ANNUAL REPORT

भाकृअनुप
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1991-92

Indian Agricultural Statistics Research Institute
(ICAR),
New Delhi-110 012

ANNUAL REPORT

1991-92

INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE
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PREFACE

The present compendium gives the panorama of activities and achievements of the Institute during 1991-92. The projects undertaken by various Divisions of the Institute in different thrust areas are reflected in this compendium.

Efforts have been made to cover all the functions and the research activities of the Institute during the year. It is hoped that the information presented in this report will be of considerable interest to the scientist fraternity. Comments and suggestions offered for improvement in the presentation of subsequent volumes of the annual reports of the Institute would be welcome and appreciated.

I am thankful to the Officers and Staff of the Institute for their willing support and cooperation in carrying out the functions and activities of the Institute and bringing out this report in the present form.

Co-ordination Cell has indeed done a commendable job of editing the voluminous material of the report and deserves appreciation for its timely publication. Thanks are also due to Sh Som Dutt and Sh OP Singh, Technical Assistants for their help in preparation of the report and Sh Mahesh Chander, Mrs Rajni Gupta and Sh Ishwar Dutt for assistance in preparing the manuscript on Personal Computer.

SK RAHEJA
DIRECTOR

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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 made a modest beginning in 1930 as a small Statistical Section in the then Imperial Council of Agricultural Research to assist the State Departments of Agriculture and Animal Husbandry in planning their experiments, analysis of experimental data, interpretation of results as also rendering advice on the formulation of the technical programmes and examining the progress reports of the schemes funded by the Council. The activities of the Section increased rapidly with the appointment of Dr PV Sukhatme as Statistician to the Council in 1940 and researches were initiated for developing objective and reliable methods for collecting yield statistics of principal food crops. The efficiency and practicability of these methods were demonstrated in different states for estimating yield by crop cutting experiments. 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 and non-food crops. Research in sampling theory and training of field and statistical staff were the activities initiated in this period resulting in the re-organization of the Statistical Section into a Statistical

Branch with permanent footing in 1945 accompanied by appropriate expansion in its strength. The designation of Statistician was changed to Statistical Advisor. The Statistical Branch soon acquired international recognition as a centre for research and training in the field of Agricultural Statistics. During 1952 on the recommendations of two FAO experts Dr Frank Yates and Dr DJ Finney who visited the Council on the invitation of the Government of India, activities of the Statistical Branch were further expanded and diversified. In 1949, it was named as Statistical Wing of the ICAR and in August, 1955, it moved to its present campus. Subsequently, in recognition of its important role as a training and research institution, the Statistical Wing was redesignated as the Institute of Agricultural Research Statistics (IARS) on 2nd of July, 1959. It is to commemorate this important event that the Annual Day of the Institute is celebrated on this day every year. An important landmark in the development of the Institute was the installation of an IBM 1620 Model-II Electronic Computer in 1964. Another major landmark for the Institute was the signing of a Memorandum of Understanding with Indian Agricultural Research Institute (IARI), New Delhi in 1964. Consequent to which new courses leading to MSc and PhD degrees in Agricultural Statistics were started in collaboration with IARI in October, 1964. In April, 1970, the Institute was declared as a full-fledged Institute in the ICAR system and is since then headed by a Director. Since 1st January, 1978 the name of the Institute was changed to Indian Agricultural Statistics Research Institute (IASRI) emphasizing the role of 'Agricultural Statistics' as a full fledged discipline by itself.

Since the activities of the Institute expanded manifold, a new three-storeyed Computer Centre building was constructed in the campus of the Institute in 1976. A third generation computer Burroughs-4700 system was installed in March, 1977. A large number of computer programmes for specific problems as also general purpose application software have been developed and are available in the Computer Centre. The Institute has installed a Super Mini COSMOS-486 Computer System with more than hundred PC/AT's, PC/XT's and dumb terminals. Computer laboratories equipped with PC/AT's, dumb terminals and printers, etc. have been set up in each of the six divisions as well as in Administrative Wing of the Institute and have been linked with the Central Computer Laboratory in a Local Area Network (LAN) environment. User friendly software packages like SPSS, Image Processing Software, Harvard Graphics, LOTUS, dBASE IV, DOS, UNIX and a few others have also been made available.

