [v being prime or prime

power], b = mv, r = mk, k=λ, λ obtained by initial block solution (Sprott,1956) have been tabulated with parameters and initial blocks.

- At Cropping Systems Research (CSR) centre, Faizabad, an experiment was conducted during 2002-03 to study the effect of different methods of sowing of wheat on yield of rice-wheat sequence. Wheat was sown by normal, late, transplanting and zero tillage methods. It was observed that maximum gross returns from rice–wheat sequence was obtained when wheat was grown by normal method.

Experimental Designs for Agricultural, Animal and Agro forestry Research

- Biological assays (bioassays) are a set of techniques relevant to the comparisons between the strength of alternative but similar biological stimuli (a pesticide, a fungicide, a drug, a vitamin, plant extract, etc.) based on the response produced by them on the subjects (e.g. an animal, a piece of animal tissue, a plant, a bacterial culture, subhuman primates or humans, living tissues, plants or isolated organisms, insects, etc.). The experimenter at times has to use incomplete block designs for the conduct of bioassays. As the contrasts to be estimated for bioassays are different from those in the usual experiments, the classical block designs are generally not efficient for bioassays. Information on efficient block designs for biological assays, at present, is scattered mostly in the form of research papers, dissertations, etc. There is, therefore, a need to consolidate the information at one place in the form of a catalogue for the benefit of experimenters and practicing statisticians. Simultaneously, it is also possible to obtain designs for bioassays that are optimal/ efficient for all the relevant contrasts of interest with more efficiency as compared to the designs available in the literature. In view of the importance of efficient designs, a project entitled “Studies on block designs for biological assays” was undertaken with the objective to obtain and catalogue optimal/efficient block designs for bioassays. In order to familiarize the stakeholders with the importance of designing and analytical aspects of biological assays and to disseminate the findings of the research project, a dissemination workshop was organized at the Institute on 15 February 2005. Besides familiarizing the participants with the findings of the project, various issues relating to practical problems of bioassays were discussed threadbare and some important recommendations were emerged from the workshop. The following are some of the salient achievements.
  - Optimality of block designs for multiple parallel line assays that allow estimation of three contrasts of major importance but do not necessarily allow the estimability of other treatment contrasts has also been studied and a method to obtain such designs has been developed. A catalogue of 35 A-optimal block designs for $3 \leq m \leq 8$, $8 \leq k \leq 16$, $k < 4m$, $bk \leq 100$ has been prepared for one standard and three test preparations.
  - A optimal block designs for asymmetric slope ratio assays have been obtained. A catalogue of 61 A-efficient block designs for asymmetric slope ratio assays has been prepared. Wherever, A-optimal design is not obtainable a lower bound to A- efficiency is provided.
  - Besides cataloguing optimal/efficient block designs obtained in the studies on block designs for biological assays, a catalogue of the designs obtainable from the methods of construction available in literature is also prepared. A-optimality aspects of these designs for parallel line assays have been investigated. None of the designs in the parametric range $3 \leq m \leq 6$, $4 \leq k \leq 10$, $bk \leq 50$ have been found to be A-optimal for inferring on the contrasts of interest. Indeed it is possible that some designs with parameter combinations beyond these parameter combinations may turn out to be A-optimal.
- The analysis of crop data on agro forestry experiment pertaining to various characters received from the collaborative center for the year 2004 revealed that performance of the under storey crop was affected by the tree species and the distance of the crop from the tree base. The yield increased as the distance increased. The RBD analysis of tree data with 12 treatment combinations (4 tree species with 2 crops along with 4 sole trees, i.e. $4 \times 2 + 4$) in two replications indicated the treatment effects as significant. The

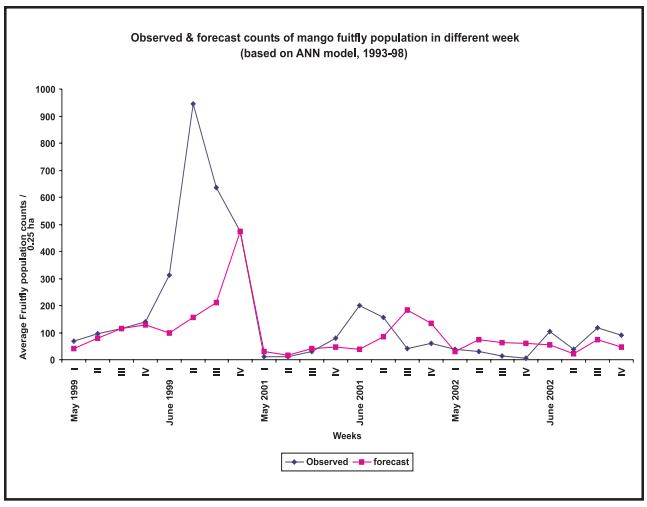
within group comparisons (4 groups from 4 tree species) for crude protein showed that the crude protein yield was significantly different in case of group containing babul indicating the effect of crops on babul.

- Trend-free binary variance balanced block designs under homoscedastic model and heteroscedastic model (error variance proportional to some power of block size) have been obtained when there is uniform trend within the blocks. Trend-free nested balanced incomplete block designs, when the trend effect is in nested blocks, have also been obtained.

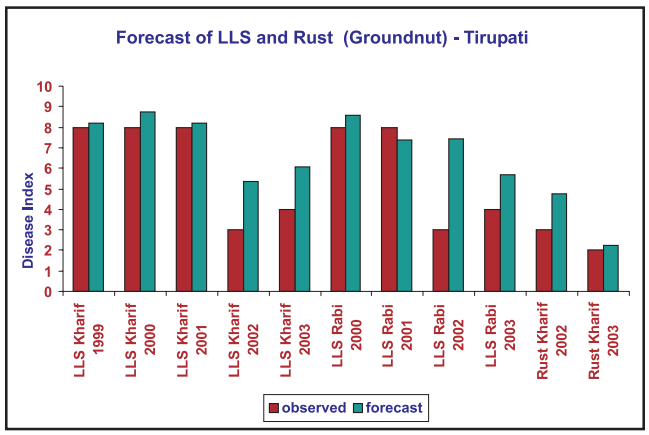
PROGRAMME 2: FORECASTING AND REMOTE SENSING TECHNIQUES AND STATISTICAL APPLICATION OF GIS IN AGRICULTURAL SYSTEMS

Forecasting Techniques in Agricultural System

- In a study in collaboration with Central Institute for Subtropical Horticulture, Lucknow, aimed for development of forewarning system for outbreak of fruit-fly and hoppers in mango crop, various non-linear models to study the fruit-fly pattern with time were examined. Models were refined by replacing time by a function of time and weather parameters with lags 2, 3 and 4 weeks as well as by using the available information for construction of the index of weather variables. The Artificial Neural Network (ANN) technique was also attempted by taking dependent variable as fruit-fly population and independent variables as fruit-fly population in 2nd and 3rd lag weeks and weather variables in 2nd to 4th lag weeks. Forecasts for the years 1999, 2001 and 2002, using models based on data for 1993 to 1998 are shown graphically above.



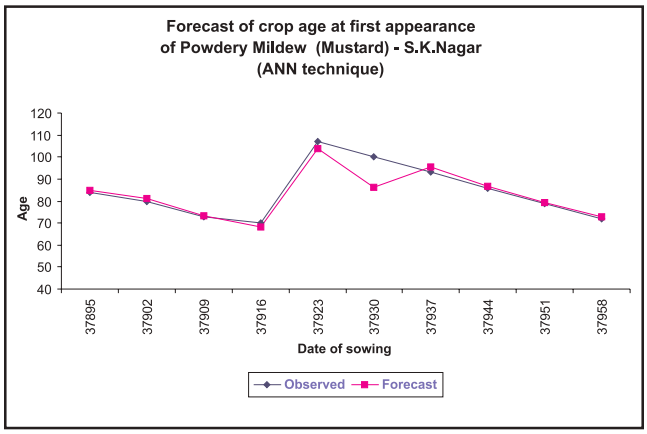
- The Institute has collaborated with Central Research Institute for Dryland Agriculture, Hyderabad in a detailed study under NATP with the responsibility to develop weather based forewarning system for important insects, pests and diseases for rice, sugarcane, pigeon pea, cotton, mustard and groundnut. Models based on weather indices (simple/weighted total of values of weather variables and product of weather variables taken two at a time) were developed and validated for cotton (whitefly, pink bollworm, American bollworm for Lam) and rice (gall midge for Cuttack). Modification and validation of the models for groundnut (late leaf for Tirupati); pigeon pea (pod borer, pod fly, phytophthora blight and sterility mosaic for Kanpur) and sugarcane (top-borer for Lucknow) has been undertaken. Forecasts of subsequent years, not included in model development, were close to the observed values in all the cases. One example for groundnut (late leaf spot and rust) is presented below graphically:



Logistic regression models were developed earlier by classifying the data on pyrilla into two classes (occurrence/non-occurrence). Similar models were developed for qualitative data on alternaria blight and white rust in mustard crop. These models were modified by categorizing the

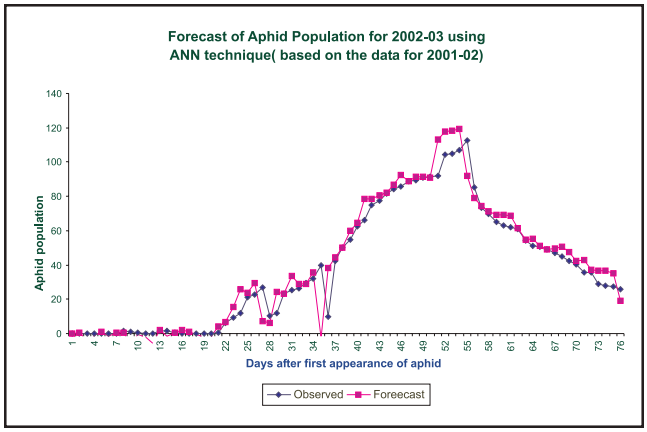
data into three categories (low, medium and high). However, in all the cases, the modified models did not perform better than the models based on two categories. The forewarnings on the basis of models using two categories were found to be satisfactory in all the cases.

ANN technique has been tried for Powdery Mildew in mustard (S.K. Nagar). Different dates of sowing were taken as treatments in each year. ANN technique was used on the data of four years for forecasting maximum severity, crop age at first appearance and peak severity. Using this technique, forecasts for fifth year were obtained. The results indicated that technique worked very well for forewarning crop age at first appearance of disease whereas for other characters further



refinement is needed. Forecasts for crop age at first appearance in fifth year for 10 different dates of sowing are given in following figure:

- ANN technique was also applied for studying aphid development pattern in Bharatpur for the year 2001-02 using data lagged by ten days on weather and aphid population. The predictions were very close to the observed ones. Using this approach, forecasts for 2002-03 were obtained which are shown above graphically:



- Non linear models for aphid development pattern developed earlier were based on the cumulative mean temperature and cumulative mean relative humidity. These models were further modified by replacing cumulative weather variables by respective indices. Index of a weather variable was obtained by taking weights as zero/half/one if weather in a particular week was in unfavourable/ favourable/ highly favourable range for aphid. In order to use this approach for forecasting aphid population in advance, models were also developed using weather lagged by one week. These models captured the fluctuation in aphid population excellently.
- A study was taken up to develop nonlinear time-series models for describing and forecasting time-series data from the field of agriculture. Jalali and Pemberton (1995) extended the class of zeroth-order threshold autoregressive models to a much richer class of mixture models. Amongst their many properties, it is observed that their auto covariance structure has the same form as that of linear ARMA models although only a subset of possible auto covariance functions are obtainable with ARMA models. In this study the performance of mixture time-series models, viz. Gaussian Mixture Transition Distribution (GMTD) models and Mixture Autoregressive (MAR) models in real data sets was studied. As an illustration, the models were applied on weekly onion price data during first week of April, 1998 to first week of November, 2001 to describe behaviour of the time-series. The data of Nasik variety at Azadpur Mandi, New Delhi, collected from N.A.F.E.D., New Delhi was considered. It showed marked volatility by touching value of Rs. 4000 per quintal in October, 1998 and remained stable in the range of Rs. 450 to Rs. 700, depicting flat stretches with occasional bursts of large amplitude to the tune of Rs. 850 to Rs. 900, during October, 1999. In subsequent year, price remained on an average of Rs. 350 in first half and above Rs. 500 for second half exhibiting another phase of flat

stretches. All these features prompted to apply MAR models to this data set. Tests for presence of unit root were made before fitting trend followed by seasonal adjustment through correlogram analysis. The detrended and deseasonalised series had shown presence of volatility due to the fact that chance of a sharp increase or decrease at some points was higher than that of a moderate change at some other point. This fact was explained through one and two-step predictive distributions which showed multimodality of predictive distribution and no constancy of volatility functions. Also Lagrange Multiplier (LM) test along with Naive-LM test, when the conditional mean is unspecified, was applied for testing presence of ARCH leading to volatility in data sets. The best models corresponding to GMTD and MAR families were selected on the basis of BIC and BIC* criteria. Two-component and three-component GMTD models for detrended and de-seasonalised weekly onion price series were considered. The order selection criterion followed was BIC as, unlike other criteria, viz. Akaike Information Criterion and final prediction error, it lead to a consistent order selection (Fan and Yao, 2003). The best GMTD model defined was found to be

$$F(\hat{e}_t \mid \hat{e}_{t-1}) = 0.11\,\Phi\{(\hat{e}_t + 0.28\hat{e}_{t-1} - 0.29\hat{e}_{t-2})/0.54\} + 0.58\,\Phi\{(\hat{e}_t - 0.61\,\hat{e}_{t-1})/0.65\} + 0.31\Phi\{(\hat{e}_t - 0.14\hat{e}_{t-2})/3.14\}$$

with BIC value as 386.72. The standard errors for ($\hat{\alpha}_0$, $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{\sigma}_0$, $\hat{\sigma}_1$, $\hat{\sigma}_2$, $\hat{\varphi}_{01}$, $\hat{\varphi}_{02}$, $\hat{\varphi}_1$, $\hat{\varphi}_2$) were (0.09, 1.28, 2.1,1.24, 2.05, 0.95, 2.56, 1.65, 0.98, 2.45), respectively. The best three-component MAR model was a MAR (3; 2, 2,1) with $\phi k0 = 0$, k = 1, 2, 3 and the model is given by

$$F(\hat{e}_t \mid \hat{e}_{t-1}) = 0.33\,\Phi\{(\hat{e}_t - 0.56\hat{e}_{t-1} - 0.36\hat{e}_{t-2})/2.08\} + 0.64\,\Phi\{(\hat{e}_t + 0.26\,\hat{e}_{t-1} + 0.13\,\hat{e}_{t-2})/0.19\} + 0.03\,\Phi\{(\hat{e}_t + 5.72\,\hat{e}_{t-1})/9.44\}$$

with BIC value as 383.84. Finally forecasting of out-of- sample data was done for MAR model along with change in forecast interval. From both modelling and forecasting points of view, present study provided deeper understanding of behaviour of weekly onion price.

- For developing forecast models for important crops in UP state by extending existing district level models and to refine the existing methodology at district level, models for forecasting rice, wheat and sugarcane yield for different districts of U.P. were developed based on weekly/fortnightly weather parameters and trend. Weather parameters considered were maximum temperature, minimum temperature, rainfall and relative humidity (morning). For each weather variable, a composite index was developed as weighted accumulation, weights being the correlation coefficients between detrended yield and weather variable in different periods (week for rice and wheat and fortnight for sugarcane). Similarly, for joint effects of weather variables, composite weather indices were developed as weighted accumulations of product of weather variables (taken 2 at a time), weights being correlation coefficients between detrended yield and product of weather variables considered in respective periods.

  The mathematical form of the model at district level was

$$Y = a_0 + \sum_{i=1}^{p} a_i Z_i + \sum_{i \neq i'}^{p} a_{ii'} Z_{ii'} + cY_r + e$$

where

$$Z_i = \sum_{w=n_1}^{n_2} r_{iw} X_{iw}$$

$$Z_{ii'} = \sum_{w=n_1}^{n_2} r_{ii'w} X_{iw} X_{i'w}$$

Y crop yield
X_{iw} value of i-th weather parameter in w-th period
r_{iw} correlation coefficient between detrended yield and i-th weather parameter in w-th period
$r_{ii'w}$ correlation coefficient between detrended yield and product of X_i and $X_{i'}$ in w-th period
p number of weather parameters
n_1 initial period for which weather data were included in the model
n_2 final period for which weather data were included in the model
Y_r year
e error term

Models were also developed at agro-climatic zone

level. In these models along with weather parameters and trend, previous year's yield, moving averages of yield and per cent area under irrigation were also used to take care of variation between districts within the zone. District forecasts were aggregated to get zone and state level forecasts taking area under the crops in different districts as weights. Reliable forecasts of rice and wheat were obtained when the crop was about 11 weeks old i.e. around two and a half months before harvest whereas for sugarcane reliable forecast was obtained in middle of September i.e. about 5 months before harvest.

- For forewarning incidence of paddy pests, weekly light trap catch counts of pests - Green Leaf Hopper (GLH) and Gundhi Bug (GB) and weather data were compiled for 15 years (1987-99) for the period July-November. The life cycles of these pests were studied and graphical analysis of their counts revealed the weeks of peak incidence as 2nd and 1st week of October for GLH and GB respectively. Correlations between pest counts and lagged weather parameters were utilized to compute weather indices. Thereafter, forewarning models were developed by establishing relationship between pest counts and two weeks lagged weather indices via stepwise regression using 1985-97 data. The forecast models for GLH and GB were respectively obtained as

  $y_1 = 16.49 + 0.41\ z_1$ and

  $y_2 = -1.49 + 0.33\ z_2$

  where

  y_1 = GLH pest count during 2nd week of October

$$z_1 = \sum_{w=m_1-3}^{m_1} r_{1w}\, x_{1w}$$

is the weather index where r_{1w} is the correlation co-efficient of y_1 with weather variable x_{1w} i.e. minimum temperature in the w-th week and m_1 is the week of forecast i.e. 4th week of September

y_2 = GB pest count during 1st week of October

$$z_2 = \sum_{w=m_2-3}^{m_2} r_{2w}\, x_{2w}$$

is the weather index where r_{2w} is the correlation coefficient of y_2 with weather variable x_{2w} i.e. relative humidity in the w-th week and m_2 is the week of forecast i.e. 3rd week of September.

- Both the models could explain around 80% of the variation in pest counts. The pest count forecasts during weeks of peak incidence compared well with those of the observed ones for the subsequent years (1998 and 1999) not included in model fitting.

Remote Sensing and Geographic Information System

- For developing a survey methodology for estimation of crop area and crop yield in Meghalaya a pilot study was taken up in one district of the state namely Rhi-boi to estimate area under paddy crop by two approaches (i) Approach based on Remote Sensing, GIS along with survey data and (ii) Village Survey approach.

  Under the first approach, the digital data of IRS-1D, LISS-III sensor pertaining to 8 September 2003 and 22 November 2003 were used. Due to undulating topography of the study area, there were large differences of area under paddy as obtained and actual area under paddy on the ground. The area under paddy crop falling on hill side or valleys may not be exposed to the satellite sensor, as satellite sensors are sun-synchronous. Further, small paddy fields are not detectable due to lower spatial resolution of the LISS-III sensors. In order to rectify the area under paddy crop due to undulating topology and misclassification errors, relationship between area under paddy in the image and actual area under paddy crop on the ground was established by measuring the actual area of some selected paddy fields by Global Positioning System (GPS) and comparing it with the area in the satellite image. This provided the corrected area under paddy, which was captured by satellite sensor. Further, area under paddy, which was not captured by satellite sensor due to hill shades and limitations of spatial resolution of the sensor, was rectified by conducting sample survey. This survey was carried out along the National Highway/State Roads by selecting a sample of field segments along the roads and actually measuring area by GPS and comparing this area again with the corresponding area of the satellite.

  Under the second approach of village survey, a simple random sample of 20 villages was selected. The data pertaining to crops grown and

area under each crop was obtained by enquiry. A sample of 5 farmers was selected in each selected village for detailed enquiry. Area under paddy was recorded using GPS and by observation from 2 fields of the two selected farmers from these five farmers in each selected village and suitable estimators were developed.

The study is being extended in one more district of the state for estimating the crop acreage and yield for the entire state.

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

Assessment and Evaluation Studies

- The study to finalise the farm mechanisation strategies in the country was carried out in three concurrent phases. As part of Phase-I, to crystallize the approach and the modalities relating to the study, a Seminar-cum-Group Discussion was organised and a document comprising of 10 status papers entitled "Status of Farm Mechanisation in India", was submitted.

  In Phase-II, a large scale survey, adopting stratified multi-stage random sampling design, was planned and conducted in 120 randomly selected districts through 24 Centres (21 Centres of AICRP on FIM; GAU, Gujarat; SKUAST, Jammu; NDUAT, Faizabad) spread Nation-wide. The analysis of data for all the States was carried out.

  In Phase-III, the identified experts on the basis of results obtained as well as on their own experience have prepared the mechanization strategy papers for different Agro Climatic Zones/ States. The draft report of the project was submitted to funding agency and a presentation-cum-discussion on the draft report was orgasnised at the Institute on January 05, 2005 under the chairmanship of Shri Champak Chatterji, Additional Secretary, DOAC, Ministry of Agriculture. Chairman/Members of the Project Management Committee, senior officials of the DOAC, Ministry of Agriculture/ICAR, DES, CIAE, experts involved with the preparation of the strategy papers and the associate scientists participated in the meeting.

  It was decided that for discussing these mechanization strategies with respect to their implementation aspect etc., a 2-days National Workshop inviting senior officials of different State Governments; DOAC, Ministry of Agriculture, GOI; Farm Mechanisation Experts from different institutions and other private organizations may be organised at the NASC Complex during April 15 -16, 2005.
- In order to develop a user friendly software for the imputation of missing data based on neural network based imputation concept along with other alternative methods of imputation, requirement analysis was done.

Production and Area Estimation

- For studying the methodology of estimation of wool production a pilot study was taken up in one district each viz. Bikaner of Rajasthan and Kolar of Karnataka, the two major wool-producing states of the country in Northern and Southern region respectively. The estimates of sheep number, average wool yield and total wool production for Kolar and Bikaner districts were prepared and finalised. The difference in estimates obtained by using different estimators was also tested.
- From the study, "On efficient block level estimators of yield rates of important crops" grown in the two districts of Bhiwani and Sirsa of Haryana State as well as comparing the efficiency of production as obtained by crop cutting approach and the farmers' inquiry based approach, the accuracy comparison of crop cut estimates and the farmers' estimates were made with actual production values. The crop cut estimates by and large were found to be close to the actual production figures for crops harvested in multiple pickings, cotton, etc. There was no clear cut trend in respect of the closeness of crop cut estimates and the farmers' estimate to the actual production values for the other crops covered in the survey. However, the percentage standard errors associated with farmers' estimate were smaller in comparison to the percentage standard errors of the estimates obtained through crop cut approach.

Cost of Production Studies

- The study aimed at developing sampling methodology for estimation of cost of production of coconut in Kerala revealed that farmers'

receptivity to coconut production technologies ranged from low to medium level. Technologies such as basin opening and application of organic manures were the most commonly adopted practices. Plant protection, spacing for optimum plant density and cultivation of hybrid/high yielding varieties were the items of low level of adoption. Applications of chemical fertilizers, irrigation, intercultural operations, inter/mixed cropping and mixed farming was having medium level of adoption.

- From the study "On development of methodology for productivity of important flowers" estimated production of loose flowers on the basis of market arrival from Delhi as well as outside Delhi were found to be 14570.910 MT with 2.51% S E and 25829.580 MT with 1.50 % S E respectively. The corresponding figures for cut flowers were 670.68820 lakh with 1.53% S E and 2380.80237 lakh with 0.74% S E. The percentage of market arrival of loose flowers from Delhi and outside Delhi was of the order of 36% and 64% respectively. The corresponding figures in case of cut flowers were 22% and 78%. Percentage standard errors of the estimates of different kind of flowers traded in the three flower mandis of Delhi ranged from 0.94 to 7.75. It clearly indicated the applicability of sampling methodology adopted.

Technological Change, Risk and Uncertainty in Agriculture

- An econometric study of technological dualism in egg production was based on primary survey data of selected poultry farms in two districts Mansa and Ludhiana of Punjab state. The results revealed that the initial capital investment for Cage System farms was more than two folds as that of Deep Litter System farms in Mansa and nearly three folds in Ludhiana district. However, the average investment for a particular technology was higher for farms set up at Ludhiana compared to those at Mansa probably because of urbanization. The estimates of Cost and Returns on Layer Farms indicate that Cage System farms were earning more profit compared to the Deep Litter System farms in both the selected districts. The study showed that major factors influencing egg production are feed, labour, medicines and electricity costs. The study of regression analysis showed that on both types of farms most of the input variables except for feed cost were not properly utilized. However, it was observed that if the poultry farms using Deep Litter System shifts over to Cage system of technology there may be a substantial saving in the input resources. The Chow test confirms the superiority of modern technology over the traditional one in terms of efficiency of inputs at both the districts. The existence of Technological Dualism in egg production revealed that inputs were not being efficiently used on Deep Litter farms. The Chow test further confirmed the fact that a shift to the modern (Cage) technology could save the inputs substantially. Factor share analysis in district Mansa revealed that the share of labour factor remained about 4 percent, the share of poultry feed which is a proxy variable for capital, was maximum of about 62 percent on both types of farms.
- The study on 'Technical efficiency analysis of rice-wheat system in Punjab', employed farm level rice-wheat system data of Punjab farmers to stochastic frontier for evaluating individual level of technical efficiency across given sample farms during 1985-86. Although empirical results of the study revealed an ardent economic viewpoint that the majority of farmers in Punjab did not appear very far from frontier but there existed possibilities of increasing rice and wheat output with better use of technical skills at least in deployment of factors of production under farm control efficiently.

Modeling for Agricultural Marketing

- The host wise details of brood lac in Jharkhand state was obtained as: Ranchi district: Ber Host –During Baisakhi crop, the average rate of brood lac was about Rs. 58.75/kg, Palas Host- Rs. 40/kg for Baisakhi crop and for Katki crop Rs. 21.43/kg and in W. Singhbhum: Rs.78/kg Kusum Host- in Jethwi crop of Rs.100 and for Katki crop Rs.106.25 respectively. Scrapped Lac/ Crop output – (i) Jharkhand State: Ber Host: In the Bundu block, in Baisakhi and Katki season, the average income from lac cultivation was about Rs. 3840. In Murhu block, the average income from lac cultivation was about Rs. 2720 in both the seasons. In W. Singhbhum the average

income from lac cultivation was about Rs. 2276 in two seasons. Palas Host: In the Bundu block, the average income from lac cultivation was about Rs.1327 in two seasons. Oramanjhi block, in all the selected villages the crop was affected due to adverse climatic conditions and the cultivators could earn only Rs.170 from both the crops. Murhu block, the average income from lac was about Rs. 2414.00 in two seasons. Silly block, the average income from lac cultivation was about Rs. 34.57 in two seasons. W. Singhbhum, the average income from lac cultivation was about Rs. 34.57 in two seasons. Kusum Host- the average income from lac cultivation was about Rs. 6195.50 in two seasons.

