

ANNUAL REPORT 1989-90



INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE
(I.C.A.R.)

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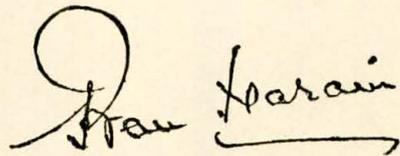


खुशहाल बालिका भविष्य देश का
CARE FOR THE GIRL CHILD

PREFACE

The present compendium gives the panorama of activities and achievements of the Institute during 1989-90 and also major recommendations made in the Ninth National Conference of Agricultural Research Statisticians organised by the Institute during the period. Mission-mode projects undertaken by various divisions of the Institute are reflected in this compendium. Areas of research in the field of computer application, namely the development of expert system, data-base management system in agriculture etc are also highlighted. It is hoped that the information furnished in this report will be of considerable interest to scientific fraternity.

Co-ordination Cell has done a commendable job of editing the voluminous material of the report and deserves appreciation for its timely publication. Thanks are due to S/Sh OP Singh and Satya Pal, Technical Assistants and Sh RS Chauhan, Assistant, for their help in the preparation of the report and Mrs Rajni Gupta for efficiently typing the manuscript.

A handwritten signature in black ink, appearing to read 'Prem Narain', with a long horizontal flourish extending to the right.

(PREM NARAIN)

CONTENTS

	<i>Pages</i>
INTRODUCTION	...
Aims and Function	1
Origin and Growth	1
Functional Set-up	3
Management Committee	4
Research Collaboration	4
Finance	5
PROGRESS OF PROJECTS	...
Division of Design of Experiments and Analysis of Experimental Data	7
Division of Sample Survey Methodology and Analysis of Survey Data	17
Division of Bio-Statistics and Statistical Genetics	30
Division of Forecasting Techniques for Crops, Diseases and Pests	36
Division of Statistical Economics	39
Division of Computing Science	43
UNDP CENTRE OF ADVANCED STUDIES IN AGRICULTURAL STATISTICS AND COMPUTER APPLICATIONS	...
UNDP Consultants	44
Deputations for Training Abroad	44
Visitors	45
POST-GRADUATE TRAINING AND EXTENSION	...
Regular Courses	46
Ad-hoc Training Courses	46

Refresher Course in Agricultural Statistics	...	47
Training Course in Administrative Vigilance	...	47
Ad-hoc Training Programme	...	48
Advanced Course on Statistical Aspects of Animal Breeding	...	48
Training Programmes Organised for trainees from other organisations	...	49
International Training Course	...	51
Research Fellowships	...	51
Hostels	...	51
Seminars/Conference	...	52
Ninth National Conference of Agricultural Research Statisticians	...	54
National Science Day/Annual Day	...	59
Nehru Centenary Celebration	...	59
Advisory Service	...	60
LIBRARY AND DOCUMENTATION SERVICES	...	62
PUBLICATIONS	...	64
SEMINARS/WORKSHOPS/SYMPOSIA AND CONFERENCES ATTENDED BY THE SCIENTISTS	...	65
PAPERS PRESENTED AT WORKSHOPS/SYMPOSIA/ CONFERENCES	...	72
OTHER INFORMATION ABOUT SCIENTISTS	...	82
Fellowship/Membership of Scientific Societies	...	82
Offices in Professional Societies	...	84
Membership of Committees/Panels/Working Groups	...	84
Special Lectures, Training, Study Tour and Meetings	...	91
Participation in ICAR Scientific Panel	...	100
Awards/Honours	...	100
Miscellaneous Information	...	100
CO-ORDINATION AND MONITORING CELLS	...	103
Co-ordination Cell	...	103
Reports/Newsletters/Quarterly Progress Reports	...	103
Communication of Research Material	...	103

Staff Research Council	...	104
Monitoring Cell	...	104
STAFF WELFARE ACTIVITIES	...	106
Joint Staff Council	...	106
Grievance Cell	...	106
Recreation and Welfare Club	...	106
Benevolent Fund	...	107
Co-operative Thrift and Credit Society	...	107
Co-operative Canteen and Store	...	107
Sports	...	107
हिन्दी के प्रगामी प्रयोग में प्रगति	...	109
APPENDICES I-VII	...	111-140
IASRI Personnel	...	111
Sanctioned and Filled-up Posts	...	114
Dissertations Approved	...	117
Papers Published	...	128
Papers Accepted for Publication	...	135
Appointments, Promotions, Transfers, Deputation, Retirements and Resignations	...	137
Primary Data Collection	...	140

INTRODUCTION

Aims and Functions

The Indian Agricultural Statistics Research Institute (IASRI) is a premier Institute for promoting and conducting research and training in Agricultural Statistics in the country for improving planning and evaluation of agricultural research and development. To achieve these objectives, the IASRI has the following functions :

- To conduct research in experimental designs, sampling methods, statistical genetics, bio-statistics and statistical economics,
- To conduct post-graduate courses leading to MSc and PhD degrees in agricultural statistics and MSc in computer application in agriculture,
- To provide advisory service to agricultural scientists/workers from various agricultural organisations in India and abroad,
- To develop computer software for agricultural research,
- To conduct in-service training courses in agricultural statistics and computer application, and
- To provide consultancy service in data processing.

Origin and Growth

The Institute on the recommendations of the Royal Commission on Agriculture made a modest beginning in 1930 as STATISTICAL SECTION of the Indian Council of Agricultural Research (ICAR), the then Imperial Council of Agricultural Research. The activities of the Statistical Section entered a new phase towards the end of 1943 when following the Bengal famine, the Government of India directed it to undertake research in the methods of collecting crop yield statistics by conducting objective surveys based on the methods of random sampling. This assignment resulted in the development of the use of random sampling methods for estimating yield by crop cutting surveys whose efficiency and practicability were demonstrated in different states. The recognition which this method attained was such that in the course of a few years the method was extended practically to the entire country to cover all principal food crops.

In 1944 the Statistical Section undertook statistical analysis of the 10 years data on goat breeding project at Etah in UP which led, for the first time, to the recognition of the need for application of statistical techniques to animal sciences.

As a result several investigations both of the methodological and basic nature followed and statistical techniques became integral part of research and development in animal sciences.

The Statistical Section was reorganised with a new name STATISTICAL BRANCH in 1945 into two separate units, each under the charge of a Statistician dealing with statistical application of research in agriculture and in animal husbandry and was headed by Statistical Adviser to the Council (ICAR). The Council also instituted regular post-graduate training courses for professional statisticians and for research workers in the field of agriculture and animal husbandry. The Statistical Branch soon acquired international recognition as a training and research institutions in the field of agricultural statistics and was made responsible for training foreign students and organising international seminars for the Food and Agriculture Organisation of the United Nations.

The period between 1951-55 was marked by multipronged activities for development as well as application of survey techniques in various fields of agriculture. On the recommendations of two FAO experts Dr Frank Yates, Chief Statistician, Rothamsted Experimental Station, Harpenden (UK) and Prof DJ Finney of Oxford University (UK), the activities of the Statistical Branch expanded manifold and in August, 1955, it moved to its present campus at Pusa as a STATISTICAL WING of ICAR. In

recognition of its significant role as a premier institution of training and research it was rechristened as the INSTITUTE OF AGRICULTURAL RESEARCH STATISTICS (IARS) in July, 1959. A mechanical data processing unit was also then added to the Institute.

An important landmark was the installation of an IBM 1620 Model-II Electronic Computer in 1964. New courses leading to M Sc and Ph D degrees in Agricultural Statistics were started in collaboration with the Indian Agricultural Research Institute (IARI), New Delhi in October, 1964. In April, 1970 the Institute was accorded the status of a full-fledged institute under the ICAR set-up and is since then headed by a Director.

Since the activities of the Institute expanded manifold, new three-storeyed Computer Centre building was constructed in the campus of the Institute in 1976. A third generation computer B-4700 system was installed in March, 1977. A large number of general purpose application software have been developed and are available on library tape. In view of Institute's mandate for research in agricultural statistics rather than in agriculture its name was changed to INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE (IASRI) in January, 1978.

In order to cover the deficiencies in the existing documentation services dealing with agriculture, the Food and Agriculture Organisation of the United

Nations initiated a series of studies, in 1971, to establish the Information System for Agricultural Sciences and Technology (AGRIS). After preliminary trials the system started functioning in 1975. As on 1st November, 1977 there were 82 input centres and 77 liaison offices all over the world, which contribute to the system. Our country is the third largest (next to USA and Japan) among the National input centres, from the point of number of inputs added to the system every month. The Institute provides selective information services to Scientists in the ICAR institutes and agricultural universities on references to documents relating to areas of their specific interest.

From October 1, 1983 the Institute is also functioning as a Centre of Advanced Studies in Agricultural Statistics and Computer Application under the aegis of the United Nations Development Programme (UNDP) for a period of 7 years. This aims at developing a centre of excellence with adequate infrastructure and facilities to undertake advanced training programmes and to carry out research in various aspects of agricultural statistics and computer application. Under this project a new course leading to M Sc degree in Computer Application in Agriculture has also been initiated.

The institute has achieved international recognition for its high quality of research and teaching work in the field of agricultural statistics. 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.

On November 19, 1987 the foundation stone of the multistorey Training-cum-Administrative block of the institute was laid by the Hon'ble Union Minister of Agriculture Dr. G. S. Dhillon.

Functional Set-up

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

Divisions :

- Design of Experiments and Analysis of Experimental Data,
- Sample Survey Methodology and Analysis of Survey Data,
- Forecasting Techniques for Crops, Diseases and Pests,
- Bio-statistics and Statistical Genetics,
- Statistical Economics, and
- Computing Science

Cells :

- Training Administration,
- UNDP,
- Coordination, and
- Monitoring

Management Committee

The Director of the Institute, who is incharge of the overall management of the Institute is assisted in the discharge of his functions by the Management Committee of the Institute (constituted by and under the administrative control of the Council) by providing a broadba-

sed platform for decision making process, by examining the progress of the Institute periodically and by recommending suitable remedial measures for bottlenecks, if any. The Management Committee of this Institute was reconstituted on October 2, 1986. The meeting of the Management Committee was held on Aug 7, 1989.

Research Collaboration

The Collaborative projects which remained in operation during 1989-90 are as follows :

Sl. No.	Title	Collaborating Agency	Start	Completion
1	2	3	4	5
1.	Pilot studies for developing statistical methodology for estimating the losses due to diseases and pests in bovines	HAU, Hissar	Jan, 85	Apr, 90
2.	Planning, designing and statistical analysis of experiments planned under All India Coordinated Agronomic Research Project at cropping systems research centres and on cultivators' fields	(i) Deptt of Agronomy, Agricultural Universities (ii) State Deptt of Agriculture, Manipur	Mar, 86	Continuing
3.	Planning, designing and statistical analysis of the data relating to experiments conducted under the All India Coordinated Research Project on Long Term Fertilizer Experiments	(i) Deptt of Soils, ICAR Institutes (ii) Deptt of Soils, State Agricultural Universities	Jul, 85	Continuing

1	2	3	4	5
4.	A within-year growth model for pre-harvest forecasting of crop yields	IARI, New Delhi	Oct, 87	Dec, 90
5.	Statistical aspects of physiological kinetics in animal nutrition	(i) IVRI, Izatnagar (ii) NDRI, Karnal (iii) CSWRI, Avikanagar	Aug, 87	Jan, 91
6.	Pilot studies on pre-harvest forecasting of yield of stick-lac in Bihar	Indian Lac Research Insitute, Ranchi	Oct, 88	Dec, 91

Finance

Budget statement for the financial year 1989-90

Head	Non-Plan		Plan	
	Funds (Rs)	Expenditure (Rs)	Funds (Rs)	Expenditure (Rs)
Pay and Allowance	—	2,58,03,202.21	—	1,86,913.00
Travelling Allowances	—	1,82,369.90	—	2,54,628.50
Recurring contingency	—	76,67,514.00	—	3,51,450.00
Total	—	3,36,53,086.11	—	7,92,991.50
Non-recurring contingency				
(a) Works	—	—	—	1,17,82,200.00
(b) Equipments	—	37,414.00	—	22,924.00
(c) Library books and journals	—	—	—	3,55,799.00
(d) Vehicles	—	—	—	—
(e) Coordinated project on data collection	—	—	—	—
(f) Electronic Computer	—	—	—	—
(g) Others	—	—	—	—
Total	—	37,414.00	—	1,21,60,923.00
Grand Total	337 Lakhs	3,36,90,500.11	130 Lakhs	1,29,53,914.50

Abstract (1989-90)		
	Funds (Rs)	Expenditure (Rs)
Non-Plan	3,37,00,000.00	3,36,90,500.11
Plan	1,30,00,000.00	1,29,53,914.50
Total	<u>4,67,00,000.00</u>	<u>4,66,44,414.61</u>
Leave salary and Pension contribution		
Non-Plan	10,454.00	
Plan	—	

PROGRESS OF PROJECTS

DIVISION OF DESIGN OF EXPERIMENTS AND ANALYSIS OF EXPERIMENTAL DATA

Mandate :

To develop statistical designs and methodologies for analysis of data relating to field and laboratory experimentation in agriculture and animal sciences

Thrust Areas :

- Cropping system research
- Crop strategies for dryland agriculture
- Agriculture Information System
- Yardsticks of additional production
- Designs for animal experiments

Projects in operation thrust—areawise :

No	Project title	Project leader and associates	Duration
1	2	3	4
Cropping System Research			
1	Planning, designing and analysis of experiments planned under All India Co-ordinated Agronomic Research Project at Cropping System Research Centres	PN Soni Rajinder Kaur Ajit Kaur	Continuing nature
2	Planning, designing and analysis of experiments planned under AICARP on cultivators' field	PN Bhargava HC Jain Mahesh Kumar	Continuing nature
3	Planning, designing and analysis of data of agronomic survey planned under AICARP	PN Bhargava JK Kapoor NK Sharma	Jan 88- Dec 90
4	Analysis of data for study of intercropping experiments using bivariate analysis technique	Basant Lal PN Bhargava Aloke Lahiri	Jan 85- Apr 90

1	2	3	4
5	Methodological studies and critical analysis of data relating to repeated experiments with some common treatments	JK Kapoor VK Gupta	Nov 85- Apr 90
6	Planning, designing and statistical analysis of the data relating to experiments conducted under AICARP on Long Term Fertilizer Experiments	PN Soni MR Vats DK Sehgal DK Mehta	Continuing nature
7	A study of interactions with reference to resource constraints of agronomic factors	GL Khurana KC Bhatnagar	Sep 87- Jul 89
Crop Strategies for Dryland Agriculture			
8	A statistical study for characterization of drought in relation to a crop	Asha Saksena PN Bhargava	Jul 84- Dec 89
Agriculture Information System			
9	Agricultural field experiments information system	RK Ghai PN Bhargava PR Yeri	Continuing nature
10	Agricultural experiments information system for animal sciences	GC Chawla	Continuing nature
Yardsticks of Additional Production			
11	Development of suitable statistical methodology for construction of yardstick for milk production through feed intake	GC Chawla	Aug 87- Jul 90
12	Yardstick of additional production from the use of crop improvement measures	VN Iyer Onkar Swarup Hanumantha Rao	Apr 85- Jul 90
Design for Animal Experiments			
13	Studies on designs for animal experiments	A Dey VK Gupta	Oct 85- Jul 90
14	Change-over designs-their construction and cataloguing useful for animal experiments	GC Chawla A Dey VK Gupta	Nov 85- Dec 89
15	Studies on robust designs	R Srivastava A Dey VK Gupta	Aug 87- Jun 90

1. Planning, designing and analysis of experiments planned under All India Coordinated Agronomic Research Project at Cropping System Research Centres

Data for about 500 complex experiments conducted during 1987-88 at 42 Cropping System Research Centres were subjected to critical analysis. Appropriate methodology for data analysis in respect of the newly introduced experiments during 1988-89 was developed and the statistical analysis of data relating to 400 complex experiments was in progress. Layout plans for complex experiments and related instructions for the conduct of experiments taken up during 1989-90 at various co-operating centres were prepared. Trainings were arranged at a number of locations to acquaint the scientists and research workers in the conduct of the experiments and on other related aspects. Salient results on the experiments conducted during 1987-88 are as below :

- Studies on production potential of promising crop sequences under optimum input conditions have identified profitable high intensity crop sequences for different agro-climatic regions. Introduction of potato and vegetable crops and substitution of summer grain legumes by fodder crops increased the profitability of the system
- Detailed studies on intercropping systems have shown that in most of the intercropping systems recom-

mended fertilizer application to both the crops resulted in higher crop yields in normal and paired row planting patterns

- Long term studies on the relative efficiency of legume—cereal and cereal-legume rotations over cereal-cereal rotations have shown that sequences comprising legume, cereal and green manure considerably enhanced the profitability of the system at most of the locations
- In long term experiments fertilizer application at recommended levels to both the crops in rice-rice and rice-wheat sequences gave consistently increased yields over years
- Placement of urea super granules (USG) in root zone in rice proved to be better than prilled urea in rice-rice and rice-wheat sequences

2. Planning, designing and analysis of experiments planned under AICARP on cultivators' field

The experiments on cultivators' fields are planned principally to test the performance of crop production technologies identified at cropping systems research centres and to obtain the magnitude of responses under varying management conditions with adequate degree of precision. The objectives of the project are to provide (i) suitable sampling plan and designs for the layout of experiments on cultivators' fields during 1988-89 under AICARP, (ii) to identify the appropriate statistical methodology for the analysis

of data collected under the programme of E.C.F.; to undertake the analysis of the data of experiments conducted during 1987-88 and to summarize the results for inclusion in the annual report of the Project.

A three-stage random sampling design was adopted for the selection of site and mostly R.B.D. and split plot designs were used for the lay-out of the experiments. Twelve different types of experiments with different objectives were laid out. In a district, about 96 experiments of different types were conducted per season.

The results of about 5, 800 experiments conducted during 1987-88 at E C.F. districts were summarized and summary tables sent to the Project Director of Cropping Systems Research at Modipuram. The data of about 6,000 experiments conducted during 1988-89 in 41 districts were scrutinized and the analysis was in progress. The Annual Report for the year 1987-88 was prepared which was presented at the 19th Annual Workshop of the Project held from 17th to 20th March, 1990 at H.A.U., Hissar.

Detailed studies on intercropping systems have shown that in many districts, these are more profitable than growing sole crops. The additional returns from intercropping varied from 10 to 197% with different intercrop combinations in various districts, the highest returns (Rs. 8262/ha as against Rs. 2785/ha for sole crop) coming from intercropping groundnut with redgram at Singh-

bhum (Orissa) followed by blackgram intercropped with groundnut at Puddokotai (Tamil Nadu)—Rs 5308/ha as against Rs 2864/ha from sole crop.

Studies on crop response to fertilizers reveal that the recommended level of fertilizers for all the crop increased the yield significantly as compared to the yield at farmers' level of fertilization. The magnitude of increase depended on the gap between recommended and farmers' level of fertilization. The percentage increase in yield with the recommended fertilization as compared to farmers' level was higher under rainfed conditions than under irrigation in all the crops except in maize. In case of oilseed crops, the magnitude of response was more with mustard than in other crops like sesamum, linseed and safflower.

Studies under integrated management experiments on rice indicate that root-zone placement of urea super granules was better than split application of prilled urea in a number of districts. Large granular urea was also seen better than split application of prilled urea except in Patiala, Balasore and Guntur districts.

Some profitable double cropping systems comprising oilseeds and pulses under irrigated conditions viz., maize-gram in Aligarh and Ghazipur, blackgram-mustard in Aligarh and Kanpur, sesamum-gram in Pratapgarh and jowar-gram in Kolhapur were identified.

3. Planning, designing and analysis of data of agronomic survey planned under AICARP

The survey was planned in different ECF districts with the principal objectives : (i) to identify the resource constraints for not-adopting the recommended crop production technology for various cropping systems, and (ii) to obtain the detailed information on the cropping system and their agronomic practices in different areas.

For generating the needed information the sampling plan was almost similar to that adopted for the conduct of experiments on cultivator's fields in the district. The total number of cultivators selected in the district were 64 at the rate of 4 cultivators per village. The analysis of the districts Bilaspur (H.P.), Aligarh (U.P.), Mayurbhany (Orissa) and Panch Mahal (Gujarat) were completed. The combined report highlighting the results of two districts Dhar (M.P.) and Aligarh (U.P.) were presented in the ICAR Annual Workshop of AICARP held at Hissar Agricultural University, Hissar from 17th to 20th March, 1990. Some salient results of these districts are :

Aligarh (U.P.)

Generally, cultivators grow two crops in a year and among the annual crops, sugarcane is quite popular and is sown in a limited area by each cultivator. The crops grown during kharif season are maize, bajra and arhar and in rabi season are wheat, barley, gram, mustard and green gram. A large number

of cultivators grow arhar and mung under the inter-cropping system. In mixed cropping system barley and gram, barley and wheat, wheat and pea are adopted in rabi season. Some cultivators having assured irrigation facilities follow three crop sequences, namely, maize-mustard-moong and maize-wheat-moong. About 85% of the cultivators having holding size less than 8 ha used F.Y.M. for maize. There was a good deal of variation in the rate of application of F.Y.M. among different holding size groups being 26, 33, 29 and 49 q/ha for small, medium, large and very large cultivators respectively. All the cultivators with operational holding less than 8 ha applied N to the crop and rate of application was around 27 kg/ha through urea. None of the cultivators applied P. For wheat crop the rate of application of F.Y.M. ranged from 25-35 q/ha. Almost all the cultivators applied N and P through urea and complex fertilizer DAP and the rates being 60 and 33-41 kg/ha respectively.

Dhar (M.P.)

The important crops grown by different cultivators during kharif season were maize, soyabean, jowar, cotton, urd and groundnut. Medium and large farmers also cultivated safflower and sugarcane. In the irrigated area cultivators grow wheat and gram as the second crop. Inter-cropping and mixed cropping were very popular among different holding size groups. The common mixed and inter-cropping systems were maize and soya-bean, cotton and maize, maize and urd

and cotton and urd. The major source of irrigation in the district is well or tubewell which accounts for around 93% of the total irrigated area. The major soil problems which affect the crop productivity and adoption of improved crop production technologies are slope erosion, shallowness and stoniness. For maize crops, the percentage area benefited by F.Y.M. was around 60 for small and very large holdings and the corresponding percentage for medium and large was around 25. The rates of application were in the range of 20-25 q/ha for holdings less than 8 ha. Whereas for holdings of more than 8 ha, the rates were around 30 q/ha. The entire area under the crop for holdings less than 8 ha was fertilized through N and the rate of application was in the range of 30-40 kg N/ha. The application of P was more common among small, medium and large cultivators whereas only 50% of the area was benefited by P for holdings having more than 8 ha. The application of K was limited to large holding group and the area benefited for the remaining holding size group was in the range 30-48%. Almost the entire area under the wheat crop for different holding size groups received the application of N, P and K. For all holdings having area less than 8 ha, the rates of application were in the range of 50-60 kg N/ha and for P, the corresponding rates were in the range of 20-30 kg P₂O₅/ha. For very large holdings (more than 8 ha) the rate of application of N was slightly lower than that applied by other categories of cultivators being around 35 kg N/ha and the rates

of P and K were 32 kg/ha and 14 kg/ha respectively.

4. Analysis of data for study of inter-cropping experiments using bivariate analysis technique

Stability of treatments in multiple cropping is one of the important aspect. In this direction attempt has been made, from time to time by various research workers. This study is confined to finding stable inter-cropping systems. The data collected from various Research Centres under AICARP over years were taken and analysed through bivariate technique. Stable systems were identified based on productivity and economic considerations. No single system was uniformly stable in all the locations.

5. Methodological studies and critical analysis of data relating to repeated experiments with some common treatments

The objectives of the project are (i) to examine the applicability of the available method of combined analysis of experiments. When at least some treatments, not necessarily all the treatments are common to all the experiments, (ii) to examine the applicability of the available method in the literature for combined analysis of experiments when some treatments are common to some experiments and not necessarily to all the experiments, (iii) to develop some new method of analysis of a series of experiments covering the situation (i) & (ii) above.

The report containing the review of work available in the literature as well as

the work done for combining the group of experiments conducted in R.B.D. with some common treatments and also the group of experiments conducted in fact. R.B.D. with some treatment combinations common was finalised. The report was being modified in the light of the comments of the internal referee.

6. Planning, designing and statistical analysis of the data relating to experiments conducted under AICARP on Long Term Fertiliser Experiments

The objectives of the project are (i) to plan and design long term fertilizer experiments, (ii) to try alternative approaches for statistical analysis of data on long term fertilizer experiments, and (iii) to coordinate the work of the project on national level and also to provide necessary information to Project Coordinator.

Based on the data collected under the project appropriate statistical methodology for analysis was developed. The data of 1986-87 received from all the cooperating centres were scrutinised, analysed and made available to all the scientists incharge of the cooperating centres and the Project Coordinator. The national report of the project embodying the results of 1985-86 and 1986-87 was finalised in collaboration with the Project Coordinator (LTFE). Some statistical aspects based on past data collected from 4 cooperating centres were brought out in the project report which was presented at the XIV annual workshop of the project held at B.A.U., Ranchi from 12th

to 14th December, 89. Some of the salient results obtained are :

- The individual treatment yields were adjusted with the corresponding control yields using a suitable linear regression equation to eliminate (to the extent possible) the environmental effect on the crop yields. These adjusted yields were subjected to fitting of linear, quadratic or cubic functions to study the cumulative yield trends over the years. Based on the magnitude of variation explained by the multiple correlation it was established that sustained high level of productivity could be obtained under integrated use of organic (FYM at 10-15 ha⁻¹ year⁻¹) and inorganic NPK (at optimum level) fertilizers in almost all the locations. Nutrient imbalances eventually led to the deterioration in productivity with the exhaustion of readily available plant nutrients in the soil as a result of high intensive cropping.
- The residual and cumulative effects of organic manures were observed to be significant on yields of subsequent crops in multiple cropping systems.
- It was also revealed that normal recommended doses of NPK fertilizers have been found to be suboptimal especially for wheat following rice with continuous application over years.

7. A study of interactions with reference to resource constraints of agronomic factors

The project was initiated with the objectives to identify the interactions which could be exploited to obtain high crop production in respect of different crops at reduced levels of certain agronomic factors and to study the optimum number of replications, locations and years required to test the performance of such interactions. The secondary data relating to production potential experiments conducted under AICARP were utilized.

The study related to the project has brought out useful results in the form of important interactions which may help in formulation of suitable packages of practices. The important interactions were identified by using Multiple Regression Technique (Draper & Smith 1966, Curnow & Mead 1983) & Analysis of Means (Nelson L. S.—1983). Which confined to the crop sequences viz. Rice-wheat, Jowar-Wheat and Bajra-Wheat for different Cropping System Research (CSR) centres. These interactions from different packages of practices comprised of Data of sowing (D), Fertilizer applied (F), Plant population (P), Weed control (W). Plant population (P) is replaced by Irrigation (I) in Rabi. These agronomic factors were used at two levels each, recommended 1, & second reduced-2 respectively. For Rice-Wheat sequence at Raipur & Kalyani— $D_1 F_1 P_2 W_2$ & $D_1 F_1 I_2 W_2$; at Kathulia Farm, $D_1 F_2 P_1 W_1$ & $D_1 F_1 I_2 W_2$; at Masodha, $D_2 F_1 P_2$

W_2 & $D_1 F_1 I_2 W_2$; & at Rudrur, $D_1 F_2 W_2$ & $D_1 I_2 W_2$ packages, were found suitable. For Jowar-Wheat sequence at Sehore, $D_1 F_2 P_2 W_2$ & $D_2 F_1 I_1 W_2$; at Akola $D_2 F_2 W_2 P_1$ or $D_2 F_2 W_2 P_2$ & $D_2 F_1 I_1 W_1$ or $D_2 F_1 I_1 W_2$ packages were identified as important. For Bajra-Wheat sequence at Bichpuri, $D_1 F_2 P_2 W_2$ & $D_1 F_2 I_1 W_1$; at Hissar $D_1 F_2 P_2 W_2$ & $D_1 F_2 I_1 W_1$ packages were found suitable for higher productivity. A study on requirement of number of plots allocated into replicates, locations and years revealed that for rice-wheat sequence in all the CSR centres given above, the increase in the number of replications or locations or both resulted in substantial reduction of standard error of the package mean whereas for other crop sequences like Jowar-Wheat & Bajra-Wheat the associated standard error could be minimised with the increase in the number of replications alone. These results will be of immense use to planners, agricultural Scientists and extension agencies.

8. A statistical study for characterization of drought in relation to a crop

The project was initiated with an objective to quantify drought threshold value for a crop and to obtain the chances of occurrence of drought. A method developed by Barger and Thom was suitably modified to obtain threshold values for groundnut, bajra and cotton for Ahmednagar and Bijapur. The chances of occurrences of droughts of various duration were obtained by fitting gamma distribution to rainfall data.

The findings of the study have shown

that the threshold amount of rain below which drought, conditions created for a crop, are different for all the crops grown in the same crop season itself. It is possible to monitor drought for groundnut, bajra and cotton, simply, by keeping a track of the amount of rain that falls in different weeks of the crop season and comparing it with the corresponding threshold amounts given by the study.