In order to remove and rectify 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 numbers 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 Applications under the aegis of the United Nations Development Programme (UNDP) for a period of 7 years, which was subsequently extended upto March, 1992. This programme 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 programme, thirteen distinguished statisticians and computer experts from abroad (19 visits; 21.5 man months) have visited the Institute for a period of four to eight weeks with a view to interacting with the scientists of the Institute, give seminars/lectures and suggest improvements in the research programmes of the Institute. Seventeen scientists from this Institute (80 man months) have received training abroad in different areas of research extending over periods of 5-6 months each. Under this project a new course leading to MSc degree in Computer Application in Agriculture was initiated.

The Institute has achieved international recognition for its high quality research and teaching 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.

A multi-storeyed Training-cum-Administration Block of the Institute, the foundation stone of which was laid by the Hon'ble Union Minister of Agriculture Dr GS Dhillon on November 19, 1987 is almost ready for occupation and is expected to be formally inaugurated on July 2, 1992, the Annual Day of the Institute.

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

—Co-ordination,

—Monitoring,

—Training Administration, and

—UNDP.

Management Committee

Under the provisions of Rule 66 (a) of the Rules of the ICAR Society, the President of ICAR Society has constituted the Management Committee of Indian Agricultural Statistics Research Institute, New Delhi for the furtherence and achievement of research, training and other activities of the Institute. The Management Committee functions as advisory committee with the following powers & functions :

—Consideration of proposals for Five Year Plan and Annual Plan;

—Periodical review of progress of development schemes;

—Consideration of proposals for the annual budget;

—Consideration of items of expenditure which are beyond the powers of the Director of the Institute;

—Policy issues relating to the Institute, including the rights and obligations of staff;

—Consideration of action taken on the recommendations of the Grievance Cell and Institute Joint Council, and

—Any other item, as may be desired by the Director or other members of the Committee or as may be required to be considered as per delegation of powers and directions of the Governing Body whether contained in any manual, order issued, resolution passed, or other instructions approved by the Governing Body.

—Such powers as may be delegated by the Governing Body to enable the Management Committees to administer the funds allocated and the programmes approved.

The present Management Committee of the Institute was reconstituted for a period of 3 years with effect from Jan 3, 1991. The meetings of the Management Committee were held on July 22, 1991 and February 29, 1992.

Staff Research Council

The Staff Research Council (SRC) is the most important forum in the Institute to plan and monitor research projects and watch their progress on a regular basis. 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

Meeting of Staff Research Council of the Institute in progress

Management Committee of the Institute in session

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 SRC was held on July 29, 1991 to consider 4 new project proposals and to review the progress of 49 ongoing research projects. As is the practice to associate a Peer Group while discussing and finalizing new research project proposals, Dr GR Seth, former FAO expert and Director of the Institute, was invited for the purpose. Another meeting of the SRC was held on December 4 and 7, 1991 to review the progress of 46 ongoing research projects.

Research Collaboration

Inter-institutional research programme is undertaken by the Institute in collaboration with other institutions.

The collaborative projects which were in operation during 1991-92 are as follows :

Sl. No.	Title	Collaborating Agency	Start	Completion
1	2	3	4	5
1.	Planning, designing and statistical analysis of experiments planned under All India Co-ordinated Agronomic Research Project at cropping systems research centres and on cultivators' fields	Directorate of Cropping Systems Research, Modipuram, Meerut	Apr, 1968	Continuing
2.	Planning, designing and statistical analysis of data relating to experiments conducted under the All India Co-ordinated Research Project on Long Term Fertilizer Experiments	(i) Departments of Soils, ICAR Institutes (ii) Departments of Soils, State Agril. Universities	Jul, 85	Continuing
3.	Statistical aspects of physiological kinetics in animal nutrition	(i) IVRI, Izatnagar (ii) NDRI, Karnal (iii) CSWRI, Avikanagar	Aug, 87	Jun, 91