Income from Scrap Lac Production: Chhattisgarh, M.P. and Maharashtra States: The annual average income of different host trees from Lac cultivation in case of Ber host income on small farms was Rs. 545, on medium farms Rs. 272 and on large farms Rs. 224. Income from Palas host on small farms was Rs. 319, on medium farms Rs. 405 and on large farms Rs. 537. In case of Kusum host income on small farms was Rs. 641, on medium farms Rs. 1073 and on large farms Rs. 868.

Food Security and Poverty Alleviation

- The study was based on primary data collected for base year, 2001 and the year 2004 on household food and nutritional security for tribal, backward and hilly areas under "Jai-vigyan national science and technology mission project". The results pertaining to Ajmer district of Rajasthan revealed that the number of sheep maintained by participating farmers and non-participating farmers were almost of the same order. The average yield of wool per animal was reported to be 2 kg by participating farmers and 1.72 kg by non-participating farmers. There was an increase in yield of wool per animal over the base year. It was found that cost of rearing of sheep has declined by about 24 percent on participating farmers over the base year. Overall, net income over input costs was found to be nominal on participating as well as non-participating farmers. The level of employment was higher on participating farmers in comparison to non-participating farmers. The availability of employment seemed to have been reduced for both categories of farmers. It was found that there was surplus consumption of cereals and millets, milk and sugar by all categories of farmers. The percent change in food security, when compared to the base year, indicated that consumption of surplus food items, viz. cereals, milk and sugar have decreased marginally. All the farmers opined a decrease in the rate of mortality and morbidity of sheep as a result of technological intervention.

  In Kangra district of Himachal Pradesh, there was a significant increase in the number of sheep and goats on participating farms. The increase in wool productivity was higher on participating farms in comparison to the non-participating farms over the base year. The rearing cost per farm was lower in case of participating farmers. The increase in gross income was more on participating farms than non-participating farms. The level of employment was also higher for the participating farmers. When compared to the base year, it was observed that there was a decrease in employment on participating as well as non-participating farms. The consumption of cereals, milk, sugar and fat and oils was more than the recommended quantity. The change in consumption over the base year indicated a marginal increase in consumption of cereals and milk and significant increase in other food items like pulses, vegetables, fruit, sugar and fat and oils on participating farms. The participating farmers indicated that they have observed a decrease in the rate of mortality and morbidity of animals due to technology intervention.
- Under the study on, "Determinants of performance of Self-Help Groups (SHG) in rural micro-finance", the divergences between Andhra Pradesh and Uttar Pradesh states in terms of agro climatic and socio-economic parameters was examined. SHG progress in both states was very diverse while it was very fast in Andhra Pradesh compared to Uttar Pradesh. Despite higher growth rate of population, higher share of cultivators, lower female literacy and higher female population in Uttar Pradesh, the SHGs progress was slow in Uttar Pradesh as compared to that in Andhra Pradesh. This scenario rejected the hypothesis that there should be a higher positive correlation between female population and number of SHGs.

The organizational setup in Andhra Pradesh showed that commercial banks had performed better as compared to regional rural banks. On the other hand, despite the vast expansion of formal credit system in Uttar Pradesh, more than half of the rural households were still outside the ambit of institutional credit.

The socio-economic conditions of two districts of Andhra Pradesh were also diverse. The analysis of determinants of repayment showed that the variable of economic homogeneity was main responsible factor in both the districts of Andhra Pradesh. It was also observed that socio-economic diversity existed in selected districts of Uttar Pradesh too. Regarding determinants of repayment of loans, the analysis showed that higher amount of loan and socially more heterogeneous groups were the main factors responsible for default in repayment of loan in Kanpur district. In Jaunpur district of Uttar Pradesh, economically and socially more heterogeneous group might add to default in repayment of loan.

Further there were diversities in socio-economic factors in both states and probably these factors were not considered at the time of formulation of policies in Uttar Pradesh. The over all position of SHG programme in Andhra Pradesh was better as compared to Uttar Pradesh. The study suggested the various steps for improving the SHG programme in Uttar Pradesh.

- In the study "Water-food security scenario analysis for 2025: Agro-ecological regional approach" a chapter entitled "Resource Analysis for Sustaining Water-Food Security in AER-4" was published in the proceedings (No.12) of NCAP. The results revealed that cropping pattern in agro-ecological sub region AESR 4.3 and AESR 4.4 was dominated by foodgrain crops. Using policy interactive dialogue model (PODIUM) the water food security scenario analysis was done for AESR 4.3 and AESR 4.4. Alternative scenarios namely, the business as usual scenario (BAU) which assumed a continuation of current trends in water and food demand-supply drivers and the food secure sustainable groundwater use scenario (GWS) postulates no ground water mining and sustaining food security in future, were analyzed for these AESRs upto 2025 with specific set of interventions. BAU scenario analysis showed that the sub-region 4.3 has food deficit and declining groundwater balance, whereas sub-region 4.4 has a very large food deficit but stable groundwater balance. On the other hand, GSW scenario analysis emphasized on yield growth in AESR 4.3 to eliminate the food deficit but groundwater depletion would continue unabated.

Agricultural Research Data Book 2004

- 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 the 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 2004, which is 8th in the series, is an attempt to put together main components/indicators of such information. The Data Book comprising of 231 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 and 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 Institutions associated with agricultural research and education along with their addresses, telephone numbers and e-mail addresses. The Data Book has been compiled through the joint efforts of the Indian Agricultural Statistics Research Institute (IASRI) and the Computer Centre of the Indian Council of Agricultural Research (ICAR). It is the eighth edition and contains the latest information/ data as available in the country at the end of April, 2004.

  Accordingly, the Agricultural Research Data Book 2004 has been published during May, 2004

and was released during the Directors Conference on 14 July, 2004. 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.

The preparation of Agricultural Research Data Book 2005 is in progress.

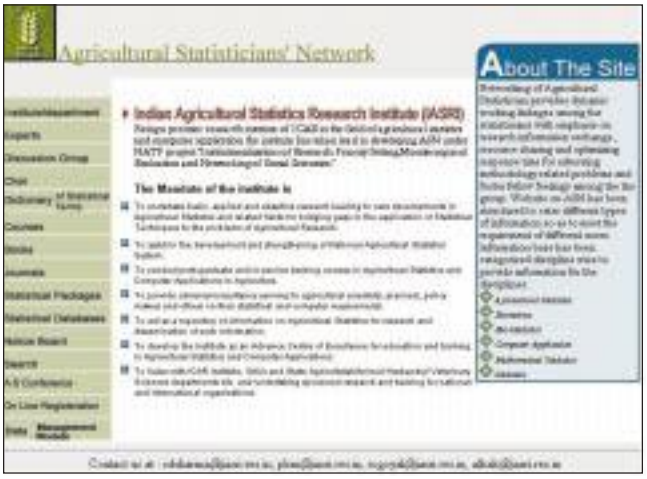
PROGRAMME 4: MODELLING AND SIMULATION TECHNIQUES IN BIOLOGICAL SYSTEMS

Computer Simulation Studies and Applications of Re-sampling Techniques like Bootstrap in Biological Investigations

- In an empirical investigation, "to study the influence of fixed effects on estimates of heritability" it was observed that the bias was reduced considerably and became negligible when the data was adjusted for all the fixed effects present in the data under half-sib model. A close similiarity was observed with the estimates obtained by mixed model technique in terms of percentage of bias in the estimates of heritability. The bias would be quite high if all the fixed effects considered in the model were not utilised for the adjustment and was observed to be a function of sample size. Similar results were obtained for estimating sire-component heritability under full-sib model. The method of fitting constants proved comparable to mixed model technique for moderate and high values of heritability. However, in case of low heritability the bias in the estimates of sire-component heritability from data adjusted for all the fixed effects was slightly higher as compared to estimates obtained by using mixed model technique.

PROGRAMME 5: DEVELOPMENT OF INFORMATION TECHNOLOGY IN AGRICULTURAL RESEARCH

- NATP project 'Institutionalization of Research Priority Setting, Monitoring and Evaluation and Networking of Social Scientists' was completed. PIMSNET was developed for implementation. For Monitoring and Concurrent Evaluation (M&CE) of the research projects running under NATP, the M&CE mechanism was developed and implemented through the PIMSNET at all the AED's offices. PIMSNET is available on the Internet (http://www.pimsnet.gen.in) and contains data of all 845 sub-projects running under different research modes of NATP. To bring more awareness about PIMSNET system usage, sensitization-training workshops at all the Agro-Ecosystem Directorates of NATP and PIU, NATP, New Delhi were organized during July-August 2004. To provide a comprehensive view of



Homepage – Agricultural Statisticians' Network

research information in statistics within the NARS a web site for agricultural statisticians http://iasri.res.in/ASN/ was designed and developed.

The website is accessible across the world and thus provides an opportunity to share the scientific resources through a common platform and enhances the multidisciplinary research and act as a key to nourish the agricultural research. PIMSNET was initially designed to cater the needs of the personnel directly or indirectly related to NATP project and in its extension phase (01-01-2004 to 31-3-2005), its capabilities were extended to handle online M&CE of projects being undertaken at the ICAR institutions as a part of Plan activities and AP-Cess funded projects undertaken at ICAR institutions and SAUs. Technical documents on ASN and PIMSNET were prepared. Reports as required by NATP, PIU were provided from PIMSNET.

- Under the NATP Mission Mode Project 'Integrated National Agricultural Resources Information System' (INARIS) the design and development of flexible Central Data Warehouse (CDW) of

agricultural resources of the country at IASRI, New Delhi (lead center) and databases on different subjects at respective co-operating centers were undertaken. The target users of information systems and decision support system developed under this project are (i) Research Managers, (ii) Research Scientists and, (iii) General Users. In this project a state of art CDW of agricultural resources of the country was developed at IASRI, New Delhi and was probably the first attempt of data warehousing of agricultural resources in the world. This provided systematic and periodic information to research scientists, planners, decision makers and developmental agencies in the form of On-line Analytical Processing (OLAP) decision support system. The above project was implemented with active collaboration and support from 13 other ICAR institutions, namely NBSSLUP, Nagpur (for soil resources), CRIDA, Hyderabad (for agro-meteorology), PDCSR, Modipuram (for crops and cropping systems), NBAGR, Karnal (for livestock resources), NBFGR, Lucknow (for fish resources), NBPGR, New Delhi (for plant genetic resources), NCAP, New Delhi (for socio-economic resources), CIAE, Bhopal (for agricultural implements and machinery), CPCRI, Kasargod (for plantation crops), IISR, Calicut (for spices crops), ICAR Research Complex for Eastern Region Patna (for water resources), NRC-AF, Jhansi (for agro forestry) and IIHR, Bangalore (for horticultural crops).

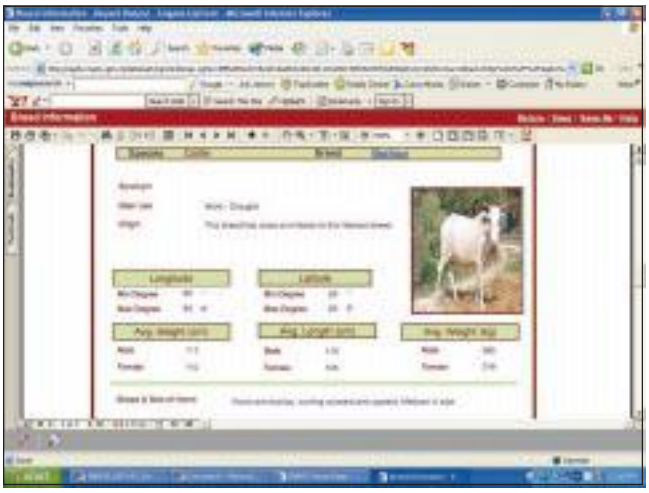
In all 59 databases on agricultural technologies generated by Council, research projects in

Homepage – INARIS

Graphical presentation of multi-dimensional cube

operation and related agricultural statistics from published official sources at least from the year 1990 onwards at the district level were integrated for the development of above data warehouse. Subject-wise data marts were created; multi-dimensional data cubes developed and published on Internet/Intranet. The web site of the project is already launched (www.inaris.gen.in) and the multidimensional cubes, dynamic reports, GIS maps, adhoc-queries and information systems are already available to the users.

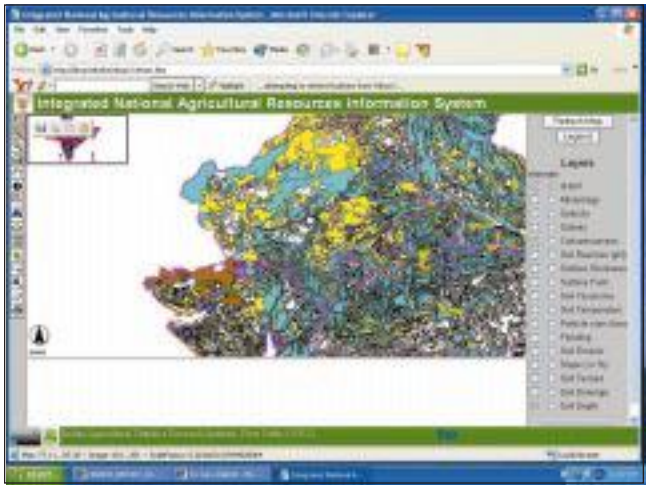
The information of this data warehouse are available to user in the form of decision support system in which all the flexibility of the



Dynamic report from CDW

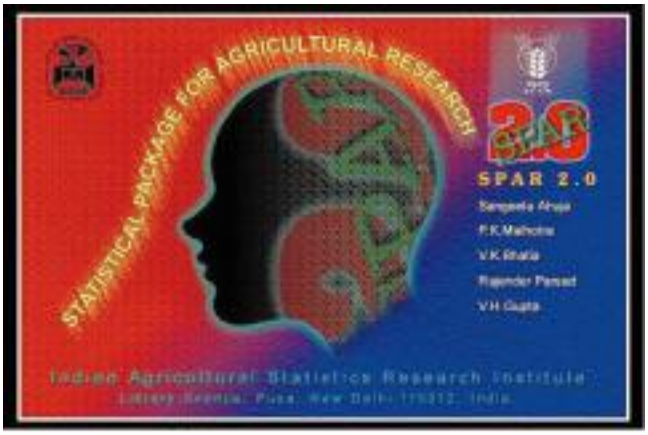
presentation of the information, its on-line analysis including graphic is inbuilt into the system.

The system also provides facility of spatial analysis of the data through web using functionalities of Geographic Information System (GIS). Apart from this, subject wise information systems have been developed for the general users. The user of this system has the access of subject wise dynamic reports through web. The facilities of data mining and generation of ad-hoc querries were also extended to limited users. Therefore, the dissemination of information from this data warehouse for different categories of users is through web browser with proper authentication of the users.



GIS map for spatial analysis

- In another NATP project 'Development of Expert System of Extension' an interactive website of Agricultural Extension was developed. This project was designed to help farmers to take appropriate decisions and disseminate need based research findings to millions of the farmers at a time, which was neither possible nor practicable by conventional system of extension. The extension website was also relevant as the conventional extension system was lacking human and financial resources to meet the needs of millions of the farmers in diverse agro-climatic conditions. Farmers information needs, effectiveness of the technology, efficiency of the website, its adoptability and cost was considered in very fast changing electronic scenario. Java Expert System Shell (JESS) was used to develop the Expert System. The system was built with a user-friendly utility to create the online decision trees to solve the various problems of the farmers. With the help of this web based utility, experts of different crops and domains can make decision trees to solve the problems from their locations and the website enables the farmers to find the solution of their problems in an interactive fashion. The decision trees can be developed for variety selection, identification of diseases, insect pests, weeds and their control measures etc. The expert system of extension developed is generic in nature and allows the entry of any crop and for any region of the country. Although keeping in mind the scope of this project under the limited resources and time only information of seven selected crops was considered. The expert system contains various user-friendly forms to capture the information.
- The development of the Statistical Package for Agricultural Research (SPAR 2.0) was completed. SPAR 2.0 is a Windows Version of SPAR 1.0 with some additional modules. It was developed to overcome the limitations of SPAR 1.0. This package has been developed in Microsoft Visual C++ 6.0 language, which is ideally suited for this job as it has powerful features and excellent numerical support. This package is user-friendly, interactive, password protected, completely menu-driven. Context-Sensitive Help with Index, Contents and Search facility has also been provided in the package. The package consists



Statistical Package for Agricultural Research (SPAR 2.0)

of the following eight modules, which have sub-modules for various type of data analysis:

- Data Management - (i) Editing of data and (ii) Transformation of data
- Descriptive Statistics - (i) Measures of Central Tendency, (ii) Measures of Dispersion, (iii) Generation of Moments, (iv) Measures and Coefficients of Skewness, (v) Measures and Coefficients of Kurtosis and (vi) Measures of Partition Values
- Estimation of Breeding Values - Generations Means (Six Parameter Model, Five Parameter Model, Three Parameter Model) and Scaling and Joint Scaling Tests
- Correlation and Regression Analysis - Estimates of the Regression Coefficients, Analysis of Variance of Regression, and Regression Equations (linear regression or multiple), Simple Correlation, Partial and Multiple Correlations, Validity of Test of Significance and Path Analysis.
- Variance and Covariance Components Estimation - Computation from ANOVA, Components of Variances such as Phenotypic Coefficient of Variation, Genotypic Coefficient of Variation and Heritability (broad sense), Standard Error and Critical Differences, Bivariate Analysis of Variance and Covariance Components such as Phenotypic Covariance, Genotypic Covariance
- Stability Analysis - (i) Eberhart and Russell's, (ii) Perkins and Jinks' and (iii) Freeman and Perkins' Models
- Multivariate Analysis - (i) Cluster Analysis, (ii) Discriminent Analysis and (iii) Principal Component Analysis
- Mating Design Analysis - (i) Complete Diallel, (ii) Partial Diallel, (iii) Line x Tester (with parents), (iv) Line x Tester (without parents), (v) Three Way Cross, (vi) Double Cross and (vii) North Carolina Designs Analysis

- Under the Institute project "Statistical Package for Animal Breeding (SPAB 2.0)" following twelve more modules were developed:
  1. Creation of variables for analysis
  2. Calculation of inbreeding coefficient
  3. Estimation of genetic gain
  4. Estimation of genetic trend
  5. Estimation of producing ability
  6. Principal component analysis
  7. Cunningham's selection index
  8. Sire evaluation using SRLS
  9. Sire evaluation using REML
  10. Simple sign test
  11. Paired sign test
  12. Wilcoxon signed rank test
- For 'Development of Expert System on Wheat Crop Management' information for four modules viz. variety selection, plant protection, cultural practices and harvest was collected from different sources and catalogued. Database for all the modules has been designed. Coding of two modules for developing the inference engine was completed. A major portion of variety selection module and plant protection module was completed. A requirement analysis workshop was organized in the Institute to discuss the requirement of the farmers and obtain the advise of the experts in developing the proposed expert system.

Information System for Agricultural and Animal Experiments

- Agricultural Field Experiments Information System contains the details of 19386 experiments conducted at various agricultural research stations in the country. The information of experiments stored includes location specification, objectives, treatments details, basal conditions viz. soil type, date of sowing/harvesting, seed rate, spacing, site history, design details, etc. The data stored can be retrieved as per the user requirements. The system has been modified using JAVA technology so as to make web-based system. The transformation of existing database into web-based system has been undertaken.
- National Information System on Long Term Fertilizer Experiments (NISLTFE) is being developed to store and maintain the data generated under long term fertilizer experiments conducted at various organizations under the Horticulture, Crop Sciences and Natural Resource Management Divisions of ICAR. NISLTFE is a web-based application using Java technology. The system has three layered architecture viz., Client Side Interface Layer (CSIL), Server Side Application Layer (SSAL) and Database Layer (DBL). CSIL has been developed using HTML and

Java Script whereas SSAL is implemented using Java Server Pages. DBL has been implemented using MS ACCESS 2000.

Linkages with the organizations engaged in LTFE were established and about 25 scientists were identified as Nodal Officers for supplying the necessary information and data for NISLTFE. Different information tables relating to various attributes under NISLTFE were prepared and accordingly the user interface was designed and developed for data entry and updation. Reports generation module wherein a variety of dynamic reports relating to different aspects of LTFE could be generated, is under preparation. Home Page and Logo of NISLTFE with related links were prepared.

- National Information System on Animal Experiments (NISAE) has been developed wherein the information relating to the experiments conducted in the country in various disciplines of Animal Sciences can be stored at a central place in a compatible form. The information stored includes location specification, species, breed, principal investigator, objective and salient results achieved, etc. The system is a web-based application using JAVA technology. The system has three-layered architecture viz., client side interface layer (CSIL), a service side application layer (SSAL) and database layer (DBL). CSIL has been developed using HTML, JAVA Script using browser as front end whereas SSAL is implemented using Java Server Pages. DBL has been implemented using Microsoft Access 2000.

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 Applications. The achievements made under this programme are outlined separately in 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 remains open from 9.30 a.m. to 4.30 p.m. on all working days. 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 2004-05 has been as under:

1. Dr. S.D. Sharma	Chairman
2. Dr. V.K. Gupta	Member
3. Dr. P.K. Malhotra	Member
4. Dr. H.V.L. Bathla	Member
5. Dr. Ranjana Agarwal	Member
6. Dr. V.K. Sharma	Member
7. Dr. V.T. Prabhakaran	Member
8. Dr. S.S. Kutaula	Member
9. Dr. V.K. Bhatia	Member
10. Dr. Jagbir Singh	BOS Member
11. Sh. A.K. Chaturvedi	Member (Till August 2004)
12. Sh. Chironji Lal	Member
13. Sh. H.K. Samaddar	Member (Till May 2004)
14. Sh. K.K. Hamza	Member (Since June 2004)
15. Dr. S.S. Srivastava	Member Secretary (Till October 2004)
16. Dr. P. Visakhi	Member Secretary (Since November 2004)

The internal administration and organisation of the library and documentation is supervised by Dr. S.S. Srivastava (Head Library) till 31 October 2004 and by Dr. P. Visakhi since 01 November 2004.

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

Home page of library information centre

Reprographic Service (Manual)
Computerized Services

1. Biblographical Database
2. On-line Database (Through Internet)
3. Off-line Searches (CD-ROM Database)
4. Current Content Service (JCC)
5. Internet Search
6. On-line Enquiry (OPAC)
7. On-line Journals (Through Internet)
8. Current Awareness Service (New Arrivals)
9. On-line Reservation of Document.

The following Computer Activities were done in the Library:

1. All resources have been bar-coded and house keeping operations like cataloguing, circulation have been computerized.
2. Conventional catalogue of books, journals, some of grey literature, Ph.D. thesis and M.Sc. dissertation have been computerized and kept on on-line for members to access.
3. Bonafide members have been issued electronic, bilingual and bar-coded Membership Card with Photo.
4. Available 28 On-line Journals (e-Journals)
5. Subscribing 3 On-line portals i.e.
   - MathScinet (http://www.ams.org./mathscinet)
   - Ingenta (http://www.gateway.ingenta.com)
   - Indiastat (http://indiastat.com)
6. Available the following CD-ROM Databases
   - Current Index Statistics (1955-2003)
   - AGRIS (1991 onwards)
   - Maths Science Disk (1940 Onwards)
   - AGRICOLA (1970 Onwards)
   - NUCSCI (1991 - 2001)
   - Energy Statistics of OECD Countries (1960-2000)
   - World Guide to Libraries Plus- 2003
   - UNCTAD Handbook of Statistics-2001
   - Ulrich's International Periodicals Directory
   - National Accounts Statistics (EPW) (1950–2001)
   - Domestic Product of States of India (EPWC) (1960-2001)
   - Rural Household Expenditure
   - Statistical Theory and Methods Abstracts (2002 Onwards)
7. Current Contents of Journals subscribed in Library are available for 2004 On-line.
8. Launched elaborated and well featured website of the Library (http://lib.iasri.res.in) with link to all resources and services available in the Library so that user can access these services from his/her work place.

Brief statistics relating to the library is as under:

S.No.	Item	Number
1.	Books added (English)	151
2.	Books added (Hindi)	296
3.	Grey literature added	110
4.	Indian and Foreign Periodicals subscribed	115
5.	Publication issued from the library	10325
6.	Publication borrowed or lent out on Inter-Library-Loan	38
7.	Readers visited and consulted the library	13528
8.	Scientific and Technical Papers Reprographied (Pages)	23375
9.	CD-ROM Data Bases Acquired	13
10.	Newsletters and Journals received on complementary basis	52
11.	Internet/Databases Access, Searches	1512

5

Technology Assessed and Transferred

Crop yield estimation at smaller area level using farmers' estimates

At present the estimates of average yield and crop production in the country are available at somewhat higher levels such as a state or district. With the growing demand for micro-level planning the need for building reliable estimates of crop yield at smaller area level (say, tehsil/block or even gram panchayat) is imperative. One alternative for meeting the requirement of building up precise estimators at smaller area level is to increase the number of crop cutting experiments. However, this is usually not possible due to cost constraints. Therefore, a new cost effective technique needs to be developed which could be adopted by the State Governments for estimation of yield of various crops at the smaller area level and also which is easy to handle by local agencies with marginal additions in the field work and the associated processing of data. Further, a need is being felt to review the present methodology being used for crop yield estimation and to explore the possibilities of simpler and cheaper alternatives. The study entitled Crop yield estimation at smaller area level using farmers' estimates funded by the Ministry of Statistics & Programme Implementation, Central Statistical Organization, was taken up with the objective of developing precise block level estimators of crop yield and to compare the farmers' eye estimates and the crop-cut estimates of yield.

As a part of this study a sample survey was carried out in Bhiwani and Sirsa districts of Haryana State in Rabi season (2002-03) on Mustard, Wheat and Bajra and in Kharif season (2003-04) on Cotton and Bajra in Bhiwani district and Cotton, Bajra and Paddy in Sirsa district.