9. Agricultural field experiments information system

The objectives of the project are to maintain at a central place the results and other ancillary information in respect of all the Agricultural Field Experiments except purely varietal trials conducted at different research stations spread all over the country. This would avoid duplication of research and assist the scientists in developing efficient research programmes. The data under the project is collected by personal visits of the regional staff posted at different regional centres under senior officers of Agriculture Department/Universities. Till recently, the details of all the experiments collected under the project were brought out in the form of compendia volumes but now the work has been reorganised into Agricultural Field Experiments Information System and made computer based. The system is based on development of data bank which would store on magnetic tapes of future retrieval experimental data in respect of field experiments conducted during 1978 and onwards at different research stations in the country. Necessary software for data

storage and its retrieval are being developed.

The preparation of cropwise reports of experiments conducted in the country during 1966-77 giving results in summarised form alongwith details of treatments and other ancillary information have been taken up. One such report "Results of Cotton Experiments in India (1966-77)" Vol. I covering the experiments conducted in A.P, Gujarat, Haryana, Karnataka and Madhya Pradesh have been brought out whereas the printing of Vol. II was initiated. Similar reports on oilseeds and sugarcane experiments were under preparation. In addition, for the period 1978 onwards the regional staff reported during the year, experimental data in respect of about 2500 experiments on Index Cards/Coding schedules prescribed for A.F.E.I.S. While about 450 experiments were reported on the prescribed proformae. Inclusive of these about 13050 experiments on the coding schedules have so far been reported for the system. Processing and validation of data and their storage on magnetic tapes was in progress.

10. Agricultural experiments information system for animal sciences

About seventy experiments collected from south zone and central zone were scrutinized. Index for the period 1987-88 was prepared. The coding of data for about 80 experiments pertaining to south zone was in progress.

11. Development of suitable statistical methodology for construction of yardstick for milk production through feed intake

A complete list of experiments conducted on milk production pertaining to various research stations from the project 'National Index of Animal Experiments' was prepared. Breed wise data were also prepared in order to pool the results pertaining to different set of treatments under each experiments.

12. Yardstick of additional production from the use of crop improvement measures

The objective of the project is to prepare simple and composite yardsticks of additional production and to work out the benefit cost ratio using different response functions for crops from the use of fertilizers.

Yardsticks of additional production of wheat, maize, jowar and bajra from the use of fertilizers were worked out. Yardsticks were also prepared for pulses and oilseeds from the use of fertilizers. A new methodology for developing composite yardsticks using the principle of differential coefficients was under investigation.

13. Studies on designs for animal experiments

The aim of the project is to suggest efficient designs for animal experiments and to prepare a catalogue of designs. The work relating to the project was completed. All theoretical results, as mentioned in the objectives of the project

proposal, were obtained. The report writing was in progress.

14. Change-over designs their construction and cataloguing useful for animal experiments

The project was initiated to examine the feasibility of adopting the existing designs with their optimal properties and to prepare a catalogue of change over designs useful in animal experiments. A methodology of two factor study was evolved in which the levels of one factor are nested within that of the other factor by adopting Williams square and Mutually Orthogonal Latin Square (MOLS)

The work on the development of methodology of two factor study was completed by adopting MOLS and William's Square and list of cataloguing of all change over designs and their efficiencies were prepared.

15. Studies on robust designs

The project was launched with the objective to study the designs with robustness property against missing observations, outliers, trend and model inadequacy.

Investigations on robustness of block designs against missing observations, taking into consideration general structure of block designs, were carried out. Robustness balanced block design (BBD) was studied. Some observations pertaining to a district block were lost. In particular robustness of resolvable BIB design was studied against loss of all observations in a group. Robustness of GEB block designs against loss of all observations in a block was also studied,

DIVISION OF SAMPLE SURVEY METHODOLOGY AND ANALYSIS
OF SURVEY DATA

Mandate :

To evolve sample survey techniques for estimation of various parameters of interest relating to crops, livestock, fishery, forestry and allied fields and to develop techniques for analysis of survey data

Thrust Areas :

- Cost of production studies
- Cost of cultivation of horticulture crops
- Statistical modelling for production and growth
- Inland fish catch estimation
- Crops and livestock productivity studies
- Demographic parameters estimation
- Assessment and evaluation studies
- Operational feasibility studies
- Remote sensing technology applications

Projects in operation thrust-areaawise :

No	Project title	Project leader and associates	Duration
1	2	3	4
Cost of Production Studies			
1.	Pilot sample survey for estimation of cost of cultivation of oilseeds and pulses	AK Banerjee DL Ahuja OP Kathuria SK Raheja	Sep 84- Mar 91
2.	Pilot sample survey for estimation of area of grazing land and its utilisation, Tamil Nadu	Anand Prakash BC Saxena	Dec 84- Feb 90
3.	Pilot sample survey for estimation of losses, price spread at various stages of marketing and cost of cultivation of vegetable crops, Pune	AK Srivastava SK Raheja DC Mathur Satya Pal	Feb 85- Sep 90

1	2	3	4
Cost of Cultivation of Horticulture Crops			
4.	Pilot sample survey for study of cost of production of chikoo and its marketing practices, Gujarat	MS Batra OP Kathuria	Jan 82- Mar 90
Statistical Modelling for Production and Growth			
5.	Pilot survey of develop statistical models for production and culling pattern in poultry	KPS Nirman JP Jain Balbir Singh	Jan 86- Sep 90
Inland Fish Catch Estimation			
6.	Pilot sample survey to evolve a sampling methodology for estimation of inland fishery resources and catch in a region of Orissa	OP Kathuria HVL Bathla KK Kher	Dec 84- Dec 90
Crops and Livestock Productivity Studies			
7.	Pilot sample survey to evolve an appropriate methodology for estimation of lac production	DC Mathur OP Kathuria AK Srivastava SC Sethi	Feb 84- Mar 91
8.	Pilot sample survey for estimation of production of hides and skins in Chingleput and North Arcot districts of Tamil Nadu and Surat district of Gujarat	JP Goyal KB Singh RS Khatri	Dec 84- Dec 90
Demographic Parameters Estimation			
9.	Pilot studies for estimation of birth and death rates in ovines	SN Arya Balbir Singh	Feb 84- Sep 90
10.	A comparative study of some methods for estimating mortality rates in bovines	SN Arya	Sep 81- Sep 89
11.	Study of distribution of age specific mortality and fertility rates in bovines	LBS Somayazulu SN Arya SC Aggarwal	Mar 83- Jan 90
12.	Pilot studies for developing statistical methodology for assessing the losses due to diseases and pests in bovines	HP Singh JP Jain BC Saxena	Jan 85- Mar 90

1	2	3	4
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Assessment and Evaluation Studies

13.	Studies on comparative performance of mixed farming involving crops, livestock, poultry and fish	Shivtar Singh RL Rustogi HO Aggarwal	Sep 84- Oct 89
14.	Pilot sample survey for estimation of post-harvest foodgrain losses (wheat)	Prem Narain HC Gupta	Apr 85- Jun 90
15.	A study of employment and income of small farmers and landless labourers	Randhir Singh AK Srivastava	Mar 83- Dec 90
16.	Sample survey for study of constraints in transfer of new agricultural technology under field conditions	SK Raheja PC Mehrotra VS Rustogi SS Gupta SS Shastri NK Ohri GS Bassi RC Gola MS Narang	Jan 84- Mar 92
17.	Pilot sample survey for estimating the energy utilisation for different levels of adoption of modern technology in agriculture	KK Tyagi PC Mehrotra SK Raheja Satya Pal	Jul 83- Dec 90
18.	Pilot sample survey to develop sampling methodology to study the impact of integrated rural development programme on employment potential and income generation by the programme for beneficiaries	MG Mittal	Jul 87- Dec 90
19.	A sampling study on utilization of crossbred working animals vis-a-vis non-descripts	KB Singh	May 89- Apr 94

1	2	3	4
Operational Feasibility Studies			
20.	Pilot sample survey for developing a sampling methodology for estimation of livestock products on the basis of data collected as a part of the normal work of field agency of animal husbandry department	RS Khatri JP Goyal KB Singh	Mar 84- Sep 90
21.	Pilot sample survey for studying the relative merits of the data obtained by actual weighment and those through enquiry for estimation of milk production	KB Singh JP Goyal RS Khatri	Feb 85- Mar 90
Remote Sensing Technology Applications			
22.	Use of remote sensing technology in crop yield estimation surveys	Randhir Singh	Apr 90- Mar 93

1. Pilot sample survey for estimation of cost of cultivation of oilseeds and pulses

Presently no reliable data are available for cost of cultivation of important oilseed and pulse crops. Accordingly study on this aspect was taken up with the objective of (i) to evolve suitable sampling procedure for estimation of various components of cost of production of oilseed and pulse crops, and (ii) to work out an index of cost of cultivation of these crops from year to year taking into account the price fluctuation. The project was in operation at two centres viz Rajasthan (Bharatpur) and MP (Vidisha).

The crops covered in the study are : Rajasthan centre-Groundnut, Sesamum (kharif) and Mustard (rabi); MP Centre-Moong, Urad (kharif) and Gram (rabi). The field work of the project at both the centres was completed. The estimators

were finalised and programmes prepared. At the time of analysis certain problems were faced. These crops are generally sown as a mixture crop and hence inputs both material and physical need appropriate apportioning. Also the kharif and rabi seasons for these crops are generally overlapping and day to day physical inputs needed real reflection in the appropriate cost component. The programmes for various cost components at the size group level/cluster level were modified and test run carried out. Finally cost component estimates were obtained for both the centres. The analysis of data was in progress.

2. Pilot sample survey for estimation of area of grazing land and its utilisation, Tamil Nadu

The objectives of the project are to evolve a suitable sampling technique for estimating with reasonable degree of

precision (i) the area of grazing land, (ii) average yield per unit grazing area in different seasons, and (iii) chemical and botanical composition of the grass land produce.

The sampling technique adopted was stratified multi-stage sampling design with tehsils/talukas as the strata, villages as the primary sampling units, grazing areas within the villages as second stage units and plots of specified size as the ultimate unit of sampling.

The estimate of grazing area for the district was obtained as 32,225 hectares with 6.74 per cent standard error. The estimates of yield of herbage before grazing for winter and rainy seasons were respectively 45.6 gm and 40.0 gm with the respective percentage standard errors of the order of 4.41 and 8.83.

The quantity of feed given to animals was comparatively low in the region. It varied from about 2 kg to 19 kg only. The intake through grazing was also quite meagre. The project report was being finalised.

3. Pilot sample survey for estimation of losses, price spread at various stages of marketing and cost of cultivation of vegetable crops, pune

The objectives of the project are (i) to evolve a suitable sampling methodology for estimating the losses taking place in marketing of vegetables, (ii) to study the price spread of vegetables at various stages of marketing, (iii) to study the various marketing practices prevalent

in the vegetable marketing trade, and (iv) to evolve a suitable sampling methodology for estimating the cost of cultivation per unit area and production of important vegetables.

The field work of the project was undertaken under the administrative control of Director of Horticulture, Maharashtra state, Pune. The project has two important objectives (i) cost of cultivation, and (ii) marketing of vegetables. The cost of cultivation data was collected for 2½ years while for marketing 1½ years. The analysis of data remained in progress.

4. Pilot sample survey for study of cost of production of chikoo and its marketing practices, Gujarat

This study was taken up with the objectives (i) to obtain reliable estimates of cost of production of chikoo based on a suitable sampling design, and (ii) to study the prevailing marketing practices of the fruit in the region of study. The analysis work was completed and the report was being finalised.

5. Pilot survey to develop statistical models for production and culling pattern in poultry

The objectives of the project are (i) to estimate monthwise/seasonwise age specific vital characteristics affecting the growth and structure of poultry production, (ii) to estimate production of broilers in terms of number and weight and culling of layers by size of farm at regular interval of time (fortnightly/

monthly), and (iii) to develop appropriate models characterising the production and culling pattern in poultry farms utilizing the estimated vital characteristics.

The detailed data were processed and analysed with a view to work out specific rates of mortality, culling and replacement by adopting the Fractional Exposure's method. The existing deterministic Leslie's growth model was modified to characterise the production of broilers and culling of layers. The analysis of data for estimating the production of broilers and layers was in progress. Besides this, the initial chapters of the report were also drafted and finalised.

6. Pilot sample survey to evolve a sampling methodology for estimation of inland fishery resources and catch in a region of Orissa

The study was undertaken in Cuttack, Sambalpur and Kendrapara districts for estimation of resources and catch from fresh water ponds and tanks and in Cuttack, Balasour and Ganjam districts for estimation of resources and catch from brackishwater ponds. The study on estimation of resources under fresh water ponds and tanks was completed and estimates of catch from these resources were being worked out.

7. Pilot sample survey to evolve an appropriate methodology for estimation of lac production

The objective of the project is to evolve a suitable sampling methodology

for providing reliable estimates on (i) number of lac host trees, (ii) number of cultivated lac host trees, (iii) average yield per cultivated host tree, and (iv) total production of stick lac in a region with a reasonable degree of precision.

The project was initiated at the instance of Directorate of Lac Development, Ranchi, Ministry of Agriculture, Govt. of India. The field work was the responsibility of Directorate of Lac Development while technical guidance was provided by the scientist of IASRI. The field work of the project was taken up in a phased manner one centre at a time in one year. The regression analysis of data collected from Ranchi centre with yield of stick lac as dependent variable and total length of encrustation girth of tree, weight lac with sticks and number of shoots with lac as independent variables was tried. The results revealed positive correlation coefficient between yield of stick lac and various characters varying between 0.5 to 0.9, the highest was in case of total length of encrustation. Two models linear and quadratic were tried and 53 and 54 percent variation was accounted for by different morphological characters respectively. It means that linear model can be chosen for its simplicity. The writing of the project report was in progress.

8. Pilot sample survey for estimation of production of hides and skins

(a) North Arcot and Chingleput Districts (Tamil Nadu)

The basic tabulation for preparing the final tables regarding the socio-economic

conditions of farmers handling hides and skins was completed and final tables were prepared.

The analysis relating to the sample size required for estimating the production of hides and skins with specified precision was completed. The finalisation of the project report was under progress.

(b) Surat district (Gujarat)

The tabulation for the analysis of the data was completed. Preliminary estimates of production of hides and skins were worked out. Further analysis work was in progress.

9. Pilot studies for estimation of birth and death rates in ovines

The project was taken up with a view to developing suitable methodology for estimation of specific fertility and mortality rates in stationary flocks of sheep and goats with respect to breed, sex and age. A sample survey was conducted in Tiruchirapalli district of Tamil Nadu adopting stratified two-stage equal probability sampling technique. The sampling units at the two stages were villages and households having ovines. Requisite data were collected by trained field investigators in two phases : a census of households in the selected villages and collection of detailed data from the selected households through successive periodical visits.

The analysis of detailed data was pursued with a view to obtaining combined ratio estimates of mortality and

fertility rates. Data on acquisition/disposal of ovines during the period of survey were analysed and the results were compiled in suitable tables.

10. A comparative study of some methods for estimating mortality rates in bovines

The project envisaged a comparative study of four methods for estimating specific mortality rates to examine whether less cumbersome and less expensive methods could lead to reasonably accurate estimates of the demographic parameters for dynamic populations of bovines in rural environments. The comparison was made with empirical results based on a survey conducted earlier. The report on the project was completed by including a discussion on errors of approximation and appendices, etc. and the same was being finalised.

11. Study of distribution of age specific mortality and fertility rates in bovines

The project was taken up to study the distributional aspect of age specific mortality and fertility rates in bovines. Such rates were earlier estimated through surveys on estimation of birth and death rates. However, it was not known which statistical distribution these rates followed.

In the present investigation, data pertaining to the Gujarat survey in 75 villages of an ICD area were used. Eight hundred and twenty samples of the size of 50 villages each were developed

from the data. Distributions were formulated for sizes of 205, 410, 615 and 820 samples by different combinations and stability of the distributions over increasing sample size was tested by Kolmogorov—Smirnov test.

Calculating the moments and other characteristics of the distributions, several discrete and continuous types of distributions were tried for fitting. Suitability of quasi-binomial distribution was investigated during the period. However, it was found not to fit well to the data. Draft report on the project was prepared.

12. Pilot studies for developing statistical methodology for assessing the losses due to diseases and pests in bovines

The study is aimed to evolve suitable methodology for estimation of losses in the productivity of animals due to some of the diseases and pests of economic importance. It involves estimation of (a) incidence of diseases and occurrence of deaths due to them, (b) losses in production due to disability and death, and (c) extent of losses in production and reproduction which could be avoided through protection measures. The field data was collected in a contiguous area around Hissar comprising 20 and odd VAS circles. Stratified sampling with two-stage random sampling with clusters as the first stage unit and households within clusters as second stage units was adopted. Various epidemiological rates and estimates of losses in production due to various diseases were obtained.

It was observed that on an average the losses in milk production in pregnant cattle was lower than in-milk open cattle. Almost similar trend is observed in case of buffaloes also, Cattle suffered highest (575 gm per day) losses in productivity due to repeat breeding reproductive disorder, followed by rheumatic syndrome, anoestrous and mastitis. The latter resulted in losses to the tune of 430 gms, 200 gms and 85 gms of milk per day respectively. Buffaloes suffered highest losses (1 kg per day) in productivity due to rheumatic syndrome followed by reproductive disorders like repeat breeding and anoestrous. By and large the losses in productivity in buffaloes were higher than in cattle.

13. Studies on comparative performance of mixed farming involving crops, livestock, poultry and fish

The project aimed at determining design and response parameters for studying the comparative performance in terms of production, investment, return, etc. of different systems of farming singly or in combination and also comparing the different systems of farming in respect of labour intensification. The field work for primary data collection was taken up in Cuttack district of Orissa. The sampling design adopted was stratified two-stage random sampling with blocks as strata, groups of three villages as primary stage units and households in different mix of farming combination as second stage units. Selection of units at each stage was done with equal probabi-

lity without replacement. In all 288 households spread over 36 villages were selected.

Of all the farming combinations considered crop farming with fish rearing or crop farming with poultry keeping were found to be equally remunerative. The net return over input costs (Cost C) was about 28 per cent. Further, the return per day of family labour was Rs 50 in crop-fish farming households as against Rs 15 in crop-poultry keeping households. The output-input cash and kind expenses (Cost A) ratio was 2.4 in the former and 3.5 in the latter farming households. The capital turn over in farming combinations was about 10 per cent. Small and marginal farmers should take up poultry or fish farming in addition to crop farming for increasing their incomes.

The farming combinations involving crop, poultry, dairy and fish provided a net return of 23 per cent over Cost C, a return of Rs 26 per day of family labour, an output-input (cash and kind expenses) ratio of 2.7 per cent and a capital turn over of 10 per cent. But this may not be a feasible combination to adopt by the cultivators particularly small and marginal due to obvious reasons.

Crop-dairy and crop-dairy-poultry combinations of farming were found less remunerative than arable farming. However, perhaps livestock keeping cannot be avoided as this provides the much needed draught power for raising crops and

supplying milk and milk products for the family. Thus, in view of the complementarity of the enterprises viz. livestock keeping and crop production, the cultivators should be motivated to replace their milch stock by more productive animals to ensure regular income and gainful employment for the family members all the year round.

An examination of the 'between' and 'within' PSUs variation of the response indicators for different farming combinations showed that the 'within' PSUs variation ranged between 2 to 10 per cent of the total variation. In view of this, for a given precision, the number of PSUs to be sampled was found independent of the sample size at the second stage. This shows that the number of households (SSUs) within PSUs irrespective of level of precision may be taken as the minimum (say 2 households per farming combination). The study also revealed that a sample of 12 PSUs would be sufficient for estimating output-input ratios, with less than 5 per cent standard error. The optimum sample size has been suggested keeping in view the variability as well as the effective sample size for some of the combinations being small in actual practice.

14. Pilot sample survey for estimation of post-harvest food-grain losses (wheat)

Zone-wise percentage loss due to attack of weevils, germs, micro-organism and total loss due to these three, during different quarters i.e. I (May-July), II

(Aug-Oct), III (Nov-Jan) and IV (Feb-Apr) quarter and during different periods i.e. 3 (May-Jul), 6 (May-Oct), 9 (May-Jan) and 12 (May-Apr) months period in grains kept in different types of storage systems were estimated for II (1986-87) and III (1987-88) year. Similarly zone-wise percentage losses due to different reasons actually observed by cultivators/field enumerators during different quarters and during different periods of II and III years were also estimated. Increase/decrease (%) in weight of wheat due to increase/decrease in moisture contents during different durations of time in II (1986-87) and III (1987-88) were estimated. Drafting of the report was in progress.

15. A study of employment and income of small farmers and landless labourers

The objectives of the project are (i) to investigate a sampling procedure for estimating extent of employment and income of small farmers and landless agricultural labourers, (ii) to estimate the extent of employment for these people in the field of agriculture, and (iii) to estimate the income of people belonging to this section of the society.

The study was undertaken in two districts, namely-Ludhiana in Punjab presumably the most prosperous state of India and the second Sultanpur in U.P. which is agriculturally backward and poor. Each district was divided into 3 strata (groups of tehsils). A stratified sample of 48 villages with equal alloca-

tion was selected. For detailed inquiry on employment, income, expenditure, etc. a sample of 24 households from landless labourers and small and marginal farmers was selected for study in district Ludhiana. But the number of households in Sultanpur district was reduced to 16. The data for the selected households was obtained for the past seven days from date of visit at weekly intervals for a sample of 4 villages, at monthly intervals for another samples of 4 villages and at quarterly intervals for the remaining 8 villages in each stratum. Different intervals were adopted to obtain the optimum interval for visit keeping in view the recall lapse, the precision of the estimator and the cost of the survey.

From the study it is observed that only around 10% families have any member in regular employment and the extent of regular employment of women is almost negligible only (.3%) which indicates that women still remain dependent. The largest number of families are engaged in agriculture. It is observed that 35% population of male members are engaged in agriculture. It was also observed that in labour households both male and female are working as labour while in other households mostly male members are engaged in work. From a study of the income status of different households it was observed that the number of very poor households has decreased during the past 10 years (37% of the households were very poor 10 years ago). Most of these households did improve their income although they shall

continue to fall in the category of the poor. But unfortunately most of the poor (around 69%) today feel that they are not having much hope of improving during the next 10 years, if the situation continues as at present. Even after 10 years from the present only 33% households expect to be above the poverty line and 67% will continue to remain poor (below average).

From a study on the extent of employment of small and marginal farmers it is observed that on an average a male member of agricultural family was employed gainfully for about 60% of the time while he remained unemployed for the remaining 40% period. In case of agricultural labour the employment was available for only 50% of the time which means that on an average labour remains unemployed for half of the period in a year. Further, it is found that a reference period of one week is desirable and the periodicity of visit of 2 weeks is more appropriate in case of employment and income of the rural labour households whereas in case of farmers the periodicity of 2 weeks to 4 weeks give almost similar results suggesting that a visit only once in a month will be more appropriate and economic for such longitudinal enquiries.

16. Sample survey for study of constraints in transfer of new agricultural technology under field conditions

The objectives of the project are (i) to develop suitable sampling methodology for studying the effect of new agricultural technology including high yielding/im-

proved varieties/fertilisers, plant protection chemicals and cultural and management practices for increasing productivity of land, (ii) to determine the extent to which the potential of high yielding/improved varieties has been achieved under field conditions, and (iii) to identify and investigate constraints and limiting factors in the transfer of new agricultural technology to cultivators field.

The field data collection work of the project was in operation in 16 selected districts spread over 9 states. Refresher training in the conduct of the survey for the benefit of the field and supervisory staff was imparted in the different states. Almost all the data upto the last year of the survey viz 1988-89 were received from all the states except Punjab from where data receipt for 1988-89 was partial. Data for 1987-88 were under scrutiny. All data for 1985-86 and 1986-87 were punched/taped and were being subjected to computer scrutiny programmes for cleaning. The data in respect of five card designs was under analysis.

17. Pilot sample survey for estimating the energy utilisation for different levels of adoption of modern technology in agriculture

The main objective of the project is to develop suitable sampling methodology for estimating the energy utilization for different levels of adoption of modern technology in terms of labour and inputs like irrigation, fertilisers, etc.

Under stratified multi-stage sampling

design, various estimates making use of ratio-type and regression method of estimation at various stages of sampling for estimating the total energy input going into various crops/crop rotations and the technology output from these crops/crop-rotations were detained along with the estimates of their standard errors. Output-input ratio for various crops/crop-rotations were also worked out. The analysis of data remained in progress.

18. Pilot sample survey to develop sampling methodology to study the impact of integrated rural development programme on employment potential and income generated by the programme for beneficiaries

The main objective of the study is to examine a suitable reference period and periodicity of enquiry for estimation of employment and income generated per beneficiary family. Secondary objectives included study of (i) the association between employment generated and amount of loan, (ii) income generated and amount of loan, and (iii) comparison of different trades on the basis of employment and income generation.

19. A sampling study on utilization of crossbred working animals vis-a-vis non-descripts

The study is confined to plain (first phase) and hilly (second phase) areas of Kathua district of J and K. The sampling design adopted was a stratified two-stage random sampling with tehsils as strata, a

village as p.s.u. and a cultivator as s.s.u. The selection of the p.s.us was done with probability proportional to size in respect of number of crossbred working animals in each village whereas at the second stage it was done with equal probability without replacement. The survey was spread over one full year so as to cover both the seasons viz. rabi and kharif and in each season the p.s.us were selected afresh.

The information on the area cultivated by the selected cultivators, cropping pattern adopted by them, the number of working animals and the machanical agricultural equipment possessed by them was collected. The data were also collected on the breed and utilization of working animals alongwith the feed fed to them, their sale, purchase and health care. The work of collection of data was in progress.

20. Pilot sample survey for developing a sampling methodology for estimation of livestock products on the basis of data collected as a part of the normal work of field agency of animal husbandry department

The objectives of the project are (i) to evolve a suitable sampling technique for estimation of livestock products by utilizing the normal field agency of stockmen/stock assistants of animal husbandry department in the state, and (ii) to obtain estimates of annual products of major livestock products for the district to be covered with a reasonable precision.

The estimates of number of animals in milk/milch and number of layers were worked out. The statistical analysis of data pertaining to the management practices was in progress. Drafting of the project report was also in progress.

21. Pilot sample survey for studying the relative merits of the data obtained by actual weighment and those through enquiry for estimation of milk production

The objectives of the study conducted in Palwame district (J and K) were (i) to study the relative merits of the data obtained by actual weighment and those through enquiry for estimation of milk production, and (ii) to obtain estimates of annual milk production at district level with a reasonable precision. The methodology adopted for obtaining the estimates was double sampling ratio and regression technique with data collected

by enquiry as the auxiliary variate. The report of the project was under finalisation.

22. Use of remote sensing technology in crop yield estimation surveys

The special data for district Sultanpur (UP) for wheat crop during March, 1986 collected by the LANDSAT Satellite (T.M.) has been used to stratify the vegetation areas into different strata of vegetation vigour based on the vegetation index. Post-stratified estimators of crop yield have been obtained using the yield data obtained from yield estimation surveys. It has been seen that the use of spectral data improves the efficiency to about 50 percent.

Stratification using false color composites in place of vegetation index has to be studied to examine the cost effective usefulness of spectral data in yield estimation surveys.

DIVISION OF BIO-STATISTICS AND STATISTICAL GENETICS

Mandate :

To conduct statistical research in the areas of plant and animal pharmacological kinetics in animal research, ecology, pest control management and crop insurance.

Thrust Areas :

- Optimum designs in plant and animal breeding.
- Statistical methodology in crop insurance
- Statistical studies in animal epidemiology
- Statistical aspects of physiological and pharmacological kinetics in animal research

Projects in operation thrust-area wise :

No	Project title	Project leader and associates	Duration
1	2	3	4
Optimum Designs in Plant and Animal Breeding			
1.	Statistical analysis of cross-breeding data at military dairy farms	BS Sharma	May 84- Apr 90
2.	Direct and maternal additive and heterotic effects in cross-bred dairy cattle	RK Jain LK Garg SD Wahi	Dec 84- Apr 90
3.	Investigations on appropriate statistical methods for comparing genetic groups based on multiple traits in dairy animals	Lal Chand Prem Narain	Jun 85- Apr 90
4.	Studies on spatial patterns and its role in analysis of agricultural field experiments	VK Bhatia Prem Narain JS Samra	Aug 87- Jul 92
Statistical Methodology in Crop Insurance			
5.	Statistical studies in relation to crop insurance	JN Garg Prem Narain Shivtar Singh	Oct 85- Dec 89

1	2	3	4
Statistical Studies in Animal Epidemiology			
6.	Statistical studies in animal epidemiology	VK Bhatia PK Malhotra	Mar 86- Jun 90
Statistical Aspects of Physiological and Pharmacological Kinetics in Animal Research			
7.	Statistical aspects of physiological kinetics in animal nutrition	PS Rana Prem Narain	Aug 87- Jan 91
8.	Estimation of repeatability of fruit yield in presence of biennial rhythm	SD Wahi PK Malhotra	Aug 87- Jun 90

1. Statistical analysis of cross-breeding data at military dairy farms

The project aims (i) to study the problem associated with adjustment of data by least square technique, (ii) to study the suitability of various grades of crossbred cattle for life time traits, (iii) to study the genetic divergence among the crossbred grades, and (iv) to study genotype-environment interactions.