1	2	3	4	5
4.	Studies on robust designs	ISI, New Delhi	Aug, 87	Jun, 91
5.	Pilot studies on pre-harvest forecasting of yield of stick lac	Indian Lac Research Institute, Ranchi	Oct, 87	Dec, 91
6.	Fertilizer response function environment for agro-climatic regions in India	International Food Policy Research Institute, Washington, D.C., U.S.A.	Oct, 88	Sept, 93
7.	Use of remote sensing techniques in crop yield estimation surveys	Division of Agricultural Chemistry and Soil Science, IIRS, Dehradun	Apr, 90	Mar, 93
8.	Estimation of cost of production of sheep and wool	CSWRI, Avikanagar	Apr, 91	Jun, 93
9.	Survey methodology to study economics of keeping goats	CIRG, Makhdoom	Apr, 91	Sept, 94

Annual Day

The Annual Day of the Institute was celebrated on July 2, 1991. As a part of the celebration, a Declamation Contest on Data Base Management in Agriculture for the IASRI students was organised on July 1, 1991. Dr SK Sinha, Professor of Eminence, IARI was the Chief Guest. The three best speakers were given prizes in the form of books.

The highlights of the Institute research activities were presented by the scientists in another session. Dr GR Seth, Former Director, IASRI chaired the session and presented prizes to the three best speakers in the form of books.

On July 2, the main Annual Day Function was held in which Sh KC Lenka, Hon'ble Minister of State for Agricultural Research and Education, Animal Husbandry and Dairying, Govt. of India was the Chief Guest. Dr SK Raheja, Acting Director, IASRI welcomed the Chief Guest and Dr IP Abrol, DDG(SAA), ICAR gave the presidential remarks. Prof JK Ghosh, Director, Indian Statistical Institute, Calcutta delivered the second Nehru Memorial Lecture) on Stochastic Model of Discovery of Oil and Related Question. The Nehru Memorial Medal for the year 1988-90 was awarded to Sh Manish Khanna, M. Sc. (Computer Application in Agriculture) by the Chief Guest who also delivered his address. Dr Randhir Singh, Professor (Ag. Stat.), IASRI gave the Vote of Thanks.

Sh KC Lenka, Hon'ble Minister of State for Agricultural Research and Education, Animal Husbandry and Dairying, Govt. of India and Prof. JK Ghosh, Director, ISI, Calcutta who delivered Nehru Memorial Lecture at the Annual Day Function of the Institute with DDG (SAA) and Director, IASRI

Sh KC Lenka, Hon'ble Minister of State presenting the Nehru Memorial Medal to the Best M.Sc. (CAA) student

Finance

Budget statement for the financial year 1991-92

Head	Non-Plan		Plan	
	Funds (Rs in Lakhs)	Expenditure (Rs)	Funds (Rs in Lakhs)	Expenditure (Rs)
Pay and Allowances	270.46	2,60,50,837	3.00	—
Travelling Allowances	2.50	2,24,144	0.90	88,891
Contingencies	102.04*	—	129.10*	—
Recurring	—	98,73,068	—	2,98,604
Non-recurring				
(a) Works	—	1,23,200	—	22,53,766
(b) Equipments	—	500	—	8,57,697
(c) Library books and journals	—	10,86,084	—	7,79,472
(d) Vehicles	—	1,996	—	—
(e) Electronic Computer	—	—	—	59,50,374
Grand Total	375.00	3,73,59,829	133.00	1,02,28,804

Abstract (1991-92)

	Funds (Rs in Lakhs)	Expenditure (Rs)
Non-Plan	375	3,73,59,829
Plan	133	1,02,28,804
Total	508	4,75,88,633

* Total contingencies including recurring and non recurring.