To compare the estimates of yield obtained through the crop-cut approach vis-à-vis the corresponding estimates obtained from the farmer by inquiry, the

closeness of the two sets of estimates was examined vis-à-vis the actual production figures. Based on the results obtained from this study, it can be seen that the crop-cut estimates are closer to the actual production figures for the crops which are harvested in multiple rounds, in this case cotton. However, for the other crops covered in this study it is not possible to recommend one method of estimation of crop yield over the other.

Design for AICRP on STCR

- A design for fitting response surface for the AICRP on Soil Test Crop Response Correlations that shall incorporate the effect of both the inorganic and organic fertilizers into the models has been developed. The experiment is a symmetrical factorial of the type 3 × 3 × 3 and the number of runs is 24. The design has been approved in the National Workshop of AICRP on STCR held at Bhopal during January 23-24, 2005. All co-operating centres will now adopt the design. The design points finalized are given as follows:

S.No.	N	P	K	S.No.	N	P	K
1	1	2	2	13	3	3	3
2	2	2	2	14	3	3	2
3	3	2	2	15	3	2	3
4	2	1	2	16	0	0	0
5	2	3	2	17	0	0	0
6	2	2	1	18	0	0	0
7	2	2	3	19	3	1	1
8	1	1	1	20	3	2	1
9	2	1	1	21	3	3	1
10	1	2	1	22	2	2	0
11	1	1	2	23	2	0	2
12	2	3	3	24	0	2	2

For organic manure, 3 levels of OM and 3 strips are as:

	Strip 1	Strip 2	Strip 3
OM1	A	B	C
OM2	B	C	A
OM3	C	A	B

Where A, B, C comprise of 8 design points each. The composition of A, B, C is the following:

A	B	C
0 0 0	0 0 0	0 0 0
3 1 1 and 2 2 0	3 2 1 and 2 0 2	3 3 1 and 0 2 2
Any of the 5 points from 1 to 15	Any of the 5 points from the remaining 10 points (of 1 – 15)	Remaining 5 points

6

Education and Training

DEGREE COURSES

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

(i) Ph.D. (Agricultural Statistics)
(ii) M.Sc. (Agricultural Statistics)
(iii) M.Sc. (Computer Application)

Both Ph.D. and M.Sc. students are required to study courses not only in Agricultural Statistics but also in Agricultural Sciences like Genetics, Agronomy, Agricultural Economics, etc. The Courses in Mathematics, Agricultural Statistics and Computer Application, are offered at this Institute while the courses in Agricultural Sciences are offered at 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 during 2004-05 is as follows:

(a) **Ph.D. (Agricultural Statistics)**
Five students were admitted and four students completed the Ph.D. (Agril. Statistics) degree.

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

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

Details of students completed various courses during 2004-05 is as follows:

(a) Ph.D. (Agricultural Statistics)

1. Abhishek Rathore – Development of algorithms for computer aided search of optimal or nearly optimal designs

The present investigation is an attempt to develop new algorithms and obtain optimal/nearly optimal designs for various experimental settings. Research work is mainly divided in two parts. First part deals with computer aided search of optimal/nearly optimal block designs for making all possible pairwise treatment comparisons. Second part consists of developing algorithms for test treatments - control treatment(s) comparisons. The second problem is again divided into two parts (i) designs for the situations where one can not afford more than one replication of test treatments and (ii) where replications for the test treatments is possible. Using this algorithm, a search of the efficient designs for making all possible pairwise treatment comparisons was made for $v \leq 35$, $b \leq 50$, $k \leq 34$ such that average replication number of treatments is less than or equal to 20 and $v > k$. A total of 6474 designs with lower bound to the A-efficiency > 0.95 and D-efficiency > 0.968 were obtained. Out of these 6474 designs, 268 designs have efficiency more than 0.999. This excludes the Balanced Incomplete Block (BIB) Designs and 2-concurrence most balanced designs. Algorithm could obtain all the BIB designs for $v \leq 12$. A search was also made for the efficient designs for the parametric combinations for which either a BIB design does not exist or a combinatorial solution is not available for the number of treatments v (≤ 60). The efficiencies of the all the designs obtained are more than 0.9900. The designs generated using the algorithm are compared with existing catalogues of designs available in literature and found to be more efficient for several cases. Designs for the situations where one can not afford more than one replication of test treatments are known as augmented designs. The algorithm for generation of augmented designs has been converted in to computer software "Statistical Package for Augmented Designs" (SPAD). The software is capable of generating the randomized layout of the augmented design for given number of test treatments '*w*', control treatments '*u*' and number of blocks '*b*'. It computes the number of control replications in each block of the design that maximizes the efficiency per observation for the treatments *vs* control(s) comparisons. The flexibility of choosing the number of replication '*r*' of the control in each of the blocks is also provided. The randomized layout of the design is generated once the values of *u*, *w*, *b* are entered and *r* is chosen by the user. SPAD also analyzes the data generated from the experiments using augmented designs. Algorithm for computer aided search of optimal/nearly optimal designs for comparing test treatments with a control treatment has also been developed. Algorithm copes up with the situations where differential precision is required for two sets of contrasts, namely test *vs* test and test *vs* control contrasts. A search was made through algorithm for a set of parametric combinations where $w \leq 20$, $b \leq 50$, $n \leq 300$ and lower bound to A-efficiency ≥ 0.95. A large number of designs with A-efficiency ≥ 0.95 were obtained. Out of these, 66 are A – optimal and 22 have A-efficiency ≥ 0.9999. For the efficient designs obtained through the computer search, a robustness study against different values of ρ, a function of inter and intra block variances and α, a non-negative weight given to treatment *vs* treatment comparisons, for a fixed and mixed effects model was carried out. Computer aided search was also made to obtain block designs for the situations, where the experimenter is interested in comparing several treatments with more than one control with unequal precision. Execution of algorithm gave a large number of efficient designs whose efficiency is ≥ 0.95, for parametric combination $v \leq 17$, $b \leq 28$, $n \leq 300$. Out of these designs 222 designs were A-optimal and 49 designs were having lower bound to A-efficiency ≥ 0.9999.

(Guide: Dr. V.K. Gupta)

2. K.P. Chandran—A study on some aspects of nonlinear statistical models in agriculture

Nonlinear growth models, viz. monomolecular, logistic and Gompertz models are widely employed in

agricultural research. These models generally assume that carrying capacity of the system is constant. However, for describing plant disease dynamics, evidently plant parts (viz. number of leaves or number of panicles) no longer remains same but also grows over time. So, for a more realistic modelling, it is desirable to incorporate this aspect in the above models. Accordingly, generalized nonlinear growth models with upper asymptote following a growth model, are developed. As an illustration, corresponding generalized nonlinear statistical models are applied to data on powdery mildew development of mango varieties, using constrained optimization in Levenberg-Marquardt iterative procedure and characteristics of importance for disease progress dynamics are computed on the basis of fitted models. In many situations, underlying functional form may not be known. So in these cases, using a parametric model with a specific form is not recommended. A very promising approach of nonparametric regression analysis has recently been developed to address this problem. This approach is flexible and robust to deviations in underlying functional form, since there is no assumption on the form of the function. Most popular method of local linear regression smoother is studied in detail. As an illustration, modelling and forecasting of country's annual rainfall data is carried out. However, above methodology is not applicable when data is affected by the presence of outliers or jump points. Accordingly, a robust approach for nonparametric regression to deal the problem of outliers is thoroughly discussed. The methodology is applied to model monthly onion arrival data and has performed better than Seasonal ARIMA approach. Similarly, standard methodology has to be modified to model situations where change points or sudden jumps are present in the data series. Accordingly, nonparametric regression methodology with jump points is studied. Relevant computer programs are developed for estimating location and size of jumps and for computing critical values for testing the significance of jump size. This methodology is successfully applied to statistically examine jump in productivity of oilseeds after setting up of "Technology Mission on Oilseeds". Extension of the standard nonparametric regression methodology for autocorrelated errors is also considered. Further, when more than one explanatory variables are present, for application of nonparametric methods, too many data points are required. This 'curse of dimensionality' can be handled by application of additive approach. Methodology for two explanatory variables, using local linear kernel regression is studied in detail. Here individual effects of each variable can be separated out as demonstrated with data from the field of agriculture. The usual parametric approach for growth rate analysis is to assume multiplicative error in the underlying nonlinear geometric model and then to fit the linearized model by "Method of least squares". As this methodology is having many drawbacks, new approaches (both parametric and nonparametric) are suggested, which are demonstrated by applying to country's food grain production data.

(Guide: Dr. Prajneshu)

3. Sumanta Kumar Das—Application of multiple frame sampling techniques for crop surveys using remote sensing satellite data

Agriculture is the most important sector of Indian economy for collection and compilation of agricultural statistics, at present the agricultural statistics system is mainly based on the data obtained by the primary reporter of every village (commonly known as Patwaries). Acreage estimates are developed after complete enumeration of all fields whereas yield estimates are obtained through General Crop Estimation Surveys (GCES) based on crop cutting experiments. The current system however suffers from a number of drawbacks. With the advent of remote sensing technology efforts are being made to use remote sensing satellite data to estimate crop statistics. Conventional acreage estimation by satellite data is based on crop discrimination using supervised maximum likelihood classification. However this method has a number of limitations. First, necessary ground information to train the classifier is not always available or is difficult to obtain. Next, it does not consider the spatial aspects of crop growth. In this method a pixel is assigned to the class having the highest probability. However many times a pixel may not exclusively lie in one class or composed exclusively of one material as field sizes in our country are small and several crops may be growing in neighboring fields. Most classifiers rely on a Gaussian probability distribution of the spectral signature of the training data, which often exhibit a non-Gaussian distribution.Fuzzy classification based on indicator kriging can eliminate various limitations of

usual supervised hard classification. In the present study fuzzy classification of satellite data for crop acreage estimation has been developed and the relative proportion of different classes in a pixel are determined by blocked indicator kriging. In order to evaluate the fuzzy classifier approach to sub pixel evaluation, the spectral signature of the desired classes are used. To compare the efficiency of fuzzy classification by indicator kriging we have classified the satellite data for different land cover classes using both supervised maximum likelihood and fuzzy classification. It has been seen that fuzzy classification based on indicator kriging gives reasonable accuracy compared to supervised maximum likelihood classification. it has also been shown that remotely sensed satellite data can be used effectively as area frame for conducting crop yield estimation surveys. The effectiveness of the satellite data to be used as area frame depends on their aerial and spatial resolution. Fine resolution data is costly and aerial coverage is less, whereas coarse resolution data has larger aerial coverage but poor spatial resolution. Since spectral reflectance is a manifestation of integrated effects of all inputs like weather, soil and agricultural practices, it is expected to have a very high correlation with crop vigor and hence the crop yield. An attempt has also been made to apply the multiple frame estimation technique for crop yield estimation when the satellite data is multistratified by different spectral vegetation indices. An empirical study to estimate the yield of wheat crop for district Rhotak, and Haryana state for the year 1997-98 using Indian Remote Sensing (IRS-1D), LISS-III & WIFS data has been conducted. It has been found that multiple frame-sampling estimator is considerably more efficient as compared to conventional estimators. The growth rate of a plant is dependent upon the amount of heat it receives and whether a crop, weed or disease, an organism is adapted to grow at its optimum rate within a specific temperature range. Within this range, the growing degree days (GDD as agro-meteorological index) is the heat accumulation above a given base temperature for a specific period, such as a crop's growing season or phenological stages. A methodology to predict GDD for synthetically generated average growing seasons derived from average climatic data over the Haryana state has been given. An application of these techniques has been made using monthly temperature data to characterize optimum growth of wheat. The predicted GDD surface along with the NDVI are used to predict the wheat yield over the entire Haryana state applying both the ordinary linear regression technique and spatial regression technique. It has been found that prediction of daily temperature is possible using monthly temperature generator.

(Guide: Dr. Randhir Singh)

4. Sunil Kumar, G.—Some investigations on statistical modelling in agriculture

Bilinear family of nonlinear time-series models is thoroughly discussed. A heartening feature is that it is able to capture sharp discontinuities or spikes present in the data. As an illustration, India's marine products export data during the period 1961-62 to 1998-99 is considered. Based on Normalized Akaike Information Criterion (NAIC), appropriate bilinear time-series model is fitted by applying Newton-Raphson iterative procedure. Stability test, used for forecasting hold-out data, is performed on fitted model. Out-of-sample forecasting based on optimal nonlinear predictor is derived theoretically and is then applied to given data. Mixture nonlinear time-series models may be employed to describe those data sets that depict sudden bursts, outliers and flat stretches at irregular time epochs. Various models, viz. Gaussian Mixture Transition (GMTD), Mixed Autoregressive (MAR) and MAR-Autoregressive Conditional Heteroscedastic (MAR-ARCH) are thoroughly studied. Weekly wholesale onion price data during April, 1998 to November, 2001 is considered. Estimation of parameters is done using Expectation Maximization (EM) algorithm and the best model is selected on basis of Bayesian Information Criterion (BIC). Out-of-sample forecasting is performed for one-step and two-step ahead prediction by naive approach. It is concluded that, for data under consideration, a three-component MAR and a two-component MAR-ARCH is the best in respective classes. Further, identified MAR-ARCH model is also shown to perform better than three-component MAR model identified earlier in terms of having fewer numbers of parameters and lower BIC value. Threshold Autoregressive (TAR) types of models are of great importance in the field of agriculture, as, quite often, the time series data depicts cyclical fluctuations. These models are studied and applied to country's lac export data during the period 1901-2003, obtained from annual reports of Shellac Export Promotion Council, Kolkata.

It is shown that fitted model, based on minimum Akaike Information Criterion (AIC) value, exhibits a threshold behaviour. Finally, attempts are made to forecast out-of-sample data, which is found to be quite satisfactory. Wavelet analysis with thresholding can be viewed as a powerful alternative for traditional nonparametric regression. This methodology is thoroughly discussed. As an illustration, modelling and forecasting of annual rainfall data of East U.P. meteorological subdivision is carried out. Comparison with traditional approaches, like Autoregressive Integrated Moving Average (ARIMA) time-series approach and nonparametric regression, shows superiority of proposed methodology for data set under consideration. Similarly, wavelet methodology is applied to detect jumps or change points present in data on oilseed yield of the country using wavelet coefficients at finest levels. To this end, various thresholding procedures are studied. It is shown that wavelet analysis with hard thresholding provides a statistical evidence of jump in productivity of oilseeds, thereby demonstrating success of "Technology Mission on Oilseeds". Wavele thresholding methodology is applied to describe country's marine fish production data during 1971 to 2002. Residual analysis reveals presence of autocorrelation and so extension of the level independent thresholding to level dependent wavelet thresholding methodology for autocorrelated errors is considered. It is shown that this methodology is superior to well-known ARIMA and nonparametric regression with autocorrelated errors methodologies.

(Guide: Dr. Prajneshu)

(b) M.Sc. (Agricultural Statistics)

1. Dharam Nath Jha — Some analytical techniques for On-farm trials data

On-farm trials in the National Agricultural Research System are conducted under the aegis of All India Co-ordinated Research Project on Cropping Systems, Project Directorate for Cropping Systems Research, Modipuram. Planning, designing and statistical analysis of these trials are undertaken at Indian Agricultural Statistics Research Institute, New Delhi. The main objective of these trials is to test the performance of recommendations that are made on the basis of experiments conducted at research station. The data from these trials are also used for obtaining fertilizer response ratio.

Fertilizer response ratio has been defined as increase in output of crop in kg for per unit use of fertilizer in kg. Earlier attempts were made to obtain the fertilizer response ratios on the basis of yield of crop without considering the availability of nutrients in the soil, before sowing of crop and also that was on macro level i.e. at country level or at state level. In this study fertilizer response ratios have been worked out in terms of kg/kg i.e. response of nutrient for per unit application of fertilizer for each of the on-farm trials conducted on wheat crop during 2000-2001 in the country. The response ratios have been worked out for various groups formed. Groups have been formed by (i) Natural grouping i.e. at administrative unit basis (ii) using classification of soil as Low, Medium and High (iii) Cluster analysis and (iv) Principal component analysis as per the availability of initial N, P and K in the soil of the farmers' field. Among these grouping methods, grouping based on classification of soil as Low, Medium and High for the availability of N, P and K seems to be of importance as various response ratios i.e. response to N, response to P over N, response to K over N etc. are significantly different in many of the groups. This confirms the assertion that the initial soil test value should be taken into consideration for deciding the amount of fertilizer to be applied to the crop and by this one can make recommendation for that field.

For the identification of the best technology for a given development block, the appropriate analytical procedures needs to be developed. The analytical procedure used at present for combined analysis of data over Farming Situations ignores the variability between blocks (FS), Villages (Block FS), treat × block (FS). Although some researchers have taken care of these variability factors, considering all these effects as fixed. Since FS, development blocks and villages are a random sample from a totality of villages, therefore, these effects and effects depending upon these factors are random. In this study a method has been developed to analyse on-farm trials data, which assumes all factors as random except treatment in the model. By using this method, comparison of treatments within blocks and FS could be carried out and one can identify the treatments that are the best in a given development block and for a given farming situation.

(Guide: Dr. P.K. Batra)

2. Mir Asif Iquebal—Estimation of heritability of threshold characters using auxiliary traits

The assessment for improvement of dairy animal is generally evaluated by various characteristics such as production status, resistance to disease and adaptability to the changing environment. This is the aptitude of the animal to stay healthy and productive in the herd. This characteristic is not only important from economic point of view but is also very important for making room for heifer replacements. This characteristic has been defined in various ways and is directly associated with the longevity/survival/retention status of the animal in the herd commonly known as "stayability". It becomes more important if the net effect of production and other related or unrelated characters are eliminated from stayability to get the true picture of stayability along with its estimate of heritability. Different methods of analysis of stayability and its measures are critically reviewed. The effect of single character adjustment (production) is already available in the literature. The present study has been taken into account to observe the effect more than one auxiliary traits on estimates.For estimation of heritability of stayability (herd life), we considered it as a threshold character. The estimates are obtained using mainly beta-binomial approach and Dempster-Lerner method. Individual narrow sense heritability and family mean heritabilities are computed. For judging the closeness to the true heritability and its precision the relative root mean square errors are used. The effect of non-normality is also studied.The estimate of stayability in terms of herd life adjusted for production and other related as well as unrelated characteristics has been discussed with standard error and root mean square error. It is observed that two characters adjustment always plays significant role. The unbalancedness may induce inconsistency in the results. The procedure based on real data (with transforming to binomial character), beta binomial and Dempster-Lerner shows encouraging results where as procedure based on family mean exhibit very unreliable estimates of heritability. Among the methods which are relatively good, besides the method based on real data, the beta binomial is by and large a good procedure of estimation of heritability of stayability for different situation of parametric values of heritability and points of truncation. It is observed that Lognormal distribution (near to Normal distribution) gives encouraging result as compared to Gamma distribution (far away from Normal distribution) in case of related trait whereas Gamma distribution gives stable performance for unrelated trait.

Finally it is concluded that heritability of stayability is a very important genetic parameter and has to be estimated with extra care. Whenever prior information on the relationship between stayability, production and other reproductive traits are available, one should go for adjustment of two characters for arriving the true estimate of heritability because a small adjustment in the estimate of heritability plays a significant role in formulating further breeding strategies for genetic improvement. It is also seen that consistent estimates are found in case of Normal distribution, otherwise stable results are not found except the case of two character adjustment.

(Guide: Dr. A.K. Paul)

3. Sarika - A study on the robustness of estimates of genetic correlation

The knowledge of genetic correlation among different economic trait is must for halting the decline in the other traits while allowing improvement in a particular trait. This is also useful in obtaining simultaneous improvement in two or more than two characters at a time by constructing a suitable selection index. Most of the economic characters in agricultural crops and dairy animals are quantitative in nature and are correlated among themselves and the environment in which the genotype is produced or grown. The breeders use this variability and covariability for improvement in the characters through efficient selection strategies. The formulations of sound and efficient selection programs are possible only when we have the complete information about the genetic properties of the population as well as the characters. The present investigation was conducted to study the robustness of estimates of genetic correlation towards the influence of non-normality and the outliers on the estimates of genetic correlation. The genetic correlation estimates were obtained by the variance covariance components under half sib model. The simulation using statistical-biological models given by Ronningen (1974) was done for various combinations of sires (i.e. 10,15 and 20) and number of offsprings per sire (i.e. 10,15,20,25 and 30). Three levels of genetic and environmental correlations as 0.1,0.25 and 0.5 and three levels of heritability viz. 0.1,0.25 and 0.5 were taken in the

present investigation. Data were simulated for all the above combinations following normal distribution, beta I distribution and in the presence of outliers introduced under normal distribution. The results showed that the genetic correlations were underestimated and had negative bias in most of the cases when the genetic correlation was low as compared to the higher genetic correlation irrespective of the distribution of data. The estimates of standard error as well as the mean square error showed the decreasing trend with the increase in sample size and family size for each of the above said three situations. The probability of inadmissible estimates too showed the decreasing trend as the sample size increases under normal distribution, beta I distribution and the presence of outliers. The deviation from the normality assumption increases the magnitude of estimates of standard error and mean square error. The standard error estimate decreases as the environmental correlation and heritability of correlated traits increases in the population under normal distribution, beta I distribution and in the presence of outliers. It was also found that in the presence of outliers, the estimates of standard errors as well as the mean square errors were higher for the given population parameters and sample size as compared to the data under normal distribution and beta I distribution. The estimates of standard error and mean square error get stabilized for sample size 500 for all the above combinations of population parameter. It shows that at least sample size 500 is required for the precise estimate of genetic correlation.

(Guide: Sh. S.D. Wahi)

4. S. Selvaganapathi—A statistical investigation on growth and variability in the production of gram and tur in India

Indian population is predominantly vegetarian; the pulses constitute its major source of protein. The per capita availability of pulses has reduced to almost half from about 60 gram per day in 1950-51 to 26 gram per day in 2001-2002 as against the recommendation of 43 gram per day of the Indian Council of Medical Research. Among pulses, gram and tur constitute the important pulse crops which together occupy more than 50% of the pulses area and account for 60% of the production at all India level (2001-02). Therefore, the study was confined to these two crops and was based on the state level time series data from 1950-51 to 2001-02 on area, production and yield collected from "Estimates of Area, Production and Yield of Principal Crops in India" published by the Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India. The period 1950 – 2002 was divided into five sub-periods consisting of decades. A decomposition of change in production in each decade into its constituent components, viz., change in area, yield and their interaction was carried out for both the crops. The growth in production of the crops was examined for their sources, namely, area and yield by fitting compound growth models using the non-linear Levenberg-Marquardt algorithm. Besides, magnitude of fluctuations in the production of the crops was measured using, "Measure of relative fluctuations" which allowed its decomposition into variation due to area, yield and their interaction.

The study revealed that the stagnation or low rates of growth and high fluctuations were the two important characteristics of the yields of gram and tur crop at the all India level. Besides, the acreage of both the crops either stagnated or witnessed a negative growth. The negative growth in acreage implied that the crops were loosing their place in the cropping pattern due to low profitability relative to their competing crops. The fluctuations in yields seemed to be the effect of sensitivity of the existing varieties to vagaries of weather and proneness to insects, pests and diseases. Therefore, to step up the growth in production and yield of these pulses the need is to evolve crop production technologies suiting to various agro-climatic regions of the country and also to help the farmers by providing them seeds, plant protection measures and extension services.

(Guide: Dr. V.K. Sharma)

5. Susheel Kumar Sarkar — Some analytical techniques for growth data on pigs

Pigs are a good source of fat and protein. They are accepted not only among the poor people but also in well to do families when they are reared in good hygienic conditions. Pigs play an important role in increasing meat (pork) production because of their high proficiency, faster growth, excellent feed convergence and shorter generation interval. This study, deals with some analytical techniques such as profile analysis, multivariate analysis of variance, of growth (repeated

measures) data and some non-linear growth models of body weight on pigs. The technique of profile analysis, a multivariate technique, gives a detailed analysis of growth data. The data for present study were used of two research locations viz. Jabalpur and Triputi for the period 1986-1990.

From profile analysis it is observed there is no interaction between groups by time points, there is no difference among groups (male and female) but significant difference was observed among the time points for the data on both the research locations. Since there is interaction among groups by time points, so we can say that the growth of male and pigs is similar (parallel) at different time points. Further, the growth trend of pigs is studied by using the non-linear growth models. It is because the behaviour of growth of pigs may be non-linear. Moreover the non-linear growth models give better insight and are more realistic. Thus the fitting of models Exponential, Gompertz, Logistic and Monomolecular have been attempted. For selection of best fitted model, various statistics viz. mean absolute error (MAE), root mean square (RMSE) and absolute percentage error (MAPE) have been used. The best fitted models for Jabalpur and Tirupati research stations for male and female pigs were studied and Gompertz model was found to be best fitted model in six situations and Logistic model in two situations. Moreover the shape of the curve of body weights seems to be follow the Gompertz trend. Thus, in general, we can say that Gompertz model is the best fitted model for the pigs maintained at Jabalpur and Tirupati research stations.

(Guide: Dr. Krishan Lal)

(c) M.Sc. (Computer Application)

1. Nilbrata Goswami — On Line Agricultural Research Farm Management Information System

The present era has seen an exponential growth and diversification in all forms of information, which is sometimes called, as 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 types of organizations, whether small or large, public or private, national or multinational. Information systems exist for almost all the fields may be IPM, Farm Management, Decision Support System, Expert System etc. ARFMIS is a web based user-friendly, integrated solution for the farm management activities, developed in Java Server Pages (JSP). It is developed as comprehensive farm management software for Indian Agricultural Research Institute (IARI) research farm. It has a three-layered architecture. Client Side Interface Layer is implemented in HTML and JavaScript. Server Side Application Layer is implemented in Java Server Pages and Java Database Connectivity. Database Layer is implemented in Microsoft Access 2000. ARFMIS can be implemented as a network-based system with a server at IASRI so that information is available on-line. ARFMIS runs at any node of the Internet through a browser. Security features are provided in such a way that only concerned person can access the database. There is provision to insert and update the information. AFRMIS assists in informing land and its distribution, types of soil, information on soil testing results, the nutrient status of soil, water resources, information on implements used (tractors, other assets etc.), inputs being used, information on land preparation, information on fields/plots, crops and varieties sown, information on sowing (direction, time of sowing etc), information on seeds (seed rate etc.), information on treatments used in the experiment, information on fertilizers being used, other inputs (electricity, water etc.), manpower used, irrigation schedule, incidence of weeds, pests and diseases, information on important pesticides applied, climatic information (temperature, precipitation, rainfall, humidity etc.), information on harvesting and storage. ARFMIS provides search facility for plot, crop, variety, soil type, fertilizer, infestation, water source and year wise information. The software also provides keyword wise searching facility. Users can also view customized reports on various aspects of farm. User can interact with subject specialists through email. On-line help is provided for both administrator and user. The feature of providing information to users through frequently asked questions has also been included. Information on various activities being undertaken in various divisions of IARI is also available in ARFMIS.