For examining the presence of genotype \times environment interactions the linear model for non-orthogonal data was fitted considering one of the interactions such as grade \times farm, grade \times period and grade \times season in the model. As the data available were not sufficient to examine the interaction considering all of the grades, farms and seasons, some of the levels of these factors were dropped to have at least one observation in each of the cells of the particular interaction. In most of the characters grade \times farm, grade \times period and grade \times season interactions were not

significant. Grade \times farm interaction was found to be significant for first calving interval, weight at first calving and total milk yield in first three lactations. Further grade \times period was significant only for total milk yield in first three lactations.

2. Direct and maternal additive and heterotic effects in cross-bred dairy cattle

The project aims at the estimation of direct and maternal additive breed effects and heterotic effects in dairy cattle and comparing the estimates of heterotic effects obtained by the approach of multiple regression technique with that of the fitting of biometrical genetic models to the means of different grades in dairy cattle. For this purpose breeding data in respect of 32 exact genetic groups of Friesion \times Sahiwal crosses obtained from various military dairy farms were analysed using three different approaches of analysis: (i) simplified multiple regression analysis suggested

by Parekh (1973), (ii) modified statistical model suggested by Robison *et al.* (1981), and (iii) the estimation of heterosis based on the fitting of biometrical genetic models specifying the contribution of additive, dominance and epistatic gene effects to grade means suggested by Jain (1982) and Sharma (1984).

It was observed that the partial regression coefficients for genetic group of sire were significant for almost all important economic and livestock traits, but they were not significant for genetic group of dam except for weight of animal at calving and total milk yield in first three lactations. This shows that the inheritance from the exotic breed of sire improves the economic and livestock characters such as milk yield, age at first calving, lactation period, etc. Also negative values of the coefficients indicate that the effect from exotic breed reduces the age at first calving and dry period. Similar results were obtained by the modified models proposed by Robison *et al.* (1981), Jain (1982) and Sharma (1986).

Also the heterotic effects observed indicate that the interaction with exotic breed of sire affects significantly the main economic and livestock traits but at the same time none of the partial regression coefficients for maternal heterotic effects were seen significant showing no evidence of interaction with maternal exotic breed. Also the analysis shows the negative value of the regression coefficients in respect of lactation

period and weight of animals at calving but they were found non-significant which indicates no evidence in reducing the lactation length and weight of animals at calving.

3. Investigations on appropriate statistical methods for comparing genetic groups based on multiple traits in dairy animals

Statistical analysis to estimate repeatability coefficient alongwith 95 percent fiducial limits for individual characters as well as for compounded character 'y' based on lactation yield, age at first calving and calving interval in respect of graded buffaloes at each farm was carried out. Quadratic regression analysis to determine the optimum level of exotic inheritance in cross-breds (Friesion \times Sahiwal) based on multiple traits was also undertaken for the composite character 'y' by combining lactation yield, age at first calving, dry period and breeding efficiency in an optimum manner by taking least square constants as the dependent variable and the proportion of exotic blood as the independent variable.

4. Studies on spatial patterns and its role in analysis of agricultural field experiments

The main objectives of the project are (i) to examine the spatial variability presence in sire characteristics and its influence in plant growth traits and (ii) to examine suitable statistical models for treatment comparison in the presence of spatial dependence among observations.

The estimated semi-variograms for different growth traits were subjected to model fitting and in most cases spatial model was the best choice. It is found from the results that spatial dependence stochastic component is having a longer contribution in comparison to nugget effect.

5. Statistical studies in relation to crop insurance

The project was taken up to (i) critically examine and analyse premium and indemnity tables for different crops under Comprehensive Crop Insurance Programme as modified from time to time, (ii) to develop suitable methodology for estimating premium and indemnity rates based on appropriate distribution of crop yields over time and space, and (iii) to investigate into modifications needed to take into account of technological changes in yield over time as noticed through trend in crop yields.

The distribution of crop yields in the unit of insurance was tested for normality by applying Shapiro-Wilk test at 5 percent level of significance. It was found that out of 529 crop strata, the normality was found to be positive in 59 cases for paddy and in 24 cases out of 411 crop strata for wheat. The empirical findings thus showed that distribution of crop yields need not necessarily be normal. Crop strata in which the test of normality was negative were further tested for normality after applying square root and logarithm transforma-

tions of crop yields. The results of test for normality indicated that these transformations did not help much to transform the yield data to normality.

Pearsonian system of distributions was tried on crop yields in a defined area. The results indicated that in 80 percent of crop strata paddy and wheat followed Type-I Pearson distribution and in 15-17 percent of crop strata indicated Type-II Pearson distribution. Only in one percent of crop strata normal distribution fitted well. The premium rates were worked out by using normal and Type-I Pearsonian frequency distributions of crop yields in a defined area.

Premium rates did not vary much among themselves based on USA method, normal curve technique and M.P.D. method. However, premium rates estimated by Type-I Pearson curve and regression techniques were lower than those estimated by other techniques. The crop strata not following normal distribution overestimated the premium rate in comparison to Type-I Pearson distribution. The reduction in premium in regression technique was due to the fact that a part of variation due to systematic trend in crop yields was removed in premium estimation. The mean percentage deviation (M.P.D.) procedure is preferred in premium estimation because of its simplicity in practical application and also it takes into account the variation in crop yields which is not so in USA method. Further

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it avoids estimation of parameters as was done in normal curve and Type-I Pearson techniques for each crop strata. The M.P.D. procedure was extensively used in premium rate making by GIC in comprehensive crop insurance programme.

Premium rates depend upon the coefficient of variation in crop yields as well as level of coverage. The rates increase with increase in the variation in yields and decrease with decrease in the level of coverage. The results indicated that the raising of the threshold yield to 100 percent even in the most progressive states would not be possible as 5 percent coefficient of variation may be obtainable in very few crop strata. The Ministry of Agriculture which monitored the progress of the comprehensive crop insurance scheme suggested the criterion to be used for determining the level of coverage. Analysis of yield data of different crops revealed that negligible percentage of crop strata had coefficient of variation less than 5 percent. The majority of crop strata had coefficient of variation more than 20 percent particularly for millets, pulses and oilseeds crop. Stability in crop production was noticed for wheat and paddy crops only. The level of coverage may be modified taking into account the coefficient of variation of these two crops.

The average premium rate at country level was estimated at 5.3 percent for paddy, 5.5 percent for wheat, 9.1 percent for millets, 9.3 percent for oilseeds and

8.6 percent for pulses at 80 percent indemnifiable limit in the year 1985-86. The corresponding figures at 90 percent indemnifiable limit were 7.7 percent for paddy, 7.9 percent for wheat, 12 percent for millets, 12.2 percent for oilseeds and 11.4 percent for pulses. The premium rates were more or less of the same order in 1986-87. These rates included 0.3 percent as administrative cost.

Variability in crop yield was observed more in millets, oilseeds, and pulses as compared to paddy and wheat crops. In 37 percent of crop strata for paddy, in 45 percent of strata for wheat, in 19 percent of strata for millets, in 12 percent for oilseed and in 31 percent of crop strata for pulses, the premium rates were upto 2 percent at 80 percent indemnifiable limit. Majority of crop strata showed premium rates very much different from the flat rates fixed in the comprehensive crop insurance scheme. This implied that the scheme implemented by the Ministry of Agriculture lacked actuarial soundness resulting in heavy losses from year to year. The extent of variability in actuarial premium rates between states and between crop strata within a state for different crops showed that a large proportion of the total variability in premium rates ranging from 70 to 96 percent in 1985-86 and 62 percent in 1986-87 was accounted for by between crop strata within states. This implied that differential rates of premium for different crop strata would be more meaningful than flat rates.

6. Statistical studies in animal epidemiology

The project was undertaken with the main objective to carry out studies on culling process in dairy cattle as well as modelling the epidemiology of diseases.

The work relating to failure probability estimation as well as relating to studies on functional relationship between order of successfully completed lactation and retention times were completed. The failure probability estimates obtained for different retention times in respect of several hypothetical values of first and second lactation milk yield were low for the animals with level of exotic inheritance around 50% indicating that their chances of retention at the farm are more when compared to other crossbred animals.

7. Statistical aspects of physiological kinetics in animal nutrition

To describe the flow of digesta

through the gastro-intestinal tract of the ruminants a single rate of flow was considered for the feeds having inherent variabilities in characteristics such as age, size, chemical composition, etc. Different rates of flow for different characteristic particles can give better description and accordingly a model was obtained to translate the idea.

8. Estimation of repeatability of fruit yield in presence of biennial rhythm

The data with nine different levels of repeatability, three different sample sizes, three levels of biennial effects and three different proportions of "ON-Phas" and "OFF-Phas" tree were generated. These different sets of simulated data were analysed by using different methods of estimation of repeatability: ANOVA, principal component analysis, structural analysis and moving averages. The Monte Carlo bias, variance and mean square errors were obtained for all the estimators.

DIVISION OF FORECASTING TECHNIQUES FOR CROPS,
DISEASES AND PESTS

Mandate :

To develop statistical models for obtaining pre-harvest forecast of crop production on the basis of biometrical characters, weather parameters and agricultural inputs and also to develop forecast models for the incidence and intensity of pests and diseases

Thrust Areas :

- Crop yield forecast models
- Forecasting models for occurrence of crop pests and diseases

Projects in operation thrust-area wise :

No	Project title	Project leader and associates	Duration
Crop Yield Forecast Models			
1.	Pilot studies on pre-harvest forecasting of yield of groundnut crop on the basis of data on biometrical characters, weather variables and agricultural inputs, Rajkot district (Gujarat)	BH Singh RC Jain Madan Mohan	Mar 84- Apr 90
2.	Pilot studies on pre-harvest forecasting of apple yield on the basis of data on biometrical characters, weather variables and crop inputs, Shimla district (HP)	Chandrabas KG Aneja Prem Narain	Mar 84- Oct 90
3.	A within-year growth model for pre-harvest forecasting of crop yields	RC Jain Ranjana Agrawal KN Singh (IARI)	Oct 87- Dec 90
4.	Probability model for crop yield forecasting	RC Jain Ranjana Agrawal	Sep 87- Jul 90
5.	Pilot studies on pre-harvest forecasting of yield of stick lac	SK Saha (ILRI) AK Jaiswal (ILRI) BH Singh	Oct 87- Dec 91
Forecasting Models for Occurrence of Crop Pests and Diseases			
6.	Models for forecasting aphid-pests of mustard crop	GN Bahuguna Chandrabas	Jan 87- Mar 91

1. Pilot studies on pre-harvest forecasting of yield of groundnut crop on the basis of data on biometrical characters, weather variables and agricultural inputs, Rajkot district (Gujarat)

The objective of the project is to develop suitable statistical methodology for obtaining pre-harvest estimates of yield of groundnut on the basis of data on biometrical characters, weather variables and agricultural inputs at various stages of crop growth.

Comparison of yield forecast with actual yield on the basis of previous year showed that the yield forecast in 1985 and 1986 is very nearer to estimated yield on the basis of year 1984, when the crop attained the age of 50 days. The forecast on the basis of 1985 was not done because it was a drought year. The error of prediction was found to be very low. Models given in technical programme were fitted but there was no significant improvement in the model in terms of R^2 .

Preparation of the consolidated report was in progress

2. Pilot studies on pre-harvest forecasting of apple yield on the basis of data on biometrical characters, weather variables and crop inputs, Shimla district (HP)

The objective of the project is to develop the methodology for obtaining pre-harvest estimate of apple yield on the basis of data on tree characters, weather

variables and crop inputs as explanatory variables.

To achieve this integrated forecast regression models using data on tree characters, manure applied and weather variables were developed separately for two varieties-Royal Delicious and Golden Delicious. The analysis revealed that age of tree, fruit drops after two months from blooming, intensity of flowering and manures applied as input are the important characters contributing towards yield variation. In case of yield of Royal Delicious trees girth of trees was also found significant in addition to the above characters. In the integrated models these regressors alongwith the generated weather variables on average relative humidity (morning and evening), temperature difference and average sunshine hours were included. The amount of variation explained by these variables for the integrated models for Royal Delicious varied between 50 to 75% over different periods during fruiting season and it varied between 55 to 65% in the case of Golden Delicious trees.

3. A within-year growth model for pre-harvest forecasting of crop yields

The project aims at developing model for making early forecasts of yield based on current season data.

Weekly data on plant population, plant height, length and weight of ear-head and dry matter accumulation for wheat during rabi season (1988-89) and rice during kharif season (1989) were

collected from IARI Research farm. Analysis was in progress to find out suitable growth model for crop yield forecasting.

4. Probability model for crop yield forecasting

The project aims to develop crop yield forecast model using Markov Chain theory.

Computer programmes for analysis of data were finalised and analysis was completed. The results revealed that Markov Chain approach can be used as an alternative method in crop forecasting. This method is robust against outlier and extreme observations.

5. Pilot studies on pre-harvest forecasting of yield of stick lac

Data collected for the first round of survey (Baisakhi and Katki, 1988) were analysed. Summary tables were prepared. Time series data on weather parameters and on production were also analysed and summary tables were prepared.

6. Models for forecasting aphid-pests of mustard crop

To identify the meteorological variables influencing growth of aphid-pest population of mustard crop and to develop methodology for forecasting pest intensity at different crop growth stages, a computer program was developed for the forecasting equations.

DIVISION OF STATISTICAL ECONOMICS

Mandate :

To develop appropriate stochastic models and methods for quantification of economic phenomena related to agriculture

Thrust Areas :

- Yield gap analysis
- Acreage response models
- Resource use in agriculture

Projects in operation thrust-area wise :

No	Project title	Project leader and associates	Duration
Yield Gap Analysis			
1.	Economic study of new farm technology with special reference to yield gap and associated factors in selected ORP areas	RK Pandey Shanti Sarup HB Choudhary Bhagat Singh BL Kaul	Jul 84- Jun 90
Acreage Response Models			
2.	Statistical estimation of multi-equation acreage response models under crop substitution	VK Sharma Ashok Kumar	Aug 87- Dec 90
Resource Use in Agriculture			
3.	Level of employment in modern farm technology	Bhagat Singh RK Pandey PC Mehrotra UN Dixit	Apr 86- Jun 89
4.	Study of cost functions for milk production in rural areas	S Kaul RK Pandey Ashok Kumar	Oct 85- Sep 89
5.	Study of fertilizer use and effect of subsidy on its consumption	UN Dixit SP Bhardwaj	Sep 87- Apr 89

1. Economic study of new farm technology with special reference to yield gap and associated factors in selected ORP areas

The project aims (i) to examine the new technology and its yield potential for different crops, (ii) to estimate the extent of untapped yield potential under farmers' environment, and (iii) to identify socio-economic and other constraints responsible for the existing gap between potential yield and actual yield.

The analysis was undertaken using the secondary as well as primary data collected through farm surveys in collaboration with four agricultural universities viz., BAU, Ranchi; JNKVV, Jabalpur; Sukhadia Agricultural University, Udaipur, and HAU, Hissar in their respective ORP locations in Ranchi (Bihar), Indore (M.P.), Bhilwara (Rajasthan) and Mohindergarh (Haryana).

Preliminary analysis of the data collected under ORP area in Mohindergarh revealed that major kharif crop of the area is bajra followed by guar, jowar and pulses. The major rabi crops of the area are wheat, gram, barley and rapeseed mustard. Due to severe drought conditions during kharif season of 1985-86 and 1986-87, the kharif crops were mostly damaged and hence the detailed analysis of crops during rabi are only taken up. The results of the adoptive research experiments conducted at Bawal research station during 1985-86 showed that the yield levels upto 20.6 q/ha for gram, 54.1 q/ha for mustard could be

achieved with the improved package of practices and proper management. Feasible achievable yield levels for wheat, gram, mustard and barley were estimated to be 41.2, 13.2, 12.9 and 30.0 q/ha in comparison to average yield levels of 31.8, 9.1, 9.5 and 22.4 q/ha respectively. This implies the existence of wide yield gap in different crops grown in the ORP. Production functions have been estimated to quantify the contribution of various factors in improving the productivity levels and bridging the yield gap.

2. Statistical estimation of multi-equation acreage response models under crop substitution

The project was initiated to evolve estimation procedures for multi-equation acreage response models under crop substitution, to develop multi-equation acreage response models for competing crops in the selected regions, and to examine the role of supply prices for bringing about a change in the acreages of various crops. An estimation procedure was developed for the case in which there are n time series observations for the first equation and $n_1 + n + n_2$ observations for the second, the observations of the first equation match in time with those of the second starting from $(n_1 + 1)$ th observation. The proposed estimator of the coefficient vector has the minimum variance in the class of linear unbiased estimators when the variance-covariance matrix of the error vector is known. A consistent estimator has been proposed for the situation in which the variance-

covariance matrix is unknown. The results have been generalized for auto-correlated errors. The results are being used to obtain a two equation model for rice and maize crop for Ferozepur district (Punjab).

3. Level of employment in modern farm technology

The objective of the project are (i) to examine employment generated in various enterprises including allied farm activities, (ii) to estimate overall employment generated on holdings of different sizes and various levels of technology, (iii) to examine employment pattern during lean periods, (iv) to estimate labour productivity in different crops, and (v) to examine the suitability of observations-interview method of data collection to measure farm employment

The sampling design adopted is one of stratified two-stage random sampling. The strata are the four tehsils of the district. The villages and holdings are the first and ultimate stage units of sampling respectively. The total sample size for the first stage units are 18 villages and have been allocated to different strata in proportion to the total cultivated area. The sample size at the ultimate stage will be 12 cultivators per first stage unit. The selection of the sample at both the stages has been done with equal probability without replacement. Thus for the survey a total of 216 holdings would be studied from the district.

The analysis of data would be done

as per the adopted sampling design, utilizing the standard techniques. For studying the employment generation over different holding size classes and for different levels of adoption of modern technology the technique of post-stratification with respect to these two characters will be followed. Detailed plan of analysis is :

- Appropriate indices of the totality of the adoption rates of different components of modern agricultural technology as available in the literature will be utilized for determining the level of adoption of modern agricultural technology for each of the sampled cultivators.
- For estimating the different parameters under the project, the available estimation procedure appropriate for the sampling design adopted as contained in the published literature will be utilized.
- For testing different hypotheses appropriate tests will be used.
- Functional analysis will also be undertaken utilising several variables pertaining to input use generated in the course of survey. The regional production functions for main crops would be estimated with the objective of examining variation in labour productivity in different agro-climatic zones of the state.

The study was taken up in district Muzaffarnagar of U.P.

4. Study of cost functions for milk production in rural areas

The project was initiated to examine the suitability of different types of function to obtain optimal production and cost function using data on milk yield, feed cost, labour cost and other costs that are incurred in production of milk. Production functions of linear, log-linear and quadratic type were fitted following the usual regression analysis.

The study was undertaken in several areas of West Bengal. Analysis revealed that in case of crossbred animals, quadratic function was the best in almost all seasons over the period of three years, explaining about 40% of variation. Among the input variables considered the most important was feed, as in most cases the regression coefficient corresponding to it was positive and statistically highly significant.

In case of non-descript animals, the

variation explained by cost variables was rather low, even though the quadratic function was the best for this group of animal also. In the study of cost functions, two variables viz. fixed cost and variable cost were regressed on milk-yield and cubic and quadratic functions were estimated.

5. Study of fertilizer use and effect of subsidy on its consumption

The project aimed (i) to study spatial and temporal distribution of fertilizer subsidy in India, (ii) to study consumption of pattern of chemical fertilisers of different categories of farmers, (iii) to examine the effect of fertilizer subsidy on crop production and income for different categories of farmers, and (iv) to study the constraints to fertiliser consumption.

Analysis of secondary data was completed. Report writing was in progress.

DIVISION OF COMPUTING SCIENCE

Mandate :

To develop appropriate software based on modern statistical methods for analysis of agricultural and animal sciences research data and as also to modify the available programmes to users' friendly software. In addition, this division is also responsible for undertaking studies on file organisation techniques in relation to information management.

Thrust area :

—Development of computer software for research data analysis in agriculture

Fifteen new application programmes were developed to meet the requirements of computer users. The development of 'Statistical package for agricultural research data analysis', (SPARI), dealing, mainly with genetics and plant breeding research has been developed and tested with real data. SPARI package alongwith the user's manual will be released for use shortly.

EDP System Utilization

(a) B-4700 main frame computer system alongwith its interactive terminals, all the PC-XT and ET-2000 graphics PC were made available for production jobs, testing jobs and software development to research workers and students from 8 AM to 8 PM on all working days.

(b) The details of jobs processed on B-4700 system during the period under report are :

Production Jobs : 10,384

Testing Jobs : 1,082
Listing Jobs : 1,235

All the PC's were used for development of software, processing of data and hands-on training of the scientists, technical personnel and students of the Institute. ET-2000 graphics terminal and X-Y plotters attached to PCs were extensively used for graphs, charts and transparency preparation.

M.T. Unit

Mechanical tabulation (data entry) unit undertook jobs of data entry on cards as well as floppy disks. 2.33 lakhs of punch cards were punched. 3.78 lakhs of data records were created on floppy disks. 773 batches (jobs/files) were created on data entry machines for this purpose.

Scientific Support

Programming and data processing assistance were provided to 180 research students and workers from various ICAR institutes and agricultural universities.

UNDP CENTRE OF ADVANCED STUDIES IN AGRICULTURAL STATISTICS & COMPUTER APPLICATIONS

This Institute has been recognised as a 'Centre of Advanced Studies in Agricultural Statistics and Computer Applications' by United Nations/FAO, under their development programmes from Oct 1, 1983. The main objective is to develop a Centre of Excellence with adequate infrastructure facilities to undertake advanced training programmes and carry out research in various aspects of agricultural statistics and computer applications.

UNDP Consultants

The following foreign consultants visited the Institute

Consultant	Field of Consultancy	Period of visit
1. Dr James E Gentle, Houston, Texas, USA	Computer Applications	Sep 4-30
2. Dr GM Southward, New Mexico State University, New Mexico, USA	Curriculum Development and Training Methods	Oct 30- Nov 8
3. Dr Mervin E Muller, The Ohio State University, Columbus, USA	Software Development and Computer Applications	Oct 25- Nov 10

Deputations for Training Abroad

Four scientists of this institute were deputed for training abroad in different fields as indicated below :

Name of Scientist	Field of training	Training Centre	Period
1	2	3	4
1. Sh HO Agrawal, Scientist (S-1)	Software Development and Programme Packages for Agricultural Research	Carnegie Mellon University, Pittsburgh, USA	5 Months
2. Sh Balbir Singh, Scientist (S-1)	-do-	University of Massachusetts, USA	5 Months

	1	2	3	4
3.	Sh SD Wahi, Scientist (S-2)	Plant Breeding and Statistical Genetics	University of Hohenheims, FRG	5 Months
4.	Dr BS Sharma, Principal Scientist	Animal Breeding and Applied Genetical Statistics	Technische University of Munchem, FRG	5 Months

Visitors

Dr Raj S Chhikara, Professor, Mathematical Sciences, University of Houston. U.S.A. and an expert in the field of Remote Sensing Technology visited this Institute from Feb 15 to Jun 12, 1989 for a period of four months. He was acquainted with aims and objec-

tives of the project and he also delivered a series of seminar talks.

Mr NHB Hughes, Country Project Officer, FAO, Rome visited this Institute on the Mar 9, 1990 and discussed the details of the progress of the UNDP Project of the Institute. He made a visit to Computer Centre and Library of this Institute.

POST-GRADUATE TRAINING AND EXTENSION

Regular Courses

The four regular post-graduate training courses : Professional Statisticians' Certificate Course, Diploma in Agricultural and Animal Husbandry Statistics Course, Senior Certificate Course and Course in Advanced Computer Programming which were being conducted at the Institute (the first two courses since 1945) were discontinued in 1985 and a new set of short refresher courses namely Refresher Course for Statisticians and Agricultural Scientists and also a short term course on the Use of Computer in Agricultural Research have been started from 1986. Apart from this, the Institute continued to conduct, in collaboration with IARI, two degree courses leading to M.Sc. and Ph.D. degrees in Agricultural Statistics and M.Sc. degree course in Computer Application in Agriculture. During 1989-90, 20 students were admitted to various courses : 7 Ph.D., 8 M.Sc. in (Ag Stat) and 5 M.Sc. (Computer Application in Agriculture). Twenty two students : 10 Ph.D. and 6 M.Sc. (Agricultural Statistics) and 6 M.Sc. (Computer Application in Agriculture) successfully completed their degree programmes.

Ad-hoc Training Courses

The Sixth Short-term training course

on 'Use of Computer in Agricultural Research' was organised by the Institute from March 1-28, 1989. The main emphasis in the course was on practical training on PC's, programming in BASIC and FORTRAN languages and in use of different soft-ware packages such as Microstat, Graphics, dBASE-III, Lotus-123 and Word Processing, which are available on all micro computers. Twenty-four participants from various ICAR Institutes and Agricultural Universities attended the course. A Valedictory function was held on March 28, 1989. Hon'ble Minister of State for Agriculture Research and Education Shri H.K. Shastri was the Chief Guest and distributed certificates to the participants of the course. The function was attended by eminent scientists like Dr PV Sukhatme, Dr NS Randhawa, Director General, Dr RM Acharya, DDG, ICAR besides other distinguished guests and scientists of the Institute.

The Seventh Short-term course on 'Use of Computer in Agricultural Research' was organised in the Institute from Sep 4-30 which was attended by 25 participants from ICAR Institutes and Agricultural Universities. A Valedictory function was held on Sep 30, 1989 in

**SHORT-TERM TRAINING COURSES ON 'USE OF COMPUTER IN
AGRICULTURAL RESEARCH'**



**Prof. Prem Narain, Director, IASRI delivering the Welcome Address
at the Valedictory Function of the VI Short-term Course**



**Dr. R.S. Paroda, DDG (CS), ICAR delivering the address at the
Valedictory Function of the VIII Short-term Course**

which certificates were given to all participants by Dr SS Pillai, Principal Scientist, IASRI.

The Eighth Short-term course was organised by the Institute from Mar 1-29, 1990 which was attended by 25 participants from ICAR Institutes and Agricultural Universities. A Valedictory function was held on Mar 29, 1990 with Dr RS Paroda, DDG (CS) as the Chief Guest. Certificates were given to all participants by the Chief Guest.

Refresher Course in Agricultural Statistics

The main objective of the refresher course was to impart basic knowledge of statistical techniques to persons who may not have formal training in statistics but who use the scientific statistical techniques in their research and other day to day activities.

The course covered

- Statistical Methods
- Data Processing and Computer Programming
- Design of Experiments
- Survey Sampling
- Statistical Genetics
- Econometrics Theory

The First Refresher Course in Statistics for Agricultural Scientists was organised by the Institute from Nov 15, 1988 to Feb 4, 1989 for the benefit of scientists and other personnel working in ICAR Institutes and Agricultural Universities.

The Valedictory function for the Course was held on Feb 4, 1989. Prof Prem Narain, Director, IASRI distributed the certificates to the participants.

The Second Refresher Course in Statistics for Agricultural Scientists was organised in the Institute from Oct 3 to Dec 30. The course was attended by 14 participants from Agricultural Universities and ICAR Institutes. The Valedictory function for the course was held on Dec 30. Prof Prem Narain, Director, IASRI distributed the certificates to the participants.

Training Course in Administrative Vigilance

A training course in Administrative Vigilance was organised at the Institute from Feb 21 to Mar 2, 1989. The purpose of the training was to expose the administrative, scientific and technical staff of the Institute to take up cases of administrative vigilance at the Institute. The training was inaugurated by Dr GC Srivastava, Secretary, ICAR. The course coordinators were Dr OP Kathuria, Principal Scientist and Vigilance Officer, IASRI and Sh GC Sharma, CAO, IASRI.

The faculty for the training course comprised eminent persons having long experience of administrative vigilance : Sh JV Dangwal, Director (Administration) Planning Commission; Shri GB Singh, (Retired) Deputy Director, ISTM; Shri GM Singh, Commentator and

Consultant ; Shri BN Pathak, Legal Adviser, ICAR; Shri VP Kanwar, Retired Senior Analyst (Vigilance), ICAR ; Shri Nirmal Singh, Under Secretary (Retired) ICAR and Sh GC Sharma, CAO, IASRI. Twenty two participants comprising 7 senior scientists, 2 technical officers and 13 administrative personnel participated in the training programme.

Dr PV Sheno, Special Secretary, Department of Agriculture, Research and Education delivered the Valedictory Address on Mar 2, 1989 and distributed certificates to the participants.

Ad-hoc Training Programme

On request from Director Animal Husbandry, Andhra Pradesh, Hyderabad a 10-days training programme on 'Progeny testing and sire evaluation' was organised from Apr 10-20 for two of their Assistant Directors (Animal Husbandry Statistics)-Dr K Lakshmi Narayana and Dr K Krishna Murthy. The programme consisted of 25 hours of theory and 10 hours of practical work and was well received by the trainees.