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

—Information system for agricultural and animal experiments

—Experimental designs for agricultural, animal and fisheries research

Projects in operation thrust-areawise ;

No.	Project title	Project leader and associates
1	2	3
	Cropping System Research	
1.	Planning, designing and analysis of experiments planned under All India Coordinated Agronomic Research Projects (AICARP) on cultivators' fields	PN Bhargava (upto Jan, 1992) KC Bhatnagar Mahesh Kumar NK Sharma (w.e.f. Feb, 1992)
2.	Planning, designing and analysis of experiments planned under AICARP at Cropping System Research Centres	Rajinder Kaur Ajit Kaur
3.	Planning, designing and statistical analysis of data relating to experiments conducted under AICARP on Long Term Fertilizer Experiments	MR Vats PR Sreenath DK Mehta DK Sehgal

1	2	3
4.	Methodological investigations in predicting fertilizer responses using soil test values and other site variables	Aloke Lahiri DK Mehta NK Sharma
	Crop Strategies for Dryland Agriculture	
5.	A statistical model to assess the effect of moisture stress on yield	Asha Saksena PN Bhargava (upto Jan 1992)
	Information System for Agricultural and Animal Experiments	
6.	Agricultural field experiments information system	RK Ghai PN Bhargava (upto Jan 1992) PR Yeri
7.	Agricultural experiments information system for animal sciences	GC Chawla PR Sreenath
	Experimental Designs for Agricultural, Animal and Fisheries Researeh	
8.	Studies on robust designs	R Srivastava A Dey (ISI, New Delhi) VK Gupta
9.	Construction of balanced incomplete block designs with nested rows and columns	PR Sreenath
10.	Study on optimality of designs for one-way and two-way elimination of heterogeneity	VK Gupta

1. Planning, designing and analysis of experiments planned under All India Co-ordinated Agronomic Research Projects (AICARP) on cultivators' fields

The experiments on cultivators' fields are planned basically to test the performance of crop production technologies identified at cropping systems research centre and to obtain the magnitude of responses under varying management conditions with adequate degree of precision. The objectives of the project are, (i) to provide suitable sampling plan and designs for the layout of experiments on cultivators' fields during 1990-91 under AICARP, (ii) to identify the appropriate statistical methodology for the analysis of data collected under the programme of E.C.F. and undertake the analysis of the data of experiments conducted during 1989-90 and summarize the results.

A three stage random sampling design was adopted for the selection of site and mostly RBD and split-plot

designs were used for the layout of the experiments. Out of about 16 types of experiments each with a different objective, about 96 experiments are planned in a district in each season.

During the period under report the data of 6020 experiments conducted during 1989-90 at 41 ECF districts were analysed and the results were summarized and summary tables were sent to the Project Director, Cropping Systems Research at Modipuram. In addition, the data of about 5000 experiments conducted during 1990-91 in 27 districts and 11 NARP zones were received, scrutinized and the analysis was in progress. For these experiments, the technical programme was modified. In some states a NARP zone was taken as one 'On-Farm' unit in place of a district. The types of experiments were reduced to five and the design for laying out was R.B.D. The salient results obtained from the experiments conducted during 1989-90 are as below :

In experiments to evaluate the performance of crop varieties at farmer's level and recommended level of fertilization under irrigated and rainfed conditions, the increase in yield with the recommended level was significantly higher under irrigated conditions than under rainfed conditions. In kharif rice the increase in yield ranged from 2q/ha at Periyal (T.N.) to 18q/ha at Ghazipur (U.P.) whereas in rabi wheat the increase was highest (22 q/ha) at Kapurthala (Punjab) and lowest (1.7 q/ha) at Surendergarh (Gujarat). In other crops the increase in yield ranged from 1 to 7.5 q/ha, the highest being in maize at Pithoragarh (U.P.).

In intercropping experiments the results indicated that as high as 155 to 175% more returns could be obtained by intercropping soyabean with redgram at Wardha, with maize at Pithoragarh and redgram with navane at Bellary. Other remunerative intercropping systems were redgram+rice at Ranchi, redgram + groundnut at Mayurbhanj, groundnut + blackgram at Puddokotai and Bangalore. The results also showed the need of fertilization of both the sole crop and intercrop to obtain maximum benefits from the system.