(Guide: Dr. P.K. Malhotra)

2. Ram Manohar Patel—Development of Markov chain crop forecast modeling software

Crop yield forecasts are quite useful in formulation of policies regarding stock and distribution of agricultural

produce to different areas of any country. One among the various statistical approaches in vogue includes models based on Markov chains for providing objective forecasts of crop yields well in advance before harvest for taking timely decisions. A situation, which takes the form of a chain of stages with a limited number of possible states (plant condition classes) within each stage, is called a Markov chain if there is a case of simple dependence that any state of a particular stage depends directly on any of the states of the preceding stage. However, for dealing with the key features of Markov chains like estimation of transition probability matrices, predicted yield distributions etc. to get final forecasts, the computational efforts are tedious. One has to either take recourse to writing programs or use statistical packages. Many standard statistical software packages cater to analyze data and obtain forecasts only using the traditionally used regression models. No single software has tailor-made and customized module to get forecast using Markov chain modeling. Hence a user-friendly software (MC-FOMOS) has been developed based on Markov chain model. It can be used in any platform having Java Virtual Machine (JVM), Java being a platform independent language, programming has been done in Core Java (for back end) and Java Swing (for front end). For testing the software, two years data on biometrical characters and yield collected by IASRI, New Delhi under the "Pilot study on pre-harvest forecasting of sugarcane" in Meerut district were utilized. MC-FOMOS builds first order finite Markov chain model. The software allows up to 20 stages (excluding the harvest stage for first year) depending upon the crop, in the Markov chain model, 16 states within each stage and four variables can be considered within each stage. Minimum ten records are required for performing analysis through this software. It has online help at each screen. The software shows output in terms of the expected crop yield (forecast) at various stages.

(Guide: Dr. R.C. Goyal)

3. Sanjeev Kumar - Online data management system for long term fertilizer experiments

Online data management systems exist for almost all the fields may be Farm Management, Industry Management or Satellite Management etc. (ODMSLTFE) is an attempt to develop such a web based user-friendly, integrated solution for the data management activities. It is developed as online data management system for long term fertilizer experiments. It has a three-layered architecture. Client Side Interface Layer implemented in HTML and JavaScript, Server Side Application Layer in Java Server Pages and Java Database Connectivity. Database Layer is implemented in Microsoft Access 2000. ODMSLTFE can be implemented as a network-based system with a server at a central location (IASRI) so that information is available on-line. ODMSLTFE runs at any node of the Internet through a browser. Security features are provided in such a way that only concerned person can access the database. There is provision to insert and update the information. ODMSLTFE provides centre information, experiment information, crop information and attribute information. Centre information includes location of the centre and related information. Experiment information includes title and objectives of experiments, name of statistical designs, number of replications and treatments, mid course bifurcation done in the experiment (if any), number of original treatments bifurcated and number of superimposed treatments within the original treatment. Crop information includes crops category, crops and their varieties name, treatment input doses, sowing and harvesting date, and crop damage with reason (if any). Attribute information includes yield data like grain and straw, primary, secondary and micronutrients uptake data by plants, available soil nutrients and other characters and weekly weather parameters. ODMSLTFE provides search facility for centre information, experiment information, bifurcate information, weather parameters, crop information, fertilizer dose, experimental data, and experimental data with bifurcated treatments. User can interact with concerned people through e-mail. On-line help is provided for Administrator, Nodal administrator and Users. Further, the features of providing information to users through frequently asked questions are also incorporated.

(Guide: Dr. I.C.Sethi)

Revision of Course Curriculum

(a) Discipline of Agricultural Statistics

An intensive exercise was under taken to revise the M.Sc. and Ph.D. courses in the discipline of Agricultural

Statistics with a view to weed out the obsolete topics/ courses and to add new topics/courses keeping in view the current need and the latest developments in the subject. The courses were updated which also included a two credit separate course on Probability Theory (AS-160) and introduction of two new courses namely, AS-171: Bio-informatics-I (3L+1P), and AS-208: Bio-informatics-II (2L+1P).

(b) Discipline of Computer Application

A comprehensive exercise was carried for the revision of course curriculum. The courses have been renamed from CS to CA, revised, renumbered and rescheduled. Six new courses namely CA-101: Computer Fundamentals and Programming (3L+1P), CA-212: Computer Graphics (2L+1P): CA - 213: Artificial Intelligence (2L+1P): CA-214: Internet Technologies and Applications (2L+1P): CA-221: Data Warehousing and Data Mining (2L+1P) and CA - 222: Multimedia and Applications (1L+1P) have been added in the emerging area in IT. There will be 24 courses consisting of 71 credits (49L+22P) after the revision.

The modified courses and new courses have been included in the new PG School Calendar.

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 Institutes 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 07 July 2004 to 27 December 2004. The course comprised of two independent modules of three months duration each. Eight officials including two international participants from Gambia participated in both the modules. Module –I was organized during 07 July 2004 to 27 September 2004.Two officials participated in Module–I only. Module–II was organised during 06 October 2004 to 27 December 2004. 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 27 December 2004 in which Dr. S.D. Sharma, Director,IASRI distributed the certificates to successful participants.

SUMMER/WINTER SCHOOL/SHORT PROGRAMME

A Winter School on “Sample Survey Techniques in Agricultural Research”, was organised at the Institute during 11-31 January 2005. The participants were Assistant/Associate Professors from SAUs and Scientists from ICAR Institutes.

A participant receiving the certificate during Valedictory Function of Winter School of Sample Survey Techniques in Agricultural Research

PROGRAMME UNDER CENTRE OF ADVANCED STUDIES

- A 21 days training programme on Recent Advances in Biometrics under Centre of Advanced Studies in Agricultural Statistics and Computer Application was organised from 24 November to 14 December, 2004 with the objectives: (i) To familiarize the participants with the recent advances in the field of Biometrics and other useful statistical and computational tools applied in the areas like Plant/Animal Breeding, Genomics

Inauguration of a training programme on 'Recent Advances in Biometrics' under CAS

and Bioinformatics (ii) To acquaint the participants with the statistical software packages used in the analysis of data (iii) To help upgrade the research and teaching skills of the participants. The programme was structured in a series of modules such as, some preliminaries on statistical genetics, introduction to computers and use of statistical software packages for data analysis, advanced statistical methods in breeding and genetics, statistical and computational techniques in genomics and bioinformatics and statistical modeling in biological phenomena with 54 class room lectures and practicals on computers, including the demonstration of software packages. One reference manual, giving the details of the lectures, was compiled, edited and distributed to the participants. An electronic reference manual in the form of CD was released by the Director of the Institute and the same was also distributed to the participants. The training was imparted by distinguished faculty comprising of 26 members including 7 guest faculty from outside the Institute. The course was attended by 23 participants from various Institutes of ICAR and SAUs. The training programme was widely appreciated by the participants, particularly for giving special emphasis on the emerging topics like Bioinformatics and Genomics.

- A training programme on Advances in Designing and Analysis of Agricultural Experiments under Centre of Advanced Studies was organized from 03 to 23 February 2005. In all 20 participants from different disciplines (Soil Science, Microbiology, Agricultural Statistics, Agronomy, Floriculture, Economic Botany, Agricultural Economics) and from different ICAR Institutes (12) and State Agricultural Universities (8) attended this training. The training covered various topics on design and analysis of agricultural experiments alongwith use of statistical softwares, viz., SAS, SPSS etc. The participants were also exposed to the information systems and statistical softwares developed in the Institute.

Valedictory function of a training programme on 'Advances in Designing and Analysis of Agricultural Experiments' under CAS

OTHER TRAINING PROGRAMMES

Following training programmes were organised at the Institute:

(i) The Institute organized a training programme on "Sampling Techniques, Sample Surveys and Methodological Aspects relating to Cost of Cultivation Studies", for senior level Officers of Tariff Commission, Ministry of Commerce and Industry, Govt. of India, during 16-21 August 2004. The broader objective of the training programme was to make the participants familiar with sample survey techniques and different aspects relating to cost of cultivation of crops. Nine senior level Officers of Tariff Commission participated in this training programme. A number of lectures on different topics relating to its broader objective were planned. The Resource Persons were from the Institute Faculty as well

Inauguration of Training Programme on 'Sampling Techniques, Sample Surveys and Methodological Aspects relating to Cost of Cultivation Studies' for officers of Tariff Commission, Ministry of Commerce, Government of India

Dr. VK Gupta, Joint Director delivering the lecture to the participants of a Training Programme

as Officers from other Organizations. For this Course Introductory Session was organised at the Institute on 16 August 2004 and Valedictory Function was organised on 21 August 2004.

(ii) A training programme was organized on "Statistical tools for data analysis" during 23-28 August 2004 at IASRI for Scientists/RAs working at Cooperating centres under NATP project " Development of Weather Based Forewarning Systems for Crop Pests & Diseases". The faculty comprised of the scientists (working in this project) and the technical officers of the Institute. The purpose of this programme was to impart in-depth understanding about the techniques/ models developed at the Institute under the project. The schedule comprised of the lectures and demonstration of the techniques on the topics - Overview of Forecasting Techniques in Pests and Diseases, Methodology for Weather Indices Technique & Growing Degree Days, Principal Component and Discriminant Function Analysis, GMDH Technique, Models for Qualitative Data, Deviation Method and Non-linear Models. Apart from these, the analysis of data from the respective centers was also demonstrated. Thus it was an opportunity, not only for the participants but also for the scientists at IASRI associated with the project to have an interaction with the workers at different centres and find solutions of the problems arising in analysis of the data. There were 28 participants in the programme.

(iii) Thirteen participants of International Statistical Education Centre (ISEC) sponsored by Ministry of Statistics and Programme Implementation, New Delhi visited on 27 October 2004 and one day training was arranged for them.

(iv) Three training programs were organized on 'Working with INARIS data warehouse' for participants from ICAR Institutes during 13-15 September 2004, 01-03 November 2004 and 08-10 November 2004.

(v) Five two-day training programs were organized on 'Exposure and usage of Personnel Management Information System' during 19-20 July 2004, 23-24 July 2004, 17-18 August 2004, 1-2 September 2004 and 8-9 September 2004. 185 Nodal Officers from all ICAR Institutes, NRC's, PD's & Bureau attended these programmes.

Director releasing the User Manual for PIMSNET

(vi) Eleven probationers of Indian Statistical Service sponsored by Ministry of Statistics and Programme Implementation, New Delhi visited on 25 November 2004 for one day training programme.

(vii) A training programme for the personnel of E.I. Du Pont India Private Limited was organized during 25-26 November 2004. Twelve participants attended the training programme. A total of 12 lectures were organized during the training programme.

Inauguration of Training programme for the personnel of E.I.Du Pont India Pvt. Ltd.

Discussion with the participants during a training programme

(viii) Twenty four participants attended the course on Large Sample Survey on 28.01.2005 and were sponsored by Ministry of Statistics and Programme Implementation, New Delhi.

Research Fellowships

During 2004–05, 14 Ph.D and 20 M.Sc. students received research fellowship. 13 Ph.D. students received IARI Scholarship at the rate of Rs.4400/- p.m. in addition to Rs.10,000/- per annum as the contingent grant. One Ph.D student received CSIR fellowship at the rate of Rs.8000/-p.m besides Rs.20000/- per annum as the contingent grant. Eleven M.Sc. students received ICAR Junior Research Fellowship at the rate of Rs. 3600/- p.m. besides Rs.6000/- per annum as the contingent grant and nine M.Sc. students received IARI Scholarship at the rate of Rs.3200/- p.m. besides Rs.6000/- per annum as the contingent grant.

Joint Director addressing the students of M.Sc. and Ph.D. during the orientation programme

Faculty members/scientists during orientation programme

Faculty members of P.G. School, IARI, in Agricultural Statistics

S. No.	Name	Year of induction
1.	Dr. V.K.Gupta, Joint Director	1984
2.	Dr. V.K.Sharma, Professor (Agricultural Statistics)	1984
3.	Dr. Randhir Singh, Principal Scientist	1974
4.	Dr. Prajneshu, Principal Scientist	1984
5.	Dr. V.T.Prabhakaran, Principal Scientist	1987
6.	Dr. V.K.Bhatia, Principal Scientist	1987

7.	Sh. S.D.Wahi, Principal Scientist	1987
8.	Dr. Ranjana Agarwal, Principal Scientist	1988
9.	Dr. H.V.L.Bathla, Principal Scientist	1991
10.	Dr. R.Srivastava, Principal Scientist	1993
11.	Dr. U.C.Sud, Principal Scientist	1995
12.	Dr. K.K.Tyagi, Principal Scientist	1995
13.	Dr. Chandrahas, Principal Scientist	1996
14.	Dr. P.K.Batra, Principal Scientist	1996
15.	Mrs. Asha Saxena, Principal Scientist	1998
16.	Dr. Amit Kumar Vasisht, Principal Scientist (at IARI)	1998
17.	Dr. Rajender Parsad, National Fellow	1995
18.	Dr. Anil Rai, Senior Scientist	1995
19.	Dr. Seema Jaggi, Senior Scientist	1995
20.	Dr. Jagbir Singh, Senior Scientist	1996
21.	Dr. M.S.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 Ahmed, Scientist(Sr.Scale)	1998
26.	Dr. A.R.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. R.L.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

1.	Dr. S.D.Sharma, Director	1996
2.	Dr. P.K.Malhotra, Professor (Computer Application)	1991
3.	Dr. R.C.Goyal, Principal Scientist	1995
4.	Dr. I.C.Sethi, Principal Scientist	1995
5.	Dr. V.K.Mahajan, Principal Scientist	1996
6.	Sh. Harnam Singh Sikarwar, Scientist (S.G.)	1997
7.	Dr. D.K.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. K.K.Chaturvedi, Scientist	2002
15.	Sh. S.N.Islam,Scientist	2004
16.	Sh. S.B.Lal, Scientist	2004
17.	Ms. Anshu Dixit, Scientist (Study Leave)	2004
18.	Ms. Anu Sharma, Scientist	2004

Courses taught during the Academic Year 2003 – 04
Trimester – III

Code	Title	Course Instructors
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 L.M.Bhar
AS-164	Design of Experiments – I (3+1)	Seema Jaggi and V.K.Gupta
AS-166	Statistical Genetics – I (3+1)	V.T. Prabharkran and A.R. Rao
AS-299	Seminar (1+0)	V.Ramasubramanian
AS-302	Advanced Design of Experiments-II (2+1)	R.Srivastava and P.K.Batra
AS-304	Advanced Sample Survey-II (2+1)	U.C. Sud and Prachi Misra
AS-307	Forecasting Techniques (1+1)	Chandrahas and V.Ramasubramanian
AS-370	Recent Advances in the Field of Specialisation (1+0)	U.C.Sud
Computer Application		
CS-115	Introduction to Computer Use and Use of PC (1+1)	Balbir Singh
CS-132	Data Structures and Structured Programming (2+1)	Shashi Dahiya and K.K.Chaturvedi
CS-133	Numerical Algorithms Analysis and Software (2+1)	H.S.Sikarwar and Pal Singh
CS-134	Modeling and Simulation (2+1)	P.K. Mathotra and Anshu Dixit
CS-135	Computer Communication Networks (2+0)	Alka Arora and S.N.Islam
CS-299	Seminar (1+0)	V.Ramasubramanian

Code	Title	Course Instructors
	Courses taught during the Academic Year 2004–05	
Agricultural Statistics		
	Trimester – I	
AS-101	Elementary Statistical Method (2+1)	V.T.Prabhakaran and S.D. Wahi
AS-150	Mathematical Methods in Statistics-1 (4+0)	Cini Varghese and Himadri Ghosh
AS-161	Statistical Methods-1 (3+1)	V.T. Prabhakaran and G. K. Jha
AS-167	Applied Multivariate Analysis (2+1)	Ranjana Agrawal and A.R.Rao
As-168	Econometrics(2+1)	V.K.Sharma and Sivaramane N.
AS-169	Planning of Surveys/Experiments (2+1)	M.S.Narang, R.S.Khatri and M.R.Vats
AS-200	Design of Experiments-II (1+1)	Rajendra Parsad and Cini Varghese
AS-201	Sampling Techniques – II (1+1)	K.K. Tyagi and G.K.Jha
AS-202	Statistical Genetics – II (1+1)	V. K. Bhatia and A.K. Paul
AS-203	Regression Analysis (1+1)	L.M. Bhar and V.Ramasubramanian
AS-204	Linear Models (2+0)	V.K.Sharma and R.Srivastava
AS-206	Optimization Techniques (1+1)	U.C.Sud and Amrendra Kumar
AS-370	Recent Advances in the Field of Specialisation	Prajneshu
AS-299	Seminar (1+0)	V.Ramasubramanian
	Trimester – II	
AS-102	Elementary Design of Experiments (2+1)	Aloke Lahiri and Krishan Lal
AS-151	Mathematical Methods in Statistics – II (4+0)	P.K.Batra and N.K. Sharma
AS-162	Statistical Methods – II (3+1)	Seema Jaggi and G.K. Jha
AS-165	Sampling Techniques – I (3+1)	Tauqueer Ahmed and Anil Rai
AS-170	Statistical Modeling (2+1)	Prajneshu and Wasi Alam
AS-205	Advanced Statistical Inference (1+1)	Krishan Lal and U.C.Sud
AS-207	Stochastic Processes (3+0)	Himadri Ghosh
AS-301	Advanced Design of Experiments-I (2+1)	R.Srivastava and V.K.Gupta
AS–303	Advanced Sample Survey – 1 (2+1)	H.V.L.Bathla and Jagbir Singh
AS-370	Recent Advances in the Field of Specialisation	V.K.Gupta
AS-299	Seminar (1+0)	V.Ramasubramanian
Computer Application		
	Trimester – I	
CS-111	Introduction to Computer Organization and Architecture (3+0)	Shashi Dahiya and S.B.Lal
CS-113	Data Analysis in Agriculture (1+2)	V.K. Mahajan and M.S. Farooqi
CS-114	Discrete Mathematics (2+0)	P.K. Batra and H.S.Sikarwar
CS-115	Introduction to Computer Use and Use of PC (1+1)	V. H.Gupta and Pal Singh
CS-211	Compiler Construction (2+1)	V. K. Dubey and S.B.Lal
CS-212	Operating System (2+1)	I.C. Sethi and H.O. Agarwal
CS-215	Software Engineering (2+0)	K.K. Chaturvedi and Anu Sharma
CS-216	Object Oriented Analysis and Design (2+1)	Sudeep and Anu Sharma
CS-299	Seminar (1+0)	V. Ramasubramanian
	Trimester-II	
CS-115	Introduction to Computer Use and Use of PC (1+1)	V.H. Gupta
CS-123	Fundamental of Computer Programming and Its Applications (2+1)	K.K.Chaturvedi and Pal Singh
CS-125	System Analysis and Design (2+1)	I.C. Sethi and M.S. Farooqi
CS-131	System Administration and Management(2+1)	Alka Arora andS.N.Islam
CS-227	Data Base Management System (2+2)	R.C.Goyal and Sudeep
CS-228	GIS and Remote Sensing Techniques (2+1)	Anil Rai and Prachi Mishra

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


शीतकालीन स्कूल
"कृषि अनुसंधान में प्रतिदर्श सर्वेक्षण तकनीक
(दिनांक 11 - 31 जनवरी, 2005)
प्रतिदर्श सर्वे प्रभाग
कृषि सांख्यिकी अनुभाग नई दिल्ली

7

Awards and Recognitions

AWARDS

- भारतीय कृषि अनुसंधान परिषद के 24 दिसम्बर 2004 को दिल्ली में महानिदेशक महोदय की अध्यक्षता में आयोजित वार्षिक हिन्दी पुरस्कार वितरण समारोह में भाग लिया। बड़े संस्थानों की श्रेणी में भारतीय कृषि सांख्यिकी अनुसंधान संस्थान को राजर्षि टंडन राजभाषा पुरस्कार योजना के अंतर्गत द्वितीय पुरस्कार प्रदान किया गया जिसे संस्थान के निदेशक महोदय ने अन्य सहयोगियों सहित प्राप्त किया।

निदेशक महोदय राजर्षि टंडन राजभाषा पुरस्कार योजना के अंतर्गत द्वितीय पुरस्कार प्राप्त करते हुए

- Dr. Rajender Parsad, Dr. Subhra Sarkar and Dr. VK Gupta received the best paper award for publication of a paper entitled 'Robust block designs for making test treatments-control treatment comparisons against presence of an outlier' in the Journal of Indian Society of Agricultural Statistics, **56(1)**, April 2003, 7-18 under the category of **Design of Experiments**.
- Dr. Amrit Kumar Paul and Dr. VK Bhatia received best paper award for publication of a paper entitled 'Estimation of heritability using some auxiliary traits in dairy cattle' published in the Journal of Indian Society of Agricultural Statistics, **56(2)**, August 2003, 131-141 under the category of **Statistical Genetics**.

- Dr. BMK Raju and Dr. VK Bhatia received best paper award for publication of a paper entitled 'Measures of stability with respect to ranking ability under varying situations' published in the Journal of Indian Society of Agricultural Statistics, **56(3)**, December 2003, 276-293 under the category of **Applied Statistics**.
- Dr. BMK Raju and Dr. VK Bhatia received best paper award for publication of a paper entitled 'Bias in the estimates of sensitivity from incomplete G X E tables' published in the Journal of Indian Society of Agricultural Statistics, **56(2)**, August 2003, 177-189 under the category of **Statistical Methodology**.
- हिन्दी चेतनामास के अन्तर्गत "शोध-पत्र पोस्टर-प्रदर्शन प्रतियोगिता" में संस्थान के वैज्ञानिकों तथा तकनीकी कर्मियों ने अपने-अपने 11 शोध-पत्र पोस्टर प्रदर्शित किए जिसमें से सर्वश्रेष्ठ निम्न चार शोध-पत्रों को पुरस्कृत किया गया। भारतीय कृषि अनुसंधान समिति, करनाल ने भी निम्न चार शोध-पत्रों को पुरस्कृत किया।
- डॉ. डी. आर. सिंह और डॉ. सुशीला कौल को "अजमेंर जिले में प्रवासी भेड़ पालन में प्रौद्योगिकी हस्तक्षेप का मूल्यांकन" शोध पत्र के लिए प्रथम पुरस्कार मिला।

एक वैज्ञानिक हिन्दी चेतनामास के अन्तर्गत "शोध-पत्र पोस्टर-प्रदर्शन प्रतियोगिता" का पुरस्कार प्राप्त करते हुए

- डॉ. सुशीला कौल और डॉ आर. के. पांडे को "भारत में खाद्य उपलब्धता और खाद्य सुरक्षा में इसका प्रभाव" शोध पत्र के लिए द्वितीय पुरस्कार मिला।
- डॉ रंजना अग्रवाल एवं श्री एस.सी. मेहता को "मौसम चरों के आधार पर फसलों की उपज का पूर्वानुमान" शोध पत्र के लिए एवं डॉ सीमा जग्गी को "कृषि वानिकी परीक्षण का सांख्यिकीय मूल्यांकन" शोध पत्र के लिए सयुंक्त रूप से तृतीय पुरस्कार मिला।

RECOGNITION

Dr. Rajender Parsad was recognized for his contribution to Agricultural Statistics and was awarded the position of ICAR National Fellow since 27.01.2005.

(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 Economic Association
- Bhoovigyan Vikas Foundation
- Indian National Science Association
- IARI Alumini, IARI
- 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
- Indian Statistical Institute, Kolkata for 'Sankhya'

(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 and Member, Executive Council
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
Dr. Randhir Singh	Member, Editorial Board

Society of Statistics, Computer and Applications

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

The Indian Journal of Agricultural Science

Prof. SD Sharma	Member, Editorial Board

Journal of Statistical Planning and Inference

Dr. VK Gupta	Associate Editor

Aligarh Journal of Statistics

Dr. Taqueer Ahmad	Member, Editorial Board

Farming Systems Research and Development Association

Dr. Anil Kumar	Joint Secretary, Executive Council

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 & Development Studies

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

International Journal of Remote Sensing

Dr. Randhir Singh	Referee

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, Nagpur

Dr. SP Bhardwaj	Member, Executive Council


भारतीय
दिनांक 1

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.	A study relating to formulating long term mechanisation strategy for each agro-climatic zone/state	Department of Agriculture and Cooperation, Ministry of Agriculture	01 July, 2000	30 September, 2004
3.	Estimation of wool production – emerging data needs and a methodological reappraisal	Central Sheep & Wool Research Institute, Avikanager, Rajasthan (ICAR A.P. Cess Fund)	01 April, 2001	31 March, 2005
4.	Crop yield estimation at small area level using farmers' estimate	Department of Agriculture, Haryana (Funded by Ministry of Statistics and Programme Implementation, CSO, New Delhi)	01 February, 2003	31 July, 2004
5.	Sample survey to develop sampling methodology for estimation of area, production and productivity of important flowers on the basis of market arrivals	Ministry of Statistics and Programme Implementation, CSO, New Delhi	01 June, 2003	30 November, 2004

S. No.	Title	Collaborative/Funding Agency	Start	Completion
6.	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
7.	Planning, designing and analysis of experiments planned ON STATIONS under PDCSR	Project Directorate of Cropping System Research, Modipuram	01 April, 2002	31 March, 2007
8.	Planning, designing and analysis of ON FARM experiments under PDCSR	Project Directorate of Cropping System Research, Modipuram	01 April, 2002	31 March, 2007
9.	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
10.	Design and analysis of experiments for spatially correlated observations	Department of Science and Technology (DST)	27 September, 2004	26 September, 2007
11.	Studies on block designs for biological assays	ICAR A.P. Cess Fund	01 March, 2003	28 February, 2005
12.	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
13.	Combined analysis of experiments on long-range effect of continuous cropping and manuring on soil fertility and yields stability	ICAR A.P. Cess Fund	01 May, 2004	30 April, 2007
14.	National information system on long-term fertilizer experiments	ICAR A.P. Cess Fund	01 June, 2003	31 May, 2005
15.	National information system on animal experiments	ICAR A.P. Cess Fund	01 November, 2002	31 October, 2004
16.	Outliers in designed experiments	ICAR A.P. Cess Fund	01 August, 2004	31 July, 2007
17.	Some investigations on design and analysis of agro-forestry experiments	Indian Grassland and Fodder Research Institute (IGFRI), Jhansi	01 September, 2004	31 August, 2006
18.	Precision farming for sustainable rice-wheat cropping system	IARI, Division of Agronomy	01 June, 2001	31 May, 2006
19.	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
20.	Development of model of forewarning about infestation of insects for paddy crop	N. D. Univ. of Agri. & Tech., Kumarganj, Faizabad	01 November, 1999	31 August, 2004
21.	Development of weather based forewarning system for crop pests and diseases	CRIDA, Hyderabad and other collaborating organizations (NATP Project)	01 April, 2001	31 December, 2004
22.	Modeling of forecasting of crop yield using weather parameters and agricultural inputs.	CRIDA, Hyderabad (ICAR A.P. Cess Fund)	01 March, 2003	28 February, 2005
23.	An econometric study of technological dualism in egg production	Punjab Government, Chandigarh	01 October, 2000	31 October, 2004

S. No.	Title	Collaborative/Funding Agency	Start	Completion
24.	Jai-Vigyan National Science and Technology Mission on household food and nutritional security for tribal, backward and hilly areas	ICAR Institutes and Agricultural Universities (NATP Mission Mode)	01 April, 2001	31 March, 2005
25.	Study of lac marketing in India	Central Lac Research Institute, Ranchi (ICAR A.P. Cess Fund)	15 November, 2001	14 November, 2005
26.	Water food security scenario analysis for 2025: Agro-ecological regional approach	NCAP, New Delhi	September, 2001	30 April, 2004
27.	Determinants of performance of self-help groups in rural micro-finance	NCAP, New Delhi	01 March, 2002	31 March, 2005
28.	Institutionalization of research priority setting, monitoring and evaluation and networking of social scientists	NCAP and NAARM/NATP (NATP, PME project under O&M)	01 May, 2000	31 March, 2005
29.	Integrated national agricultural resources information system	13 ICAR Institutes/NATP Mission Mode	01 April, 2001	31 December, 2004
30.	Expert system of extension	IARI/NATP CGP	01 April, 2001	30 September, 2004
31.	Development of expert system on wheat crop management	DWR Karnal/IARI, New Delhi	01 March, 2003	28 February, 2006

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Research Coordination and Management Unit

Research Coordination and Management Unit (RCMU) is responsible for documentation and dissemination of scientific output of the Institute through IASRI News and Annual Report etc. It also 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 ARIC (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 (Bilingual) of the Institute for the year 2003-04
- IASRI Newsletters (Bilingual)
- Monitoring Progress Reports—Half-yearly Summary of progress of on-going research projects ending March 31, 2004 and Sept 30, 2004
- Action Taken Report of XIII National Conference of Agricultural Research Statisticians held at PAU, Ludhiana during 6-8 November, 2001. This report

was discussed in the 1st Session of XIV National Conference at JNKVV, Jabalpur (M.P.)