Advanced Course on Statistical Aspects of Animal Breeding

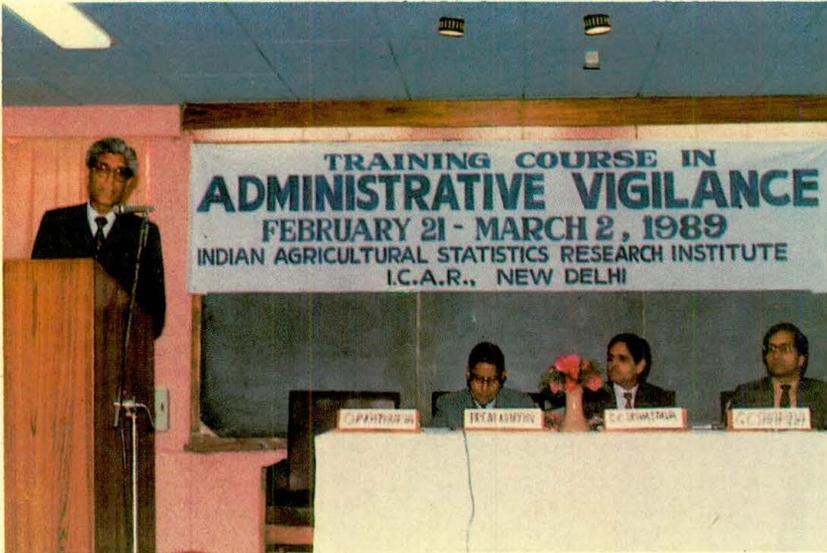
An advanced level course on Statisti-

cal Aspects of Animal Breeding was organised by this Institute during Jul 24-29. The course was inaugurated on Jul 24 by Dr RM Acharya, Deputy Director General (Animal Science), ICAR and certificates were distributed to the participants on Jul 28 by Prof. Prem Narain, Director, IASRI, New Delhi.

This advanced course was first of its kind to be organised by this Institute. The main aim of this course was to acquaint the practising animal breeders with the latest research work done at this Institute on the statistical aspects of animal breeding. The emphasis was more on interaction among the participants and course instructors rather than the usual deliverance of lectures.

About 14 research workers and university teachers from Agricultural Universities, ICAR Institutes participated in the programme. Some of the latest and important topics like BLUP and SRLS methods in indexing sires, progeny testing with auxiliary traits, gene action in Indian dairy cattle, use of partial diallel crosses in animal breeding and possible use of MOET to increase response to selection were included in the course for the benefit of the participants.

TRAINING COURSE IN ADMINISTRATIVE VIGILANCE



Dr. O.P. Kathuria, Principal Scientist and Vigilance Officer, IASRI and Course Coordinator briefing the participants about the course modalities



Prof. Prem Narain welcoming the Chief Guest at the Valedictory Session



**Dr. R.M. Acharya, DDG (AS), ICAR inaugurating the advanced level
course on Statistical Aspects of Animal Breeding**

Training Programmes organised for trainees from other organisations

Sl No	Name of the Programme	Dates	No. of trainees	Agency sponsoring the programme	Lectures delivered by
1	2	3	4	5	6
1.	M.Sc. (Stat.) students	Jan 24	40	Deptt. of Statistics, Punjab University, Chandigarh.	Prof Prem Narain Dr HP Singh Sh PN Soni Sh R Gopalan
2.	Junior Certificate Course	Feb 20	35	C.S.O., New Delhi.	Prof Prem Narain Sh PN Soni Dr (Smt.) Ranjana Agrawal
3.	B.Sc. (Agri.) students	Apr 3	89	Gujarat Agricultural University	Prof Prem Narain
4.	Jr. Certificate Course (Specialised Training in Data Processing)	May 9	20	C.S.O., New Delhi	Sh Ram Kumar
5.	M. Stat. Students (National and International Statistical Systems)	Jun 7	28	C.S.O., New Delhi	Dr HP Singh Dr PC Mehrotra Dr Shivtar Singh
6.	Jr. Certificate Course (Specialised Training in Agricultural Statistics)	Jun 19 to Jun 22	6	C.S.O., New Delhi	Dr HP Singh Sh PN Soni Dr (Smt.) Ranjana Agrawal Dr VK Sharma Sh AC Kaistha Dr Chandrahas Dr RC Jain
7.	Jr. Certificate Course (Specialised Training in Organisation of Large Scale Sample Surveys)	Jun 19 to Jun 22	3	C.S.O., New Delhi	Dr HP Singh Dr AK Banerjee Sh KB Singh Dr PC Mehrotra Dr MG Mittal Dr Shivtar Singh Dr VT Prabhakaran Sh HC Gupta

1	2	3	4	5	6
					Dr SS Shastri Dr HVL Bathla Dr BC Saxena Dr AK Srivastava
8.	Foreign students from Republic of Phillippines	Jun 28 to Jun 29	2	C.S.O., New Delhi	Prof Prem Narain Dr VK Sharma Dr HP Singh Dr PC Mehrotra Sh PN Soni Dr (Smt.) Ranjana Agrawal Dr Prajneshu Sh AC Kaistha Dr AK Banerjee
9.	Participants of regular course in statistics of International Statistics Education Centre	Oct 13	27	C.S.O., New Delhi	Prof Prem Narain Dr PC Mehrotra Dr (Smt) Ranjana Agrawal Dr VK Sharma Sh PN Soni Sh R Gopalan
10.	Participants of regular course in statistics of International Statistics Education Centre (Specialised Training in Agri. Statistics)	Nov 6	4	C.S.O., New Delhi	Dr PC Mehrotra Sh PN Soni Dr (Smt.) Ranjana Agrawal Sh R Gopalan
11.	M.Sc. (Stat.) students	Jan 31, 90	44	Punjab University, Chandigarh	Dr Randhir Singh Sh R Gopalan
12.	Jr. Certificate Course	Feb 19, 90	31	Central Statistical Organisation, New Delhi	Prof Prem Narain Dr PR Sreenath Dr RC Jain
13.	B.Sc. (Agril.) student	Mar 1, 90	1	University of Agricultural Sciences, Bangalore	Dr Randhir Singh

International Training Course

The Institute organised an International Training Course on 'Techniques of estimation of output of food crops' from Nov 8 to Dec 21 in association with Afro-Asian Rural Reconstruction Organisation (AARRO). The training course was funded by Ministry of External Affairs under the ITEC programme and AARRO. Nine participants from different Afro-Asian countries : Malaysia, Ethiopia, Kenya, Ghana, Jordan, Syria, Sierra Leone, and PDR Yemen attended the training programme. The training course was inaugurated by Shri BC Gangopadhyay, Secretary General, AARRO. Various faculty members from IASRI, IARI, NSSO, DES, Department of Food and Civil Supplies delivered lectures during the training course. As a part of the training programme the participants were taken for a field visit to Jaipur and Ajmer in connection with Food Consumption Surveys. They were also taken to Trivandrum for crop cutting experiments on tapioca and paddy crops. The valedictory function of the training course was held on Dec 21 at which Dr AM Michael, Director, IARI was the Chief Guest.

Research Fellowships

During 1989-90, 21 M.Sc. and 21 Ph.D. students received research fellowships. M.Sc. students received fellowships @ Rs. 1200/- p.m. each besides Rs. 3000/- per annum as contingent grant. Out of the 21 Ph.D. students 12 received fellowship @ Rs. 1800/- p.m.

each in the I and II year and 9 students received fellowship @ 2100/- p.m. in the III year in addition to Rs. 5000/- per annum as contingent grant.

Hostels

The Institute maintains two well furnished hostels : Panse Hostel and Sukhatme Hostel within its premises to cater residential requirements of the students. Ample facilities also exist for cultural activities and sports. All the students are required compulsorily to stay in the Hostel. Hostel mess is run by the students on cooperative basis. The general management of hostels is vested in the Warden, who is assisted by Prefect and the students Executive Committee. During the period under report the main activities included :

- New Year's Day, Holi and Dipawali festivals were celebrated with great pomp and show
- Sarasvati Puja was celebrated on Feb 10, 1989
- General body meeting held on Oct 6 under the chairmanship of Dr PR Sreenath, Warden, IASRI Hostels in which executive committee for the session 1989-90 was elected
- Mr Ashish Das, PhD student was felicitated on his receiving 'Young Scientist Award' at the 76th Annual Conference of Indian Science Congress
- The Annual sports meet of the students of IASRI was organised
- A Friendly one day cricket match was organised on Feb 11, 1989

between staff and students of the Institute

- The Students of IASRI receiving M Sc and Ph D degrees were felicitated jointly by the students and faculty of the Institute
- A picnic was organised at Suraj Kund in which Director, Warden and Professor (Ag. Stat.) also participated
- The students of IASRI won first prize in hockey, second prizes in both javeline throw and triple jump events and third prizes in both

javeline throw and long jump events in the sports meet held by IARI during Mar, 1990

Seminars/Conference

The result of the research projects and field trials undertaken in different aspects of Agricultural Statistics and Computer Applications were presented in the seminars organised regularly in the Institute. During the period under report 127 talks were delivered by the scientists, research scholars and various experts, the ones delivered by eminent scientists are :

Sl No	Speaker	Topics
1	2	3
1.	Sh PR Ramchander, IIHR, Bangalore	—Problems and prospects of applications of biometrical genetics on plantation and fruit crops
2.	Edward Pollak, UNDP Consultant, Iowa State University, Department of Statistics, USA	—Theory of finite population undergoing partial selfing
3.	Prof RA Bailey, Rothemsted Experimental Station, UK	—Experimental designs at Rothemsted
4.	Dr AR Sen, University of Galary, Canada	—On sampling methodology for estimating marine fish catch
5.	Dr MN Das, Ex Director, Central Water Commission, New Delhi	—On problems of search designs
6-8.	Dr Raj S Chhikara, UNDP Expert, University of Houston, Houston Texas, USA, Expert in the field of Remote Sensing Technology	—Crop estimation using remote sensing—An overview —Ratio and regression estimation in finite population sampling

INTERNATIONAL TRAINING COURSE ON 'TECHNIQUES OF ESTIMATION OF OUTPUT OF FOOD CROPS'



Prof. Prem Narain giving his opening remarks at the Inaugural Session



Shri B.C. Gangopadhyay, Secretary General, Afro Asian Rural Reconstruction Organisation delivering the Inaugural Address

1	2	3
		—Inverse Gaussian distribution-statistical theory, methodology and application
9.	Dr Murari Singh, Statistician, ICRISAT, Hyderabad	—Mixed errors in variables in models for fertilizer crop responses
10.	Prof D Raghava Rao, Temple University Philadelphia, Pennsylvania, USA	--Randomized response technique and ordering sensitive questions
11-16.	Prof JE Gentle, UNDP Expert	—Introduction to statistical computing —Design and development of software-I —Design and development of software-II —Simulation techniques —Computation for linear models --Future of computing
17.	Sh ML Saikumar, Manager, Computers and Information Technology Division, Institute of Public Enterprises, Hyderabad	—Artificial intelligence and expert systems
18.	Prof G Morris Southward, Department of Experimental Statistics, New Mexico State University (USA)	—Teaching for consulting in statistics
19-23.	Mr Mervin E Muller, Chairman, Department of Computer and Information Science, The Ohio State University, Coloumbus, Ohio, USA	—Top down and bottom up design or acquisition of statistical computing capabilities —Importance of performance analysis in statistical computing —Need for design of computer supported data bases —Computers in the design and analysis of experiments

1	2	3
		—Computer assisted modelling in statistical computing analysis : Examples for forecasting
24.	Prof BS Minhas, ISI, Delhi Centre	—Techniques of estimation of output of food crops
25.	Dr KR Satyamurthi Jt. Director, NSSO	—Silvometrics
26.	Prof MS Ramanujam, Institute of Applied Man Power Research, Delhi	—Estimation of employment in the informal sector
27.	Prof Arjun K Gupta Bolling Green, Ohio, USA	—Two factor mixed hierarchical model for classification
28.	Mr KS Krishnan, Ex- Sr Scientist, IASRI, New Delhi	—Long term fertilizer experiments
29.	Prof Subhash C Narula	—Regression quantiles

Ninth National Conference of Agricultural Research Statisticians

Ninth National Conference of Agricultural Research Statisticians was held at Tamil Nadu Agricultural University, Coimbatore from July 19-21, 1989. The main theme of the Conference was 'Research Challenges in Agricultural Statistics and Computer Applications in Agriculture'. Dr. S. Jayaraj, Vice-Chancellor, TNAU inaugurated the Conference and Prof. Prem Narain,

Director, IASRI delivered the Key Note Address. Apart from inaugural and plenary sessions there were four technical sessions :

- Research challenges in agricultural statistics pertaining to crop sciences and agro-forestry;
- Research challenges in agricultural statistics pertaining to animal sciences and fisheries;
- Research challenges in computer applications in agriculture; and

- Research and teaching coordination and linkages between ICAR Institutes and Agricultural Universities.

Sh VN Amble, eminent statistician attended the Conference as a special invitee and chaired two sessions. About 75 Agricultural Statisticians of Agricultural Universities, ICAR Institutes, State Departments of Agriculture, Animal Husbandry and Fisheries participated in the deliberations of the Conference.

Recommendations that emerged are :

A. Agricultural Statistics

(i) Crop Sciences and Agro-Forestry

1. Development of methodologies of crop forecasting and estimation of crop acreage and yield using remote sensed data for both micro and macro level planning.
2. Development of survey sampling methodologies for estimation of acreage and production for areas under multiple cropping systems, tuber crops (other than potato) condiments, spices and other important minor crops.
3. Development of appropriate statistical methodologies in relation to design and estimation problems in dryland agriculture and water management.
4. Determination of the extent of bias due to respondents, enumerators, call backs etc. in agricultural sample surveys.
5. Cataloguing of designs of various types including the new series being developed, for promoting the use of efficient designs, jointly by IASRI and SAUs.
6. Development of soil test-crop response models for judicious use of fertilizers.
7. Initiation of an AICRP in Statistics for developing statistical procedures for analysis of data from mixed and inter-cropping experiments; studies on the size and shape of plots for experimentation with different crops including agro-forestry and inter-cropping.
8. Development of suitable statistical models for stability analysis for dryland crops research.
9. Development of suitable experimental designs and methods of analysis for agro-forestry experiments.
10. Development of suitable statistical methodologies using density estimation for determining appropriate premium rates for crop and livestock insurance.
11. Development of a more refined technique for estimation of crop losses due to pests and diseases particularly soil borne diseases.
12. Development of survey sampling methodology for estimation of

area and production of field crops in hilly areas.

(ii) *Animal Sciences and Fisheries* :

13. Development of mixed model theory to handle the following situations

- (i) when there is certain relationship among the random effects (e.g. sires may be related);
- (ii) when in a multi-trait analysis, the observations are correlated and also when some traits are continuous and some are of categorical nature;
- (iii) estimation of parameters free from selection effects; and
- (iv) when in multi-trait BLUP model the traits are non-linearly related and also when some traits are subject to inequality constraints.

14. Evaluation of various selection strategies involving MOET technology to find optimum strategy.

15. Development of appropriate methodologies in the area of 'Surveillance of important animal diseases' for adjustment for time lag in case reporting; imputation of non-observations, detection of changes in patterns of occurrence in the incidence of disease, description of disease trends over time, identifying aberrations in the occurrence of disease and for assessing the impact of health programmes.

16. Study of the response to selection in finite populations and the effect of linkage on homozygosity of a population under various inbreeding systems through simulation approach.

17. Development of improved techniques for small area estimation, analysis of categorical data, and for imputation of incomplete data in the field of survey sampling as applied to livestock sector. For small area estimation a combination of data from sampled respondents and supervisory survey checks may be used.

18. Development of more realistic deterministic and stochastic fish population models by incorporating various aspects such as time delays, age-structure, etc.

19. Investigations into the sampling techniques for determining area and production of fodder and grasses in hilly tracts.

20. Development of sampling technique for estimation of total inland fish catch based on data from actual weighment and by enquiry.

21. Definition and estimation of area under wasteland and its utilization.

B. Computer Applications in Agriculture

1. Providing appropriate and adequate computing facilities includ-

ing micro and personal computers, printers, graphics, etc. in various ICAR Institutes and Agricultural Universities. These may be suitably networked by creating a KRISHINET. This network would have a nodal organisation link the IASRI to serve as central storage and dissemination body where a large powerful mainframe computer system may be provided. For ensuring uniformity and compatibility among these computer units, a Coordination Committee of experts in different areas may be constituted.

2. Development of programs and software packages for statistical applications in various areas of agricultural research. A newsletter for exchange of programs and other developments may be brought out periodically.
3. Development of expert systems in different fields of agriculture and agricultural statistics. A begining may be made with expert systems in the areas of pest and disease surveillance, crop forecasting and choice of cropping system including fertiliser use.
4. Development of appropriate databases as part of information technology for improved farm production.
5. Modelling and simulation techni-

ques using computers. Training courses may be organised by IASRI in these and other areas of computer application.

6. Planning and conduct of suitable training programmes in the new programming languages, particularly, for use on PC's/micros.
7. Convening of periodical meetings, workshops, etc. of agricultural scientists, research statisticians and computer professionals for exchanging of ideas and knowledge on the latest state-of-the-art in different fields and encouraging active collaboration among scientists.

C. Research and Teaching-Coordination Linkages

1. A senior level position of the rank of DDG (Statistics) may be created at the ICAR Headquarters for effective coordination amongst statisticians in various ICAR Institutes and Agricultural Universities.
2. In view of the increasing importance of mathematics and computer science in most disciplines there should be adequate number of courses in these areas at the undergraduate level. Attempts to scale down the importance of these courses should be discouraged.
3. It was learnt that some committees had recommended reduction

- in the number of statistics courses for agricultural students at under-graduate level. In view of the importance of statistics in agricultural research, it was emphasised that teaching of statistics to agricultural students should be further strengthened in the various Agricultural Universities.
4. To bridge the gap of communication between the Agricultural Statisticians and Animal Sciences and Fishery Scientists, short-term training courses in agriculture and animal sciences including fisheries may be planned and organised for statisticians in ICAR Institutes and Agricultural Universities.
 5. In-service training courses in statistics offered earlier at IASRI for the benefit of scientists in other disciplines of agriculture may be revived immediately.
 6. A National Standing Committee should be set up for bringing about uniformity in eligibility requirement, curriculum development, teaching strategies, etc. in both the disciplines of agricultural statistics and computer applications in agriculture.
 7. A Research Direction Committee should be constituted to encourage collaboration and coordinate research between State Agricultural Universities and ICAR Institutes.
 8. All India Coordinated Research Projects dealing with important research aspects in agricultural statistics should be initiated.
 9. Statisticians in ICAR Coordinated Research Projects should be encouraged to take up research projects in statistics.
 10. Students majoring in statistics should be actively involved in statistical consultancy work for equipping them with sound background in application of statistical techniques to real life problems in agriculture.
 11. Exchange of research scientists and teachers in statistics and computer sciences amongst different Agricultural Universities and ICAR Institutes may be engaged.
 12. In some ICAR Institutes and SAUs, statisticians are scattered in different departments and Coordinated Projects. They should be brought under one umbrella end their participation in research, teaching and extension activities should be encouraged.
 13. Summer Institutes/Schools in advanced statistical methods may be organised at IASRI and SAUs, in specialized areas.
 14. Statisticians should be associated in all aspects of planning, implementation analysis and interpretation of data in the various

ANNUAL DAY OF THE INSTITUTE



Dr. N.S. Randhawa, Director General, ICAR releasing the Annual Report of the Institute



Dr. N.S. Randhawa giving prize to a winner of the declamation contest arranged on this occasion

coordinated research projects and projects funded under NARP involving large amount of data.

15. For healthy growth of statistics, this discipline should function as an independent unit and may be delinked from any other faculty wherever such arrangements exist presently.

NATIONAL SCIENCE DAY/ANNUAL DAY

National Science Day

The Institute observed Feb 28, 1989 as 'OPEN DAY'. Invitations were sent to the Principals of nearby Higher Secondary Schools inviting the students in 11th and 12th classes to visit the Institute for familiarizing the students in the use of computers.

A number of visitors visited the Computer Centre. The mainframe computer system as well as the IBM compatible PCs and Graphic plotters were demonstrated to them as an aid in data processing and summarisation of large scale data and other applications in the field of agriculture, animal husbandry and allied subjects.

Annual Day

The Annual Day of the Institute falls on 2nd July. This year 2nd July being Sunday, the Annual Day of the Institute was celebrated on July 1, 1989. As a part of these celebrations a declamation contest for the students was held on June 30, 1989. The topic of the contest was 'Role

of Statistics and Computers in Planning for Agricultural Development.'

On 1st July the main annual day function was held at which Dr NS Randhawa, Director General, ICAR was the Chief Guest. Late Sh MK Bose memorial award and Late Sh VVR Murthy memorial award were given to the best students for the years 1983-84, 1985-86 and 1987-88.

Annual Report of the Institute for the year 1988 was released by Dr NS Randhawa on this occasion. In the afternoon a panel discussion on 'Need for Appreciation of Agricultural Statistics and Computer Application in India', was organised in which Prof. Prem Narain, Director, IASRI presented the lead paper. The session was chaired by Sh JS Samra, Ex Economic and Statistical Adviser, Dte. of Econ. and Stat., New Delhi and the discussants on the paper were Dr JR Arora, Director, Deptt. of Bio-technology, New Delhi, Dr RP Sinha, Economic and Statistical Adviser, Directorate of Economic and Statistical, New Delhi and Sh JS Samra.

Nehru Centenary Celebrations

To commemorate the Nehru Centenary Celebration, 'Nehru Memorial Lecture' was organised at this Institute on Nov 7. Prof PV Sukhatme, Maharashtra Association for the Cultivation of Science, Pune, delivered the key-note address on 'Food, Physical Growth and Work Output'. Dr MS Swaminathan presided over the function and distributed the Nehru Memorial medals to the

candidates selected for the award for the year 1986-88.

Advisory Service

The Institute continued to play another important role of giving technical advice and guidance in regard to problems in agricultural statistics and sampling techniques particularly in the statistical aspects of the projects financed by the ICAR.

Technical advice and guidance were also rendered to research workers and students of the various research institutes, universities and other research organisations in planning of their experimental investigations and in processing and analysis of data on the computer. Division-wise brief resume of such assistance rendered during the year is as follows:

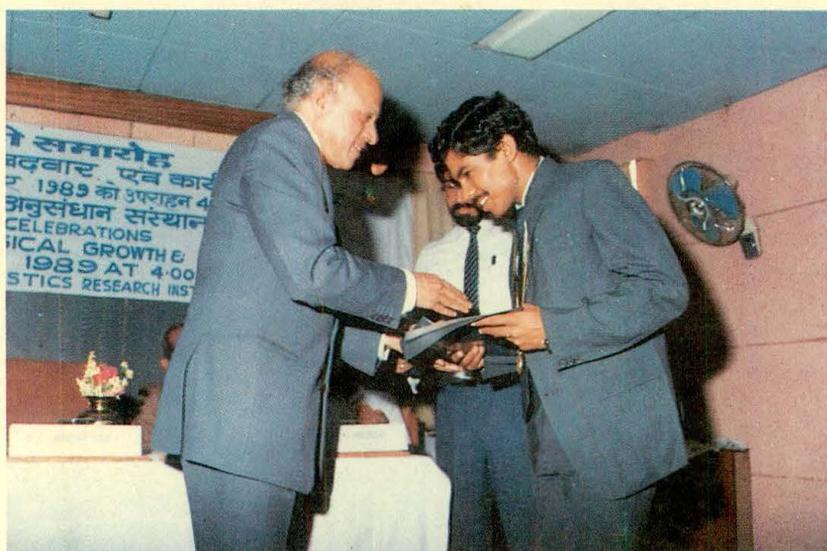
Sample Survey Methodology and Analysis of Survey Data

- Shri R Chatterjee, Technical Officer of Directorate of Lac Development, Ranchi regarding lac survey project and for finding optimum dose of bread lac
- Joint Director (Agriculture), Govt. of West Bengal regarding crop estimation surveys on fruits
- Dr RK Rajput, Project Coordinator (WM), CSSRI Karnal on planning of bench mark survey in irrigation command area under the project on farm water management operational research pilot project
- Dr JP Singh, Additional Secretary, Ministry of Water Resources on planning of survey for yield estimation in irrigation command areas
- Agriculture Finance Consultants regarding monitoring and evaluation of National Oilseeds Development Project
- Joint Director (AH), Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi on the draft report of the sub group on Animal Husbandry Statistics for the formulation of the five year plans
- Dr Bhupal Singh and Sh SB Agarwal, Sr Scientist, NDRI, Karnal in regard to formulation of the project, "Effectiveness of AI under field conditions"
- Agricultural Finance Corporation Ltd. on sampling design for evaluation of special rice production and special food production/programme
- Director Camel Research Centre, Bikaner in regard to sampling design for the sample survey to be conducted in Rajasthan
- Dr Stephan Biggs, Consultant, ICAR, on Management Information System
- Director (AH) Gujarat, Ahmedabad regarding the project 'Inter-state variations in milk production over couple of years in India—a few observations on Gujarat and other leading states'
- Dr TK Govindrajan, Addl.

PANDIT JAWAHARLAL NEHRU CENTENARY CELEBRATION



Prof. P.V. Sukhatme delivering the key-note address



Dr. M.S. Swaminathan presenting Nehru Medal to the best M.Sc. (Agricultural Statistics) student

Director (AH), Madras regarding estimation of meat production in sub-urban area

- Scientists working in AICARP on agricultural by-products for preparing the schedules for conducting surveys in the project area
- Director, Vikram Research Centre, Jaipur on formulation of a project on women's role in rural development in Rajasthan
- Field Officer, Punjab for planning and implementation of centrally sponsored scheme on estimation of area and production of fruits, vegetables and minor crops in Punjab
- Managing Director, IPL, New Delhi on planning and implementation of survey for determining level of adoption of fertiliser use and other agricultural practices in selected districts of UP covered under Indo-Canadian Agricultural Extension Project
- Zonal Coordinator, LLP, Andhra Pradesh regarding evaluation methodology for determining impact of LLP in selected centres
- Chief Engineer, Command Area Development, Ministry of Water Resources, New Delhi on assess-

ment of yield rates in irrigation command areas

Design of Experiments and Analysis of Experimental Data

- Dr AH Mir, Incharge, Statistics, SKUAT, Shalimar regarding layout of experiments and related methodology for data analysis

Forecasting Techniques for Crops, Diseases and Pests

- Mr Tharper Tashi, FAO trainee from Bhutan regarding estimation methodology for crop losses due to pests and diseases
- Sh CD Ravindran, Scientist, CICR, Nagpur on crop forecasting methodology
- Dr SK Saha, Head, Extension Division and Dr AK Jaiswal, Scientist at ILRI, Ranchi regarding the project 'Pilot study on pre-harvest forecasting of yield of stick-lac'

Statistical Economics

- Shri RA Singh, Scientist, IGFR, Jhansi regarding statistical economics

Computing Science

- Four ARS trainees in dBASE III Plus software

LIBRARY AND DOCUMENTATION SERVICES

Resource Building

As a part of its important activities, library continued its resource collection programme as under.

Total number of publications as on 31.03.90

Books	—	20702
Hindi books	—	191
Journals	—	2132
Reports, etc.	—	6021

Number of publications added upto 31.03.90

Books	—	195
Journals (bound)	—	476
Reports, etc.	—	158

Journals subscribed

Indian	—	60
Foreign	—	120

Bulletins/Newsletters received on gratis/exchange : 105

Number of reprints procured during 1989-90 :

For exchange	—	19
For users	—	113

Maintenance

Publications bound	—	651
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Library Usage :

Working Hours : 9.30 A.M. to 4.30 P.M.

Number of readers consulted the library — 25400

Number of publications issued from library — 28300

Library Users :

Number of bonafide library members — 246

Number of students (regular) members — 30

Number of ad-hoc trainee users — 40

Library Services :

Number of documents borrowed or lent out on inter library loan — 75

Number of pages (scientific and technical nature) reprographed — 49165

Number of issues 'Current Content Mirror' brought out — 12

Number of electronic stencils and transparencies made — 232 and 249 respectively

Advisory Services :

Provided guidance to ICAR Institutes and CSIR Librarians, Documentation

Officers with regard to technical and organisation part.

Library Management

Present Library Committee consists of :

Prof Prem Narain,	Chairman
Director	
Dr HP Singh	Member
Dr VK Sharma	„
Dr Prajneshu	„
Dr Ranjana Agrawal	„
Sh R Gopalan	„
Sh PN Soni	„
Dr Randhir Singh	„
Sh SN Mathur	„
Sh SS Srivastava	Convener

Art and Photography Unit

Art Unit assisted the scientists in preparing diagrams, charts, histograms and maps for research publications and

as also visual display of research findings in the exhibition room. It also assisted in transcribing the lectures write-ups on transparencies.

Photographic jobs including exposing, processing and printing of about 600 photos taken on various important occasions and of important research and extension activities of the Institute were executed. In addition, enlargement of good number of photographs were also done.

The charts and graphs were updated in the light of recent research findings for display in the exhibition room. A number of new charts were also added to the existing ones depicting current research findings. Photos taken at the special occasions were also displayed. Latest publications were also added.

PUBLICATIONS

Research Papers

The major publications of the Institute comprised over 80 papers and popular articles the details of which are given in Appendices IV and V.

Research reports/monographs/compendia

Ahuja, DL, A Dey, AK Banerjee and SK Raheja. A study of yield trends of wheat in India during last three decades (1988).

Bajpai, SN, AK Nigam and DK Bhatia. Overview of the designs adopted in animal nutrition experimentation in India with recommendations of new designs in appropriate situations.

Bhargava, PN, JK Kapoor, NK Sharma and DC Pant. Report on Agronomic Survey for Aligarh and Dhar (ECF districts) conducted under the AICARP.

Chandras, KG Aneja and BH Singh. Tobacco yield forecast model based on principal components of biometrical character and crop inputs.