In yield and income potential experiments, net returns obtained under maize-gram (Rs 13434/ha) at Pratapgarh, redgram-mustard (Rs 11993/ha) at Ratlam and gram-jowar (Rs 10296/ha) at Wardha were more than under the cereal-cereal sequences like maize-wheat or jowar-wheat.

Studies on relative efficiency of slow release nitrogenous fertilizers and modified urea materials in influencing the grain yield of rice showed that LGU (Large granular urea) applied direct or in splits was more efficient than PU (Prilled urea) and other modified urea materials in most of the districts.

2. Planning, designing and analysis of experiments planned under AICARP at Cropping System Research Centres

The objectives of the first component of the project are to evolve and standar-

dise the agronomic practices of various crops and cropping systems in different soil and agroclimatic conditions in order to increase the production of major food, fibre and fodder crops on a sustainable basis by efficient utilization of available resources. The technical programme for the conduct of the experiments is formulated each year in the Workshop. This Institute is associated for the planning, designing and statistical analysis of the data and for summarising the data for inclusion in the National Report.

Summary tables for 357 experiments conducted during 1989-90 were prepared and sent to the Directorate for inclusion in the National Report. Statistical analysis of 341 experiments conducted during 1990-91 was taken up and communicated to the concerned centres. Salient results based on the experiments conducted during 1989-90 were as follows :

—Experiments for identification of need based cropping systems for different agro-climatic conditions revealed that among different crop sequences tried at various centres, maize-wheat sequence gave the highest grain yield at Ranchi and Banswara, rice-maize at Varanasi and Rudur and bajra-wheat at Bichpuri. Among the three crop sequences, rice-maize-green gram at Rajendranagar, sorghum-wheat-bhindi at Akola and maize-ragi-sorghum at Kathalgere gave the highest productivity in comparison to other sequences.

—The effect of reduced fertilizer dose under normal and delayed sowing was examined under varying components of other inputs for rice-wheat and bajra-wheat sequences. The study revealed that delayed sowing is one of the most important constraints in aehieving desired production level. To increase the productivity of crop under late sown conditions, plant population and fertilizer level may need to be increased.

—Investigations on long range effect of continuous cropping and manuring in cereal based crop sequences indicated the importance of applying recommended levels of fertilizers for crops of rice-rice, rice-weeat and maize-wheat sequences to get sustained high yields. It was also observed that over the years continuous application of only N, P and K has resulted in declining trend in yield at several locations.

3. Planning, designing and statistical analysis of data relating to experiments conducted under All India Coordinated Research Project on Long Term Fertilizer Experiments

The objectives of the project are to plan and design long term fertilizer experiments and to try alternative approaches for statistial analysis of data on long term fertilizer experiments.

Data received from the cooperating centres for various characters were ana-

lysed and the results were provided to the concerned scientists incharge of the respective cooperating centres.

The treatment-wise cumulative yields of individual crops were subjected to regression analysis to study the yield trends over years. Similar studies were also undertaken for available soil nutrients and other characters to investigate their build up or deterioration in the soil as a result of intensive multiple cropping. To estimate the residual effects of the fertilizers and manures applied on the succeeding crop in the sequence, covariance analysis technique was applied, treating the yield of the previous crop as covariate and that of the succeeding crop as main variate. This approach was applied to the individual crop in the multiple cropping system. The national report of the project embodying the results of 1987-88 and 1988-89 was under preparation in collaboration with Project Coordinator.

4. Methodological investigations in predicting fertilizer response using soil test values and other site variables

The objectives of the study are (i) to identify a suitable statistical model based on soil test values for estimating the optimal fertilizer response, and (ii) to evaluate the economic gain in adopting fertilizer recommendation involving soil test values versus general recommendations.

Analysis of data in respect of Muzaffarpur and Purnea (Bihar), Gurdaspur (Punjab), Faizabad (UP), Khamman and Krishna (A.P.), North Arcot and Tirunelveli (T.N.), Ganjam & Sundergarh (Orissa), Bhandara (Maharashtra) for both kharif and rabi of the year 1977-78 was undertaken.