Communication of Research Material to:

(i) Indian Council of Agricultural Research

- Material for preparation of DARE-ICAR Annual Report for the year 2004-2005
- Action taken report on the proceedings of the Conference of the Directors of ICAR Institutes held at NASC, New Delhi during 14-16 July, 2004
- Action taken report on the proceedings of the Sixteenth Meeting of the ICAR Regional Committee No. IV held at PAU, Ludhiana during 13-14 August, 2002
- Copies of Annual Report of the Institute, for review of Annual Report 2003-2004 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 to be held during July - December, 2004 and January – June, 2005
- Information for organization of Summer School/ Winter School/Short Course – regarding proposal etc. during 2005
- Suggestions to introduce new reforms and innovations that aims at changing the NARS into an internationally competitiveness, state of the art, merit based, "Quality First" organization in view of six core goals
- Institutes views regarding RAC functioning and linkages between RAC-SRC-IMC
- Information on present status of research and future directions in the area of Agricultural Statistics and Computer Applications for inclusion in the Revised Perspective Plan: Vision 2020 of the Institute
- Copies of Revised Perspective Plan: Vision 2020 of the Institute for discussion at SMD level
- 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
- Revised X Five Year SFC Memo for the Institute
- Mid Term X Plan Appraisal for the Institute
- Information of different Research Project Files (RPF I, II, III) of various Divisions of the Institute
- Quarterly Performance Review (QPR) of Central Schemes by Planning Commission
- Monthly targets and progress of the Institute
- Half yearly Scientific targets and achievement twice in a year
- Quarterly Progress Report (QPR)
- Monthly progress of Identified thrust areas required by Planning Commission
- Other miscellaneous correspondence with respect to the Institute

(ii) CSO

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

(iii) Indian Veterinary Research Institute, Izatnagar, Bareilly (U.P.)

- Status report of the Institute for presentation at the Seventeenth Meeting of the ICAR Regional Committee No. IV held at IISR, Lucknow (U.P.) during 28-29 December, 2004

(iv) National Social Science Documentation Centre, (ICSSR), (Ministry of Human Resource Development), New Delhi

- Information for Directory of Social Science Research Institutions as per their questionnaire

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

- Miscellaneous correspondence for supply of IPR CD Version 2.0 regarding

(vi) SAARC Agricultural Information Centre (SAIC), Bangladesh

- Information for promotion of Livestock and Fisheries on Poverty Alleviation in the SAARC countries

(vii) Gales Research Centre, Michigan, USA

- Verification form for the 19th edition for International Research Centers Directory

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 15 April 2004, 13 May 2004, 03 June 2004, 08 July 2004, 06 August 2004, 06 September 2004, 12 October 2004 10 November 2004, 08 December 2004; 01 and 07 January 2005, 08 February 2005 and 09 March 2005. The meetings were chaired by the Director.

- The Brain Storming Session for revision in the Perspective Plan - Vision 2020 of the Institute was organised at the Institute on 02 September, 2004.

Joint Director, addressing the house during brain stroming section for revision in the Perspective Plan-Vision 2020

- The meeting with Subject Matter Specialists, Principal Scientists and PME Cell members for revision in the Perspective Plan - Vision 2020 of the Institute was organised at the Institute on 04 September, 2004.

Meeting with experts during brain stroming section for revision in the Perspective Plan-Vision 2020

- Organised a Meeting of Director with all the Technical Officers/ Technical Staff (T-4 and above) for getting feedback to improve the work culture) at the Institute on 10 September, 2004.
- Organized six meetings on 27 April 2004, 21 May 2004, 02 June 2004, 21 October 2004; 14 January 2005 and 15 March 2005 for finalizing the Consultancy/Contract proposals received at Consultancy Processing Cell as per Johl Committee Guidelines and subsequently getting approval of the Director.
- Organized a meeting of PME Cell on 14 July, 2004 for finalizing the draft for sending the suggestions to ICAR to introduce new reforms and innovations that aims at changing the NARS into an internationally competitiveness, State of the art, merit based, "Quality First" organisation in view of six core goals.

Organisation of Conferences

- Organised the XIV National Conference of Agricultural Research Statisticians of the ICAR Institutes, Project Directorates, State Agricultural Universities and Central State Departments of Agriculture, Animal Husbandry, Forestry and Fisheries at Jawahar Lal Nehru Krishi Vishwa Vidayalaya (JNKVV), Jabalpur (Madhya Pradesh) from 17-19 November 2004.

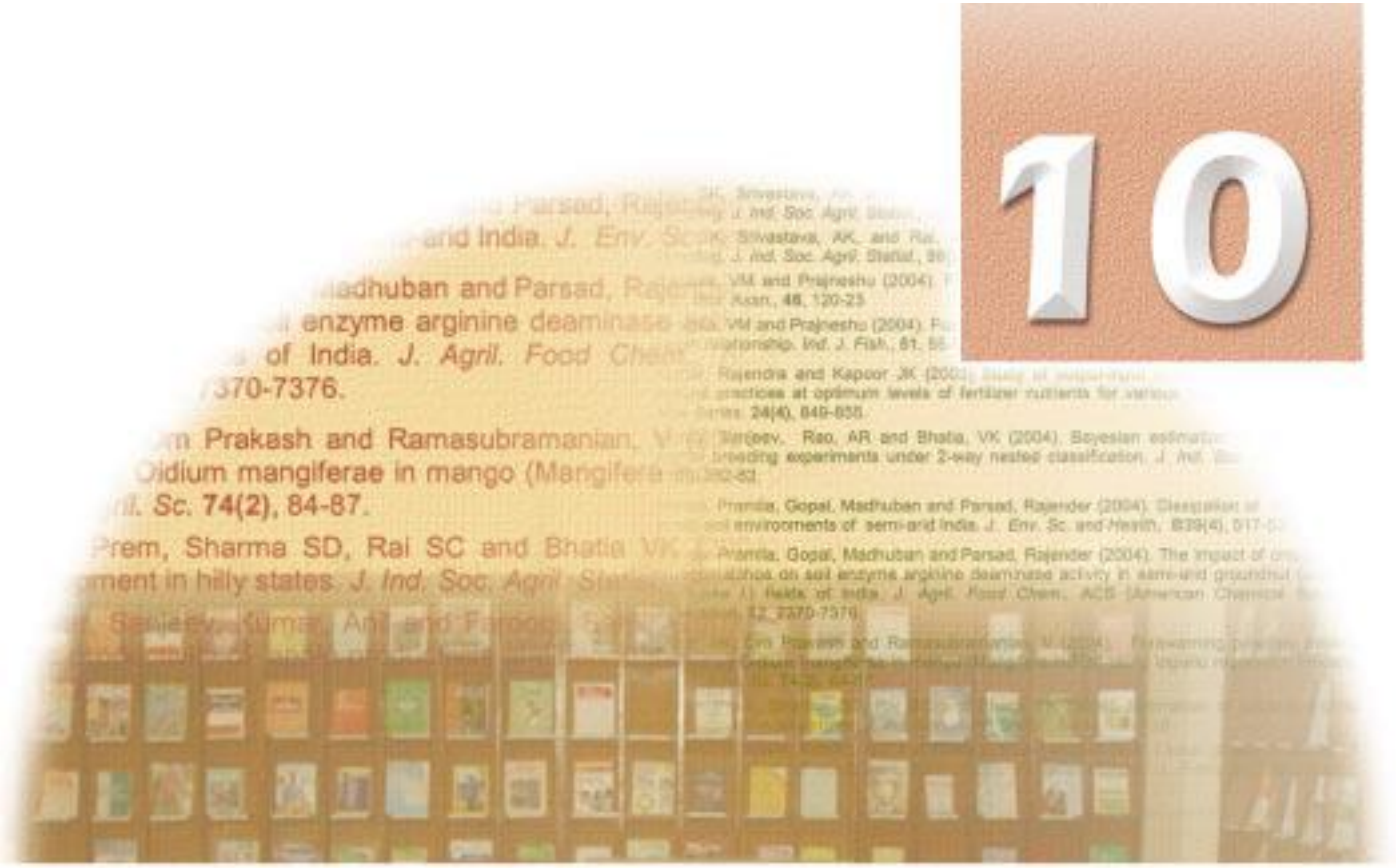
Art, Photography and Reprography

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 600 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 Scaner were also procured. On Gestetner Copy Printer 5327 and Rex Rotary Copy Printer 1560 machines about 4.53 lacs copies of 7477 pages for 387 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 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 items:

- Miscellaneous correspondence with other organizations of ICAR/SAUs for the XIV National Conference of Agricultural Research Statisticians to be organized at JNKVV, Jabalpur (M.P.) during 17-19 November 2004
- 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.
- Various drafts for revised Perspective Plan: Vision 2020 of the Institute
- Slides material for presentation of revised Perspective Plan: Vision 2020 of the Institute at several level
- Gant Charts for SFC of X Plan presentation.
- Correspondence/ Initiation for procuring various useful Software 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 web site of the Institute



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List of Publications

Research papers

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2. Ahmad, Tauqueer, Kathuria, OP and Rai, Anil (2004). Comparative study of farmer's eye estimate and crop cut estimate for general crop estimation surveys. *J. Ann. of Agril. Res.*, **25(3)**, 394-397.
3. Ahuja, Sangeeta, Parsad, Rajender, Gupta, VK and Malhotra, PK (2004). Statistical package for factorial experiments. *J. Ind. Soc. Agril. Statist.,* **58(3)***,* 312-330.
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14. Handa, DP, Jaggi, Seema, Gill, AS and Singh, NP (2004). Impact of fruit trees on the yield of wheat crop. *Ind. J. Forestry*, **27(2**), 141-144.
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Books

- Bathla, HVL, Tyagi, KK, Khatri, RS, Singh, Jagbir, Goyal, JP, Agarwal, SC and Sood, RM (2004). Agricultural Research Data Book.
- Sharma, SD, Srivastava, AK and Sud, UC (2004). Information Support. 168 pages. Volume 20 of the publication "State of the Ind. Farmer - A Millennium Study". 27 Volumes + CD-Rom. Book published by Academic Foundation, New Delhi in association with Department of Agriculture & Cooperation, Ministry of Agriculture, Govt. of India.

Electronic Book

- The electronic book on Design and Analysis of Experiments has been compiled, edited developed and revised by Rajender Parsad, R. Srivastava and V.K. Gupta. The book now contained 63 lectures divided into 5 modules. The Chapters are now available in PDF format.

Book Chapters

1. Bhardwaj, SP (2004). Economic thought of Prof. VKRV Rao on economic development and growth with particular reference to Keynesian Multiplier Application to India Economy. *Great Ind. Economists Their Creative Vision for Socio-Economic Development.* Deep & Deep Publication Pvt. Ltd., 7, 371-376.
2. Bhardwaj, SP (2004). Ranade and His Economic Nationalism. *Great Ind. Economists Their Creative Vision for Socio-Economic Development,* Deep & Deep Publication Pvt. Ltd., 2, 278-282.
3. Dhillon, BS, Singh, M, Parsad, Rajender, Gupta, VK and Singh, BB (2004). Evaluation of plant genetic resources: Issues, Advances and Opportunities. In: Dhillon, B.S., Tyagi, R.K., Lal, A. and Saxena, S.(eds) *Plant Genetic Resource Management*. Narosa Publishing House, New Delhi, 242-265.
4. Ghosh, H and Pal, A (2004). Estimation of variance components in diallel crosses. *Recent Advances in Mating Designs.* Eds L.S.Kaushik and R.C.Hasija, Dhanpat Rai and Company (P) Ltd., New Delhi, 4.1 to 4.19.
5. Panda, DK, Parsad, Rajender and Sharma, VK (2004). Robustness of block designs for complete diallel crosses against interchange of a pair of crosses. In: *Recent Advances in Mating Designs.* Eds L.S.Kaushik and R.C.Hasija, Dhanpat Rai and Company (P) Ltd., New Delhi, 3.1-3.23.
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Research Project Reports

1. Pilot study on cost of production of coconut in Kerala by *UC Sud, HVL Bathla, Jagbir Singh, GK Jha, DC Mathur, KK Kher, K Murlidharan, C Thamban and C.V. Sairam.*
2. Assessment of harvest and post harvest losses by *HVL Bathla, Anil Rai, RS Khatri, Jagbir Singh, Tauqueer Ahmad, GK Jha, Vipin Dubey et al.*
3. Planning, designing and analysis of experiments relating to AICRP on soil test crop response correlation by *Aloke Lahiri, VK Sharma, A Subba Rao, MR Vats, DK Mehta, Rajender Parsad and Sanjay Srivastava.*
4. Statistical investigation on the fertilizer use efficiency in relation to cultural practices by *Rajendra Kumar and JK Kapoor.*
5. A diagnostic study of design and analysis of field experiments by *Rajender Parsad, VK Gupta, PK Batra, R Srivastva, Rajinder Kaur, Ajit Kaur and Prawin Arya.*
6. Three associate class partially balanced incomplete block designs and their application to partial diallel crosses by *Cini Varghese, VK Sharma, Seema Jaggi and Anu Sharma.*
7. Studies on data processing techniques for statistical analysis of large field variability in hilly and salt affected soil regions. (NATP Report) by VK *Bhatia, and Rajender Parsad*.
8. Some empirical investigations to study the influence of fixed effects on the estimates of heritability by *SD Wahi and AR Rao.*
9. Impact assessment of technology intervention and crop diversification in tribal, backward and hilly areas (Programme 6) pertaining to Improvement in Migratory Sheep Production Programme for Tribal farmers in North-West, Annual Report (2003-2004), Division of Econometrics, IASRI, New Delhi, p 33 (2004). by Sushila Kaul, and DR Singh.
10. Impact assessment of technology intervention and crop diversification in tribal, backward and hilly areas. (Programme 6) pertaining to “Improvement in Migratory Sheep Production Programme for Tribal farmers in North-West”, Annual Report (2004), Division of Econometrics, IASRI, New Delhi, December 2004, p 42 by Sushila Kaul and DR Singh.
11. PIMSNET Users Reference Manual, National Agril. Technology Project by SD Sharma, PK Malhotra, RC Goyal, Sudeep Marwaha, Alka Arora, VH Gupta, Vikrant and Rajat.
12. PIMSNET Technical Reference Manual, National Agricultural Technology Project by SD Sharma, PK Malhotra, RC Goyal, Sudeep Marwaha, Alka Arora, VH Gupta, Vikrant and Rajat.
13. Agricultural Statistician Network, Technical Report, National Agricultural Technology Project (2005) by SD Sharma, PK Malhotra, RC Goyal, Sudeep Marwaha, Alka Arora.

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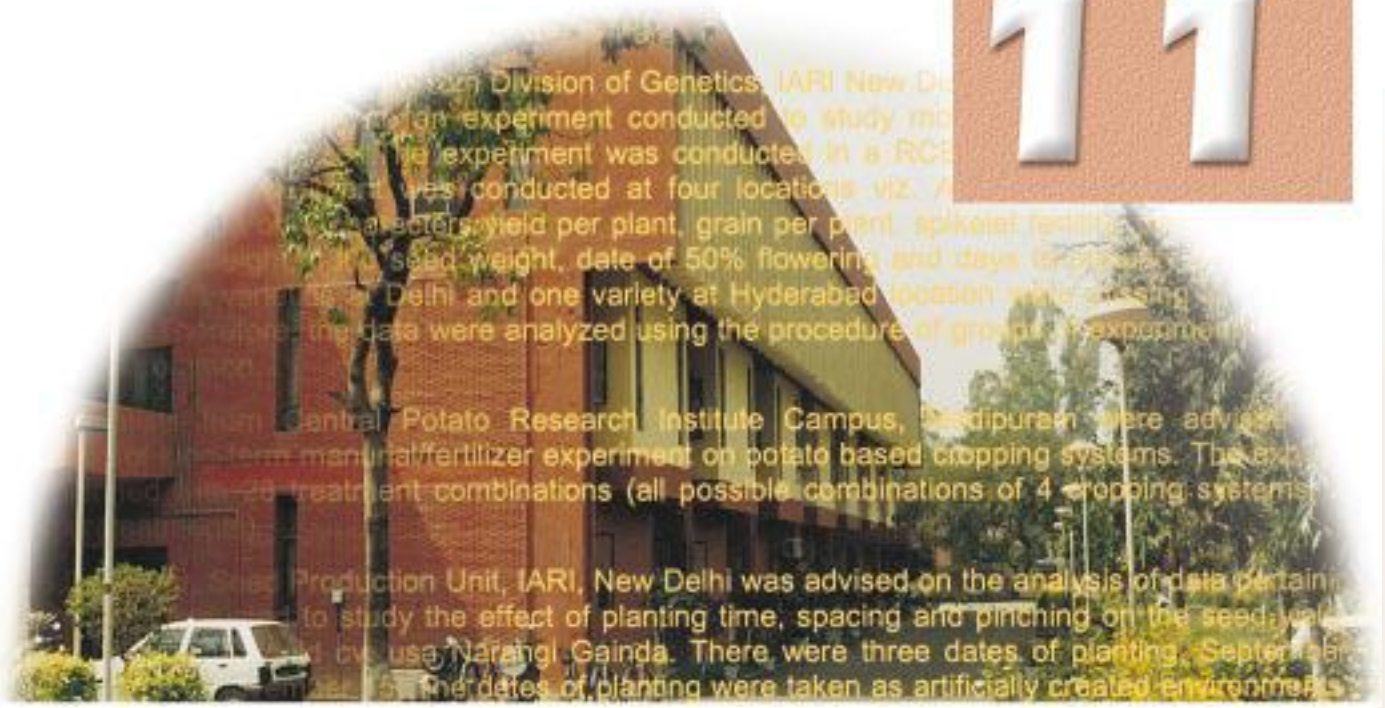

Consultancy and Advisory Services

Consultancy/Advisory Services provided

- Provided the estimators for various characteristics under the study in the project entitled "India's livestock feed balance and its environmental implications" jointly being carried out by SESR and NCAP, New Delhi.
- Dr. K.K. Sharma, Project Co-ordinator was advised regarding the sampling design for undertaking a national survey for 32 commodities to see the pesticide residue, on 16 September, 2004.
- As per request from CSO, a new project proposal on "Study for the Assessment of Survey Capabilities of Private Sector" was submitted to CSO, Ministry of Statistics & Programme Implementation, Govt. of India, New Delhi for approval and funding. The proposal has been approved for funding and MOU is yet to be signed.
- Project proposals for preparation of following manuals as a consultancy project have been submitted to MOS & PI, CSO, New Delhi, for funding.
  (i) Area and Crop Production Statistics
  (ii) Animal Husbandry Statistics
  (iii) Agricultural Prices and Marketing
  (iv) Cost of Cultivation Surveys
  (v) Horticulture and Spices Statistics

  All the five proposals have been approved for funding.
- Dr. A.K. Singh, Senior Scientist from Division of Genetics, IARI, New Delhi was advised on the combined analysis of data pertaining to an experiment conducted to study molecular divergence in relation to hybrid performance in rice. The experiment was conducted in a RCB design with 30 varieties and 3 replications. The experiment was conducted at four locations viz. Aduthurai, Delhi, Hyderabad and Varanasi. The data on 8 characters yield per plant, grain per plant, spikelet fertility, panicle length, tiller per

plant, plant height, 1000 seed weight, date of 50% flowering and days to maturity were observed. The data from 3 varieties at Delhi and one variety at Hyderabad location were missing in all the three replications. Therefore, the data were analyzed using the procedure of groups of experiments with some treatments common.

- The scientists from Central Potato Research Institute Campus, Modipuram were advised on the designing of long-term manurial/fertilizer experiment on potato based cropping systems. The experiment was planned with 28 treatment combinations (all possible combinations of 4 cropping systems and 7 fertilizer treatments).
- Dr. B.S. Tomar, Seed Production Unit, IARI, New Delhi was advised on the analysis of data pertaining to experiment conducted to study the effect of planting time, spacing and pinching on the seed yield and seed quality in marigold cv. usa Narangi Gainda. There were three dates of planting, September 15, October 15 and November 15. The dates of planting were taken as artificially created environments and the experiment was conducted using a randomized complete block design with 9 treatment combinations of three spacings (30' 30, 30'45 and 30'60 cm^2) and three inching levels (control, 30 days after planting and 60 days after planting) each replicated thrice in each of the 3 environments. The data from each of the three experiments were analyzed individually and the mean square errors so obtained were used for testing the homogeneity of error variances. The procedure of groups of experiments was followed for the analysis. He was also advised on the analysis of data pertaining to experiment conducted to study the effect of planting methods and irrigation on onion. There were three methods of planting and two irrigation methods. The irrigation methods were taken as artificially created environments. The data from both experiments (with planting methods as treatments) were analyzed individually and the mean square errors so obtained were used for testing the homogeneity of error variances. The procedure of groups of experiments was followed for the analysis.
- Dr. Dinesh Kumar, Sr. Scientist, Division of Agronomy, IARI, New Delhi was advised on the analysis of experimental data conducted for standardization of nitrification inhibiting property of Neem oil coated urea for Kharif Rice. 16 treatments were tried in the experiment that were all possible combinations of 5 sources of nitrogen viz. prilled urea, 500 ppm oil coated urea, 1000 ppm oil coated urea, 2000 ppm oil coated urea, 5000 ppm oil coated urea and three doses viz. 50, 100, 150 kg/ha and one absolute control. The experiment was conducted using a randomized complete block design. The analysis was carried out using the concepts of contrast analysis. A second order rotatable response surface design with orthogonal blocking for 4 factors each at 5 equispaced levels in 30 design points arranged in three blocks each of size 10 has been recommended for an experiment related to osmotic dehydration of the Aonla, planned to obtain the optimum combination of levels of solution to sample ratio, concentration of sugar solution, revolutions per minute and temperature of osmosis. The design was catalogued in the project on designs for fitting response surfaces in agricultural experiments.
- Provided consultancy services regarding analysis of AICRP groundnut yield trials data for simultaneous selection of genotypes for yield and stability at National Research Centre for Groundnut, Junagarh, Gujarat.
- Guidance and help were provided to agricultural workers from various SAUs and ICAR Institutes in analyzing the data and interpretation of results. An amount of about Rs.14000/- was collected for sale of software packages and analysis of data.
- Sh. Pankaj Gupta, Ph.D. (Agricultural Engineering), a student of IARI, New Delhi was advised on the analysis of data pertaining to an experiment conducted in laboratory to determine the design parameters of air-assisted spraying system influencing the application efficiency of pesticides on vegetable crops.
- A data set pertaining to an experiment conducted to test the performance of 11 varieties using a RCB design in 3 replications was received as a follow up action of Meeting of Senior Breeders Meeting of AICRP on Rapeseed and Mustard on April 05, 2004 at NRC-RM, Bharatpur. The experiment was conducted at 4 locations.