Ghai, RK, PN Bhargava, PR Yeri and PK Mitra. Results of cotton experiments in India, Vol I (1966-67).

Ashok Kumar, RK Pandey and Sushila Kaul. Study on institutional credit in agriculture.

Malhotra, JC, P Narain, JP Jain and PK Malhotra. Growth studies on crossbred dairy cows available at various military farms in the country (1989) : 1-62.

Nambiar, KKM, PN Soni, MR Vats, DK Sehgal and DK Mehta. All India coordinated research project on Long Term Fertilizer Experiments, 1985-86 and 1986-87 (1989).

Narain, P and CR Leelavathi. Yards-ticks of additional production from the use of irrigation (IASRI Technical Bulletin) 1989.

Rai, SC and VK Bhatia. Statistical investigations in sensory evaluation of agricultural products.

Rustogi, VS, PC Mehrotra, SK Raheja and MS Narang. A study of variability of yield rates and acreage under HYV cotton (1988).

Shanti Sarup and RK Pandey. Acreage response of tur crop in India. (Technical Report).

Verma, SP and JP Jain. Development of a suitable statistical methodology for estimating extent of labour utilization in livestock and poultry keeping in rural areas (1989) : 79.

**SEMINARS/WORKSHOPS/SYMPOSIA AND CONFERENCES
ATTENDED BY THE SCIENTISTS**

S. No.	Name of the Scientist	Programme Title	Place	Period
1	2	3	4	5
1.	Dr Randhir Singh Dr RC Jain	The 76th Session of Indian Science Congress	Madurai	Jan 07-12
2.	Sh Lal Chand	The XII Workshop on All India Co-ordinated Research Project on Goat Breeding	Bikaner	Jan 15-16
3.	Prof Prem Narain Sh SC Rai Dr AK Srivastava Dr HVL Bathla Sh RL Rustagi Dr Shivtar Singh Sh Tribhuvan Rai	The 42nd Annual Conference of the Indian Society of Agricultural Statistics	Assam Agricultural University, Jorhat, Assam	Jan 19-21
4.	Dr BS Sharma Dr PR Sreenath	The Workshop on Effective Communication and Instructional Aids	NAARM, Hyderabad	Jan 31- Feb 03
5.	Dr SK Raheja Dr HP Singh	National Workshop on Training and Planning for finalisation of training schedules for the extension beneficiaries working in the State Department of Agriculture, Animal Husbandry, Horticulture, etc for the year 1991	New Delhi	Jan
6.	Sh Mahesh Kumar Sh SP Doshi	National Seminar on 'Data Base Management System and Standards' organised by CSI	Lucknow	Feb 04-06

1	2	3	4	5
7.	Dr (Mrs) Ranjana Agrawal Dr Randhir Singh Dr RC Jain	Round Table Conference on "Resources Management from Space" organised by Ministry of Foreign Affairs, France; Ministry of Research and Technology, France	Vigyan Bhawan, New Delhi	Feb 06-07
8.	Dr SK Raheja	National Workshop on Monitoring and Evaluation of Agricultural Extension	MANAGE, Hyderabad	Feb 07-08
9.	Sh SN Mathur Sh OP Dutta	Two Days Seminar on 'Super Computers' and their Applications, organised by CSI	Delhi	Feb 17-18
10.	Dr PS Rana	Workshop on Mathematical Models in Biology	Indian Institute of Chemical Biology, Jadavpur, Calcutta	Feb 21-24
11.	Sh SN Mathur	Seminar on Distributed Data Processing organised by CSI	Hotel Imperial, New Delhi	Feb 28
12.	Dr RC Jain Sh GN Bahuguna	National Symposium on Epidemiology and Forecasting of Plant and Diseases, organised by Indian Phyto Pathological Society	IARI, New Delhi	Feb 28- Mar 01
13.	Dr JP Jain Sh TB Jain	Workshop-cum-Seminar on Latest Techniques of Sample Surveys for Estimation of Wool, Meat and other products organised by Ministry of Agriculture	Central Sheep Breeding Farm, Hissar	Mar 08-14
14.	Prof Prem Narain	Workshop on 'Food Supply Information Systems in Africa'	Nairobi (Kenya)	Mar 13-17

1	2	3	4	5
15.	Dr PC Mehrotra	National Workshop on Situational Analysis of Children in India	National Institute of Public Cooperation and Child Development, Hauz Khas, New Delhi	Mar 14-16
16.	Dr SK Raheja Dr SS Shastri	Symposium on Recent Advances in Stochastic Models and Related Fields organised by Department of Mathematics, MD University, Rohtak	Mahrishi Dayanand University, Rohtak	Mar 25-27
17.	Dr VK Bhatia	One Day Symposium in Hindi entitled 'Contribution of Statistics in Health Care'	IRMS, New Delhi	Apr 05
18.	Dr PS Rana	Seminar on "Some Distribution Related to Lattice Path Combinatorics"	ISI, New Delhi	Apr 05
19.	Prof Prem Narain Dr OP Kathuria Dr JP Jain Dr Randhir Singh Dr (Mrs) Ranjana Agrawal	Nehru Centenary Symposium on 'Agricultural Research : Emerging Challenges and Opportunities' organised by Federation of Indian Societies of Agricultural Sciences and Technologies	India International Centre, New Delhi	Apr 05-06
20.	Sh KB Singh	The Second Annual Workshop of AICRP on Utilization of Animal Energy	Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad (UP)	Apr 28-30
21.	Dr SK Raheja Dr PC Mehrotra	National Workshop on "Integration of Drought Relief with Wasteland Development" organised by Centre for Administratives of Drought Relief	India International Centre, New Delhi	Apr 30

1	2	3	4	5
22.	Dr RK Pandey Sh SC Rai	The Sixteenth Special Hindi Workshop for Executives organised by Raj Bhasha Sansthan	Hotel Samrat, New Delhi	May 01-02
23.	Dr OP Kathuria* Dr Randhir Singh Dr KK Tyagi Sh KB Singh Sh SC Rai	Symposium on "Need for Data Base at Lower Level for Agricultural Planning" by ISAS	IASRI, New Delhi	May 15
24.	Prof Prem Narain	Directors' Conference of the ICAR Research Institutes	New Delhi	May 16-17 May 26-27
25.	Dr HP Singh	The Sixteenth Workshop of AICARP on Determination of the Availability of Animal Feed Resources Agriculture By products etc. Economic Rations for Livestock and Poultry	HAU, Hissar	Jun 06-07
26.	Dr SK Raheja	Seminar on 'Fertilizer Response Ratios in Field Crops in Different Agroclimatic Regions' organised by Centre for Agricultural and Rural Development Studies	Planning Commission, New Delhi	Jun 20
27.	Dr SK Raheja	Drought Management Workshop organised by IIM, Ahmedabad and Ministry of Agriculture, New Delhi	New Delhi	Jul 04-05
28.	Prof Prem Narain** Dr SK Raheja Dr OP Kathuria Dr JP Jain Sh PN Bhargava Dr HP Singh	Ninth National Conference of Agricultural Research Statisticians	TNAU, Coimbatore, (TN)	Jul 19-21

*Convenor

**Chaired Technical Session III 'Research Challenges in Computer Applications' and Technical Session IV 'Research and Teaching Coordination and Linkages between ICAR Institutes and Agricultural Universities'

1	2	3	4	5
	Dr Prajneshu Sh SC Rai Dr Randhir Singh Sh TB Jain Sh SP Doshi Sh DS Aneja			
29.	Dr PC Mehrotra	National Seminar on Training and Visit System of Agriculture Extension	Pragati Maidan, New Delhi	Oct 18-19
30.	Dr SK Raheja	CGIAR 'International Centres' Week	Washington DC, USA	Oct 23-29
31.	Prof Prem Narain* Sh Shanti Sarup	Asian Congress on Quality and Reliability	Vigyan Bhawan, New Delhi	Oct 30- Nov 02
32.	Dr SK Raheja	CGIAR Annual Meeting	Washington DC, USA	Oct 30- Nov 03
33.	Dr PS Rana	National Seminar on 'Role of Nehru in Modernizing Indian Agriculture'	IARI, New Delhi	Nov 01
34.	Prof Prem Narain**	National Symposium on 'New Frontiers in Pulses Research and Development'	Directorate of Pulses Research, Kanpur	Nov 10-12
35.	Dr PS Rana Dr PK Malhotra	The XI National Conference on Critical Care Medicine and Emergency and Disaster Medicine	CSIR, New Delhi	Dec 02-05
36.	Dr HP Singh	Workshop on 'Women in Agriculture'	IARI, New Delhi	Dec 04
37.	Prof Prem Narain Sh PN Bhargava	FAI Annual Seminar on 'Self-reliance in Fertilizer'	New Delhi	Dec 04-06
38.	Sh PN Soni Sh MR Vats Sh DK Mehta	The XIV Annual Workshop of the AICRP on Long Term Fertilizer Experiments	BAU, Ranchi	Dec 12-14

*Chaired a Session on 'Agricultural productivity with particular reference to quality of inputs' on Nov 1 during the Congress

**Co-chaired the Session II on Presentation of Status Paper on Nov 10 during the symposium

1	2	3	4	5
39.	Prof Prem Narain* Dr JP Jain Dr OP Kathuria Dr Randhir Singh** Sh R Gopalan Dr AK Srivastava Dr VK Bhatia*** Dr Shivtar Singh Dr GC Chawla Sh Jagmohan Singh Sh RL Rustagi Sh SN Arya Sh KC Bhatnagar Dr PS Rana Sh SP Bhardwaj Sh DK Bhatia Sh T Rai	The 43rd Annual Conference of the Indian Society of Agricultural Statistics	HAU, Hissar	Dec 18-20
40.	Dr BC Saxena	International Symposium on Optimization and Statistics	AMU, Aligarh	Dec 18-21
41.	Dr PS Rana	National Conference on Sto- chastic Models in Manage- ment Science	IIM, Ahmedabad	Jan 03-05
42.	Dr PR Sreenath	Fourth Biennial Workshop of the AICRP and Sympo- sium on Agro-forestry	GAU, Navsari	Jan 08-11
43.	Prof Prem Narain****	The IETE Seminar	New Delhi	Jan 12-13
44.	Sh PN Soni	International Symposium on National Resources Manage- ment for a Sustainable Agriculture	New Delhi	Feb 06-10

*Chaired the symposium on 'Impact of Cross-breeding Programme on Rural Economy' on Dec 19 during the conference.

**Convened the symposium on 'Teaching of Maths and Statistics at Under Graduate and Post-Graduate Levels'

***Convened the symposium on 'Impact of Cross-breeding Programme on Rural Economy' on Dec 19 during the conference.

****Chaired a session on Jan 13 at the seminar

1	2	3	4	5
45.	Dr RC Jain Dr VK Bhatia Dr PS Rana	One Day Symposium on 'Generalised Inverse and Its Applications'	ISI, New Delhi	Feb 09
46.	Prof Prem Narain*	National Seminar on 'Gene- tics Studies in India-Impact of Haldane,	Department of Genetics, Osmania University, Hyderabad	Feb 16-17
47.	Dr OP Kathuria	Ninth National Conference of Central and State Statistics Organisation organised by Department of Statistics, Ministry of Planning	New Delhi	Mar 15-19
48.	Sh PN Soni Sh PN Bhargava** Sh KC Bhatnagar Sh JK Kapoor Mrs Rajinder Kaur	The Nineteenth Annual Workshop of All India Co- ordinated Agronomic Re- search Project	HAU, Hissar	Mar 17-20
49.	Dr BS Sharma	The Conference for Genetic Statistical Methods	Hans Düsse, FRG	Mar 19-21
50.	Sh PN Bhargava Dr SK Raheja	National Seminar on Import- ance of Low Analysis Ferti- lizers in Indian Agriculture organised by FAI	New Delhi	Mar 22-23
51.	Prof Prem Narain	Directors' Conference of ICAR Reserch Institutes	IARI, New Delhi	Mar 27-28

*Chaired the session on 'Population Genetics' on Feb 17 during the above National Seminar

**Acted as Co-chairman for the development of Technical Programme of ECF trials

PAPERS PRESENTED AT WORKSHOPS/SYMPOSIA/CONFERENCES

S. No.	Author	Paper title	Programme title	Venue	Period
1	2	3	4	5	6
1.	Agrawal, Ranjana Jain, RC	Probability model for crop forecasting	Focal Theme Symposium on Statistical Methodology for Crop Forecasting at the 76th Session of Indian Science Congress	Madurai	Jan 07-12
2.	Singh, Randhir Goyal, RC	Use of remote sensing technology in crop yield forecasting	"	"	"
3.	Bathla, HVL Kathuria, OP Kher, KK	Estimation of fish catch from Chilka lake	The 42nd Annual Conference of Indian Society of Agricultural Statistics	Assam Agricultural University Jorhat, Assam	Jan 19-21
4.	Bhardwaj, SP Dixit, UN	A study of constraints to lac cultivation	"	"	"

1	2	3	4	5	6
5.	Bhatia, VK Narain, P Malhotra, PK	Comparison of culling patterns of different categories of dairy animals—Non-parametric approach	The 42nd Annual Conference of Indian Society of Agricultural Statistics	Assam Agricultural University, Jorhat, Assam	Jan 19-21
6.	Bhatia, VK Narain, P Malhotra, PK	Genetic parameters of stability of different categories of dairy animals	”	”	”
7.	Jain, JP Singh, Shivtar	Quantitative and Qualitative insufficiency of live-stock feeds by 2000 AD and possibility of bridging the gap	”	”	”
8.	Kathuria, OP Bathla, HVL Kher, KK	Comparison of area under ponds/tanks collected from different sources	”	”	”
9.	Kathuria, OP Singh, Jagmohan, Sethi, SC Mathur, DC	A study on labour utilization in cultivation of crops in flood affected areas	”	”	”
10.	Rai, Tribhuwan	Growth pattern of total foodgrain production in different states	”	”	”
11.	Rustagi, RL	Extent of labour employed in mixed farming	”	”	”

1	2	3	4	5	6
12.	Shrestha, RN Srivastava, AK	Bias associated with the use of matched sample in evaluation studies	The 42nd Annual Conference of Indian Society of Agricultural Statistics	Assam Agricultural University, Jorhat, Assam	Jan 19-21
13.	Singh, Jagmohan Kathuria, OP Singh, BH Mathur, DC	A study of cropping pattern in flood affected area in UP	”	”	”
14.	Singh, Jagmohan Mehrotra, PC	Average yield performance of HYV of wheat	”	”	”
15.	Singh, Randhir	Use of vegetarian index for improved yield estimation and draught monitoring	”	”	”
16.	Sood, UC Srivastava, AK	Forecasting of crop yield when auxiliary characters are estimated	”	”	”
17.	Srivastava, AK	On overlapping clusters	”	”	”
18.	Kathuria, OP Bathla, HVL	Indicators for monitoring land and soil use pattern for environment planning	Symposium on Data Base Needs for Environmental Planning during the above Conference	”	”
19.	Narain, P Rana, PS	On stochastic modelling for digesta flow in animal nutrition	Workshop on Mathematical Models in Biology and Medicine	Indian Institute of Chemical Biology, Jadavpur, Calcutta	Feb 21-24

1	2	3	4	5	6
20.	Singh, Randhir	Non sampling errors in surveys	Workshop-cum-Seminar on Latest Sample Survey Techniques for Eestimation of Wool, Meat and other Products	Hissar	Mar 08-14
21.	Singh, Randhir	On use of imperfect frames in surveys	”	”	”
22.	Narain, P	Methodological issues in estimation of crop production in African countries.	The Workshop on Food Supply Information Systems in Africa	Nairobi (Kenya)	Mar 13-17
23.	Raheja, SK	Recent trends of research in sample surveys	Symposium on ‘Recent Advances in Stochastic Models and Related Fields’	Mahrishi Dayanand University, Rohtak	Mar 25-27
24.	Shastri, SS Raheja, SK	A study on generalised successive sampling design.	”	”	”
25.	भाटिया, वी. के.	मनुष्य के विभिन्न रोगों व स्वास्थ्य के स्तर पर आधारित छटनी हेतु वेज भेद—मूलक विश्लेषण	“सांख्यिकी का स्वास्थ्य सेवा में योगदान” पर संगोष्ठी	आई. आर. एम. एस., नई दिल्ली	अप्रैल 05
26.	Raheja, SK Mehrotra, PC	Study of factors for low productivity of crops in tribal blocks	National Workshop on Integration of Drought Relief with Wasteland Development	India International Centre, New Delhi	Apr 30

1	2	3	4	5	6
27.	Kathuria, OP	Data-base requirement for lower level agriculture planning	Symposium on "Need for Data Base at Lower Level for Agricultural Planning" organised by ISAS	IASRI, New Delhi	May 15
28.	Prajneshu	Asymptotic results for the stochastic logistic model	International Symposium on "Stochastic Models, Analysis and Application"	Karnataka University, Dharwad	Jun 15-18
29.	Narain, P	Need for appreciation of agricultural statistics and computer application in India	Annual Day Function of IASRI	IASRI, New Delhi	Jul 01
30.	Bhargava, PN Ghai, RK	Agricultural field experiments information system	Ninth National Conference of Agricultural Research Statisticians	TNAU, Coimbatore	Jul 19-21
31.	Bhargava, PN Sreenath, PR Soni, PN	Research needs in design and analysis of experiment in crop sciences.	"	"	"
32.	Chawla, GC Bhargava, PN	Agricultural experiments information system for animal sciences	"	"	"
33.	Jain, JP Singh, HP	Planning statistical research in animal sciences in the Nineties	"	"	"

1	2	3	4	5	6
34.	Kathuria, OP	Agricultural statistics research in retrospect and tasks ahead	Ninth National Conference of Agricultural Research Statisticians	TNAU, Coimbatore	July 19-21
35.	Pillai, SS	Research challenges in computer applications in agriculture	"	"	"
36.	Prajneshu	Some statistical problems in fisheries modelling	"	"	"
37.	Raheja, SK	Research and teaching coordination and linkages between ICAR Institutes	"	"	"
38.	Singh, Randhir	Instructional strategies, curriculum development and evaluation linkages between ICAR Institutes and Agricultural Universities	"	"	"
39.	Bhargava, PN Bhatnagar, KC	Some observations on data collected under ECF	Group Meeting of Senior Agronomist under AICARP	Project Directorate, Modipuram, Meerut	Sep 11-13
40.	Soni, PN	Future strategy for experimental programme for station research and on farm research	"	"	"

	1	2	3	4	5	6
41.	Rai, SC Shanti Sarup		Composite index of socio-economic development	Asian Congress on Quality and Reliability	Vigyan Bhawan, New Delhi	Oct 30- Nov 02
42.	Narain, P Pandey, RK Shanti Sarup		Study of trends and projections of productivity and production of pulses in India	National Symposium on 'New Frontiers in Pulses Research and Development'	DPR, Kanpur	Nov 10
43.	Saksena, Asha Bhargava, PN Jain, TB		Conservation and utilization of run-off in a low rainfall area-A case study	Golden Jubilee Conference of Indian Society of Agricultural Economics	Indira Gandhi Institute of Development Research, Goregaon, Bombay	Dec 04-07
44.	Arya, SN		Comparative study of some methods for estimating mortality rates in bovines	The 43rd Annual Conference of ISAS	HAU, Hissar	Dec 18-20
45.	Bhardwaj, SP		Impact of soil conditions on cropping pattern-A case study of Haryana	„	„	„
46.	Bhatia, DK Singh, HP Bajpai, SN Nigam, AK		On some aspects in planning animal nutrition experiments	„	„	„

1	2	3	4	5	6
47.	Bhatia, VK Mazumdar, D	Studies on mixture of discrete and continuous distributed variables in animal breeding-I (Measures of Association)	The 43rd Annual Conference of ISAS	HAU, Hissar	Dec 18-20
48.	Bhatia, VK Mazumdar, D	Studies on mixture of discrete and continuous distributed variables in animal breeding-II (fitting of log linear models)	”	”	”
49.	Chawla, GC	Role of change-over designs in animal experimentation	”	”	”
50.	Dutta, OP	Computer graphics			
51.	Raheja, SK Rai, T	Prospects of rice production in India and its states	”	”	”
52.	Rana, PS	Particle heterogeneity in compartment models	”	”	”
53.	Rustagi, RL Singh, Shivtar	Fish farming a remunerative enterprise	”	”	”
54.	Singh, Jagmohan Mathur, DC Sethi, SC	Role of biometrical characters in estimation of lac yield	”	”	”

	1	2	3	4	5	6
55.	Somayazulu, LBS Arya, SN Agarwal, SC	On the sampling distribution of age-specific death rates and birth rates for cattle	The 43rd Annual Conference of ISAS		HAU, Hissar	Dec 18-20
56.	Singh, Randhir	Teaching of mathematics and statistics in agricultural universities-Some issues	The Symposium on 'Teaching of Maths and Statistics at Under Graduate and Post-Graduate Levels in Agricultural Universities' at the above conference		„	Dec 18
57.	Bhatia, VK	Impact of cross-breeding programme in relation to stability of dairy animals	Symposium on Impact of Cross-Breeding Programme-A Rural Economy during above Conference		„	Dec 19
58.	Jain, JP Singh, Shivtar	Dairy cattle cross-breeding in India-An over view and optimal crossing strategy under village conditions		„	„	„
59.	Saxena, BC Srivastava, AK	Optimization in multiple frame surveys	International Symposium on Optimization and Statistics		AMU, Aligarh (UP)	Dec 18-21
60.	Rana, PS	Stochastic theory of compartments and queues	National Conference on Stochastic Models in Management Science		IIM, Ahmedabad	Jan 03-05

1	2	3	4	5	6
61.	Nambiar, KKM Soni, PN	Yield sustainability under long term chemical fertilization and organic manure	International Symposium on Natural Resources Management for a Sustainable Agriculture organised by Indian Society of Agronomy	New Delhi	Feb 06-10
62.	Singh, Randhir	Application of remote sensing data in agriculture	„	„	„
63.	Soni, PN Ajit Kaur	Yield trends under balanced fertilizer application	„	„	„
64.	Narain, P	Impact of Haldane-some theoretical aspects	National Seminar on Genetics Studies in India-Impact of Haldane	Osmania University, Hyderabad	Feb 17
65.	Bhargava, PN	Report on agronomic survey for Aligarh and Dhar (ECF districts)	Nineteenth Annual Workshop of AICARP	HAU, Hissar	Mar 17-20
66.	Bhatnagar, KC Bhargava, PN	A brief survey of experiments on cultivators' field trials during the period 1979-89	„	„	„
67.	Sharma, BS	Heterosis in Friesion X Sahiwal crosses	The Conference for Genetic Statistical Methods	Hans Düsse, FRG	Mar 19-21

OTHER INFORMATION ABOUT SCIENTISTS

Fellowship/Membership of Scientific Societies

Prof Prem Narain

- Indian National Science Academy
- Indian Academy of Sciences, Bangalore
- Royal Statistical Society, UK
- International Statistical Institute, Netherlands (Elected)
- National Academy of Sciences, India
- General Council of Edinburgh University, UK (Elected)
- Indian Society of Agricultural Statistics
- Indian Society of Genetics and Plant Breeding
- Indian Society of Agricultural Science
- Bernoulli Society for Mathematical Statistics and Probability
- Indian Society of Medical Statistics
- Indian Society of Human Genetics
- Indian Econometric Society
- Indian Society of Mathematical Statistics
- Computer Society of India

- Biometric Society, Washington, USA

Dr SK Raheja

- Indian Society of Agricultural Statistics, New Delhi
- Indian Society of Agricultural Science, New Delhi
- Secretary, Centre for Agricultural and Rural Development Studies, New Delhi
- Indian Association of Statistics and Applied Research, HAU, Hissar

Dr RK Pandey

- Indian Society of Agricultural Economics, Bombay
- Indian Academy of Social Sciences, Allahabad

Dr OP Kathuria

- Indian Society of Agricultural Statistics, New Delhi
- International Association of Survey Statisticians, Paris, France
- Indian Society of Agricultural Science, New Delhi

Dr JP Jain

- Indian Society of Agricultural Statistics, New Delhi

- Indian Society of Agricultural Science, New Delhi
- Dr Prajneshu
 - Indian Society for Probability and Statistics
 - Biometric Society, Washington, USA
 - Gujarat Statistical Review
- Dr VK Sharma
 - Indian Econometric Society
 - Agricultural Economics Research Association
- Dr BS Sharma
 - Indian Society of Agricultural Statistics, New Delhi
 - Biometric Society, Washington, USA
- Dr PR Sreenath
 - Biometric Society, Washington, USA
 - Indian Society of Agricultural Statistics, New Delhi
- Sh TB Jain
 - Indian Society of Agricultural Statistics, New Delhi
 - Indian Society of Agricultural Economics, Bombay
- Sh OP Dutta
 - Computer Society of India
- Dr VK Gupta
 - Royal Statistical Society of Britain
- Indian Society of Agricultural Statistics, New Delhi
- International Association of Survey Statisticians (ISI)
- Biometric Society, Washington, USA
- Dr VK Bhatia
 - Indian Society of Agricultural Statistics, New Delhi
 - Biometric Society, Washington, USA
- Dr Shivtar Singh
 - Indian Society of Agricultural Statistics, New Delhi
 - Indian Society of Agricultural Science, New Delhi
- Sh KB Singh
 - Indian Society of Agricultural Statistics, New Delhi
 - National Academy of Agricultural Research Management, Hyderabad
- Sh Lal Chand
 - Indian Society of Agricultural Statistics, New Delhi
 - Biometric Society, Washington, USA
- Sh Satya Pal
 - National Academy of Agricultural Research Management, Hyderabad
- Sh PK Malhotra
 - Indian Society of Agricultural Statistics, New Delhi

—Biometric Society, Washington, USA

—Computer Society of India

Sh SN Arya

—Indian Society of Agricultural Statistics, New Delhi

Sh RS Khatri

—Indian Society of Agricultural Statistics, New Delhi

—Indian Dairy Association

—Indian Association of Statistics and Applied Research

Dr AK Srivastava, Dr PC Mehrotra, Sh VS Rustogi, Dr RC Jain, Sh Jagmohan Singh, Dr GC Chawla, Sh KPS Nirman, Sh KC Bhatnagar, Sh JP Goyal, Sh BH Singh, Sh HC Gupta, Sh DC Mathur and Sh Hari Om Aggarwal

—Indian Society of Agricultural Statistics, New Delhi

Offices in Professional Societies

Prof Prem Narain

—Council Member, Biometric Society Washington, USA (Elected)

—Vice-President, Indian Society of Agricultural Science, New Delhi

—Secretary-General, Federation of Indian Societies of Agricultural Sciences and Technology

—Secretary, Indian Society of Agricultural Statistics

—Chairman, Editorial Board, Journal of the Indian Society of Agricultural Statistics

—Member, Editorial Board, Journal of Pure and Applied Mathematics, Indian National Science Academy

—Member, Editorial Board, The Indian Journal of Genetics and Plant Breeding

Membership of Committees/Panels/ Working Groups

Prof Prem Narain

—Indian Science Congress Association, Calcutta

—General Body of the Jan Timbergen Institute of Development Planning, Rohtak

—New York Academy of Sciences, USA

—Editorial Board of the Journal of Energy from Biomass and Recycling, India House Development

—Scientific Advisory Committee of the Institute for Research in Medical Statistics, New Delhi

—Committee of Direction for the National Bureau of Animal Genetics Resources and the National Institute of Animal Genetics for formulation of detailed programme

—Direction/Committee of Computer Science and Numerical Analysis IASRI, New Delhi

—Chairman, Advisory Board on Training Courses, IASRI, New Delhi

—Academic Council, IARI, New Delhi

—Committee on Improvement of Agricultural Statistics, National

- Sample Survey Organisation, New Delhi
- Sampling Methods Sectional Committee, TDC-33 for preparation of Standard of Statistical Quality Control of the Bureau of Indian Standards, New Delhi
 - Committee on Improvement of Agricultural Statistics, Directorate of Economics and Statistics, New Delhi
 - Faculty of Mathematics, University of Delhi
 - Chairman, AFDC-57 on behalf of the Sampling Methods for Food Production Agricultural Inputs, Sectional Committee of the Bureau of Indian Standards, New Delhi
 - Chairman, Management Committee, IASRI, New Delhi
 - The group to undertaken in depth and critical review of the functioning of the Comprehensive Crop Insurance Scheme constituted by Govt. of India, Ministry of Agriculture, Department of Agriculture and Cooperation, New Delhi
 - The reconstituted Technical Advisory Committee for Applied Statistics, Surveys and Computing Division of the Indian Statistical Institute, Calcutta w.e.f. Mar 4, 1987
 - The reconstituted Technical Advisory Committee for Biological Sciences, Division of the Indian Statistical Institute, Calcutta
 - The Board of Post-graduate Studies in Statistics, Department of Statistics, Punjab University, Chandigarh for the period April 1, 1987 to Mar 31, 1989
 - Chairman, Joint Staff Council on the Committee for issue of liveries for supporting staff
 - The Technical Committee set up by the Directorate of Economics and Statistics, Ministry of Agriculture to examine the feasibility of generating estimates of total food production on per hectare basis
 - The reconstituted National Advisory Board on Statistics of the Department of Statistics, Planning Commission, Govt of India, New Delhi
 - The ICAR Steering Committee to oversee the computerisation process and to identify priority areas for computerisation
 - The Working-Group of SAC-PM on "Strategies for efficient and optimum fertilizer use"
 - The Committee constituted by DG, ICAR to go into the details for the development of a suitable proforma for the maintenance of Research Project Files by the scientists at ICAR Headquarters and other Institutes
 - The ICAR Society under Rule 4 (xix) of the Society upto June 12, 1990 by the Union Minister of