A number of computer programmes were prepared to analyse the data as per the requirement of the technical programme of the project.

5. A statistical model to assess the effect of moisture stress on yield

It is generally seen that the crops seldom achieve their potential yield in rainfed areas. The reduction in yield in these areas is more often than not, due to deficiency of rain/soil moisture. Thus a project was initiated with the objectives to develop moisture stress index for rainfed crops, to examine the effect of various degrees of stress on yield, and to work out the chances of occurrence of stress of various degrees, and to determine the appropriate unit size for such studies.

Daily rainfall and pan-evaporation data for 1972-89 and pearl-millet yield data for 1975-88 were analysed. Daily estimates of soil moisture right from the date of sowing till the date of harvest were obtained for each year using Shaw's model. During the period of study there were 7 deficit moisture years, 9 surplus moisture years and two normal years. Estimates of soil moisture were compared with measured soil moisture for 15 time-points in the crop season for 1987 (a deficient moisture

year) and 1988 (a surplus year) each. The mean difference between the estimated and observed soil moisture varied from 1.6 per cent to 4.3 per cent for the three layers of soil for 1987, whereas it varied from 1.7 per cent to 2.0 per cent for 1988. The standard deviation of the difference was approximately 2 per cent in all the cases. In the process of estimating soil moisture, daily estimates of moisture stress to the crop as compared to water requirement were also obtained.

Utilising the information available in the literature regarding the degree of damage done to the pearl millet crop at different stages of growth by the moisture stress suitable weights were assigned to daily stress. By adding daily stress acumulated stress index and weighted stress index were obtained for each year. These indices were related to the yield through a regression model. It was found that the correlation between the rainfall and yield was only 0 65 which increased to 0.87 when related to stress index. It further improved to 0.93 when weights were assigned. It was also observed that the surplus water/moisture had deterimental effect on crop yield. But in the absence of any information available from the literature regarding the degree of damage done by the surplus water at different stages of growth, weights were assigned by trial and error. A combined regression equation to deficit and surplus years was fitted. Drafting of the project report was in progress.

6. 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 would assist a scientist drawing up a programme of investigation providing information on the nature, extent of work done in the past, the approaches followed and experimental findings obtained by other scientists in the fieid of their research. The data under the project is collected by personal visits to the research centres by the regional staff posted at different regional centres under the guidance of Senior Officers of Agriculture Departments/Universities. Earlier, the results of experiments collected under the project were published in the form of Compendia Volumes for the period 1948-53, 1954-59 and 1960-65. With the increase in the scale and complexity of agricultural field experiments over time, 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/ floppies for future retrieval of experimental data in respect of field experiments conducted since 1978 and onwards at different research stations in the country. Necessary software of data storage and its retrieval are being developed.

The preparation of crop-wise reports of experiments conducted in the country during 1966-77 giving results in summarised form along with details of treatments had been taken up. One such report on "Results of Cotton Experiments in India (1966-77)" in two volumes covering the experiments conducted in different states, has been brought out. Similar reports on sunflower had been finalised for printing whereas that on groundnut was under preparation. In addition, for the period 1978 onwards the regional staff reported during the year, experimental data in respect of 2550 experiments on Index cards/coding schedules prescribed for A.F.E.I.S. while about 630 experiments were reported on the prescribed proformae. Inclusive of these about 18,500 experiments on the coding schedules have so far been reported for the system. Processing and validation of data and their storage was in progress.

7. Agricultural experiments information system for animal sciences

The objectives of the project are to collect data on a large number of experiments in the various disciplines of animal sciences carried out by various institutes/agricultural universities in the country, to prepare instruction manual for data preparation, to put the data in an approved format and prepare the coding sheets and to retrieve information according to the queries made, etc.

During the period under report, Instruction Manual has been modified and finalised. The format of presentation of results has been completed for about one hundred and fifty experiments pertaining to different zones. For the preparation of index, details on more than 400 experiments consisting of state, discipline, subject, species, breed and category and source of experiment were transferred on floppies. Development of software was again being tested for selective retrieval.