- The assumptions of normality (using Shapiro-Wilk test) and homogeneity of errors (using Bartlett's test for normal errors and Levene test for non-normal errors) were tested for the data from each of the locations. The results revealed that the assumptions of normality and homogeneity of error terms are not satisfied at two locations. The data from these locations were transformed using Box-Cox transformations. The data from one of the location remained heterogeneous even after Box-Cox transformation and hence, was analyzed using Friedman test. To see the effect of plant stand on the yield, analysis of covariance was performed using plant stand as covariate. For performing the combined analysis of data, the mean square errors (MSEs) of individual locations were used for testing the equality of error variance over locations. The error variances were found to be heterogeneous. Therefore, the data were transformed using the Aitken's transformation. The errors over combined locations were found to be non-normal. Therefore, it is felt that there is need to develop some statistical techniques for the combined analysis of non-normal data. It was also felt that there might be nearest neighbour correlation effects among the neighbouring units and the application of nearest neighbour methodology may improve the precision of variety comparison. For this analysis, we require the actual randomized layout of trial. The results have been sent to Director, National Research Centre on Rapeseed and Mustard, Bharatpur with a request to send the randomized layout of these trials.
- Sh. Sudhir Sharma, Ph.D. student of Department of Plant Breeding, CCS HAU, Hisar was advised on the analysis of data pertaining to an experiment conducted with 81 genotypes/hybrids of pearlmillet conducted in a simple lattice design. He was also advised on obtaining the genetic parameters viz. genotypic variance, phenotypic variance, heritability coefficient and genotypic correlation. For this purpose, the procedure developed under the project "A diagnostic study of design and analysis of field experiments" was used.
- Sh. Ramavtar Jat, Ph.D. (Agronomy), a student of P.G. School, IARI, New Delhi was advised on the analysis of data pertaining to an experiment conducted to study the response of pigeonpea + groundnut intercropping system to sulphur in conjunction with organic manure. The experiment was conducted using a split plot design. The main plot treatments were all combinations of two intercropping system(sole pigeonpea and pigeonpea + groundnut) and two levels of organic manure (no FYM and FYM @ 5t/ha). There were 7 subplot treatments that were all levels of 3 sources of sulphur (Elemental S, Gypsum and Cosavet) and 2 levels of (35, 70 kg/ha) and one control treatment i.e. no application of S. The analysis was carried out using the concepts of contrasts analysis.
- A reinforced alpha design in 55 (50 tests and 5 check varieties of tomato) arranged in 10 blocks each of size 15 was recommended to Dr. Mahender Singh, Head, Division of Germplasm Evaluation, NBPGR, New Delhi. The layout of the design recommended was:

Replication 1					Replication 2				
B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
21	12	18	9	25	38	27	9	36	24
31	47	48	14	45	34	35	49	50	44
16	22	28	19	35	7	20	31	4	37
26	37	23	34	20	25	8	15	29	6
36	17	3	39	40	19	41	3	23	46
41	32	8	24	15	1	2	22	32	30
11	42	33	4	30	45	48	42	10	5
6	27	38	49	5	13	14	40	17	18
46	7	13	44	50	26	21	28	43	33
1	2	43	29	10	47	39	16	11	12
51	51	51	51	51	51	51	51	51	51
52	52	52	52	52	52	52	52	52	52
53	53	53	53	53	53	53	53	53	53
54	54	54	54	54	54	54	54	54	54
55	55	55	55	55	55	55	55	55	55

Computer Services

Resource utilization

(i) The Division of Computer Application 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)	2772	13364
Bio-Informatics-Lab. (118)	459	2326
Divisional Scientist-Lab. (129)	971	3466
CAS Training-Lab. (130)	760	2951
Data Entry-Lab. (131)	446	2240
Total	5408	24347

(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 3 requests from other institutes of ICAR and output of 7230 abstracts were provided to them.

(iii) Special Assignments
- The Internet services have been provided to the users and website of IASRI has been regularly updated including the Hindi Version. So far 75, 170 users have visited the site.
- Support is also being provided for operation and maintenance of computer and related equipment and network services in the Institute.
- Management of the NATP and NISAGENET Cell.

(iv) Miscellaneous
- Designed and developed the website for TAAS (Trust for Advancement of Agricultural Sciences).

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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), 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

Management Committee meeting in progress

The 49th meeting of the Management Committee was held on 14 May 2004 under the Chairmanship of Prof. SD Sharma, Director, IASRI. The following agenda items were discussed:

- Confirmation of proceedings of the 48th meeting of the Management Committee held on 03 May 2003
- Review of action taken on the recommendations of the 46th meeting of the Management Committee held on 03 May 2003
- Consideration of proceedings of the Staff Research Council meeting held on 21-22 February 2004
- Consideration of proceedings of Research Advisory Council meeting held on 03 November 2003
- Consideration of progress report of Revolving Fund Scheme for the period 15 April 2003 to 31 March 2004
- Information for approved EFC Memo of the Institute
- Expenditure statement of Plan and Non-Plan
- Item of work for execution, equipment for procurement during 2004-05
- Approval of official side Members of Institute Grievance Committee
- The progress of Hindi in the Institute during 2003-04.

The 50th meeting of the Management Committee was held on 17 August, 2004 under the Chairmanship of Prof. SD Sharma, Director, IASRI. The following agenda items were discussed:

- Confirmation of proceedings of the 49th meeting of the Management Committee held on 14 May 2004
- Review of action taken on the recommendations of the 49th meeting of the Management Committee held on 14 May 2004
- Allotment of funds for works/equipment to be purchased/executed during 2004-05
- Library facilities
- Expenditure statement of IASRI Plan and Non-Plan budget

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.

Dr. VK Bhatia, Member Secretary, SRC, Dr. SD Sharma, Director, Chairman, SRC and Dr. VK Gupta, Joint Director at SRC Meeting (*Left* to *Right*)

A view of house at SRC meeting

Two meetings of the Staff Research Council (SRC) were held during 20-21 August 2004 and 18-19 February, 2005. In the first meeting two new research project proposals and one Institute funded new research project, one project funded by Central Statistical Organisation (CSO), one project funded by North East Space Application Center (NE-SAC), Shillong and three new AP Cess funded projects were approved and progress of 44 ongoing research projects was discussed. In the second meeting five new research project proposals comprising of three Institute funded, one project each funded by ICAR AP Cess Fund and Central Statistical Organisation (CSO) were approved and review of progress of 33 ongoing research projects and four research studies were discussed.

Presentation of progress of research project at SRC meeting

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

PAPERS PRESENTED

National Workshop on 'Improvement of crop statistics' organised by Directorate of Economics and Statistics at Vigyan Bhawan, New Delhi during 06-07 July 2004

- Anil Rai. Spatial modeling of land use statistics using GIS
- Anil Rai, GK Jha, Tauqueer Ahmad and PM Sahoo. Spatial regression analysis under rank set sampling framework
- T Ahmad, Randhir Singh and Anil Rai. A resampling procedure using imputation techniques for missing survey data.
- UC Sud. A pilot study on cost of production of coconut in Kerala

6th World Congress of the Bernoulli Society for Mathematical Statistics and Probability and 67th Annual Meeting of the Institute of Mathematical Statistics at University of Barcelona, Barcelona, Spain during 26-31 July 2004

- Seema Jaggi, VK Gupta and Cini Varghese. Universal optimality of block designs for competition effects

2nd National Symposium on 'Alternative Farming Systems: Enhanced Income and Employment Generation: Options for Small and Marginal Farmers' at PDCSR, Modipuram, Meerut, U.P. during 16-18 September 2004

- Samir Farooqi, Balbir Singh, Alka Arora and Shashi Dahiya. Efficient human resource management in ICAR through Information Technology
- Sanjeev Panwar, Anil Kumar and Samir Farooqi. Trend analysis of flower production in India

National Symposium on 'Wheat Improvement for the Tropical Areas' at IARI Regional Station Welington, Coimbatore during 23-25 September 2004

- SN Islam, Samir Farooqi, HO Agarwal, Vipin K Dubey, KK Chaturvedi, HS Sikarwar. Expert system for effective selection of wheat varieties

Workshop of AICRP on LTFE at Punjab Agricultural University, Ludhiana during 06-08 November 2004

- MR Vats. Web based Information System on Long Term Fertilizer Experiments

XIV National Conference of Agricultural Research Statisticians at JNKV, Jabalpur during 17-19 November 2004

- Anil Rai, Vipin K Dubey, KK Chaturvedi and PK Malhotra. Issues of design and development of agricultural data warehouse
- VK Bhatia. Application of data mining techniques in cluster analysis
- GK Jha and Randhir Singh. Imputations for handling non-response
- PK Malhotra. Application of Information Technology (IT) in agricultural research and development research needs
- PK Malhotra. Teaching and training in computer application in the NARS-Emerging needs
- PM Sahoo, Randhir Singh, Anil Rai and T Ahmad. Spatial data quality: Issues and problems
- PM Sahoo, Randhir Singh, Anil Rai and T Ahmad. Spatial data quality: Issues and problems
- Rajender Parsad and VK Gupta. Statistical issues for experimentation in National Agricultural Research System
- Ranjana Agrawal and Chandrahas. Forecasting Agricultural Systems-Current status and challenges
- VK Sharma and Seema Jaggi. Teaching and research linkages between ICAR Institutes and Agricultural Universities: Current scenario and emerging challenges
- VK Gupta and Rajender Parsad. Status of agricultural experimentation in National Agricultural Research System

18th National Conference of Agrilcultural Marketing at HIPA, Shimla during 29-30 November to 01 December 2004

- Sanjeev Panwar, Anil Kumar and Samir Farooqi. An analysis of trend in area, production and productivity of fruits in Himachal Pradesh
- SP Bhardwaj. Strategies to enhance egg production in India

3rd International Co-operative Forum and 6th Regional Assembly and 3rd ICA Regional Research Conference at Chiangmai, Thailand during 29 November to 04 December 2004

- Sushila Kaul. Problems and prospects of Women Dairy Co-operatives in Indian Dairy Sector

International Seminar on Geoinformatics-2004 at University of Mysore, Mysore during 13-14 December 2004

- Anil Rai, Randhir Singh, Bhavishya Patel and GM Pathak. Spatial modelling on land use statistics using remote sensing satellite data
- T Ahmad, Anil Rai, Randhir Singh and Abha Kant. Evaluation of villages with respect to development and potential for agroforestry using GIS

International Conference on Emerging Trends in Agricultural and Food Engineering at IIT, Kharagpur during 14-17 December 2004

- Abhijit Kar, Pitam Chandra and Rajender Parsad. Microwave assisted dehydration of banana (Dwarf cavendish) slices: An alternative energy efficient method

Seminar on Rural Finance- Status, Issues and Challenge at Pantnagar, Uttaranchal during 17-18 December 2004

- Ashok Kumar and Lakshmi Prasanna. Regional diversities in status and issues of self-help groups in India

25th Annual Workshop of AICRP on Post Harvest Technology at Junagarh Agricultural University, Junagarh during 20-23 December 2004

- SP Bhardwaj. Study of lac marketing in India progress report

International Symposium on Industrial Drying at Mumbai during 22-23 December 2004

- Abhijit Kar, Pitam Chandra, KSS Sajala and Rajender Parsad. Microwave assisted dehydration: An innovative method of quality potato chips production

Seventh Annual Conference of Society of Statistics, Computer and Applications at Sri Venkateswara College, New Delhi during 22-24 December 2004

- AR Rao and V T Prabhakaran. On the estimation of variance of heritability based on full-sib correlation
- Alka Arora, Balbir Singh, Shashi Dahiya and Samir Farooqi. Planning and distribution of manpower for Indian Council of Agricultural Research (ICAR) through Personnel Management Information System (PERMISnet)
- Dharm Nath Jha, PK Batra and Rajender Parsad. Analysis on evaluation of fertilizer response ratios of farmers' field
- Dinesh Kumar Pateria, Seema Jaggi and Cini Varghese. A series of incomplete non-circular block designs for competition
- H Ghosh and A Das. Designing trend free diallel cross experiments and related optimality
- KK Chaturvedi, Anil Rai, Vipin K Dubey and PK Malhotra. Online analytical processing using multidimensional cubes
- Krishan Lal, Rajender Parsad and VK Gupta. Robustness of block designs on the basis of pair-wise treatment comparisons for the loss of observations
- LM Bhar and VK Gupta. Loss of efficiency of experimental designs due to presence of a single outlier
- Mir Asif Iquebal and Amrit Kumar Paul. Effect of more than one unrelated auxiliary traits for estimation of heritability of herdlife
- Nilabrata Goswami, PK Malhotra, and Vipin K Dubey. Online Agricultural Research Farm Management Information System (ARFMIS)
- OP Khanduri and PK Batra. Web-based Agricultural Field Experiments Information System"
- PK Batra, DK Sehgal, OP Khanduri, Ashish Patel and Ramesh Dular. National Information System on Animal Experiments
- Rajendra Kumar, JK Kapoor and NP Singh. Statistical look for cultural cum manurial experiments
- Ram Manohar Patel, RC Goyal, V Ramasubramanian and Sudeep Marwaha. Development of Markov chain based crop forecast modeling software
- Vipin K Dubey, Anil Rai, KK Chaturvedi and PK Malhotra. INARIS Data Warehouse: A basis for strategic decision in Indian Agriculture

11th International Conference on Interdisciplinary Mathematical and Statistical Techniques: SCRA-2004 FIM XI at Institute of Engineering and Technology, Lucknow during 27-29 December 2004

- Anil Rai, GK Jha, PM Sahoo and T Ahmad. Spatial regression analysis under ranked set sampling framework
- GK Jha. Imputation for missing data: A simulation study
- GK Jha, Anil Rai, Tauqueer Ahmad and PM Sahoo. Effect of ranked set sampling on regression analysis
- Rajender Parsad, VK Gupta and PK Batra. Applications of experiments with mixtures methodology in agricultural experiments (Invited talk)
- Rajender Parsad, VK Gupta and Abhishek Rathore. Computer aided construction of weighted A-efficient designs for making treatment-treatment and treatment-control comparisons (Invited talk)

- T Ahmad, Randhir Singh and Anil Rai. A resampling procedure using imputation techniques for missing survey data
- UC Sud and IC Sethi. Estimation of finite population regression coefficient when the variables are subject to measurement errors

92nd Session of Indian Science Congress at Nirma University, Ahmedabad during 03-07 January 2005

- Amrender Kumar and Ranjana Agrawal. Forecast model for pests and diseases for Pigeon Pea
- Prajneshu . On MAR-ARCH nonlinear time-series modelling and forecasting

58th Annual Conference of Indian Society of Agricultural Statistics at CMFRI, Kochi during 20-22 January 2005

- Aloke Lahiri. On use of regression diagnostic on data of experiments of AICRP on soil test crop response correlations
- Amrender Kumar, Ranjana Agrawal, Lalmohan Bhar, AS Rao, T Murali Krishna , V Nandagopal, YG Prasad and YS Ramakrishna. Forecast models for pests and diseases in groundnut
- Ananta Sarkar, Rajender Parsad and MR Vats. Multivariate analysis of variance of data from long term fertilizer experiments
- DR Singh and N Sivaramane. Determinants of access to groundwater irrigation: An application of logit model
- JP Goyal, J Jayasankar, V Geethalakshmi and RS Khatri. Sheep productivity estimation- Data paucity and loss issues and their possible redumption using plug-in
- Jagbir Singh. Precise and cost-effective integrating surveys
- Krishan Lal, Rajender Parsad and VK Gupta. Trend free block designs for diallel cross experiments
- N Sivaramane, Prawin Arya, and DR Singh. Spatial integration of price series using vector error correction mechanism- A case of coconut oil markets in India
- PM Sahoo. Spatial sampling technique for agricultural surveys using GIS
- Prajneshu and H Ghosh. Mixture modeling and forecasting through nonlinear time-series
- Prawin Arya, N Sivaramane and DR Singh. An application of Box-Jenkins approach for forecasting copra wholesale price series
- Ramasubramanian, V and Ranjana Agrawal. Simulation based multiple Markov chain models for crop forecasting
- S K Sarkar, Krishan Lal and GK Jha. Non-linear growth (body weight) models for pigs
- SP Bhardwaj. Study of lac marketing in India
- Shushil Kumar Sarkar, Krishan Lal and GK Jha. Non-linear growth (body weight) models for pigs
- Subhra Sarker, Rajender Parsad and VK Gupta. Outliers in block designs for diallel crosses
- VK Sharma and Amitava Dey. Predicting total of response in seemingly unrelated linear regressions
- VT Prabhakaran. On interval estimation of heritability based on sib analysis

National Workshop of Soil Test Crop Response Correlation at IISS, Bhopal during 23-24 January 2005

- Aloke Lahiri. Planning, designing and analysis of experiments relating to AICRP on Soil Test Crop Response Correlation (Invited talk)
- VK Gupta and Rajender Parsad. Statistical issue related to designing and analysis of experiments pertaining to AICRP on STCR (Invited Talk)

23rd Annual Conference and National Symposium of Indian Poultry Science Association at DOP, Hyderabad during 02-04 February 2005

- Mahender Singh and Ashok Kumar. Statistical methodology for estimation of poultry meat production in Gurgaon district of Haryana

Map India 2005: 8th Annual International Conference in the Field of GIS, GPS, Aerial Photography and Remote Sensing at New Delhi during 07-09 February 2005

- Randhir Singh, T Ahmad, Anil Rai and Abha Kant. Development of agro-forestry potential index using GIS
- T Ahmad, Randhir Singh, Anil Rai and Abha Kant. Model for prediction of area under agroforestry in district Yamunanagar, Haryana

Global Land Cover Network Workshop Organized by, FAO, UNEP, IITD, NRSA, ICAR at IIT, New Delhi during 14-18 February 2005

- Anil Rai. Achievements of IASRI, New Delhi in GIS and RS and its role in international GLCN programme

VIII National Conference on Animal Genetics and Breeding in the Silver Jubilee Year of CIRG at Makhdoom (Mathura) during 08-10 March 2005

- RS Khatri, JP Goyal and HVL Bathla. Livestock Census in India

39th Annual Convention of Indian Society of Agricultural Engineers at ANGRAU, Hyderabad during 09-11 March 2005

- KK Tyagi. Study relating to formulating long term mechanization strategy for each agro climatic zone/state

PARTICIPATION

- IV International Health Care and Herbal Expo Seminar 2004 organized by Voluntary Health Educations and Rural Development Society and FICCI at Pragati Maidan, New Delhi on 02-04 April 2004
- National Workshop on Assessment of Rural Development jointly organised by Society of Statistics, Computer and Application and Planning Commission at Yojana Bhawan, New Delhi on 06 April 2004
- ELITEX 2004 on the theme 'Technology Vision: India in 2010' at India Habitat Centre, New Delhi during 26-27 April 2004
- National Workshop on Standardization of Biological Databases organized by DST and IIT, Delhi at IIC, New Delhi on 07 May 2004
- Workshop on Sampling and Methodology organized as part of project entitled "India Programme of Research in Human Development 2003-2007", which is being executed by NCAER jointly with the University of Maryland, College Park, USA at NCAER, New Delhi during 17-18 May 2004
- Sensitization Training Workshop on Implementation of Project Information and Management System Network (PIMSNET), NATP at IASRI, New Delhi during 07-08 June 2004
- Policy Makers Workshop on 'Mission 2007: Every Village a Knowledge Centre - A Road Map' organised by MS Swaminathan Research Foundation, Chennai at New Delhi on 09 July 2004
- Directors' Conference of ICAR Institutes at NASC Complex, Pusa, New Delhi during 14-16 July 2004
- Hindi Karyashala IASRI, at New Delhi
- 43rd All India Coordinated Wheat and Barley Workers' meet at IARI, New Delhi during 27-30 August 2004
- Workshop on 'Agriculture Information Technology' at Bioinformatics Institute of India, Noida on 28 August 2004
- National Symposium on 'Lac Industry - Convergence for Resurgence' at Indian Lac Research Institute, Ranchi during 20-21 September 2004
- National Seminar on "Angora Rabbit Wool and Cashmere Production and Utilisation" organised by ISSGPU and CWDB, Jodhpur at Manali during 25-26 September 2004
- XXXIII Dairy Industry Conference organized by Indian Dairy Association at Ashoka Hotel, New Delhi during 26-28 September 2004
- Conference of Central and State Statistical Organisation at New Delhi during 04-05 October 2004

- 24th ISRS Annual Convention and National Symposium on " Converging Space Technologies for National Development" at BM Birla Science and Technology Centre, Jaipur during 03-05 November 2004
- 28th Workshop of AICRP on "Cropping systems" at CSHPKVV, Palampur during 01-04 December 2004
- International Conference on "Cognetive Science" at Allahabad during 16-18 December 2004
- Requirement Analysis Workshop for the project on 'Development of Expert System for Wheat Crop Management' at IASRI, New Delhi during 20-21 December 2004
- National Workshop on "Role of Information Communication Technology in Taking Scientific Knowledge/Technologies to the End Users" at IARI, New Delhi during 10-11 January 2005

Inaugural Session of National Workshop on 'Role of information communication technology in taking scientific knowledge/ technologies to the end users'

- Dissemination Workshop of AP Cess fund project on "Studies on Block Designs for Biological Assays" at IASRI, New Delhi during 15 February 2005
- Workshop on "Implementation of Personnel Management Information System for ICAR" at IASRI, New Delhi on 09 and 15 March 2005
- Workshop to review the activities/exprience of NATP project on "Institutionalisation of Research Priority Setting, Monitoring and Evaluation (PME)'" at NCAP, New Delhi on 15 March 2005
- The 20th session of the Asia and Pacific Commission on Agricultural Statistics (APCAS) held during 20-24 September 2004 at Vigyan Bhavan, New Delhi.
- International Meet: Attended Twentieth Session of Asia and Pacific Commission on Agricultural Statistics (APCAS) for Development and Standardisation of Agricultural Statistics within the Framework of FAOSTAT, held at Vigyan Bhavan, New Delhi.

Participation in Training Programmes

- Management Development Programme on Performance Assessment of Agricultural Research Organizations at NAARM Hyderabad during 8 -22 May 2004
- Training on Multilingual Software ISM Office 2000 at IASRI, New Delhi during 21-22 July 2004
- Training on 'Microsoft Net Technologies' organized by NIIT Ltd, Delhi at IASRI, New Delhi during 27-29 July 2004
- Globalisation of the Dairy Industry in India-Application of Forecasting Techniques at UAS, Banglore during 18-27 August 2004
- ICAR short course on "Applications of Recent Methodologies of Statistics and Computers in Agricultural Research' at Sugarcane Breeding Institute, Coimbatore during 15-24 September 2004
- Summer School on "Agro-forestry Research for Integrated Land Use" at Forestry and Natural Resources Department, PAU, Ludhiana during 05-25 October 2004
- Training programme on "Working with INARIS Data Warehouse" at IASRI, New Delhi
- Training programme on "Recent Advances in Biometrics" under Centre of Advanced Studies at IASRI, New Delhi during 24 November-14 December 2004

- Directors' National Workshop on "Commercialization of Agricultural Technologies" at NAARM, Hyderabad during 30 November-03 December 2004.
- Quantitative Techniques for Policy Analysis in Agricultural Economics at IARI, New Delhi during 01-21 December 2004
- Winter School on 'Sample Survey Techniques in Agricultural Research' at IASRI, New Delhi during 11-31 January 2005
- Training programme on "Advances in Designing and Analysis of Agricultural Experiments" under Centre of Advanced Studies at IASRI, New Delhi during 03-23 February 2005
- Management Development Program on 'Cyber Security' at National Institute of Financial Management, Faridabad during 14-18 February 2005
- National Workshop on "Executive Health and Stress Management" organized by the Indian Society of Health Administrators (ISHA) in collaboration with the Department of Public Enterprises, Ministry of Heavy Industries and Public Enterprises, GOI, New Delhi at Bangalore during 24-26 February 2005
- Executive Development Programme on Good Governance in NARS at NAARM, Hyderabad during 01-05 March 2005

Participation in various meetings/discussions/ functions, etc.