Agriculture and President, ICAR Society

- The ICAR Governing Body under Rule 35 (xi) Upto Jun 12, 1990 by the Union Minister of Agriculture and President, ICAR Society
- The Steering Committee for monitoring the effective implementation of the Study on Fertiliser Consumption and Quality Seeds : constraints on their increased use by National Council of Applied Economics Research, New Delhi. The Committee was constituted by Ministry of Agriculture, Govt. of India, New Delhi
- INSA representative on the Council of the Indian Statistical Institute, Calcutta for a two-year term commencing from Sept 18, 1988 nominated by the Indian National Science Academy
- The Board of Directors of the Centre of Advanced Development Research (CADR), Lucknow
- The Committee of Direction under the chairmanship of Prof CH Hanumantha Rao to provide technical guidance to Agricultural Finance Corporation in undertaking concurrent evaluation of the NODP being implemented in 180 districts and SKPP in Six Eastern States of the Country
- Task Force on Agricultural Production Statistics to go into the improvement of the quality, reliability and coverage of Agricultural Statistics by the Ministry of Agriculture, Govt of India
- Working Group on Demand and Supply Projections and Improvement of Agricultural Statistics for the formulation of the Eighth Five Year Plan by the Planning Commission, under the chairmanship of Shri Nitin Desai, Chief Economic Adviser, Ministry of Finance
- Chairman, Sub-Group on Animal Husbandry Statistics for formulation of VIII Five Year Plan, by the Ministry of Agriculture, Govt of India
- The National Committee on Mathematics Education and Research by the Ministry of Science and Technology, New Delhi
- Re-constituted Regional Committee No. 4 of ICAR comprising Sub-humid Sutlej-Ganga Alluvial Plains comprising the States of Punjab-Delhi, Uttar Pradesh Plains and Bihar for a period of 3 years w.e.f. Sep 24, 1988
- The Task Force on the interaction between nutrition and health with agriculture and rural development of the Indian Council of Medical Research, New Delhi
- The Committee for developing the mode qualifications for all the categories of scientists and science coordinators and administrators of the ICAR system

- The reconstituted Technical Advisory Committee for Applied Statistics, Surveys and Computing Division of the Indian Statistical Institute, Calcutta w.e.f. March, 1989
- Selected as Reviewer of Mathematical Review by the American Mathematical Society, USA
- Chairman, reconstituted Technical Advisory Committee of Direction for improvement of Animal Husbandry and Dairying Statistics of the Department of Agriculture, Cooperation Ministry of Agriculture, Govt of India
- The reconstituted Working Group on Agricultural Statistics of the Govt of India, Ministry of Planning, Department of Statistics, NSSO, New Delhi
- The Council of the Indian National Science Academy as a member of their Editorial Board of the Indian Journal of Pure and Applied Mathematics for the year, 1990
- Expert Committee for Review of Methodology of Cost of production of crops and make suitable recommendations to the Government
- The Committee for revision of Agricultural Service Rules
- The International Statistical Institute, Netherlands for the period 1989-1993
- The reconstituted Technical Advisory Committee for Biological Sciences Division of the Indian Statistical Institute Calcutta w.e.f. March, 1989
- PG Faculty of PG School, IARI, New Delhi
- Chairman, Watch and Review Committee for Ph D students of Agricultural Statistics of IASRI, New Delhi
- Member, Board of Studies of Agricultural Statistics, IASRI, New Delhi
- High level Coordination Committee for Agricultural Statistics, Department of Agriculture, HP
- Working Group on Economic Advice and Statistics, Planning Commission, New Delhi to consider the plan proposals pertaining to statistical schemes of state governments
- Selection Committee of ASRB for selection of Senior Fellow (Agricultural Statistics) of ICAR
- Chairman, selection committee for recruitment of supporting staff, IASRI, New Delhi
- Expert Committee constituted by Ministry of Water Resources to determine the yield rates of crops under irrigated and un-irrigated

Dr SK Raheja

conditions in the area of lower Bhawani irrigation project (TN)

Dr OP Kathuria

- Technical Committee of Direction for improvement of Animal Husbandry and Dairying Statistics constituted by Ministry of Agriculture, Government of India, New Delhi
- Technical Group for Reviewing the sampling design and estimation procedure for crop estimation surveys and fruits, vegetables and minor crop in different states constituted by Ministry of Agriculture, Govt of India, New Delhi
- Task Force on Agriculture, production statistics, constituted by Ministry of Agriculture, Govt of India, New Delhi
- Working Group on Environment Statistics constituted by Department of Statistics, Ministry of Planning, Govt of India, New Delhi
- Working Group on Small Area Development Programme Statistics constituted by Department of Statistics, Ministry of Planning, Govt of India
- Working group constituted by the Committee of Secretaries as a follow up action of the report on Task Force on Agricultural Production Statistics
- Working group constituted by the Department of Agriculture to monitor the progress of concurrent

evaluation of National Oilseed Development Project and Oilseed Production Trust Project

Dr RK Pandey

- Board of Studies, Agricultural Economics, Banaras Hindu University, Varanasi
- Board of Studies, Agricultural Economics, Meerut University, Meerut
- Board of Studies, Agricultural Economics, IARI, New Delhi

Sh PN Bhargava

- Selection Committee for foreign assignment of IASRI
- Selection committee for the recruitment of candidate for SC and ST held on March 23, 1990
- Selection Committee for filling up the vacancies of Technical Assistant (T-II-3) at IASRI in the interviews held at Hyderabad, Bangalore, Bombay and Delhi

Dr JP Jain

- PG Faculty of the PG School, IARI, New Delhi
- Liaison Officer of the Institute for looking after the interest of the SC/ST employees
- Course-Progress Review Committee of the Institute
- Chairman, Department Promotion Committee for administrative posts and supporting staff grade I to IV

—UNDP Recommendations Implementation Committee

—Committee for fixing of printing firms for Institute's publication work

—Sub-Group on Animal Husbandry Statistics for formulation of Eighth Five Year Plan

—Committee for monitoring the schedules of lectures/reference material relating to teaching course in statistical genetics

—Board of Studies, agricultural statistics discipline for the academic session, 1989-90

—Editorial Board, Indian Journal of Genetics and Plant Breeding, IARI, New Delhi

—Editorial Board, Annals of Agricultural Research, New Delhi

—Chairman, Advisory Committee of five Ph D Students

—Advisory Committee of eight Ph D and two M Sc students

Dr HP Singh

—PG Faculty of PG School, IARI, New Delhi

—Associate Course Director for the AARRO Programme organised by the Institute

—ICAR Scientific Panel on Animal Nutrition and Physiology

Dr VK Sharma

—The task force on supply projections of agricultural commodities

for Eighth Five Year Plan, Planning Commission

Sh KB Singh

—Technical Committee of Direction for Improvement of Animal Husbandry and Dairying Statistics

—Sub-Committee set up by Technical Committee of Directions for improvement of Animal Husbandry and Dairying Statistics for the consideration of annual estimates of milk and eggs production

—Sub-Group on Animal Husbandry Statistics for formulation of Eighth Five Year Plan

Dr PR Sreenath

—National Research Centre on Agroforestry, Jhansi

Dr KG Aneja

—PG Faculty of the PG School, IARI, New Delhi

—Faculty, IASRI, New Delhi

Dr (Mrs) Ranjana Agrawal

—PG Faculty of the PG School, IARI, New Delhi

Sh PN Soni

—Management Committee of IASRI

—ICAR Scientific panel for Agroforestry

—ICAR Scientific panel for Agronomy

Dr AK Banerjee

—Assessment Committee of Technical Personnel for grant of merit promotion in category I and II of

technical service of IASRI in June, 1989.

Sh SC Rai

- Food Sampling Committee AFDC-57 of Bureau of Indian Standards, New Delhi
- EC: 3 : 7 Statistical Quality Control and its various Sub-Committees of Indian Standards Institution, New Delhi
- Sectional Committee on Sensory Evaluation of Bureau of Indian Standards (AFDC-38) and its Sub-Committees
- PG Faculty of PG School, IARI, New Delhi
- The 'Vishaya Namika' of Agricultural Statistics of Scientific and Technological Technology Commission, Govt of India
- SMDC-4 Method of Sampling Sectional Committee of Bureau of Indian Standards

Sh VS Rustogi

- PG Faculty of the PG School, IARI, New Delhi

Dr PC Mehrotra

- Convenor of the Management Information System Group constituted in Oct, 1989
- IASRI Unit of the Central Secretariat Hindi Council
- Monitoring of Budget and Expenditure Group constituted in Oct, 1989

Dr Randhir Singh

- Chairman, Board of Studies, Agri-

cultural Statistics, IASRI, New Delhi

- Academic Council, PG School, IARI, New Delhi
- PG Faculty of PG School, IARI, New Delhi
- Convenor, Faculty IASRI, New Delhi
- Sub-Committee to review syllabi for MSc/Ph D courses in Agricultural Statistics

Dr VK Bhatia

- PG Faculty of the PG School, IARI, New Delhi
- Secretary of Board of Studies in Agricultural Statistics
- Academic Committee on courses
- Convenor of a Committee of Watch and Review
- Convenor of a Committee on courses of Statistical Genetics

Dr RC Jain

- PG Faculty of PG School, IARI, New Delhi
- Indian Science Congress Association, Calcutta

Dr Chandradas

- ICAR Scientific Panel on Plant Pathology

Dr Basant Lal

- ICAR Scientific Panel for Agro-Forestry, Horticulture, Floriculture

ture and Dairying Statistics, Department of Agriculture and Cooperation (AHS)

—ICAR Scientific Panel for Horticulture

—ICAR Scientific Panel for Floriculture

Dr Shivtar Singh

—Sub-Committee under Technical Committee of Direction for improvement of Animal Husbandry and Dairying for in-depth examination of the statewise estimates of production of milk and eggs

—Working team 'Alternative Livestock Development Strategies'

Dr JS Maini

—The Sub-Committee constituted by the Technical Committee of Direction for improvement of Animal Husbandry and Dairying Statistics, Development of Agricultural and Cooperation (AHS), Ministry of Agriculture

Sh VN Iyer

—Scientific panel for Agricultural Engineering

Sh GN Bahuguna

—ICAR Scientific Panels for Entomology and Nematology

Sh OP Dutta

—Board of Studies, M Sc (CAA)
—Management Committee of IASRI

Dr BC Saxena

—ICAR Scientific Panel for Home Science

Sh RS Khatri

—Manager, IASRI Sports contingent for participating in VII ICAR Inter-Zonal Sports Meet held from April 12-16, 1989 at CSSRI, Karnal (Haryana)

Sh BH Singh

—Joint Staff Council, IASRI, New Delhi

SPECIAL LECTURES, TRAINING, STUDY TOUR AND MEETINGS

Prof Prem Narain

—Chaired

* The meeting of the Sub-Group on Animal Husbandry Statistics of the Ministry of Agriculture Govt. of India on Feb 14 for formulation of VIII Five Year Plan

* The meeting of the Sectional Committee AFDC-57 on Sampling Methods for Food Products and Agricultural Inputs of the Bureau of Indian Standards, Manak Bhavan, New Delhi on Feb 16

* The meeting of the Institute Joint Staff Council of IASRI on Jun 22.

* The IASRI Management Committee meeting held on Aug 7

* The meeting of the Task Force for Improvement in Agricultural Statis-

tics for VIII Plan of the Dte of Economics and Statistics, Govt. of India on Aug 8

* A session on the IETE Seminar at New Delhi on Jan 13, 1990

* The meeting of the Technical Committee of Direction for Improvement of Animal Husbandry and Dairying Statistics of the Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India at New Delhi on Jan 19, 1990

* The first meeting of the sampling methods for food products and agricultural inputs sectional committee, BSD-4 of the Bureau of Indian Standards held at Manak Bhavan, New Delhi on Jan 24, 1990

* The meeting of the Executive Council-Cum-Editorial Board of the Indian Society of Agricultural Science at New Delhi on Jan 25, 1990

* तकनीकी शब्दावली आयोग भारत सरकार की कृषि सांख्यिकी नामिका की हरियाणा कृषि विश्वविद्यालय, हिसार में 21 फरवरी, 1990 को हुई बैठक।

—Attended

* The first meeting of the National Committee on Mathematics Education at the Department of Science and Technology, New Delhi on Feb 13

* The meeting of the Steering Committee of the National Council of Applied Economic Research set up to monitor the study on 'Fertilizer consumption and quality seeds: constraints on their increased use' held at NCAER, New Delhi on Apr 12, under the chairmanship of Dr MS Swaminathan

* The meetings of the Sectional Committee—X of the Indian National Science Academy on Apr 19-20

* The meeting of the Task Force on the Interaction between Nutrition and Health with Agriculture and Rural Development of the ICMR on Apr 25, at New Delhi

* The Tripartite Review meeting of the UNDP Project IND/83/020 on Apr 28 at Krishi Bhavan, New Delhi under the chairmanship of Director-General, ICAR

* The meeting regarding standard qualifications and norms for the ICAR scientists, science coordinators and administrators at New Delhi on May 3

* The Second Meeting of the Working Group on Animal Husbandry and Dairying for formulation of VIII Five Year Plan under the chairmanship of Dr V Kurien on May 3 at Krishi Bhavan, New Delhi

- * The meetings of the Board of Management of the Indian Veterinary Research Institute at Izatnagar (U.P.) on May 4-5
- * As Secretary the Executive Council meeting of the Indian Society of Agricultural Statistics under the chairmanship of Dr NS Randhawa on May 8
- * The meeting of the Inter-Disciplinary Scientific Panel of National Agricultural Research Projects of the ICAR on Jun 21 at New Delhi
- * The meeting of the Technical Advisory Committee of the Institute of Applied Manpower Research, New Delhi on Jun 22
- * The ICAR Governing Body meeting on Jun 27 at Krishi Bhavan, New Delhi
- * The meeting of the Directors of ICAR Institutes under the Chairmanship of Dr MS Swaminathan in connection with finalising the Draft Report of the Working Group on Agricultural Research and Education for formulation of VIII Plan, on Jul 9
- * The meeting of the Working Group (Agricultural Census) at the Central Statistical Organisation, New Delhi on Jul 13
- * The First Meeting of the Basic Standards, Systems and Services Division Council (BSD) of the Bureau of Indian Standards, New Delhi on Jul 26
- * The Fellowship Scrutiny Committee meeting of the National Academy of Sciences, India at Allahabad on Jul 29
- * The ICAR Governing Body meeting on Aug 5 at Krishi Bhavan, New Delhi
- * The Local Chapter meeting of the India National Science Academy at New Delhi on Oct 7
- * As Secretary the meetings of the Executive Council of the Indian Society of Agricultural Statistics on Oct 17, Nov 8 and Dec 18
- * The meeting of the Steering Committee on the study of Fertilizer Consumption and Quality Seeds at the National Council of Applied Economic Research, New Delhi on Nov 7
- * The meeting of the IARI Academic Council on Nov 24
- * The Programme Committee Meeting of the 28th Convocation of IARI on Dec 8
- * The First Meeting of the Mathematics and Statistics Research Committee of the Council of Scientific and Industrial Research at New Delhi on Dec 12
- * The Meeting of the ICAR Governing Body at New Delhi on Dec 22

* The meetings of the Expert Committee of the Ministry of Agriculture, Govt. of India, for review of methodology of cost of production of crops and make suitable recommendations to the Govt on Jan 29, Feb 10, Feb 22, Mar 8, Mar 9 and Mar 15, 1990

* The Academic Council meeting of the IARI as well as Dress Rehearsal of the XXVIII Convocation of IARI on Feb 4, 1990. Also attended the XXVIII Convocation of IARI on Feb 5, 1990

* The ICAR Governing Body meeting on Feb 20, 1990

* The 'Radar Remote Sensing Training Course—Radar Applications for Agriculture' held at IASRI on Mar 5-6, 1990 organised by M/s Malhar Sales and Service Pvt. Ltd., Bangalore

* The meeting of the ICAR Society on Mar 14, 1990 at Parliament Annexe, New Delhi

* The Academic Council Meeting of the IARI on Mar 26, 1990

* The ICAR Governing Body Meeting held at Krishi Bhavan, New Delhi on Mar 30, 1990

—Delivered

* A keynote address on 'Information Technology' on Apr 5

during the Nehru Centenary Symposium on Agricultural Research : Emerging Challenges and Opportunities, at India International Centre, New Delhi from Apr. 5-6 organised by the Federation of Indian Societies of Agricultural Sciences and Technology (FISAST)

* An invited talk entitled 'Informatics in Agriculture' during the IETE seminar on Jan 13, 1990 at New Delhi

* A lecture entitled 'Multivariate Analysis—An Introduction' at the Institute of Public Cooperation and Child Development, New Delhi on Feb 9, 1990

* On 'Reminiscences of Haldane' on Feb 16, 1990 during the national seminar on 'Genetics Studies in India—Impact of Haldane' at Osmania University, Hyderabad

* In the Panel Discussion on 'Future Prospects of Genetics in India' on Feb 17, 1990 during the National Seminar on 'Genetics Studies in India—Impact of Haldane' at Osmania University, Hyderabad

Dr SK Raheja

—Attended

* Management Development Programme for senior executives held at NAARM, Hyderabad during Feb 6-10

* The Meeting of the Task Force for improvement in Agricultural Statistics for VIII plan of the Dte. of Economics and Statistics, Govt. of India on Aug 8 at IASRI, New Delhi

* The meeting of the Management Committee of IASRI, New Delhi on Aug 7

—Delivered

* A lecture on 'Suitable Indicators for monitoring and Evaluation of T and V Agricultural Extension System' to participants of National Workshop on Monitoring and Evaluation of Agricultural Extension organised by MANAGE, Hyderabad during Feb 7-8.

* Technical Address on 'Statistics of livestock products their role and contribution in accelerating growth of national economy, at Inaugural Session and two lectures on a) Quality of data in livestock products, surveys specification, observations and measurement errors, (b) Cost of production of livestock products-concepts and definitions, to the participants of Seminar-cum-Workshop on on Latest Sample Survey Techniques for estimation of Wool, Meat and other Products organised by the Ministry of Agriculture at CSBF, Hissar during Mar 8-9

* Technical Address at the Symposium on 'Recent advances in stochastic modelling and allied fields' at MD University, Rohtak during March 25-27

* Two lectures (i) data collection and compilation, (ii) software development to the participants of Workshop-cum-Seminar on Software Development for Fertilizers during May 1-8 at IASRI, New Delhi

* Functions and activities of IASRI to the students of RAU, Patna in Feb

Dr RK Pandey

—Attended

* The meeting of the Research Degree Committee (RDC) in Economics of Meerut on Feb 24

* The meeting of technical advisory committee for estimating the requirement of agricultural and veterinary graduates by 1990, 1995, 2000 A.D. at Institute of Applied Manpower Research, New Delhi on Jun 22

—Delivered

* Three lectures on 'Input-output relationship, and least cost combination of output; cost principles; and law of limited capital to trainees from Bangla Desh at IARI, New Delhi in Feb

Dr JP Jain

—Attended

- * The meeting of 'Task Force for 8th Plan Schemes in Agricultural Statistics' at IASRI on Aug 8
- * The meeting of Department of Biotechnology, New Delhi convened to examine the proposal from NDDB, 'S and T Project on Multiple Ovulation and Embryo Transfer for Open Nucleus Breeding System in cattle on Mar 16

—Delivered

- * A lecture on 'Resume of studies on costing and estimation of major livestock products' in the Workshop-cum-Seminar on Latest Techniques for Sample Survey for Animal Husbandry Products held at CSBF, Hissar from Mar 8-9
- * Four lectures to the participants of 'Advanced level course on statistical aspects of animal breeding' at IASRI during July 24-29

Sh PN Bhargava

—Attended the Group meeting of senior agronomist under AICARP held at Project Directorate for cropping system research, Modipuram from Sep 11-13

Dr HP Singh

—Delivered

- * A lecture on 'Sample Surveys of

the Institute dealing with the animal husbandry' to ESCAP region trainees on Apr 5 at IASRI, New Delhi

- * A lecture to the students of IVRI, Izatnagar belonging to National Diploma in Animal Husbandry (NDAH)

Dr Prajneshu

—Delivered A lecture on 'Stochastic modelling for fish population growth and optimal harvesting policies' at the workshop on 'Population Dynamics of Exploited fish Stock and Mathematical Modelling' held at department of Ocean Development, New Delhi on Dec 28

Dr VK Sharma

—Attended VII Short-term course on use of computer in agriculture research from Sep 4-30 organised by IASRI, New Delhi

Dr Randhir Singh

—Delivered

- * Two lectures on (i) Applications of remote sensing in agriculture, and (ii) Use of imperfect frames, at Madras University, Madras, on Jan 12
- * Three lectures on 'Applications of remote sensing in agriculture forestry and range management' at AMU, Aligarh on Mar 13-14

Dr AK Banerjee

—Attended

- * The meeting on task force on Agricultural Production Statistics held at Krishi Bhavan under the chairmanship of Secretary Agriculture and Cooperation on Feb 16
- * Steering Committee meeting on 100 villages study on fertilizer consumption and quality seeds, constraints on their increased use held at National Council of Applied Economic Research, IP Estate, New Delhi on Apr 12

—Delivered

- * Two lectures on Sampling to the participants on 'Sampling and Household Survey Methodology' on Mar 1
- * A lecture on sampling to participants on 'Sampling and Household Survey Methodology' on Mar 7, organised by CSO, New Delhi

Dr. PR Sreenath

—Attended a meeting for finalising the mandate of National Research Centre on Agro-forestry, Jhansi on Oct 19-20

Sh SC Rai

—Attended

- * The meeting of the Executive Council of Indian Society of Agricultural Statistics on Jan 20 at Jorhat, Assam
- * The meeting of AFDC-57-Sampling

Methods for Industrial Products and Agricultural Inputs Sectional Committee of Bureau of Indian Standards on Feb 16 at Manak Bhavan, New Delhi

- * The meeting of the Inter-disciplinary Scientific Panel of NARP from Apr 5-7 and Jun 21 - 22 at Krishi Anusandhan Bhawan, New Delhi

* The meeting of EC-3, EC-3:6 and EC-3:7 held at the Bureau of Indian Standards, Manak Bhawan on Apr 10-11

* The meeting of Management Committee of IASRI on Aug 7

* The meeting of the Inter Disciplinary Scientific Panel of UNDP at Krishi Anusandhan Bhavan, New Delhi on Aug 16-17

—Delivered a lecture to the trainees of the Advanced Level Course on Statistical Aspects of Animal Breeding on the topic 'Non-parametric method' for comparing grades on Jul 28 at IASRI, New Delhi

Dr AK Srivastava

—Attended state level sub-committee meeting at Chandigarh on Jun 21 for implementation of crop estimate surveys on fruits in Punjab at the office of Director (Horticulture), Chandigarh, Punjab

—Delivered

* A lecture on determination of

sample size with respect to cost and variance function at CSO, New Delhi to the trainees of National Household Survey Programme on Mar 2 and Mar 8, 1989

* A lecture on use of auxiliary information in livestock survey at CSBF, Hissar on Mar 14, 1990

* A lecture on 'Determination of sample size with reference to cost and variance functions' to the trainees of National household survey programme at CSO, New Delhi on Mar 8, 1990

Dr PC Mehrotra

—Attended third meeting of task force on Agricultural Production Statistics held at Krishi Bhavan under the chairmanship of Secretary, Agriculture and Cooperation, Ministry of Agriculture on Feb 16

—Delivered a lecture on activities of the Division of sample survey methodology and analysis of survey data with special reference to current research projects of the Division in the field of agriculture and animal husbandry to a batch of 40 students of department of statistics, Punjab University, Chandigarh on Jan 24

Sh PN Soni

—Attended the group meeting of senior agronomist under AICARP

held at Project Directorate for cropping system research, Modipuram from Sep 11-13

Dr Shivtar Singh

— Attended as a member the meeting of the sub-committee set-up by the Technical Committee of direction for improvement of Animal Husbandry and Dairying Statistics for indepth examination held on Nov 30, at IASRI, New Delhi

—Delivered a lecture on cost of milk production at CSBF, Hissar on Mar 10

Sh TB Jain

—Delivered two lectures on (i) Sampling from fleeces for assessment of wool quality, and (ii) Estimation of cost of rearing sheep to the participants of the Workshop-cum-Seminar on Latest Sample Survey Techniques for Estimation of wool, meat and other by-products at CSBF, Hissar on Mar 13-14

Dr SS Shastri

—Delivered an invited talk on a study on generalised successive sampling at MD University, Rohtak during Mar 25-27

Dr VK Bhatia

—Delivered a lecture to the trainees on the Advanced Level Course in Statistical Aspects of Animal

Breeding held at IASRI, New Delhi
from Jul 24-29

Dr Chandrahas

—Attended

* The ICAR Scientific Panel for
'Plant Pathology' on Feb 20-21

* VII short-term course on use of
computer in agricultural research
from Sep 4-30 organised by IASRI,
New Delhi

Dr GC Chawla

—Attended the meeting of ICAR
Scientific Panel for Animal Physio-
logy on Nov 15 at ICAR, New
Delhi

Dr KK Tyagi

—Attended the meeting of ICAR
Zone-II sports organising commit-
tee at IGFR, Jhansi on Oct 6

Sh KB Singh

Attended meeting of the Technical
Committee of Direction for
improvement of Animal Husbandry
and Dairying Statistics held on Jan
19, 1990 at IASRI, New Delhi

Sh SN Arya

—Attended a training programme on
'Medical Rescue on and Resuscita-
tion' organised by National Associ-
ation of Critical Care Medicine
(India) on Feb 24 in CSIR Build-
ing, New Delhi

Sh Jagmohan Singh

—Attended Eighth short term course
on use of computer in agricultural
research at IASRI, New Delhi
during Mar 1-28

Sh Lal Chand

--Attended VII short-term course on
use of computer in agriculture
research from Sep 4-30 organised by
IASRI New Delhi

Sh KC Bhatnagar

—Attended the six monthly review
meeting of PD/PC, of crop
improvement projects under ICAR
held on Oct 7-8 at IARI, New
Delhi

Dr VK Mahajan

—Attended

* Training course on 'Use of
software packages on micro
processors for the analysis of
survey data' at Computer Centre,
CSO, RK Puram, New Delhi

* A training programme on 'Medical
Rescue on and Resuscitation'
organised by National Association
of Critical Care Medicine (India) on
Feb 24 in CSIR Building, New
Delhi

Sh Ant Ram

--Attended Eighth short term course
on use of computer in agricultural
research at IASRI, New Delhi
during Mar 1-28

Participation in ICAR Scientific Panel

S. No.	Name of the Scientist	Name of the Scientific panel and date
1.	Prof Prem Narain	Agricultural Economics, Statistics and Marketing on Apr 21.
2.	Sh PN Bhargava	Agronomy on Feb 20-21
3.	Dr HP Singh	Animal Physiology May 16-17
4.	Sh PN Soni	Agronomy on Feb 27-28
5.	Dr HVL Bathla	Fisheries on Apr 11
6.	Dr JS Maini	Animal Products Technology on Jan 11
7.	Dr VK Bhatia	Animal Breeding on Feb 16-17
8.	Dr GC Chawla	Animal Nutrition on Mar 20 and 21
9.	Dr Basant Lal	Agroforestry and Floriculture

AWARDS/HONOURS

Dr AK Srivastava

—Awarded the prize by the ISAS for the best paper in sampling entitled 'Ratio estimator with post-stratification design involving double sampling approach' published in the Journal of ISAS (Volume 39, No. 1, 1987) at a special function held at IASRI on May 15

Dr PK Malhotra

—Awarded Ph.D. degree in Agricultural Statistics from IARI, New Delhi on Mar 29, 1989. The title of the thesis was 'Statistical studies on retention times of dairy cattle and buffaloes'

Dr SS Kutaula

—Awarded Ph. D. degree (prov.) in economics by Indian Institute of Technology (IIT), Delhi on Sep 4, 1989. The title of the thesis was 'Estimating production technical

efficiency for industrial farming of paddy and wheat under land reclamation technology : A case study of Ghauranda Block (Haryana) with special reference to income disparities

MISCELLANEOUS INFORMATION

Prof Prem Narain

—Had discussion

* On 'Optimum group size in progeny testing under farm conditions' with the official of the Karnataka State at IASRI on Apr 13 as a part of the overall training programme on Progeny Testing and Sire Evaluation arranged for them at IASRI from Apr 10-20

* With Dr Gunwant Desai, Project, Director, International Food Policy Research Institute, Washington, DC, USA on the IASRI-IFPRI collaborative project of Fertiliser Response Function Environment', at IASRI on Apr 25

* With the Joint Agricultural Research Review Team consisting of members from the World Bank and the Council who visited IASRI on May 11 for identification of research gaps and priorities for future investment. Joint Director and Heads of Division of the Institute also participated in the discussion

Dr SK Raheja

—Deputed to International Food Policy Research Institute, Washington, DC, USA for developing methodology and analytical framework methodology for analysis of data under the collaborative research project on 'Fertilizer response function environment' undertaken jointly by IASRI and IFPRI

Dr RK Pandey

—Discussed with two foreign trainees from Phillipines on Jun 28, regarding the research proforma of the division of Statistical Economics

Dr JP Jain

—Was the convenor of the 9th National Conference of Agricultural Research Statisticians held at TNAU, Coimbatore, during July 19-21

—Visited Veterinary College, Madras to assess extent of data available for collection under the NIAFE project

Dr OP Kathuria

—Worked as Course Coordinator of

the training programme on 'Techniques on estimation of output of food crops' jointly organised by IASRI and Afro Asian Rual Reconstruction Organisation' was held at the Institute from 8th November-22nd December, 1989

Dr HP Singh

—Took over as Head, Division of Sample Survey Methodology and Analysis of Survey Data w.e.f. Jan 1

Dr AK Banerjee

—Officiated as Head of Division of SSM and ASD from Jan 12, 1989 to Feb 25, 1989

Dr PC Mehrotra

—Took over as Head, Monitoring Cell in Feb, 1989

Dr BS Sharma

—Deputed to receive training in the field of Plant Breeding and Applied Genetical Statistics at Technische University of Munchem, FRG had returned after receiving five months training

Dr PK Malhotra

—Attended the five months (from Jan 1 to May 31), Advanced training in 'Software Development and Programme Packages' under the UNDP/FAO training programme at the Ohio University, Coloumbus, Ohio

Dr RC Jain

- Imparted training on crop forecasting methodology to trainees from Republic of Phillipines

Sh Ram Kumar

- Arranged the visit of M Stat Students from ISI to the Computer Centre and explained the working of the Computer System to them

Sh SD Wahi

- Deputed to receive training in the field of Plant Breeding and Statistical Genetics at University of Hohenheims, FRG had returned after receiving five months training

Sh Balbir Singh

- Deputed to receive training in the field of software development and programme packages for agricultural research at university of

Massachusettes, USA had returned after receiving five months training

Sh SC Sethi

- Visited Ranchi and Calcutta from Feb 13-20 for technical discussion on lac project and crop estimation surveys on fruits, vegetables and minor crops

Sh HO Aggarwal

- Attended five months training in 'Software Development and Programme Packages for Agriculture Research', under UNDP/FAO Programme at Carnegie, Mellon University, Pittsburgh (USA)

Sh DC Mathur

- Visited Shimla on May 18-19 for technical discussion with Joint Director, Land Records, Shimla regarding crop estimation surveys in HP

CO-ORDINATION AND MONITORING CELLS

CO-ORDINATION CELL

This cell is responsible for documentation and dissemination of scientific output of the Institute through IASRI Newsletters, Quarterly Progress Reports, Annual Report, etc. It also organises National Conferences of Agricultural Research Statisticians and meetings of Senior Statisticians of ICAR Institutes and also conducts meetings of Staff Research Council and Principal Scientists and Heads of Divisions of the Institute from time to time.