- 75th Annual General Meeting of the ICAR Society under the Chairmanship of Shri Sharad Pawar, Hon'ble Union Minister for Agriculture, Consumer Affairs, Food and Public Distribution, Government of India at NASC Complex, New Delhi
- Brainstorming Session - Study on Development of Guidelines for Measuring Success or Failure of Research Projects at India International Centre, New Delhi. The Session was organized by National Foundation of Indian Engineers, New Delhi
- COGNOS meeting at Computer Centre, Central Statistical Organisation, New Delhi.
- Colloquim for DISNIC-PLAN Programme: A Perspective and Prospective view at NIC HQtrs A-Block, CGO Complex New Delhi
- CSIR Diamond Jubilee Technology Award-2003 & Shanti Swarup Bhatnagar Prizes-2003 held at Vigyan Bhavan. Dr Manmohan Singh, Hon'ble Prime Minister was Chief Guest. Shri Kapil Sibal, Hon'ble Minister of State for Science & Technology (Independent Charge) and Ocean Development presided
- Discussions on various aspects of Applied and Theoretical Statistics and about the various activities of the Institute with Prof JS Rustagi, Former Head, Department of Statistics, Ohio State University, USA who visited the Institute
- Discussions with Dr. AS Manekar, Director, National Science Centre, Pragati Maidan, New Delhi
- Discussions with Dr. LR Yadav from NIC, UP on Small Area Databases for E-governance
- Discussions with Dr. Seeta Prabhu, Head, HDRC, UNDP, New Delhi who visited the Institute along with Shri M Neelakantan, Former Deputy Director General, NSSO regarding training capabilities of IASRI
- Fourth Meeting of Direction Committee on National Data Warehouse of Official Statistics in Computer Centre, Central Statistical Organisation, R. K. Puram, New Delhi to discuss and finalize Request For Proposal (RFP) on Data Warehouse project
- High Level Inter-Divisional Committee for Zero Based Budgeting of Agricultural Engineering Division of ICAR, New Delhi
- ICAR Award Ceremony at NASC Complex, New Delhi. Shri Sharad Pawar, Hon'ble Union Minister for Agriculture, Consumer Affairs, Food and Public Distribution, Government of India was the Chief Guest of the Function and distributed the awards
- Inaugural Ceremony of IFPRI-New Delhi Office by Dr. Manmohan Singh, Hon'ble Prime Minister of India. Dr. Isher Judge Ahluwalia, Board Chair, IFPRI presided. Dr. Joachim von Braun, Director General, IFPRI was also present on the occasion

- Meeting with DDG (Engg) and ADG (Engg) for discussion on assigning the Management of National Agriculture Science Museum to Indian Agricultural Statistics Research Institute, New Delhi
- Inauguration of National Agriculture Science Museum at NASC Complex, Pusa, New Delhi by Dr. APJ Abdul Kalam, H.E. The President of India
- Coordinated the visit of 20 Board of Trustees members of ICRISAT to National Agriculture Science Museum during IFPRI-ICAR meeting on "Vision for Policy Research and Capacity Strengthening in South Asia" at NASC Complex, New Delhi
- Visit of Dr Norman E Borlaug, Nobel Laureate to National Agriculture Science Museum
- Indigenous Technical Knowledge Information Committee for the Mission Mode NATP Project for collection, documentation and validation of ITK
- Launching Ceremony of IARI Centenary Year, 2005 in IARI Library Conference Room
- Lecture on ASEAN collaboration delivered by Mr Ong Keng Yong, Secretary-General, ASEAN at Federation House, New Delhi
- Lotusphere – 2005: Innovations in people productivity event at Delhi organized by IBM
- Management of Productivity Sectional Committees MSD:3 and MSD:4 of the Bureau of Indian Standards, New Delhi
- Management Systems and Development Council, Bureau of Indian Standards, New Delhi
- Meeting as an Expert of FASAL project of Ministry of Agriculture at Krishi Bhawan, New Delhi
- Meeting for Revision of Perspective Plan document and priority areas for finalizing pattern and draft of the document under the Chairmanship of Dr. S Ayyappan, DDG (Engg.) at KAB II. All the Directors of Engineering Division attended the meeting
- Meeting held at Krishi Bhavan, New Delhi to review the progress made in connection with formulation of a Database on Horticulture Crops under the Chairmanship of Dr. ML Choudhary, Horticulture Commissioner, GOI
- Meeting in connection with Compilation of Producer Price Index by Mr. Jacob Ryten, Member World Bank Mission at Ministry of Commerce & Industries, Udyog Bhawan, New Delhi
- Meeting in UNDP Office, Lodhi Road, New Delhi regarding some training programmes
- Meeting of Expert Committee on 'GIS and RS applications in Crop Insurance' at Agriculture Insurance Company of India Limited, New Delhi
- Meeting of Senior Peers to Revise the Perspective Plan – Vision 2020 of National Centre of Agricultural Economics & Policy Research, New Delhi
- Meeting of the Core Group on National Data Warehouse of Official Statistics in Computer Center, Central Statistical Organisation, New Delhi with Shri Vishnu Kumar, DDG (CC)
- Meeting of the Empowered Committee for Implementation of "Awards and Fellowships for Outstanding and Meritorious Research Workers in Statistics" at Sardar Patel Bhawan, New Delhi under the Chairmanship of Secretary, Department of Statistics, Ministry of Statistics & Programme Implementation, GOI, New Delhi
- Meeting of the GOI-UNDP Project on "Strengthening State Plans for Human Development" at Mumbai
- Meeting of the High Level Coordination Committee for Crop Estimation Surveys, Haryana held at Chandigarh
- Meeting of the High Level Coordination Committee on Agricultural Statistics of Karnataka State at Bangalore
- Meeting of the Inter Ministerial Committee under the Chairpersonship of Smt. C T Mishra, Additional Secretary (M) to examine the structure and functioning of cost of cultivation scheme at Krishi Bhavan, New Delhi
- Meeting of the Organizing Committee of ICT workshop under the Chairmanship of Dr. S Nagarajan, Director, IARI, New Delhi
- Meeting of the Screening Committee held at CSO, Sardar Patel Bhavan, New Delhi

- Meeting regarding random sampling of transgenic material for testing at NBPGR, New Delhi
- Meeting regarding Spices Database with Dr. KV Peter, Vice Chancellor, Kerala Agriculture University
- Meeting regarding Spices Database with Officers from Directorate of Arecanut and Spices and Other Concerned Department of NSSO, CSO and DES under the chairmanship of Dr. SD Sharma, Director, IASRI, New Delhi
- Meeting to finalize the Draft Report on the CGIAR System Research Priorities for 2005-2015 at NASC Complex, New Delhi under the Chairmanship of Prof. VL Chopra, Member, Planning Commission, GOI
- Meeting with DDG (Engg.) on the eve of Directors' Conference. Directors of all the Institutes of Engineering Division attended the meeting
- Meeting with Dr. ML Chaudhary, Horticulture Commissioner, DAC regarding Spices Database
- Meeting with Dr. RS Paroda for ICT Workshop at TAAS office, IARI, New Delhi
- Meetings of Screening Committee meeting for compilation of the estimates of domestic product, capital formation and other aggregates at CSO, Sardar Patel Bhavan, New Delhi
- Meetings of Technical Monitoring Committee for centrally sponsored scheme on "Strengthening of database and information networking for the fisheries sector" at the Institute
- Meetings of the Task Force on Balanced Use of Fertilizers held at Krishi Bhawan, New Delhi
- Meting of Technical Monitoring Committee for CSS on "Strengthening of Database and Information Networking for the Fisheries Sector" at Central Inland Fisheries Research Institute, Barrackpore (West Bengal). The meeting was organized by the Department of Animal Husbandry & Dairying, Ministry of Agriculture, GOI, New Delhi. Director of the Institute Chaired the meeting
- NATP meeting in Krishi Anusandhan Bhavan-II under the Chairmanship of National Director
- NCAP Site Committee for NATP Projects
- PME Task Force Committee of NATP
- Presentation Ceremony of First Dr. MS Swaminathan Award to Dr. Norman E Borlaug by Dr. APJ Abdul Kalam, His Excellency, the President of India, at Vigyan Bhawan, New Delhi. The Award has been instituted by the Trust for Advancement of Agricultural Sciences, New Delhi
- Presentation of draft report of the project on formulating long term mechanisation strategies for each agro-climatic region/State before Shri Champak Chatterjee, Additional Secretary, Mnisistry of Agriculture and other officials and experts at IASRI New Delhi
- Review Committee for Interim Report on Financial Management Reviews for ICAR and Projects Manual for ICAR, New Delhi
- Review workshop of NATP project Development of weather based forewarning system for crop pests and diseases at NCIPM, New Delhi
- Review-cum-Planning meeting of Jai Vigyan National Science and Technology Mission (NATP) on household food and nutritional security in tribal, backward and hilly area at NCAP, New Delhi
- Round Table on Impact of River Basin Linkages on Fisheries at NAAS, NASC Complex, Pusa, New Delhi
- Skoch Summit: Challengers 2005 Awards at Hotel Intercontinental Park Royal, Delhi
- Steering Committee for Agricultural Census 2000-2001 and Input Survey 2001-2002, Ministry of Agriculture, Government of India, New Delhi
- Sub-group to examine the feasibility of 20% sample villages based estimation of livestock population
- Technical Advisory Committee for CSO Awards, Ministry of Statistics and Programme Implementation, Government of India, New Delhi
- Technical Monitoring Committee for Fishery Census with officials of Fisheries Departments of States (Mrs. Shobha Marwah, Director, Fisheries Statistics, Department of Animal Husbandry & Dairying, Ministry of Agriculture, GOI) held at IASRI. Director of the Institute Chaired the meeting

- Technical Committee of Direction (TCD) for Improvement Animal Husbandry & Dairying Statistics, of the Department of Animal Husbandry & Dairying, Ministry of Agriculture, GOI, held at Lucknow, Hyderabad and at IASRI. Director of the Institute Co-chaired the meeting

Meeting of Technical Committee of Direction for Improvement on Animal Husbandry and Dairying Statistics in progress

- The brain storming session for preparation of Perspective Plan-Vision 2020 held at IASRI
- The meeting with fisheries centers in a NATP mission mode project entitled "Integrated National Agricultural Resources Information System" held at the Institute
- The meeting with NESAC, Shillong officials during 26-30 September 2004 for organizing training and field survey for the project "Development of remote sensing based methodology for Meghalaya State"
- The meetings of Steering Committee for preparation of manuals at CSO, Sardar Patel Bhavan, New Delhi
- Two days brainstorming session for deciding agenda and road map for NATP Phase II under the Chairmanship of Dr. Mangala Rai, Secretary, DARE & DG, ICAR held at NASC Auditorium
- Weekly meetings of Weather Watch Group being held at National Crop Forecasting Centre
- XVII Meeting of the ICAR Regional Committee No.IV under the Chairmanship of Dr. Mangala Rai, Secretary, DARE & Director General, ICAR held at Indian Institute of Sugarcane Research, Lucknow. The Member-Secretary of the Regional Committee is Dr. MP Yadav, Director, IVRI, Izatnagar

VISITS ABROAD

- Dr. Seema Jaggi, Senior Sientist visited Barcelona, Spain to attended the 6th World Congress of the Bernoulli Society for Mathematical Statistics and Probability and 67th Annual Meeting of the Institute of Mathematical Statistics at University of Barcelona, Barcelona, Spain during 26-31 July 2004 and presented a contributed paper entitled 'Universal Optimality of Block Designs for Competition Effects'
- Dr. UC Sud, Principal Scientist visited (i) FAO, Rome as consultant on cost of production of crops/ livestock from 02 October 2004 to 17 October 2004. He presented a paper entitled "Cost of production/farm income of crops and livestock products" in the expert technical group meeting from 07 October 2004 to 08 October 2004 and (ii) Mauritius as TCDC expert in Agricultural Statistics from 23 January 2005 to 06 February 2005 for planning and organizing cost of production surveys
- Smt. Sushila Kaul, Scientist Selection Grade, visited Chiangmai, Thailand to attend the 3rd International Co-operative Forum and 6th Regional Assembly and 3rd ICA Regional Research Conference during 29 November to 04 December 2004 and presented a paper entitled "Problems and prospects of Women Dairy Co-operatives in Indian Dairy Sector"

14

Workshops, Conferences, Meetings, Seminars and Annual Day Organized

Workshops

In order to disseminate the findings of the research project "Studies on block designs for biological assays" a Dissemination Workshop was organized at the Institute on 15 February 2005. The participants of the workshop included many eminent research workers actually engaged in using bioassays in their research endeavors and the statisticians from various reputed institutions. Prof. M.N. Das, who initiated the work on bioassays in India, was the Chief Guest. Besides disseminating the results of the project, historical perspectives, terminology and analytical techniques for bioassays were also presented. Various issues relating to practical problems of bioassays were discussed threadbare and some very important recommendations have emerged from the workshop. Some of the important recommendations that have emerged from the workshop are:

- A-efficient designs obtained for most situations are unequally replicated therefore, concerted efforts may be made for promotion of these designs to the actual experimental situations.
- D-optimality aspects of block designs with parallel line assays may be taken up.

A view of Dissemination Workshop of completed project on 'Studies on block designs for biological assays'

- Designs with smaller number of units may be obtained and/or A-efficiency per observation of the design constructed may be investigated.
- Work on block designs for multiple parallel line assays may be intensified.
- Computer aided search of A-optimal/efficient designs and software package to generate such designs and also carrying out the analysis need to be developed.
- A separate course on bio-assays may be prepared for the students of P.G. School of IARI and statisticians along with the actual experimenters and statisticians should teach this course jointly.
- Ad-hoc training programmes may be arranged with emphasis on designing and analysis of bioassays.
- Efforts should be made to have more collaboration between statisticians and the experimenter in the National Agricultural Research System.

Dr. Alok Dey, Head, Department of Statistics, ISI Delhi Centre giving his suggestions during the Workshop

Two one-day workshops were organized on 9th and 15th 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.

Sensitization and training workshops were organized for 'PIMSNET' implementation at the following centers:

- Delhi based projects at IASRI, New Delhi from 7-8 June 2004
- AED (H&M), at Dehradun from 10-11 June 2004
- AED (Arid), at Jodhpur from 16-17 June 2004
- AED Coastal, at CTCRI, Trivendrum from 8-9 July 2004
- AED (Rainfed), CRIDA at NAARM, Hyderabad from 12-13 July 2004
- AED (Irrigated) at IASRI, New Delhi from 8-9 August 2004.

Requirement Analysis Workshop for the project "Development of Expert System for Wheat Crop Management" was organized at IASRI, New Delhi from 20-21 December 2004

Conference

The XIV National Conference of Agricultural Research Statisticians of the ICAR Institutes, Project Directorates, State Agricultural Universities and Central/ State Departments of Agriculture, Animal Husbandry, Forestry and Fisheries was organised by the Institute at Jawahar Lal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur (Madhya Pradesh) from 17-19 November 2004. The theme of the Conference was National Priorities in Agricultural Statistics and Computer Applications. There were six Technical Sessions followed by a Plenary Session. The details of the technical sessions is as follows:

The conference was inaugurated by Prof. Bal BPS Goel, Former Director, Indian Agricultural Statistics Research Institute, New Delhi and Key Note Address was delivered by Prof. SD Sharma, Director, Indian Agricultural Statistics Research Institute. Dr. Dhyan Pal Singh, Vice Chancellor, Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur presided over the

Inauguration of 14th National Conference of Agricultural Research Statisticians of the ICAR Institutes

Technical Session-I	Action Taken on the Recommendations made during the 13th National Agricultural Research Statisticians Conference held at Punjab Agricultural University, Ludhiana	Chairman: Dr. SD Sharma Convener: Dr. VK Gupta Co-convener: Dr. VK Bhatia
Technical Session-II	Statistical Methodologies – Current Status and Future Challenges	Chairman: Dr. SD Sharma Convener: Dr. VK Bhatia Co-convener: Dr. GR Makan
Technical Session-III	New Frontiers in Computer Applications in Agricultural Research	Chairman: Dr. VK Gupta Convener: Dr. PK Malhotra Co-convener: Dr. NP Katyar
Technical Session-IV	Research and Teaching Coordination and Linkages between ICAR Institutes and Agricultural Universities	Chairman: Dr. RA Khan Convener: Dr. VK Sharma Co-convener: Dr. BB Singh
Technical Session-V	Identification of Problems for Future Research	Chairman: Dr. BBPS Goel Convener: Dr. VK Gupta Co-convener: Dr. SRJ Singh
Technical Session-VI	Improvement of Quality of Agricultural Statistics	Chairman: Dr. AK Srivastava Convener: Dr. Randhir Singh Co-convener: Dr. NL Idnani
Plenary Session	Presentation of Reports by Rapporteurs of Different Sessions and Summary of Recommendations	Chairman: Dr. SD Sharma Convener: Dr. VK Gupta Co-convener: Dr. VK Bhatia

Inaugural Function. Dr. CK Teckchandani, Dean, JNKVV, Faculty of Engineering and Faculty of Basic Sciences gave his remarks. The Conference was attended by more than 65 Statisticians/Scientists/ Research Workers of various organisations spread all over the country. During the Conference, recommendations emereged are as follows:

Chief Guest releasing the Souvenir during the National Conference

General Recommendations

(i) IASRI should make efforts to revive the Certificate Courses/Training Courses that had been discontinued earlier.

(ii) The course curriculum of M.Sc. and Ph.D. programmes in Agricultural Statistics and Computer Applications should be dynamic in nature so as to include the recent advances in it. Similarly, some of the topics from M.Sc. syllabi should be shifted to undergraduate programme keeping in view that the basic course curriculum remains the same in all the teaching institutions.

(iii) A workshop may be organized for developing the course curriculum of undergraduate and post graduate programmes in Agricultural Statistics, particularly the service courses in other disciplines of agricultural research system. At least one basic course of statistics may be made compulsory at the graduate level.

(iv) To ensure continuing financial as well as human resource support for development, strengthening, maintaining and sustaining the data warehouses on agricultural research.

(v) For effective collaboration among the Agricultural Statisticians in NARS, the Agricultural

A view of Technical Session during the National Conference

Statisticians Network developed by IASRI must be expanded further and discussion forum should be used more rigorously. An orientation workshop may be organized for popularizing this network.

(vi) Information management is a manpower intensive activity. The current recruitment policy does not permit filling up of vacant positions of scientific/technical manpower resulting in slow development of information systems, updation of information and poor management of the networks. This policy needs review in case we want to harness the power of IT in disseminating the knowledge to the farming community.

(vii) The computer application in Agricultural Research is multi-disciplinary effort requiring collaboration among subject matter specialists and computer professionals, on development of expert systems and knowledge based systems. This may require inter institutional and inter disciplinary efforts and support for such programmes. Such efforts may have to be taken up in a network mode as is being done in the ICAR for other research programmes.

(viii) Efficient, cost effective and robust experimental designs and analytical techniques for cropping systems, farming systems, agro-forestry experiments, inter cropping experiments, precision agriculture, micro array experiments, food processing and post harvest storage experiments should be developed.

(ix) Planning, designing and analysis of long term experiments, integrated nutrient experiments, soil test crop response correlation etc. need to be taken up for addressing the issues of sustainability and identification of sustainable treatments.

(x) An urgent action is required for identification/ development of designs for DUS (Distinct, Uniform and Stable) testing trials as well as developing a manual of statistical techniques for DUS testing.

(xi) Diagnostics should be an inherent feature of every data analysis to ensure that the assumptions are met and statistically valid conclusions are drawn. However, if there are any gaps in the analytical techniques where there are strong departures from the assumptions, appropriate analytical techniques should be developed.

(xii) Efforts to develop indigenous, user friendly statistical software packages should be continued for the improvement in the quality of teaching and agricultural research output.

(xiii) The on-line information systems for all the designed experiments conducted in NARS should be developed and integrated at one place. The research managers should ensure that there is a continuous data flow in these information systems.

(xiv) Brain storming sessions and interactive sessions should be held with various stake holders in the NARS to identify the statistical problems of their experimentation and problems, if any, in the adoption of the current statistical techniques.

(xv) At present the M.Sc. and Ph.D. degree in Agricultural Statistics is not recognized as equivalent to M.Sc. in Statistics by many research institutions and traditional Universities for employment purposes. This issue should be taken up very strongly with the University Grants Commission, UPSC, and other Institutions.

(xvi) The Advisory and Consultancy services should be strengthened for dissemination of knowledge that would help in enhancing the quality of agricultural research. E-learning and E-advisory services should be introduced. This would help in identification of problems in future research and make the presence of the agricultural statisticians indispensable in NARS.

(xvii) Human Resource Development activities are very important for undertaking research in cutting edge technologies. Continuous financial support is to be ensured for the same.

(xviii) To develop statistical approaches for estimation of parameters of research prioritization.

(xix) Development of Bayesian optimal designs and Bayesian analysis of experimental data needs to be undertaken.

(xx) Analytical techniques for combined analysis of data and stability analysis of unbalanced and non-orthogonal data, when designs at different environments are different need development.

Seminars

Salient outcome 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, 43 were student seminars (10 thesis, 11 ORWs, 17 course seminars and 05 others), 26 by scientists of the Institute and 5 by guest speakers.

Annual Day Celebrations

The Annual Day of the Institute was celebrated on July 2, 2004. As part of these celebrations a debate contest for technical and administrative staff was held on July 1, 2004. The topic of the contest was 'Exit Polls are Reliable'. 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 July 2, 2004 in the forenoon session, another declamation contest for scientists and students was held. The topic of the contest was 'Utility of Expert System for Farming Community'.

Director, IASRI, lightening the lamp on Annual Day Function of the Institute

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

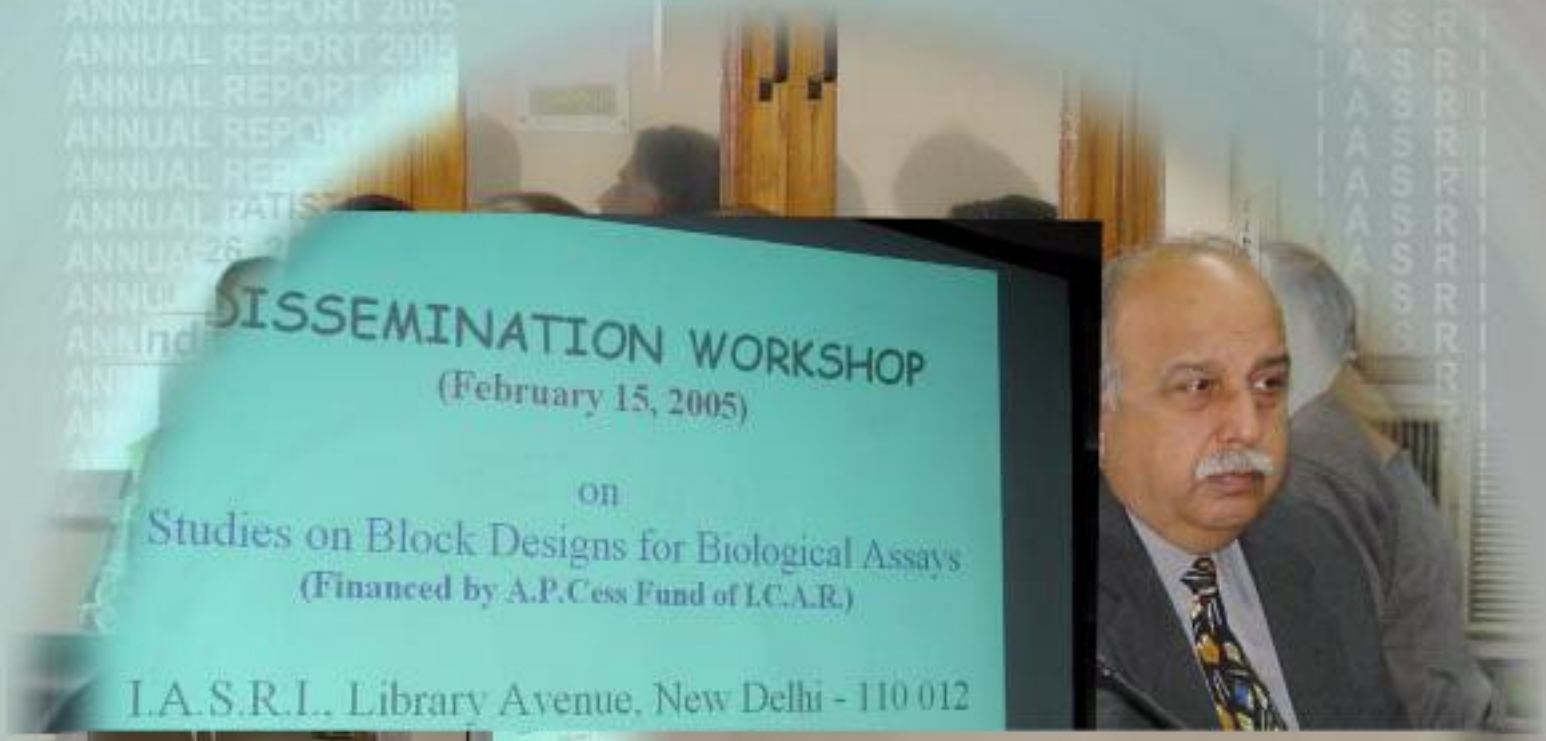
Prize	Name of the Scientist(s)	Designation
I	Ms. Anshu Dixit	Scientist
II	Sh. Sudeep	Scientist

Prize	Name of Student(s)	Course	Session
I	Ms. Priya Kohli	M.Sc. (Ag. Stat.)	2003-04
II	Sh. Dwijesh Chander Mishra	M.Sc. (Ag. Stat.)	2003-04

In the afternoon session, the main Annual Day Function was celebrated in which Dr. JSP Yadav, Former Chairman, ASRB was the Chief Guest. Dr. HK Jain, Former Director, Indian Agricultural Research Institute, New Delhi delivered the Nehru Memorial Lecture entitled "Nehru's Vision of India Science Based Development, Some Genetic Consideration".

Nehru Memorial Gold Medals for the year 2001-03 were awarded to Ms. Priyanka Shahi, M.Sc. (C.A.) and Sh. Ananta Sarkar, M.Sc.(Ag. Stat.) students.

The late Sh. VVR Murthy award for the year 2001-03 was awarded to Sh. Ananta Sarkar, M.Sc.(Ag. Stat.) student.


DISSEMINATION WORKSHOP
(February 15, 2005)
on
Studies on Block Designs for Biological Assays
(Financed by A.P.Cess Fund of I.C.A.R.)
I.A.S.R.I., Library Avenue, New Delhi - 110 012

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Distinguished Visitors

INDIAN

Dr. DN Jha,
National Professor,
NCAP, New Delhi

Sh. MM Nampoothiry,
Economics & Statistical Advisor, DES,
Ministry of Agriculture, GOI, New Delhi

Sh. AK Vishandass,
Additional Statistical Advisor, DES,
Ministry of Agriculture, GOI, New Delhi

Sh. S Maitra,
Additional Economic Advisor, DES,
Ministry of Agriculture, GOI, New Delhi

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

Dr. KA Vergese,
Head, Division of Agricultural Statistics,
M.P. Agriculture & Technology University,
Udaipur

Dr. (Mrs.) Shelja Sharma,
Joint Director, Commission for Agricultural
Costs & Prices,
Ministry of Agriculture, GOI, New Delhi

Dr. Suneel Sharma,
Additional Commissioner (Horticulture),
Ministry of Agriculture, GOI, New Delhi

Dr. ML Choudhary,
Horticulture Commissioner, GOI, New Delhi

Mrs. Shobha Marwah,
Director, Fisheries Statistics,
Department of Animal Husbandry & Dairying,
Ministry of Agriculture, GOI, New Delhi

Dr. KV Rao,
Additional DG, NSSO, New Delhi

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

Dr. MN Das,
Former Director,
I-1703, Chitranjan Park, New Delhi

Dr. LR Yadav,
Technical Director,
National Informatics Centre,
U.P. State Unit, U.P.

Sh. Bharat Krishnan,
System Manager,
RWC-CIMMYT, New Delhi

Prof. Kalyan Das,
Calcutta University, Kolkata

Prof. BK Thelma,
Delhi University, Delhi

Dr. Anwar Alam,
Vice Chancellor,
SKUA&T(K), Jammu and Kashmir

Dr. S Nagarajan,
Director,
Indian Agricultural Research Institute,
Pusa, New Delhi

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

Dr. S Ayyappan,
Deputy Director General (Engg. & Fisheries),
Krishi Anusandhan Bhavan –II,
Pusa, New Delhi

Dr. Panjab Singh,
Director,
Centre for Extension Education,
School of Agriculture, Indira Gandhi Open University,
New Delhi

Dr. JP Mishra,
Asstt. Director General (ES&M),
ICAR, Krishi Bhavan, New Delhi

Dr. SK Tondan
Asstt. Director General (Engg.),
Krishi Anusandhan Bhavan–II,
Pusa, New Delhi

Dr. SN Mishra,
Chairman,
Society of Economic & Social Research,
JR Complex No. 2,
HCMR Farms, Village-Mandoli, Delhi

Dr. SL Mehta,
National Director (NATP),
Indian Council of Agricultural Research, New Delhi

Dr. BS Pathak,
Director,
Sardar Patel Renewable Energy Research Institute (SPRERI),
Vallabh Vidya Nagar, Gujarat

Dr. Bal BPS Goel,
Former Director, IASRI,
B-77, Naraina Vihar, New Delhi

Dr. Aloke Dey,
Head, ISI, Delhi Centre,
7, SJS Sansanwal Marg, Katwaria Sarai, Delhi

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

Dr. M Moni
Deputy Director General, NIC,
A-Block, CGO Complex, New Delhi

Dr BK Sinha
Professor (Stat. Math. Unit), ISI, Kolkata

Dr. KV Peter,
Vice Chancellor,
Kerala Agricultural University, Trichur, Kerala

Dr. BP Singh,
Joint Director
CPRS, Modipuram

Sh. Champak Chatterjee,
Additional Secretary,
Ministry of Agriculture, New Delhi

Dr. Pramod Kumar,
Scientist (Sr. Scale),
Division of Agricultural Economics,
IARI, New Delhi

Dr. Seeta Prabhu,
Head, HDRC,
UNDP, New Delhi

Sh. M Neelakantan,
Former Deputy Director General,
NSSO, New Delhi

Dr. Pratap Singh,
Sr. Scientist, NCAP, New Delhi

Dr. Anjani Kumar,
Sr. Scientist, NCAP, New Delhi

Dr. (Mrs.) Lakshmi Joshi,
Research Fellow, NCAP, New Delhi

FOREIGN

Prof. JS Rustagi,
Former Head,
Department of Statistics,
Ohio State University, USA

Sh. Mausam,
Ph.D. Research Scholar,
Dept. of Computer Science,
University of Washington, Seattle, 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. Randhir Singh
Dr. K.K. Tyagi
Dr. U.C. Sud
Sh. R.S. Khatri

Senior Scientists
Dr. M.S. Narang
Dr. Jagbir Singh

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
Dr. Ashok Kumar Gupta

Scientists (Senior Scale)
Sh. Bhagwan Dass
Dr. Tauqueer Ahmad
Dr. Girish Kumar Jha

Scientists
Dr. (Smt.) Prachi Mishra Sahoo
Sh. Hukum Chandra

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

Principal Scientists
Dr. Prajneshu
Dr. V.K. Bhatia
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

Scientists
Sh. R.M. Bhasin
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.

Scientists
Dr. Himadri Ghosh
Sh. Amrender Kumar

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

Senior Scientists
Dr. S.P. Bhardwaj
Dr. Ashok Kumar

Scientists (Selection Grade)
Dr. (Smt.) Sushila Kaul
Sh. Mahender Singh

Scientist (Senior Scale)
Dr. Prawin Arya

Scientists
Sh. Shivramane N.
Dr. Dharam Raj Singh
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

Scientists
Smt. Alka Arora
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
Shri Sanjeev Panwar, Scientist

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. K.K. Hamja, Finance and Accounts Officer

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Any Other Relevant Information

National Agricultural Technology Project (NATP) Cell

NATP Cell was constituted in the Institute to streamline the coordination and monitoring of the NATP sponsored sub projects. The following are the members of the Cell:

Dr. S.D. Sharma, Director
Dr. P.K. Malhotra, HD(CA) and Nodal Officer
Sh. V.H. Gupta, Scientist
Sh. Pradeep Kumar, Sr. Clerk
Sh. Sunil Bhatia, T-2
Smt. Shakuntla Arora, P.S.

Activities undertaken by the NATP Cell during 2004-05

- Maintaining the expenditure register of NATP sub-projects. Quarterly/Half yearly and Annual Expenditure statements prepared in consultation with the Accounts Section
- Information regarding statement of expenditure, equipments procured during the financial year and other information supplied as and when required by the NATP-PIU/ICAR
- Remittance of funds to cooperating centers received at IASRI as a lead center of various NATP sub-projects
- Assisted in the recruitment of research associates and senior research fellows
- Assisted the audit party for auditing of the accounts of NATP sub-projects
- Rendered essential assistance in organizing various trainings, organisation of various Workshops /Meetings conducted under the NATP sub-projects
- Assisted in procurement of various equipments (computer hardware/software)
- Correspondence with the other Sections /Cells in the Institute, cooperating centers of the projects and PIU, NATP

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
	Chief Administrative Officer	Member-Secretary
Staff-side Representatives		
Sh. Anil Kumar Bhalla	Assistant	Secretary
Sh. Satya Pal Singh	Technical Officer (T-5)	Member
Sh. M.M. Morya	Technical Assistant (T-4)	Member
Sh. D.P.S. Mann	Assistant	Member
Sh. Gabar Singh Rana	S.S. Gr.III	Member
Sh. Raj Nath	S.S. Gr.II	Member

One meeting of the Institute Joint Staff Council was held on 30 July, 2004 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 continues its activities during 2004-05 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), compulsory deposits (Rs.100/- only per month from each member) and the fixed deposits. The present strength of the members of the society is 425.

The Management Committee of the society for the year 2004-05 is as follows:

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

Main Achievements

- The society advanced Rs. 74,78,400/- (Rupees seventy four lakhs seventy eight thousand four hundred only) to its members as loan.
- An amount of Rs. 751/- (Rs. seven hundred fifty one only) each was given as gift to 20 members on their retirement from the Institute.
- The financial help of Rs. 2000/- (Rs. two thousand only) each was extended to S/Shri R.S. Butola and B.N. Chakarborty from member welfare fund of the society during their serious illness.
- The financial help of Rs. 5000/- (Rs. five thousand only) was extended from member welfare fund of the society to the family of (late) Shri B.M. Nautiyal after his 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
CAO	Member
F&AO	Member
Sh. D.N. Bhatia	Member

Staff-side Representative

Sh. Mahendar Singh	Member
Sh. A.R. Sharma	Member
Sh. Prem Narain	Member
Sh. Ashok Kumar	Member

Seven meetings of the Grievance Committee of the Institute were held on 29 April, 28 May, 26 June, 30 July, 28 August, 27 September and 27 November, 2004 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. 500/- is being given to the retiring employees of the Institute. During the year, a sum of Rs. 7560/- only was collected from members. This year, gifts of Rs. 8500/- were distributed to seventeen retiring personnel of the Institute @ Rs. 500/- each. A relief of Rs. 1,000/- was provided to the grieved family of one IASRI personnel i.e. (Late) Sh. B.M. Nautiyal, AAO on his untimely death.

Women Cell

A Women Cell has been set up at the Institute on 27 January, 2000. The cell functions for the welfare of women in general. It caters to the issues pertaining to the grievances of women employees. Women cell, reconstituted on 5 February, 2004, comprises of the following members:

Name	Designation	Post
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

One meeting of the women cell was held on 15 September, 2004.

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 were elected for the session 2004-05 as:

Prefect	Sh. Ananta Sarkar
Assistant Prefect/ Mess Secretary	Sh. Dharam Nath Jha
Maintenance Secretary	Sh. Madan Gopal Kundu
Sports Secretary	Sh. Kaushik Bhagwati
Cultural Secretary	Sh. Dwijesh Chandra Mishra
Computer Lab Secretary	Sh. Souman Pal
Health and Sanitation Secretary	Sh. Pabitra Biswas
Common Room Secretary	Sh. Vinaynand Kandla and Sh. Mahesh Kumar Sonowne
Auditors	Sh. Jitendra Singh Tomar and Sh. Susheel Kumar Sarkar
Warden's Nominee	Sh. Pradip Kumar Nandi

On the eve of the Annual Day on 02 July, 2004, 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.

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 2004 were organised during 2004-05.

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. Mukesh Kumar	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, Director	Patron
Dr. V.K. Gupta, Joint Director	President
Dr. K.K. Tyagi, Principal Scientist	Vice President
Sh. R.S. Khatri, Principal Scientist & Warden	Member
Chief Administrative Officer	Member
Sh. K.K. Hamza, F&AO	Member
Dr. (Smt.) Seema Jaggi, Senior Scientist	Member
Sh. G.M. Pathak, Technical Officer (T-6)	Member
Sh. R.S. Tomar, Technical Officer (T-5)	Member
Smt. Vijaya Laxmi, Steno-typist	Member
Sh. D.P.S. Mann, Assistant	Member
Sh. Krishan Kumar, Assistant	Member
Sh. Amar Singh, UDC	Member
Sh. Rambhool, UDC	Member
Sh. Mukesh Kumar, UDC	Member
Sh. K.B. Sharma, UDC	Member
Sh. K.K. Hans, UDC	Member
Sh. A.K. Bhalla, Secretary IJSC	Member
Sh. M.S. Verma, Technical Officer (T-8)	Convenor

ICAR Inter-Zone Sports Meet (2003-04)

IASRI sports contingent comprising of 11 participants including, Chef-de-mission Sh. M.S. Verma, Tech. Officer/Convenor, Institute Sports Committee, participated in ICAR, Inter-Zone Sports Meet (2003-04) held at National Research Center for Grapes, Pune, Maharastra during 24-28 May, 2004.

The Institute participants achieved prestigious position: ICAR Champion Trophy in Table Tennis team event (Men), and Winner Position in Table/Tennis women singles and doubles events.

ICAR Zone-II (Central Zone) Sports Meet (2004-05)

Institute's Sports Contingent comprising of 49 participants including Sh. M.S. Verma, Technical Officer/ Convenor and Chef-de-mission, Sh. A.K. Bhalla, Sh. R.S. Tomar and Sh. K.K. Hans as managers and six ladies participants, participated in the various games/events in the ICAR Zone-II (Central Zone) Sports Meet 2004–05 held at IARI, New Delhi during 22-26 November, 2004.

In the above Sports Meet our Institute held third position among all the participated Institutes.

The Institute's participants achieved prestigious positions: Champion Trophy in Kabaddi and Table Tennis team events (Men). In individual events our Institute had Winner & Runner positions in Chess (Men), Runner position in Table Tennis singles (Women) and Runner position in Table Tennis doubles (Women). In Athletics (Women events) Runner position in Shot-put, third position in Discus and Javelin throw.

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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। अत्यन्त ही हर्ष के साथ यह उल्लेख करते हुए गर्व हो रहा है कि संस्थान में राजभाषा विभाग द्वारा जारी वार्षिक कार्यक्रम में निर्धारित लक्ष्यों में से लगभग सभी लक्ष्यों को प्राप्त कर लिया गया है। कहना अनुचित न होगा कि संस्थान का समस्त प्रशासनिक कार्य शत-प्रतिशत हिन्दी में और यथा आवश्यक द्विभाषी रूप में ही हो रहा है। संस्थान में हो रहा हिन्दी का प्रयोग केवल अनुवाद पर ही आधारित नहीं है अपितु अधिकारी एवं कर्मचारी हिन्दी में मूल लेखन कर रहे हैं।

राजभाषा हिन्दी के प्रयोग को बढ़ावा देने के लिए परिषद मुख्यालय द्वारा चलाई जा रही "राजर्षि टण्डन राजभाषा पुरस्कार योजना" के अन्तर्गत वर्ष 2003-04 के दौरान हिन्दी में सर्वाधिक कार्य करने वाले बड़े संस्थानों में से भारतीय कृषि सांख्यिकी अनुसंधान संस्थान को द्वितीय पुरस्कार के लिए चुना गया। यह पुरस्कार 24 दिसम्बर, 2004 को परिषद द्वारा आयोजित पुरस्कार वितरण समारोह में संसदीय राजभाषा समिति की उपाध्यक्षा, श्रीमती सरला माहेश्वरी द्वारा प्रदान किया गया।

प्रतिवेदनाधीन अवधि के दौरान संस्थान में राजभाषा कार्यान्वयन समिति की तिमाही बैठकें नियमित रूप से आयोजित की गईं। उनमें लिए गए

मुख्य अतिथि से वाद-विवाद प्रतियोगिता के लिये पुरस्कार ग्रहण करते हुए एक विद्यार्थी।

निर्णयों पर कार्यान्वयन सुनिश्चित करने के लिए पहले से ही संस्थान में गठित राजभाषा निरीक्षण समिति द्वारा हर तिमाही में 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 सिफारिशें निदेशक महोदय के समक्ष प्रस्तुत की गईं तथा निदेशक महोदय द्वारा दिये गये आदेशों को विभिन्न प्रभागों/अनुभागों में प्रचारित किया गया।

प्रतिवेदनाधीन वर्ष के अन्तर्गत, संस्थान के वैज्ञानिकों, तकनीकी कर्मियों, सहायक प्रशासनिक अधिकारियों तथा सहायकों और वरिष्ठ एवं कनिष्ठ लिपिकों के लिए चार कार्यशालाएं आयोजित की गईं, जिनमें वैज्ञानिक/तकनीकी विषयों पर, मूल रूप से हिन्दी में शोध एवं लोकप्रिय लेखों के लेखन के गुर, वैज्ञानिक सामग्री के अनुवाद की समस्या, भा.कृ.अ.प./भारत सरकार द्वारा चलाई गई हिन्दी पुरस्कार योजनाओं की जानकारी, हिन्दी में कार्य करने की सांविधानिक अनिवार्यताएं, राजभाषा अधिनियम एवं नियम, हिन्दी तिमाही प्रगति रिपोर्ट एवं निरीक्षण प्रश्नावली भरने, हिन्दी में मूल पत्राचार लेखन, वार्षिक कार्यक्रम में निर्धारित लक्ष्य, टिप्पण एवं प्रारूप लेखन के सिद्धान्त, परिषद में हिन्दी लेखों के प्रकाशन संबंधी जानकारी इत्यादि विषयों पर संस्थान के बाहर से आमंत्रित व्याख्याताओं द्वारा व्याख्यान दिये गए। इसके अतिरिक्त, संस्थान द्वारा समय-समय पर खरीदे जा रहे बहुभाषी सॉफ्टवेयरों पर हिन्दी में काम करने की जानकारी देने के लिए भी प्रशिक्षण कार्यक्रम चलाए गए।

संस्थान में कार्यरत सभी हिन्दीतर भाषी अधिकारियों/कर्मचारियों द्वारा हिन्दी ज्ञान सम्बन्धी प्रशिक्षण पूरा किया जा चुका है। आज तक की स्थिति के अनुसार संस्थान में अब कोई ऐसा हिन्दीतर भाषी अधिकारी/कर्मचारी शेष नहीं रह गया है जिसे हिन्दी ज्ञान सम्बन्धी प्रशिक्षण दिया जाना शेष हो। इसके अलावा, हिन्दी शिक्षण योजना के अन्तर्गत संस्थान में हिन्दी आशुलिपि के प्रशिक्षण के लिये शेष बचे एक आशुलिपिक द्वारा जुलाई, 2005 में आयोजित हिन्दी आशुलिपि की परीक्षा दी जाएगी तथा सभी कार्यरत अवर लिपिकों द्वारा हिन्दी टंकण का प्रशिक्षण पहले ही 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 ही लिखे गये साथ ही, "क" तथा "ख" क्षेत्रों से अंग्रेजी में प्राप्त पत्रों के उत्तर तथा "क" तथा "ख" क्षेत्रों की राज्य सरकारों एवं उनके कार्यालयों और गैर-सरकारी व्यक्तियों के साथ भी 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 ज़ारी किए गए।

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

संस्थान में इस वर्ष दो बहुभाषी सॉफ्टवेयर, आई.एस.एम.-2000 तथा ए.पी.एस.-2000++ खरीदे गये हैं ताकि सभी वैज्ञानिक, तकनीकी एवं प्रशासनिक कर्मी अपना दैनिक कामकाज कम्प्यूटर पर हिन्दी में सरलता से कर सकें। इन दोनों सॉफ्टवेयरों पर हिन्दी में काम करने के लिए विशेष प्रशिक्षण कार्यशालाएं चलाई गईं। इन दोनों कार्यशालाओं में लगभग 40 अधिकारियों/कर्मचारियों को उक्त सॉफ्टवेयर पर काम करने का व्यवहारिक प्रशिक्षण दिया गया। इन दोंनों ही सॉफ्टवेयरों में ऐसी सुविधा है कि वे व्यक्ति भी हिन्दी में काम कर सकते हैं जो टाईपिंग नहीं जानते।

संस्थान की वर्ष 2003-04 की वार्षिक रिपोर्ट इस बार भी हिन्दी और अंग्रेजी, अर्थात् डिग्लाट फोर्म में प्रकाशित की गई, जिसका संस्थान के वार्षिक दिवस समारोह के अवसर पर विमोचन हुआ। संस्थान की वेबसाइट (हिन्दी में) को समय-समय पर अद्यतन किया गया, साथ ही

हिन्दी चेतनामास के दौरान निदेशक महोदय ज्योति प्रज्वलित करते हुए

संस्थान की वेबसाइट पर उपलब्ध "हिन्दी-सेवा लिंक" में भी वैज्ञानिक, तकनीकी तथा प्रशासनिक शब्दावली में सामग्री जोड़ी गई।

प्रतिवेदनाधीन अवधि के दौरान संस्थान के वैज्ञानिकों ने अपने शोध पत्र, परियोजना प्रस्ताव तथा सेमिनार हिन्दी में प्रस्तुत किए। वैज्ञानिकों द्वारा अपनी परियोजना रिपोर्टों के सारांश भी द्विभाषी रूप में प्रस्तुत किए गये। संस्थान द्वारा किए जाने वाले सर्वेक्षणों की प्रश्नावलियां/प्रपत्र भी द्विभाषी तैयार किए गए।

गृह मंत्रालय, राजभाषा विभाग द्वारा ज़ारी तथा परिचालित विभिन्न नकद पुरस्कार योजनाएं संस्थान में लागू हैं। संस्थान के कर्मियों ने इन योजनाओं में हिस्सा लिया। विजेता प्रतियोगियों को ये पुरस्कार दिनांक 01 अक्तूबर, 2004 को हिन्दी चेतनामास के समापन समारोह के अवसर पर हुए पुरस्कार वितरण समारोह में मुख्य अतिथि द्वारा प्रदान किए गए।

हर वर्ष की भांति, इस वर्ष भी संस्थान में दिनांक 01 सितम्बर से 01 अक्तूबर, 2004 के दौरान हिन्दी चेतनामास का आयोजन किया गया। इस दौरान विभिन्न प्रतियोगिताएं/कार्यक्रम आयोजित किए गए। सदैव की भांति इस वर्ष के आयोजन के प्रमुख एवं लोकप्रिय कार्यक्रम थे - काव्य पाठ, अन्ताक्षरी, वाद-विवाद, प्रश्नमंच, इत्यादि। इसके अलावा, टिप्पण एवं प्रारूप लेखन, हिन्दी टंकण एवं हिन्दी आशुलिपि तथा हिन्दी व्यवहार प्रतियोगिता भी की गईं जिनमें संस्थान के अधिकारियों/कर्मचारियों/छात्रों ने बढ़-चढ़ कर हिस्सा लिया। हिन्दी चेतनामास के दौरान इस वर्ष भी हिन्दी दिवस पर डा. दरोगा सिंह स्मृति व्याख्यानमाला का आयोजन किया गया जिसमें कृषि वैज्ञानिक चयन मण्डल के अध्यक्ष, डा. अमर सिंह फरोदा द्वारा "कृषि में सांख्यिकी का महत्व" विषय पर व्याख्यान दिया गया।

इस वर्ष हिन्दी चेतनामास में "शोध-पत्र पोस्टर-प्रदर्शन प्रतियोगिता" वैज्ञानिकों तथा तकनीकी कर्मियों के लिये विशेष आकर्षण रही। यह प्रतियोगिता इसी वर्ष से आरम्भ की गई। इसमें संस्थान के वैज्ञानिकों तथा तकनीकी कर्मियों ने अपने-अपने 11 शोध-पत्र पोस्टर प्रदर्शित किए जिसमें से सर्वश्रेष्ठ तीन शोध-पत्रों को पुरस्कृत किया गया।

दिनांक 01 अक्तूबर, 2004 को चेतनामास का समापन एवं पुरस्कार वितरण समारोह हुआ। इस अवसर पर मुख्य अतिथि थे श्री बालस्वरूप राही, वरिष्ठ साहित्यकार एवं पूर्व सचिव, भारतीय ज्ञानपीठ। हिन्दी चेतनामास के दौरान आयोजित विभिन्न प्रतियोगिताओं के सफल प्रतियोगियों को हिन्दी चेतनामास के समापन समारोह के अवसर पर मुख्य अतिथि द्वारा पुरस्कृत किया गया। समारोह के अन्त में श्री राही जी ने अपने संबोधन में संस्थान में हो रहे हिन्दी के प्रयोग की विशेष रूप से सराहना की और कहा कि इस उपलब्धि से हिन्दी में हो रहे विशेषकर मूल रूप से शत-प्रतिशत प्रशासनिक कार्य का व्यापक प्रचार-प्रसार होना चाहिये ताकि इस संस्थान से अन्य संस्थानों के अधिकारियों/कर्मचारियों को भी प्रेरणा मिल सके और वे भी अपने यहां मूल रूप में राजभाषा हिन्दी का प्रयोग शुरू कर सकें।

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 harvest and post-harvest losses – a mission mode project under NATP.
   HVL Bathla, Anil Rai, RS Khatri, Jagbir Singh, Tauqueer Ahmad, Girish Kumar Jha, Vipin Kumar Dubey
4. Study relating to formulating long term mechanisation strategy for each agro-climatic zone/ state (Funded by Department of Agriculture and Cooperation, Ministry of Agriculture).
   KK Tyagi, HVL Bathla, DL Ahuja, MS Narang, Satya Pal, RM Sood, Bhagwan Dass, SC Agarwal, AK Gupta, KK Kher, DC Mathur, Man Singh

Production and Area Estimation

5. Estimation of wool production – emerging data needs and a methodological reappraisal (Funded through A.P. Cess Fund, ICAR).
   RS Khatri, JP Goyal, J Jayasankar (CSWRI, Avikanagar), V Geethalakshmi (CSWRI, Avikanagar)
6. Crop yield estimation at small area level using farmers' estimate (Funded by Ministry of Statistics and Programme Implementation, C. S. O., New Delhi).
   UC Sud, DC Mathur, GK Jha, SC Sethi, RM Bhasin

Cost of Production Studies

7. Sample survey to develop sampling methodology for estimation of area, production and productivity of important flowers on the basis of market arrivals (Funded by Ministry of Statistics and Programme Implementation, C. S. O., New Delhi).
   AK Gupta, VK Jain, MS Narang, KK Tyagi, UC Sud

Cropping Systems Research

8. Planning, designing and analysis of experiments planned ON STATIONS under the Project Directorate of Cropping Systems Research.
   Rajinder Kaur, Ajit Kaur Bhatia, Anil Kumar
9. Planning, designing and analysis of ON FARM research experiments planned under Project Directorate of Cropping Systems Research.
   NK Sharma, PK Batra
10. Planning, designing and analysis of data relating to experiments conducted under AICRP on long-term fertilizer experiments.
    MR Vats, DK Sehgal, DK Mehta
11. 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

12. Agricultural field experiments information system.
    PK Batra, OP Khanduri
13. National information system on long term fertilizer experiments (funded by AP Cess Fund, ICAR).
    MR Vats, DK Sehgal, Krishan lal, Anshu Dixit, Shashi Dahiya
14. National Information System on animal experiments (Funded by AP Cess Fund, ICAR).
    PK Batra, RC Goyal, VK Sharma, DK Sehgal

Experimental Design for Agricultural, Animal, Agroforestry and Fisheries Research

15. 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

16. Outliers in designed experiments. (Funded through AP Cess Fund, ICAR).
LM Bhar, Rajender Parsad, VK Gupta
17. Studies on block designs for biological assays (Funded through AP Cess Fund, ICAR).
R Srivastava, VK Gupta, Rajender Parsad
18. 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
19. Design and analysis of experiments for spatially correlated observations (Funded by DST).
Seema Jaggi, VK Gupta, Rajender Parsad
20. Statistical analysis for experiments on determining level and frequency phosphorous application in different cropping systems.
Ajit Kaur, VK Sharma, SK Sharma
21. A study on trend free designs.
Krishan Lal, Rajender Parsad, VK Gupta

Studies on Gene Action, Estimation of Genetic Parameters and Genetic Merit, Genetic Progress and other related Statistical Methods

22. 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
23. Some investigations on stable and robust clustering procedures (Funded through AP Cess Fund, ICAR).
Wasi Alam, AR Rao, SD Wahi, VT Prabhakaran

Forecasting Techniques in Agricultural System

24. 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)
25. Development of model for forewarning about infestation of the insects of paddy crop – Collaborative study.
MK Sharma (NDUAT, Faizabad), V Pandey (NDUAT, Faizabad), RS Singh (NDUAT, Faizabad), Ramasubramanian V, SS Walia
26. Development of weather based forewarning system for crop pests and diseases. (Mission Mode project under NATP. Lead centre CRIDA, Hyderabad).
Ranjana Agrawal, SC Mehta, LM Bhar, Amrender Kumar
27. Study of non-linear time series modeling in agriculture.
H Ghosh, Prajneshu, A Paul
28. Modeling of forecasting of crop yield using weather parameters and agricultural inputs (Funded through AP Cess Fund, ICAR).
Ranjana Agrawal, Asha Saksena, LM Bhar, Amrender Kumar, Madan Mohan,YS Ramakrishna (CRIDA, Hyderabad), Kesava Rao (CRIDA, Hyderabad)

Study of Technological Change, Risk and Uncertainity in Agriculture

29. An econometric study of technological dualism in egg production.
SP Bhardwaj, Sivaramane N, Wasi Alam, Sushila Kaul
30. Technical efficiency analysis of rice-wheat system in Punjab (Funded through A.P. Cess Fund, ICAR).
SS Kutaula
31. 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

32. Jai-Vigyan National Science and Technology project on household food and nutritional security for tribal, backward and hilly areas (Mission Mode project under NATP).
Sushila Kaul, Dharam Raj Singh
33. Dietary pattern and nutritional status of rural households: State-wise analysis.
Ashok Kumar, DR Singh, Mahendra Singh
34. Determinants of performance of self-help groups in rural micro-finance – Collaborative study.
Lakshmi Prasana (NCAP, New Delhi), Ashok Kumar
35. Water food security scenario analysis for 2025 – agro-ecological regional approach.
S Selvarajan (NCAP, New Delhi), Dharam Raj Singh

Modelling for Agricultural Marketing

36. Study of lac marketing in India (Funded through A.P. Cess Fund, ICAR).
    SP Bhardwaj, Sanjeev Panwar, Sushila Kaul, VK Bhatia

Development of Databases and Information System for National Agricultural Research System

37. Institutionalisation of research priority setting, monitoring and evaluation and networking of social scientists (NATP, PME project under O&M component).
    SD Sharma, PK Malhotra, RC Goyal, Ashok Kumar, VH Gupta, Sudeep Kumar, Alka Arora, Sangeeta Ahuja
38. Integrated National Agricultural Resources Information System (INARIS) (Mission Mode project under NATP).
    Anil Rai, PK Malhotra, Randhir Singh,,Alka Arora, Sudeep Kumar, Anshu Dixit, KK Chaturvedi, Vipin Kumar Dubey, PK Batra, MS Narang, VK Jain, T Ahmad, Prachi Mishra, SP Bhardwaj, Ramasubramanian V, AR Rao
39. Development of expert system of extension (CGP, NATP).
    Ram Bahal, (IARI, New Delhi), Sudeep Kumar
40. Development of statistical package for agricultural research (Windows Version) SPAR 2.0.
    Sangeeta Ahuja, PK Malhotra, VK Bhatia, Rajender Parsad, VH Gupta
41. Statistical package for animal breeding.
    IC Sethi
42. 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)
43. Software for the analysis of survey data.
    VK Mahajan, GK Jha, SB Lal, Anu Sharma
44. 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

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