Report/Newsletters/Quarterly Progress Reports

Annual Report, 1988

IASRI Newsletter, Oct-Dec, 1988;

IASRI Newsletter, Jan-Mar, 1989;

IASRI Newsletter, Apr-Jun, 1989;

IASRI Newsletter, Jul-Sep, 1989;

IASRI Newsletter, Oct-Dec, 1989;

Quarterly Progress Report, Oct-Dec, 1988;

Quarterly Progress Report, Jan-Mar, 1989;

Quarterly Progress Report, Apr-Jun, 1989;

Quarterly Progress Report, Jul-Sep, 1989;

Quarterly Progress Report, Oct-Dec, 1989

Communication of Research Material

ICAR

—Schedule of meetings/conferences/seminars during 1989-90

—Background information about the Institute for publication

—For DARE Annual Report (1989-90)

—For ICAR Reporter, 1989-90

—Information for compilation of a Directory of Agricultural Institutions in the SAARC Region

—A brief write-up regarding celebration of National Science Day

—Information regarding areas of consultancy services provided by the Institute.

CSO

—Information of Computerised Data Bases

—For Statistical Newsletters

DS and T

—Schedule of meetings/conferences/seminars, etc. for the year 1989-90

—Information for Directory of the retired scientists along with their fields of specialization and areas of their interest where they want to utilize their expertise

UPSC

—Panel of Experts in various subjects with a view to obtaining the experts assistance in selecting suitable candidates through interviews for recruitment to posts under the Govt. of India

HPKVV

—Information regarding Principal Scientists working in the Institute along with their fields of specialization

Institute of Applied Manpower Research

—Information regarding study on Estimates of Requirements of Agriculture and Veterinary Graduates/ Post-Graduates, 1990, 1995 and 2000 AD

Staff Research Council

The Staff Research Council (SRC) is the most important forum in the Institute to plan, monitor and evaluate research projects. The final review of the Institute research programmes is also undertaken by the SRC. The meetings of SRC are held under the Chairmanship of Director. As per the decision taken earlier, a Peer Group from outside the Institute is associated in the discussion during the

process of formulation of new project proposals.

During the period under report the meeting of Staff Research Council was held on 22nd, 29th and 30th March, 1990 in three different sessions under the chairmanship of Prof Prem Narain, Director to discuss the new project proposals to be taken up in the 8th Five Year Plan. Prof. PV Sukhatme, distinguished Scientist attended as a special invitee in all the sessions and Prof JK Ghosh, Director, ISI, Calcutta was present on 30th March, 1990. All the Scientists of the Institute participated in the meeting.

MONITORING CELL

The main functions of this cell are to monitor the progress of on going research projects and bring out half-yearly monitoring report, prepare the Annual Action Plan and Activity Milestone and EFC Memos, prepare the material for creation of data base on research projects of ICAR research Institutes and to maintain the Research Projects Files for submission to ICAR. The items of work undertaken by the Cell are :

- Preparation of material for Annual Action Plan for the Institute for the periods 1988-89 and 1989-90.
- Monitoring report of ongoing research projects for the periods ending September, 1988 and ending March, 1989.



**Staff Research Council in session with Prof. P.V. Sukhatme and
Prof. J.K. Ghosh as special invitees**

- Consolidation of material regarding activity milestones for 1989-90.
- Collection of copies of research project files (RPF) of the ongoing research project from different divisions for its onward transmission to ICAR.
- Preparation of EFC Memo of the VII Plan for submission to ICAR.
- Preparation of material regarding the 'Creation of Data Base on Research Projects of ICAR Research Institutes', 1988 for IASRI.
- Preparation of material regarding the Institute's activities for Directors' Conference.

STAFF WELFARE ACTIVITIES

The Institute has manifold activities for the amenities and welfare of the staff. The major items are detailed below :

JOINT STAFF COUNCIL

The Institute has Joint Staff Council (JSC) 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 service.

Shri Maqsud Khan, SS Grade III member expired in January, 1990 and Sh Phaguni Ram, Assistant & Secretary (staff side) went on deputation in DESU on 12.2.90. The JSC was thus reconstituted as follows :

I Chairman : Prof Prem Narain,
Director

II Official Side Representative

1. Dr SK Raheja, Jt. Director
2. Dr PR Sreenath, Principal Scientist
3. Shri BH Singh, Scientist
4. Senior Administrative Officer
5. Accounts Officer

III Staff Side Representative

1. Secretary (Staff side) : Sh Anil Kumar Sharma, Senior Clerk

2. Sh BM Nautiyal, Assistant
3. Sh Asha Ram, Technical Assistant
4. Sh ML Piplani, KPO
5. Sh Hari Singh, Field Investigator
6. Sh Sohan Lal, Driver
7. Sh Maha Nand, SS Grade III
8. Sh Bhagwat Rai, SS Grade III

GRIEVANCE CELL

The Grievance Cell 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

RECREATION AND WELFARE CLUB

The Recreation and Welfare Club of the Institute provides facilities for indoor and outdoor games, promotes social and friendly relations among the members and look after the general welfare of the members. The Club received an annual grant of Rs. 6116.00 from the Institute during the year.

The Annual Day Function of the Recreation and Welfare Club was organised on July 1, 1989. Dr KL Chadha, DDG, ICAR was the Chief Guest. Dr HP Singh, Officiating President of the Club welcomed the Chief Guest and the members to the Annual Day Function,

The Chief Guest distributed the prizes to the winners of the games and sports organised by the Club. He also addressed the members.

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 indigent conditions.

CO-OPERATIVE THRIFT AND CREDIT SOCIETY

The Society is a registered body registered with the Registrar, Cooperative Societies, Delhi Administration, Delhi (Regd. No. 495 (U)). The society continued its activities in similar manner as during the past years by advancing loans to its members and looking after their welfare. The number of members on the roll of the Society as on 31.3.90 was 524. The same managing committee elected for the year 1988-89 continued upto March, 90. The source of income of the Society includes share money, compulsory deposits and fixed deposits from the members of the Society. During the accounting year 1988-89 the Society advanced Rs. 15,52,150.00 as loan to its members.

Financial help of Rs. 1500/- was extended from the member welfare fund to the grieved family of Sh Hira Lal on his sad and sudden demise.

Rs. 51/- is given to those members

of the society who retires from IASRI service. As such a cheque of Rs. 51/- each was given to Shri SR Bapat, Sh KL Kaul, Sh RK Khosla and Sh ML Sahni.

CO-OPERATIVE CANTEEN AND STORE

The cooperative store, registered with the Registrar, Cooperative Societies, Delhi Administration, Delhi, continued to be run for the benefit of the staff members of the Institute. Coffee, cold drinks, snacks, provisions and general merchandise were made available at reasonable rates to the staff members of the Institute. The G.B. Meeting of the Co-operative Store was held on 18th February 1989. The total membership of the Society as on 31st March, 1990 was 460.

SPORTS

(a) *VII ICAR Zone-II Sports Meet, Kabaddi Final Match between IASRI and IARI*

The 'kabaddi' final match between IASRI and IARI of the VII ICAR Zone-II Sports Meet, 1988-89 which could not be played at Dehradun due to bad weather was organised at the Institute Campus on Wednesday, the Jan 25, 1989. Various officials of IASRI, IARI, NBPGR and ICAR Headquarters alongwith President and Secretary of Delhi State Kabaddi Association and Shri Ranbir Singh, Vice Captain of Indian Kabaddi team witnessed the match. The IASRI team won the match, the final score being 49 for

IASRI and 24 for IARI. Mrs Prem Narain, Chief Guest distributed the prizes to the winners/runners.

(b) *New Pusa Recreation Club, IARI :
Table Tennis (Open) Tournament*

Institute table tennis players were invited to participate in the above tournament during March, 1989. Shri OP Khanduri and Dr KK Tyagi of the Institute won the winners and runners position respectively in table tennis (singles). In table tennis (doubles), they both won the winners position.

(c) *ICAR Inter-Zonal Sports Meet, 1988-89.*

The ICAR Inter-Zonal Sports Meet for the year 1988-89 was organised by CSSRI, Karnal during Apr 12-15. IASRI being winner in table tennis (team events) and kabaddi in Zone-II Sports

Meet, participated in the above Meet with a contingent of 17 members with Dr KK Tyagi, Scientist (SG) the Chief-de-mission of the contingent.

The Institute table tennis team comprising Sh OP Khanduri (Captain), Dr KK Tyagi, Sh DK Sehgal, Sh GM Pathak and Sh Praveen Kumar won the Championship Shield for the Institute while the kabaddi team comprising S/Shri DPS Mann (Captain), Vijay Singh, Ram Bhoor, Mirazuddin, Narayan Singh, PS Mann, Meer Singh, Sohan Lal, Lokesh Kumar and Hari Lal Rai secured runners-up trophy for the Institute.

Director, IASRI, felicitated the members of the sport contingent on Apr 22 for displaying a fine performance in the Inter-Zonal Sports Meet.

VII ICAR SPORTS MEET



Mrs. Prem Narain, Chief Guest with the Zonal winner 'Kabaddi' team of the Institute



Prof. Prem Narain presenting first prize to Captain of the winning IASRI table tennis team in Inter-Zonal Sports Meet

हिन्दी के प्रगामी प्रयोग में प्रगति

जनवरी, 1989 से मार्च, 1990 के दौरान संस्था में राजभाषा के प्रयोग को गति प्रदान करने के लिए, निम्नोक्त मदों के अन्तर्गत विभिन्न निर्णय, गतिविधि आयोजनादि हुए।

1. राजभाषा कार्यान्वयन समिति :

निदेशक महोदय की अध्यक्षता में संस्थान की राजभाषा कार्यान्वयन समिति की तिमाही बैठकें दिनांक 2 मार्च, 5 जून, 16 अक्टूबर, 1989 तथा 13 मार्च, 1990 को हुईं जिनमें अनेक महत्वपूर्ण विषयों पर विचार-विमर्श हुआ और निर्णय लिये गए। संसदीय राजभाषा समिति द्वारा मांगी गयी जानकारी मुद्रित प्रश्नावली में पूरित करके सम्बद्ध सचिवालय को भेजी गयी। निदेशक महोदय ने मुख्य प्रशासनिक अधिकारी से अनुरोध किया कि वे प्रशासनिक अनुभागों में अधिकाधिक हिन्दी प्रयोग को बढ़ाने के कारगर प्रयास करें, क्योंकि प्रशासन सम्बन्धी सभी गतिविधियों में राजभाषा का प्रयोग सरलता से किया जा सकता है। राजभाषा अधिनियम 1963 की धारा 3 (3) के पालन पर जोर दिया गया। परिषद के महानिदेशक द्वारा जारी कार्यालय आदेश को संस्थान के प्रत्येक अनुभाग/प्रभाग/एकक/कक्ष आदि में प्रचालित किया गया जिसमें कहा गया है कि भा. कृ. अ. प. को राजभाषा नियम, 1976 के नियम 10 (4) के अनुसार भारत के राजपत्र (गजट) में अधिसूचित कर दिया गया है, इसलिए हिन्दी का ज्ञान रखने

वाले अधिकारियों तथा कर्मचारियों के लिए स्वतः अपना काम हिन्दी में करना जरूरी हो गया है। इससे संस्थान के अधिकारी/कर्मचारी स्वतः अपना काम हिन्दी में करेंगे केवल अपरिहार्य स्थिति में ही गूढ़ वैज्ञानिक/तकनीकी विषयों में ही आवश्यकता पड़ने पर हिन्दी अनुभाग से अनुवाद संबंधी सहायता लेंगे।

2. हिन्दी शिक्षण योजना

इस योजना के अन्तर्गत प्रबोध/प्रवीण/प्राज्ञ परीक्षाओं का आयोजन संस्थान में ही दिनांक 5, 6 एवं 7 दिसम्बर, 1989 को किया गया इस परीक्षा में संस्थान के 10 कर्मचारियों ने प्राज्ञ परीक्षा पास की। परीक्षा केन्द्र के अधीक्षक संस्थान के हिन्दी अधिकारी थे तथा हिन्दी अनुभाग के अन्य कर्मचारियों ने उन्हें सहयोग दिया।

3. के. स. हि. प. शाखा

संस्थान शाखा की नई कार्यकारिणी के वार्षिक चुनाव दिनांक 25 अक्टूबर, 1989 को हुए। शाखा के सदस्यों ने नए पदाधिकारियों का चुनाव सर्वसम्मत तौर पर किया जिनकी सूची निम्न प्रकार है :

- | | |
|-----------------|--|
| 1. शाखा संरक्षक | प्रो. प्रेम नारायण |
| 2. प्रधान | डा. रमाकांत पाण्डेय |
| 3. उप-प्रधान | (1) डा. हरपाल सिंह
(2) श्री इन्द्रजीत |

4. मंत्री श्री चरण सिंह वर्मा
5. उप-मंत्री (1) डा. शिवतार सिंह
(2) श्री खड्ग बहादुर सिंह
6. कोषाध्यक्ष श्री शब्द शरण
श्रीवास्तव
7. लेखा परीक्षक श्री राम कृष्ण वर्मा
8. केन्द्रीय प्रतिनिधि (1) श्री प्रेम शंकर राय
(2) श्री अखिलेन्द्र पाल सिंह
(3) डा. कृष्ण कान्त त्यागी
(4) श्री सुभाष चन्द्र

इनके अतिरिक्त, 20 सदस्यों का भी चुनाव हुआ और पदाधिकारियों ने संकल्प लिया कि वे संस्थान में हिन्दी के अधिकाधिक प्रसार-प्रचार के लिए पूरी लगन एवं निष्ठा से काम करेंगे।

4. हिन्दी व्यवहार पखवाड़ा

संस्थान में दिनांक 1 अगस्त से 16 अगस्त, 1989 तक हिन्दी व्यवहार पखवाड़ा मनाया गया और इस पखवाड़े के दौरान संस्थान के अधिकारियों एवं कर्मचारियों को अपना अधिकाधिक कार्य हिन्दी में ही करने के लिए प्रोत्साहित किया गया।

5. हिन्दी प्रतियोगितायें

संस्थान के वैज्ञानिक, तकनीकी एवं

प्रशासनिक वर्ग के अधिकारियों एवं कर्मचारियों में हिन्दी प्रयोग के प्रति प्रतियोगी भावना एवं रुचि को प्रोत्साहित करने के लिए हर वर्ष के समान इस वर्ष भी निम्नलिखित प्रतियोगिताओं का आयोजन किया गया :

1. हिन्दी टिप्पण एवं प्रारूपण प्रतियोगिता 18 अगस्त, 1989
2. हिन्दी लेख प्रतियोगिता 21 अगस्त, 1989
3. हिन्दी वाद-विवाद प्रतियोगिता 22 अगस्त, 1989
4. हिन्दी अन्ताक्षरी प्रतियोगिता 22 अगस्त, 1989
5. हिन्दी अनुवाद प्रतियोगिता 23 अगस्त, 1989
6. हिन्दी प्रकाशन

निदेशक महोदय की अध्यक्षता में दिनांक 13 मार्च, 1990 को हुई राजभाषा कार्यान्वयन समिति की बैठक में 'हिन्दी प्रसारिका' नामक पत्रिका को जो कम-से-कम 50 पृष्ठ का हो, छ.माही के वजाय वार्षिक संस्करण के रूप में पुनर्प्रकाशन शुरू करने तथा इसके प्रथम अंक को सितम्बर, 1990 माह में हिन्दी दिवस के अवसर पर मुख्य अतिथि द्वारा विमोचन कराने का निर्णय भी लिया गया।

IASRI PERSONNEL

(As on 31.3.90)

Prof Prem Narain, Director

Dr SK Raheja, Jt Director

Division of Design of Experiments and Analysis of Experimental Data

Shri PN Soni, Principal Scientist and Head

Shri PN Bhargava, Principal Scientist

Dr Alope Dey, Principal Scientist (On deputation)

Dr PR Sreenath, Principal Scientist

Dr VK Gupta, Scientist (SG)

Mrs Asha Saksena, Scientist (SG)

Shri RK Ghai, Scientist (SG)

Shri JK Kapoor, Scientist (SG)

Dr BL Choudhary, Scientist (SG)

Dr GC Chawla, Scientist (SG)

Shri PK Batra, Scientist (SG) (On study leave)

Shri KC Bhatnagar, Scientist (SG)

Shri Ravinder Srivastava, Scientist (SG)

Mrs Rajinder Kaur, Scientist

Shri Onkar Sarup, Scientist

Shri GL Khurana, Scientist

Shri DK Mehta, Scientist

Shri MR Vats, Scientist

Shri DK Sehgal, Scientist

Mrs Ajit Kaur Bhatia, Scientist

Shri Alope Lahiri, Scientist

Shri NK Sharma, Scientist

Shri CH Rao, Scientist

Division of Sample Survey Methodology and Analysis of Survey Data

Dr HP Singh, Principal Scientist and Head

Dr OP Kathuria, Principal Scientist

Dr JP Jain, Principal Scientist

Dr AK Banerjee, Principal Scientist

Dr PC Mehrotra, Principal Scientist

Dr AK Srivastava, Principal Scientist

Shri VS Rustogi, Principal Scientist

Dr JS Maini, Principal Scientist

Dr Randhir Singh, ~~Principal~~ Scientist (SG)

Dr MG Mittal, Principal Scientist

Dr Shivtar Singh, Scientist (SG)

Dr HVL Bathla, Scientist (SG)

Shri TB Jain, Scientist (SG)

Shri RL Rustogi, Scientist (SG)

Dr SS Shastri, Scientist (SG)

Shri KB Singh, Scientist (SG)

Shri SS Gupta, Scientist (SG)

Dr NK Ohri, Scientist (SG)

Shri Anand Prakash, Scientist (SG)

Dr KK Tyagi, Scientist (SG)

Shri MS Batra, Scientist (SG)
Shri GS Bassi, Scientist (SG)
Dr DL Ahuja, Scientist (SG)
Dr BC saxena, Scientist (SG)
Shri KPS Nirman, Scientist (SG)
Shri SN Arya, Scientist (SG)
Shri SP Verma, Scientist (SG) (On study leave)
Shri AS Gupta, Scientist (SG)
Shri KR Rajagopalachar, Scientist (SG)
Shri Satya Pal, Scientist (SG)
Shri RS Khatri, Scientist (SG)
Shri DC Mathur, Scientist
Shri RC Gola, Scientist
Dr Jagbir Singh, Scientist
Shri SC Agarwal, Scientist
Shri Satya Pal, Scientist
Shri SC Sethi, Scientist
Shri DK Bhatia, Scientist
Shri Bhagwan Das, Scientist
Shri MS Narang, Scientist (On study leave)
Shri JP Goyal, Scientist
Shri HC Gupta, Scientist
Shri MS Kaushik, Scientist
Shri T Rai, Scientist

Division of Statistical Economics

Dr VK Sharma, ~~Principal~~ Scientist (and Head) ^(SG)
Dr RK Pandey, Principal Scientist
Shri Shanti Sarup, Scientist (SG)
Dr UN Dixit, Scientist (SG)
Shri BL Kaul, Scientist (SG)
Dr VK Mahajan, Scientist (SG)
Shri Ashok Kumar, Scientist
Shri Ant Ram, Scientist
Shri SP Bhardwaj, Scientist
Mrs Sushila Kaul, Scientist

Division of Forecasting Techniques for Crops, Diseases and Pests

Dr (Mrs) Ranjana Agrawal, ~~Principal~~ Scientist and Head ^(SG)
Dr RC Jain, Scientist (SG)
Shri GN Bahuguna, Scientist (SG)
Dr Chandrahas, Scientist (SG)
Shri Jagmohan Singh, Scientist (SG)
Shri BH Singh, Scientist
Shri Madan Mohan, Scientist
Shri SC Mehta, Scientist
Shri SS Walia, Scientist

Division of Bio- Statistics and Statistical Genetics

Dr Prajneshu, ~~Principal~~ Scientist and Head ^(SG)
Dr BS Sharma, Principal Scientist
Shri LK Garg, Principal Scientist
Dr VK Bhatia, Scientist (SG)
Shri Lal Chand, Scientist (SG)
Shri SD Wahi, Scientist (SG)
Dr JN Garg, Scientist (SG)
Dr PS Rana, Scientist (SG)
Dr VT Prabhakaran, Scientist (SG)
Shri RK Jain, Scientist

Division of Computing Science

Shri R Gopalan, Principal Scientist and Head
Shri SN Mathur, Principal Scientist
Shri IC Sethi, Scientist (SG)
Shri OP Dutta, Scientist (SG)
Shri SP Doshi, Scientist (SG)
Shri Mahesh Kumar, Scientist (SG)
Shri Ram Kumar, Scientist (SG)
Shri ML Choudhary, Scientist (SG)
Shri KC Gupta, Scientist (SG)
Dr PK Malhotra, Scientist (SG)

Dr RC Goyal, Scientist (SG)
Shri HO Aggarwal, Scientist
Shri Balbir Singh, Scientist

Coordination Cell

Dr JP Jain, Principal Scientist and Head
Shri TB Jain, Scientist (SG)
Shri DS Aneja, Scientist

Monitoring Cell

Dr PC Mehrotra, Principal Scientist and
Head

UNDP Cell

Prof Prem Narain, Director and Head

Training Administration Cell

Dr Randhir Singh, Sr Professor (Ag.
Stat.)

Shri SN Mathur, Professor (CAA)

Technical Officers

Shri SK Suri, Field Officer
Shri SD Sharma, Field Officer
Shri SS Srivastava, Sr Librarian
Shri SK Sublania, MTO (on deputation)
Shri SK Mahajan, Technical Officer
Shri DC Pant, Technical Officer
Shri Amar Ranjan Pal, Sr Artist

Administration

Shri Inderjit, Chief Admn. Officer
Shri Chironji Lal, Sr. Admn. Officer
Shri RK Verma, Finance and Accounts
Officer

APPENDIX—II

SANCTIONED AND FILLED-UP POSTS

(As On 31.03.90)

S. No.	Designation	Scale of Pay (Rs.)	No. of Posts		No. of SC/ST employees	
			Sanc- tioned	Filled	SC	ST
1	2	3	4	5	6	7
1.	Director	4500-7300	1	1	—	—
2.	Joint Director	4500-7300	2	1	—	—
3.	Scientist S-3 ex- ceeding 16 years	4500-7300	} 22	} 25	—	—
4.	Scientist S-3 up to 16 years	3700-5700				
5.	Scientist S-2 ex- ceeding 8 years	3700-5700	} 29	} 53	—	—
6.	Scientist S-2 up to 8 years	3000-5000				
7.	Scientist S-1	2200-4000	65	35	2	—
8.	Scientist S-0	1740-3000	35	9	1	—
9.	Chief Admn Officer	3000-5000	1	1	—	—
10.	Sr Admn Officer	3000-4500	1	1	1	—
11.	Accounts Officer	2200-4000	1	1	—	—
12.	Field Officer	2200-4000	3	2	—	—
13.	Mech Tabu Officer	2200-4000	1	1	1	—
14.	Librarian	2200-4000	2	1	—	—
15.	Tech Officer	2200-4000	3	3	—	—
16.	Sr Artist	2200-4000	1	1	—	—

1	2	3	4	5	6	7
17.	Asstt Field Officer	2000-3500	1	1	—	—
18.	Asstt Engineer	2000-3500	1	1	—	—
19.	Asstt Admn Officer	2000-3500	3	3	1	—
20.	Hindi Officer	2000-3500	1	1	—	—
21.	Security Officer	2000-3500	1	—	—	—
22.	Electronic Computer Operator	1640-2900	8	—	—	—
23.	Artist	1640-2900	1	1	—	—
24.	Superintendent	1640-2900	8	7	1	1
25.	Sr Personal Asstt	1640-2900	1	1	—	—
26.	Photographer	1400-2300	1	1	—	—
27.	Tech Asstt (Stat)	1400-2300	155	127	18	1
28.	Tech Asstt (Eco)	1400-2300	8	8	—	—
29.	Tech Asstt (Lib)	1400-2300	2	2	—	—
30.	Asstt EC Operator	1400-2300	6	3	—	—
31.	Field Inspector	1400-2300	2	2	—	—
32.	Hindi Translator	1640-2900	1	1+	—	—
		1400-2300	1	1	—	—
33.	Assistant	1400-2300	25	25	7	1
34.	Stenographer	1400-2300	11	11	—	—
35.	Jr Stenographer	1200-2040	18	10	1	—
36.	Sr Clerk	1200-2040	21	20	3	—
37.	Field Supervisor	1200-2040	6	4	—	—
38.	Punch Supervisor	1200-2040	3	3	1	—
39.	Card Librarian	1200-2040	1	1	—	—
40.	Receptionist	975-1540	1	—	—	—
41.	Electrician	975-1540	1	1	—	—
42.	Key Punch Operator	975-1540	45	42	4	1
43.	Field Investigator	975-1540	30	30	5	—
44.	Coders	975-1540	10	2	—	—

1	2	3	4	5	6	7
45.	Reference Asstt	975-1540	1	—	—	—
46.	Counter Asstt	975-1540	1	—	—	—
47.	Telephone Operator	975-1540	3	3	—	—
48.	Tubewell Operator	975-1540	2	2	—	—
		950-1400	1	1+	1	—
49.	Sr Gestetner-Operator	950-1400	1	1+	—	—
50.	Carpenter	975-1540	1	1	—	—
51.	Driver	975-1540	2	2	2	—
		950-1400	4	2+	—	—
52.	Zerox Operator	950-1500	1	1	—	—
53.	Jr Clerk	950-1500	38	31	5	—
54.	Supporting Staff—					
	Grade-I	750-940	55	52	12	1
	Grade-II	775-1025	27	27	9	1
	Grade-III	800-1150	14	14	5	1
	Grade-IV	825-1200	7	4	3	—

Note : +Auxiliary Posts

DISSERTATIONS APPROVED

Ph D Degree

1. DV SINGH SISODIA—Economics of crop insurance in Uttar Pradesh

The aim of the study is to examine the extent of risk in crop production and to develop a suitable statistical model for computing premium and indemnity rate based on appropriate distribution of crop yields and rainfall over time. The model has been tested using time-series data for rainfall and yield rates of rice and groundnut from the selected districts of Uttar Pradesh.

(Guide : Dr RK Pandey)

2. JAGBIR SINGH—A study on the estimation of change in sampling on successive occasions

The present study pertains to the estimation of change in the population parameter in sampling on successive occasions. The Projective Geometric Approach has been used to develop Minimum Variance Linear Unbiased Estimators (MVLUE's) of population parameters for sampling on successive occasions. A most general MVLUE of any linear parametric function has been developed for sampling on

successive occasions. The most general MVLUE has been used further in generating MVLUE's of (i) several parametric functions of annual and seasonal changes under multi-subject survey sampling on nine occasions/seasons of three consecutive years, (ii) yearly and seasonal averages and fluctuations in population parameter under the three situations out of the above cited multi-subject survey, and (iii) population parameters for levels and change over time in sampling on two successive occasions with the simultaneous involvement of the two correlated main characters. Moreover, the relative efficiencies of the aforesaid situations have been investigated. MVLUE of change over time in the domain parameters has also been developed.

(Guide : Dr OP Kathuria)

3. KISHORE KUMAR—On post-stratification for improvement of estimation procedure in a multi stage sampling design

In this study appropriate estimators of population total using post stratification have been developed when sampling units are selected at different stages. The

study has three aspects. In the first aspect, post-stratification in two-stage sampling with varying probability in order to provide optimum weightage to the units has been considered. The first stage units are selected with probability proportional to size (PPS) with replacement and from each selected PSU second stage units are selected with equal probability without replacement. An unbiased estimator for population total has been suggested and its variance has been obtained. With the help of data, it is shown that the suggested procedure not only provides estimates of the character under study for various strata but also improves the precision of the overall estimate. Compared to the usual two-stage sampling with varying probability, the gain in efficiency being around 14% for the data studied.

The second aspect-deals with post-stratification in three-stage sampling with equal first and second stage units. In this case, the sample at each stage is selected with equal probability and without replacement. An unbiased estimator for the population total with its variance is developed. With the help of data, it is shown that the suggested procedure is 90% more efficient than the usual estimator.

The last aspect studied pertains to developing an appropriate estimator for use of post stratification in two-stage cluster sampling. The clusters at each stage are of equal size and sample at each stage is taken with equal probability

without replacement. An estimator for population total and its variance are developed. Some particular cases of the proposed estimator are also obtained.

(Guide : Dr SK Raheja)

4. K PUDUMAIKKANNAN—An economic evaluation of integrated rural development project

The study was undertaken with the aims of investigating the genesis of integrated rural development programme, to measure the impact of IRDP expenditure on poverty alleviation, to undertake the financial and economic benefit cost analysis of IRDP in Madurai district of Tamil Nadu and to find out the problems of IRDP in its implementation. The IRDP project was evaluated using benefit cost analysis at three stages. The impact of IRDP expenditure on poverty alleviation was examined with the help of regression analysis. The study reveals that investment in employment oriented programmes contributed positively towards reduction in poverty.

(Guide : Dr RK Pandey)

5. MANAS DAS—Some contributions to the statistical studies in plant disease control

Potential causes of loss in wheat production are the rusts. There are many races of rusts and major problem is unpredictable nature of virulent races. Amongst the various methods to combat against this rust population, crop mixture is one. Different near isogenic lines have

different levels of host resistance to fight against the pathogen. A kind of horizontal resistance can be brought in the field if judiciously selected lines are mixed in optimum proportion and cultivated as seed mixture in the field. Similar thing can be achieved if slow rusting varieties can be introduced. These two things require gene identification in variety. Leaf rust (*P. recondita*) pathogen control strategy has been suggested which has the following three components :

- (i) Gene identification through matching technique
- (ii) Mixture strategy using HPI data and
- (iii) Variety evaluation for partial resistance.

(Guide : Dr HP Singh)

6. NARAYANA HARI GAJURYAL— Sampling from rare populations and incomplete frames

The thesis is devoted to the problem for studying rare populations with emphasis on the incompleteness of the frames due to rarity of units in the entire population. Various methods are available to deal with the problem of rare populations. Screening, disproportionate sampling, multiplicity and snowball sampling, Multiple frames and inverse sampling are some of the methods used in such situations.

Predecessor-successor method is one of the methods to estimate the number of units missing in a frame. An application of this method for estimating the number

of rare units as also parameters like mean and total of a characteristic for the rare population is made. An estimator as a combination of the estimators based on predecessor-successor method and the usual proportion type estimators is also considered and it is observed that the combination leads to gain in efficiency.

It is known that the inverse sampling procedure is a well known technique for estimating the proportion of rare populations. An estimator have been developed by using inverse sampling in combination with predecessor-successor method. This estimator is essentially a two phase type estimator. The efficiencies of the estimators suggested, have been compared with that of the usual inverse sampling estimator under suitable cost functions with the constraint of some expected cost. Multiplicity sampling procedure is a technique used in the study of rare populations.

It has been observed that the multiplicity estimators can also be used in the predecessor-successor method by defining linkage, accordingly. An estimator has been derived using the technique of multiplicity sampling in predecessor-successor procedure.

(Guide : Dr AK Srivastava)

7. RAGHU NATH SHRESTHA—Some investigations in sampling for evaluation studies

In evaluation studies, one is normally interested in studying the effect of certain programme on a target group. Invariably

the target group is exposed not only to the program to be evaluated but to various other factors affecting the response. Isolation of the effect of the program under study is the foremost problem in all the evaluation studies. Matching technique is commonly used in an attempt to form the comparable control group. There are two ways in forming the matches to reduce bias due to disturbing factors. These methods are referred as pair and non-pair matching. The effectiveness of the matching method is measured by its ability in reducing the bias due to the disturbing factors in the estimate of program effect. Investigation have been made on the ability of the random order matching ascending order matching, descending order matching and mean matching methods in reducing the bias by using simulation technique for normal populations. It was observed that effectiveness of the matching methods depend largely on the size of the samples from participant and control groups and also on the type of population. The use of un-representative sample also causes the estimate to be biased. The expression for the bias due to un-representative sample as well as due to inexact and incomplete matching with sample from finite population have been obtained.

Despite the possible efforts in getting a good control group, quite often one comes across comparison groups which may not be very satisfactory. In such situation, there is a need for adjustment in the estimate to account for the difference in the distribution of covariates in

participant and non-participant groups. An attempt has been made to examine the covariance adjustment technique by incorporating the survey design. It has been observed that estimate of program effect for linear response surface using ordinary least square is unbiased only for the simple random sampling without replacement. For designs other than 'SRSWOR' such as stratified sampling, systematic sampling, covariance adjustment estimates are found to be biased of the program effect.

Another technique of adjustment for controlling the effect of the disturbing factors is through the use of post-stratification. The problem will be the use of post stratification in combining the strata results. Standardization technique has been used to combine the strata results to obtain a single measure of programme effect under linear response surface.

(Guide : Dr AK Srivastava)

8. RAMESH CHAND GOYAL—Use of remote sensing in planning of agricultural surveys

The Remote Sensing Technique has potential for monitoring the profile of cropped area and growth pattern of the crops, and therefore can be of great importance in planning agricultural surveys by providing opportunities for development of improved frames or providing additional useful information for better crop production statistics system. In the present investigation efforts have been made to identify the

potential of remote sensing data for planning agricultural surveys for better crop yield estimation and crop yield forecasting. With an aim to improve upon the usual crop yield estimates based on yield estimation surveys, the Landsat TM spectral data of Sultanpur district (U.P) in the form of vegetation indices have been used to post-stratify the crop into areas of homogeneous crop vegetation vigour and consequently alternative procedures are proposed to estimate the crop yield and considerable improvement in the crop yield estimates has been observed. However, in the use of spectral imagery for post-stratifying the sampled units to different strata, there is considerable possibility of misclassification of units, because the process of identification and allocation of units to different strata is subjective. Therefore it has been attempted to quantify the effect of misclassification of units on the post-stratified estimators. Such misclassification introduces bias and increase in variance in the usual unbiased post-stratified estimators, for which the relevant expressions have been derived in terms of misclassification parameters. The expressions of bias and variance are not explicit enough to be used to examine the efficiency of the estimators. Moreover, in post-stratification the proportion of units which belong to one of the strata, and the probability of misclassification of units would not be known in advance and therefore a simulation study has been conducted to examine the extent of misclassification on five different estimators proposed for estimat-

ing the crop yield in different situations. The relative efficiency of the proposed estimators have also been examined. To explore the usefulness of remote sensing data in crop yield forecasting attempt has been made to study the relationship between wheat crop yield and spectral parameters and it has been observed that at a specific crop growth stage spectral data in the form of vegetation indices has the predictability to forecast crop yield. To examine the usefulness of satellite data in forecasting crop yield, a suitable regression model using the space borne spectral data and crop yield obtained through crop yield estimation surveys based on crop cutting experiments have been studied, keeping in view the effect of sampling design used in obtaining the crop yield data.

(Guide : Dr OP Kathuria)

9. RAVINDER MALHOTRA—Some studies of design and analysis of factorial experiments

In the present investigation a method of construction of asymmetrical confounded designs when the levels of factors are odd or even in number is given. The technique consists in choosing a suitable confounded design of the type 3^n series where n is the number of pseudo factors and establishing a link between the effect contrasts of 3^n factorial and those of the asymmetrical factorial design. The analysis utilizes the analysis of designs of the 3^n series, after establishing a link between the interactions of

the desired design and those of 3rd design. Each of the interaction with 2 d.f. confounded in the 3rd symmetrical design involving pseudo factors leads to the confounding of one or more interaction contrasts each with 2 d.f. of the original factors. A method of detecting such confounded interaction has been given using a special type of nomenclature for confounded interaction. As these designs involve only one replication the error contrasts do not arise from block x treatment interaction but they arise due to the fact that more than one combination of the pseudo factors are used to designate the same level of an original factor. Due to this, certain error contrasts also get mix up with the block contrasts. A method of detecting such confounded error components has also been given. Finally the analysis of such designs is given and the same has been illustrated with examples.

(Guide : Dr AK Banerjee)

M Sc Degree

1. ALKA CHAUDHARY—Improvement in the precision of yield estimates using auxiliary information

In this study, the problem of improving the precision of yield estimate obtained by crop cutting experiments using information on auxiliary characters has been investigated. Two auxiliary characters namely, yield obtained by enquiry and the rate of fertilizer use, both having positive and significant correlation with the main character under study

were investigated. Various estimators like simple mean estimator, ratio estimator, regression estimator, multivariate ratio estimator, and multivariate regression estimator using double sampling have been investigated. Data for this study were taken from the crop cutting survey conducted in a district. Seven estimates of average yield of wheat have been built up and their variance worked out. Multivariate ratio and regression estimators using double sampling were found to have very low percentage errors and therefore these estimators were found to be more efficient than the other estimators studied.

(Guide : Dr SK Raheja)

2. DEBASIS MAZUMDAR—Use of Log-Linear Model in studying the association between traits of interest in dairy cattle breeding

This study deals with the association as well as relationship between different factors of interest in dairy cattle breeding, the tests of independence and log-linear methodology were used utilising the information from the data in the form of frequency tables.

Using natural grouping for qualitative traits and by forming the artificial groups of intervals for quantitative traits the frequency tables were prepared to study the association. Procedure of chi-square or likelihood ratio chi-square was used for the same when the tables were collapsed for one factor then it was observed that there was not much association between disposal and length as

well as first lactation milk yield for each of the breed. All factors except breed and disposal were closely associated when the tables were collapsed for two factors.

In relationship studies using goodness of fit tests as well as test for partial association it was observed that models only with two factor interaction were sufficient to explain efficiently the all frequency and leaving aside the interaction between breed and disposal, all main effects and two factor interactions have significant contribution. The direct model fitting approach by obtaining the estimates of log-linear parameters is similar to the case of usual analysis of variance. The estimates of the asymptotic standard errors, the ratios of the estimates to their standard errors and the estimates of multiplicative parameters were also obtained. The instance, a relationship between breed of an animal and first lactation milk yield was clearly visible. This log-linear models helped us to examine the relationship between different traits which are either discrete, continuously distributed or mixture of both.

(Guide : Dr HP Singh)

3. RK SHUKLA – Some investigations on negative estimates of heritability

This dissertation deals with the probability of negative estimates of heritability from full-sib analysis under the more general additive-dominance-epistasis model for different full-sib family sizes (i.e. $n=3,4$ and 5).

To begin with a critical and comprehensive review of past work on the subject has been made to gain insight into the existing gaps.

The expressions for the probabilities of negative estimates from full-sib analysis have been derived. The evaluation of these probabilities has been undertaken for different combinations of sires (s), dams (d) and non-additivity coefficients (C_1, C_2) assuming different full-sib sizes family (i.e. $n=3,4,5$) for three levels of true heritabilities namely 0.10, 0.25 and 0.50 based on the results obtained optimum family structures and sample size ($N=sdn$) have been prescribed in order to obtain non-negative estimates under various situations.

(Guide : Dr HP Singh)

M Sc (CAA)

1. HARNAM SINGH SIKARWAR— Development of educational software for maximum likelihood method of point estimation

In the present project a package MLESP (Maximum Likelihood Estimator's Software Package) has been developed using dBASE III Plus for microcomputers. MLESP is user friendly and interactive package. It has got two components :

First component is Educational Document, which is provided for educating the users regarding Method of Maximum Likelihood alongwith illustrative example.

Second component contains the execution package alongwith Data Management Techniques.

To solve a Point estimation problem with the Method of Maximum Likelihood a FORTRAN source package HMAXPC. FOR has been developed and its execute file HMAXPC. EXE has been used in the package MLESP for problem solution.

HMAXPC. FOR can be used to study any likelihood function, involving at most 10 parameters. The likelihood can relate to grouped or other discrete frequency distributions, probability density functions for continuous variates and can involve at most 25 independent variates.

This package can be employed simple to tabulate the logarithm of the likelihood over specified ranges of parameters. It will be set first to maximize the log-likelihood, by iteration from a chosen starting point, and then it will tabulate the log-likelihood over ranges centred upon the maximizing values of the parameters. The estimates of the parameters and their standard errors are listed. The matrix of asymptotic variances and covariances for the parameter estimates is also obtained. If all observations are from discrete frequency distributions, observed and expected frequencies can be tabulated and compared by χ^2 .

The user can provide his own subroutine for assigning appropriate

functions of observations and parameter to the component terms of the log-likelihood; all other facilities are provided within the package. In addition, certain standard sub-routines are permanently within the package. These are negative binomial, quantal bioassay based on three alternative distributions (normal, logistic, Wilson-Worcester), and simple truncation or censoring of a sample from a normal distribution. Other standard subroutines could easily be incorporated into the package,

(Guide : Sh SN Mathur)

2. KAVITA GARG—Developing an information system for personnel financial accounting

Manual system for personnel financial accounting used in educational and research institutes were studied. The existing pay structure as applied to these institutes were studied in detail.

Based on these studies, various sub systems needed for computerisation were identified.

Keeping in view, mainly, the requirements of IASRI an attempt has been made to develop a information system for computerisation of pay roll and report generation.

A user friendly system is developed using d BASE III+ software and is partially automated. The system provides security measures to some extent.

The developed system is flexible and financial accounting can be converted to

a completely automated system by developing and integrating new modules with the existing design.

The developed system was tested by using sample data obtained from IASRI accounts section and found to work very satisfactorily.

(Guide : Sh SP Doshi)

3. NIVEDITA CHAKRAVARTI— Graphic representation in information systems

It is generally believed that information presented in visual form is much more easily understood and assimilated than when they are presented in figures or statistical tables.

Modern aids like slide and overhead projectors are used commonly for presentation of information in the form of graphs. The aids used by computer in generating graphs and charts are printers, plotters, video graphs which are attached to a given computer system. For the purpose of generating useful graphs and charts using these equipments, considerable amount of software is needed and is required to be prepared.

In the present investigation an attempt has been made to prepare suitable software for the preparation of a large number of statistical charts that could be used for presentation of information as a graphical output. The design of the package which has been developed is made in such a manner that the user can use the package without any prior

knowledge of statistical methods for preparation of statistical charts.

At every stage of data entry and layout of the charts the computer presents to the user a number of alternatives to be chosen from in the form of menu or valid options. This involves questions relating to type of chart to be used, colors to be selected for drawing components of the chart, titles and legends etc. to be given. The package has been developed for the PC/XT/AT'S and on the flatbed plotter graphics-3100.

Pascal language has been used for developing this package. The package developed is user friendly and menu driven. The package can draw a total of ten graphs viz :

- Bar diagrams (Horizontal)
- Bar diagrams (Vertical)
- Pie charts (Various types)

(Guide : Sh OP Dutta)

4. SANGEETA MEHTA—Evolving information system for training administration

This work is an attempt to provide administrators with a computer based information system covering functions and activities of Training Administration Cell. The system contains a database of information regarding students, faculty members, theses information, advisory committees of students etc for two disciplines : Agricultural Statistics (M.Sc., Ph.D.) and Computer Application in Agriculture (M.Sc.). It is a user-friendly menu-driven software developed by

integrating 19 programs written using dBASE III plus. The name of software is 'TAIS'. By following the instructions displayed on the screen of the PC, the user can easily handle the package and retrieve/update the needed information. Hard copy of the information can also be obtained.

(Guide : Sh SN Mathur)

5. SHEEJA PHILIP—On developing an information system for alumni

The dissertation determines the need for developing an information system on alumni and defines the subsystems comprising the information system. The major subsystems are directory of alumni, a means of personal communication, a database on alumni, alumni activities, maintenance of forms, operating standards, update and maintenance of output formats, and software maintenance. The problems in the development of the information system have been stated. The input needs of the information system have been identified as list of names of alumni, their contact address, courses offered by them, assessment of these courses, suggestions and modifications they would like to make, their availability to the alma-maters, and schedule of visits of alumni to the institute or country to maintain a calendar. The output formats from processing of data in the information system are tables, directories, texts, and calendars. The sources of input to the information system has been determined as the

alumni records in the institute, the alumni working in the institute, addresses received from the above, etc. A suitable design for the information system has been developed alongwith a database. Forms for the collection of input to the information system have been designed. Software for operations on the information system has been provided. System specifications and performance details have been indicated. A feasibility study has been carried out.

(Guide : Sh R Gopalan)

6. VANDANA—A model for computer management using MIS techniques

The main areas involved in handling work in a fairly typical computer installation are :

(i) Data reception and conversion-input reception, data conversion, direct entry.

(ii) Data control-job reception, job assembly, software support.

(iii) Progressing-monitoring schedule adherence, rescheduling and reporting.

(iv) Library-media storage, media handling, record.

(v) Computer processing

(vi) Output preparation and distribution.

In the present case it was difficult to cover all aspects of informational needs of a computer centre within the limited time, but the scope of further expansion is always there. The modules dealt with in the present study are :

- (1) Information about programmers
- (2) Information about packages available in IASRI computer centre.
- (3) Information about programs developed by scientists in IASRI computer centre.
- (4) Information about electronic computer operators.
- (5) Job scheduling (non-multi-programming environment).
- (6) Forms required to be filled by users.

Further Job scheduling is multipro-

gramming environment etc. were to be done for the present work. These can be considered while expanding this package.

Regarding collection of data, since case study was conducted in IASRI, the data was available within the institute.

The software package developed for this purpose is written using dBASE III Plus package's programming facility. There are twelve program modules which perform the required functions.

(Guide : Sh Mahesh Kumar)

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PAPERS ACCEPTED FOR PUBLICATION

1. AJIT KAUR and SONI, PN—Input factors for high productivity in rice-wheat sequence under resource constraints. *Indian J. Agronomy*.
2. DEY, A, SRIVASTAVA, R and GUPTA, VK—Robust-designs—A review and a bibliography. *cahiers du CERO, 1990*.
3. GUPTA, VK, DAS, A and DEY, A—Universal optimality of block designs with unequal block sizes. *Statistics and Probability Letters*.
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5. GUPTA, VK, SISODIA, BVS and AGARWAL, SK—A study on the performance of an alternative estimator of population total for unequal probability sampling. *Cahiers du CERO*.
6. JAIN, JP and SINGH, SHIVTAR—Quantitative and qualitative insufficiency of livestock feeds by 2001 AD and possibilities of bridging the gap. *Indian J. Anim. Sci.*
7. LAL CHAND—Use of discriminant function to study the relationship among different genetic groups based on multiple traits in dairy animals. *Indian J. Dairy Sci.*
8. PANDEY, RK and BHARDWAJ, SP—Analysis of international trade in sugar. *Indian Sugar published by Indian Sugar Mills Association, New Delhi*.
9. PRABHAKARAN, VT, JAIN, JP and RAMESAN, PM—A note on the estimation of variance of intra-sire regression heritability. *J. Ind. Soc. Agric. Statist.*
10. PRABHAKARAN, VT and MAHAJAN, VK—On the identity from probability considerations useful in the derivation of variances of functions involving sample variances and covariances of observations from bivariate normal populations. *Australian J. of Statistics*.
11. RAHEJA, SK, MEHROTRA, PC and RUSTOGI, VS—Extent of intensity of adopting high yielding varieties of cereal crops and associated improved practices by

- farmers in different holding size groups (Hindi version). *Bhartiya Krishi Anusandhan Patrika*.
12. RAHEJA, SK, SHASTRI, SS – A study on generalised successive sampling design. *J. of Inaian Society of Statistics and Applied Research, HAU, Hissar*.
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 15. RANA, PS—State dependent queuing problem with correlated departures. *Acta Ciencia Indica*. 15(4), 1989.
 16. SAMRA, JS, GILL, HS, CHETER, JR and BHATIA, VK—Spatial stochastic modelling of growth and forest resource evaluation. *American J. Forest Sci.*
 17. SINGH, RAJESHWAR and GUPTA, VK —Resistance of block designs. *J. of Statistical Planning and Inference, 1990*.
 18. SINGH, RANDHIR (1990). A study on the role of interviewer in surveys—*Communications in Statistics, Theory and Methods A, 19(5)*.
 19. SONI, PN—Economics of long term fertilizer use and yield sustainability. *Nutrient Management for Sustainable in Agriculture in 90's*.
 20. SREENATH, PR—Construction of balanced incomplete block designs with nested rows and columns through the method of differences. *Sankhya*.
 21. SRIVASTAVA, R, GUPTA, VK and DEY, A (1990)—Robustness of some designs against missing observations. *Communication in Statistics, Theory and Methods, A 19, 1*.
 22. VERMA, DAVENDRA and JAIN, JP—An almost unbiased correlation estimator of heritability. *Biom. J.*

**APPOINTMENTS, PROMOTIONS, TRANSFERS,
DEPUTATIONS, RETIREMENTS AND RESIGNATIONS**

Appointments

Name	Grade	w.e.f.
1. Sh. Anil Kumar	1640-2900	15-12-1989
2. Sh. Gyan Singh	1400-2300	20-02-1989
3. Smt. Uma	1400-2300	03-08-1989
4. Sh. Kashi Prasad	1400-2300	07-08-1989
5. Sh. Pratap Kumar	1400-2300	09-08-1989
6. Sh. Promod Kumar	1400-2300	09-08-1989
7. Sh. Basanti Lal Pitliya	1400-2300	10-08-1989
8. Miss Adarsh	1400-2300	10-08-1989
9. Sh. Vijay Pal Singh	1400-2300	11-08-1989
10. Sh. Satya Pal Singh	1400-2300	14-08-1989
11. Sh. Arun Pratap Singh	1400-2300	16-08-1989
12. Sh. Rajender Singh	1400-2300	28-08-1989
13. Sh. Jagat Nanda Sahoo	1400-2300	01-09-1989
14. Sh. Satya Pal	1400-2300	08-09-1989
15. Sh. Nirbhay Pal	1400-2300	07-10-1989
16. Sh. Anil	1400-2300	21-11-1989
17. Sh. Rajender Singh	1400-2300	17-03-1990
18. Sh. Raje Singh	975-1540	18-05-1989
19. Sh. Hira Mani	950-1400	02-01-1989

Promotions

Name	Grade	w.e.f.
1. Dr. SK Raheja	4500-7300	22-07-1988
2. Dr. Shivtar Singh	3700-5700	01-01-1986
3. Sh. VN Iyer	3700-5700	01-01-1986
4. Sh. RS Khatri	3700-5700	01-07-1986
5. Dr. VT Prabhakaran	3700-5700	01-01-1986
6. Sh. Ravinder Srivastava	3700-5700	01-07-1986
7. Sh. SS Srivastava	3000-5000	01-07-1988
8. Sh. AR Keshva	2000-3500	01-01-1987
9. Sh. Ashok Kumar Gupta	2000-3500	01-07-1988
10. Smt. Kusum Lata Gupta	1640-2900	01-01-1988
11. Smt. Shashi Gupta	1640-2900	01-07-1987
12. Sh. SC Pandey	1640-2900	01-07-1987
13. Sh. AK Sondhi	1640-2900	01-07-1988
14. Sh. Panna Lal Gupta	1640-2900	01-07-1988
15. Smt. CK Grover	1640-2900	01-01-1988
16. Sh. Surender Singh	1640-2900	01-01-1988
17. Sh. Narain Singh	1640-2900	01-07-1988
18. Sh. AK Mogha	1640-2900	01-07-1988
19. Sh. AR Sharma	1640-2900	01-07-1988
20. Sh. GM Pathak	1640-2900	01-07-1988
21. Sh. Roop Chand	1640-2900	01-07-1988
22. Sh. Khem Chand	1200-2040	01-07-1988
23. Sh. Bhavnesh Kumar	1200-2040	01-07-1987

Transfers

(a) On transfer from other Institutes

Name	Grade (Rs.)	From	Date of Joining
Sh. Inder Jit	3000-5000	IARI, New Delhi	26-06-1989

(b) On transfer from this Institute

Name	Grade (Rs.)	Place of Joining	Date of Joining
1. Sh. GC Sharma	3000-5000	CSIR, New Delhi	19-05-1989
2. Sh. SK Maithani	1640-2900	CAZRI, Jodhpur	13-06-1989

Deputation

Name	Grade (Rs.)	Place of Joining	Date of Relieve
1. Dr. SK Bhatnagar	2000-3500	TMO, New Delhi	07-06-1989
2. Dr. Ved Parkash	2000-3500	TMO, New Delhi	15-06-1989
3. Sh. AP Singh	2000-3500	IARI, New Delhi	22-01-1990
4. Sh. Rakesh Chand	1400-2300	IRMS, New Delhi	01-02-1989

Retirements

Name	Grade (Rs.)	Date of Retirement
1. Sh. SN Bajpai	2200-4000	31-01-1989
2. Sh. RK Khosla	4500-7300	31-03-1989
3. Sh. ML Sahani	3700-5700	31-03-1989
4. Sh. Ran Singh	1640-2900	30-04-1989
5. Dr. LBS Somayazulu	3700-5700	15-07-1989
6. Miss CR Leelavathi	4500-7300	31-07-1989
7. Dr. SS Pillai	4500-7300	30-09-1989
8. Sh. HB Choudhary	3700-5700	30-09-1989
9. Sh. HC Jain	3700-5700	30-09-1989
10. Sh. JN Anand	1400-2300	30-09-1989
11. Sh. AC Kaistha	4500-7300	31-10-1989
12. Dr. KG Aneja	4500-7300	31-10-1989
13. Dr. Bhagat Singh	3700-5700	31-10-1989
14. Sh. D Jain	1740-2900	31-10-1989
15. Sh. SP Tandon	1400-2300	31-10-1989
16. Sh. VN Iyer	3700-5700	31-01-1989
17. Sh. SC Rai	4500-7300	31-01-1990
18. Sh. Ram Kumar	3700-5700	31-03-1990

Resignations

Name	Grade (Rs)	Date of Resignation
1. Sh. RCS Negi	1400-2300	06-07-1989
2. Sh. P. Sai Kumar	1400-2300	30-10-1989
3. Sh. Roop Chand	1640-2900	05-12-1989
4. Sh. Basanti Lal Pitliya	1400-2300	12-01-1990
5. Sh. Tilak Chand	1400-2300	30-01-1990
6. Sh. Dinesh Kumar	1400-2300	29-03-1990

PRIMARY DATA COLLECTION

Projects for which primary data were collected either through Institute's own field staff or through ad-hoc staff of the collaborating agencies are as follows :

(a) *Institute's own staff*

- A within year growth model for pre-harvest forecasting of crop yields-IARI, New Delhi.
- Models for forecasting aphid-pests of mustard crop-IARI New Delhi.

(b) *Ad-hoc State Staff*

- Planning, designing and analysis of experiments planned under AICARP at cropping systems research centre-RS Pura and Shalimar (J&K).
- Sample survey for study of constraints in transfer of new agricultural technology under field conditions—Hoshiarpur (Punjab) and Chandigarh, Pune (Maharashtra), Ahmedabad (Gujarat), Dibrugarh and Guwahati (Assam) Jaipur (Raj) and Madras (T.N.) and Ernakulam (Kerala).
- Pilot sample survey for the estimation of losses, price spread at various stages and cost of cultivation of vegetables crop-Pune.
- Pilot sample survey for estimation of cost of cultivation of oil seeds and pulses-Bharatpur (Rajasthan),

—Pilot sample survey to evolve an appropriate methodology for estimation of lac production-Chandigarh (Punjab).

—Command area development project and constraints analysis survey-Erode and Madras (T.N.)

—Planning, designing and statistical analysis of the data relating to experiments conducted under AICARP on long term fertilizer experiments-HPKV, Palampur (H P.), GAU, Vadodara, R.S. Pura, Shalimar (J&K).

—Sample survey on estimation of area and production of fruits and vegetables-Bangalore (Karnataka).

—Agricultural fields experiments information system IASRI, New Delhi.

—Study on consumption of edible oil in India—Bhubaneswar (Orissa).

—A sampling study on utilization of cross-bred working animals vis-a-vis non-descripts-Katra, Kathua (J&K)

—Study on comparative performance of crop-cutting methods and farmer's estimation on paddy crop-Aligarh (UP).

—Crop estimation surveys on fruits, vegetables and minor crops-Punjab,