8. Studies on robust designs

The project was started with a view to study the designs which are robust against disturbances like missing observations. The project has since been completed and final report has been prepared.

Besides, finalising the report investigations of robustness of block designs against the loss of m ($\geqslant 1$) disjoint blocks were completed using the efficiency criterion of residual design. As a special case robustness of resolvable BIB designs was investigated when all the blocks of a complete replicate are lost. Robustness of augmented BIB designs (derivable from augmenting all the blocks of BIB design with a new treatment) was also investigated when the block is lost. The investigation showed that the loss in efficiency is generally small.

9. Construction of balanced incomplete block designs with nested rows and columns

The BIBRC designs are useful when

three sources of variation are encountered in the designing of experiments. While blocking takes care of one of the sources, the rows and columns nested within the block allows the elimination of variation due to the other two sources. The development of methods of their construction and their tabulation for $v \leqslant 30$ treatments in blocks of p rows and q columns, where $k = pq \leqslant 10$ and $k \leqslant v$ were the objectives of the study.

Further methods of construction were developed. Some trial and error solutions were obtained. The designs requiring smaller number of replications have been tabulated for $v \leqslant 30$ as mentioned above. The report on the project was being finalised.

10. Study of optimality of designs for one-way and two-way elimination of heterogeneity

The broad objectives of the project are to (i) characterize and construct optimal block designs under homoscedastic and heteroscedastic models, (ii) characterize and construct optimal row-column designs, and (iii) prepare a catalogue of optimal designs.

E-optimal block designs were obtained under a heteroscedastic model. Some sufficient conditions were obtained for a design to be E-optimal and designs satisfying these sufficient conditions were constructed. Attempts were made to investigate the optimality of row-column designs with empty nodes.

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

—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

—Non-sampling errors estimation

—Small area estimation

Projects in operation thrust-areawise :

No.	Project title	Project leader and associates
1	2	3
	Cost of Production Studies	
1.	Pilot sample survey for estimation of losses, price spread at various stages of marketing and cost of cultivation of vegetable crops	AK Srivastava SK Raheja DC Mathur Satya Pal
2.	Study for estimation of area and production of important vegetable crops on the basis of partial harvest	AK Srivastava DL Ahuja DC Mathur K Chugh

1	2	3
3.	Pilot sample survey for estimation of yield of pepper and study of cultivation practices using successive sampling	SS Shastri SK Raheja VK Jain
4.	Estimation of cost of production of sheep and wool	TB Jain JP Jain PS Rawat (CSWRI) Riyazuddin ,, SC Sharma ,,
5.	Survey methodology to study economics of keeping goats.	RL Rustogi SC Agarwal Shivtar Singh DR Deoghare (CIRG) BU Khan ,,
	Statistical Modelling for Production and Growth	
6.	Pilot sample survey to develop statistical models for production and culling pattern in poultry	KPS Nirman JP Jain Balbir Singh
7.	Statistical modelling for projection of bovine populations and prediction of milk availability	SN Arya SC Agarwal HP Singh
	Inland Fish Catch Estimation	
8.	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
9.	Sampling methodology for estimation of fish catch from a lake	HVL Bathla OP Kathuria KK Kher
	Crops and Livestock Productivity Studies	
10.	Pilot sample survey for estimation of production of hides and skins in Chingleput and North Arcot districts (Tamil Nadu) and Surat district (Gujarat)	JP Goyal KB Singh RS Khatri

1	2	3
11.	Pilot sample survey for evolving a sampling methodology for estimation of area and yield of cultivated fodder crops other than berseem and jowar crop, cost of production and cultivation practices thereof—Ghaziabad district (U.P.)	Anand Prakash BC Saxena KK Tyagi
	Demographic Parameters Estimation	
12.	Pilot studies for estimation of birth and death rates in ovines	SN Arya Balbir Singh AS Gupta
	Assessment and Evaluation Studies	
13.	Pilot sample survey for estimation of post-harvest foodgrain losses (Wheat)	AK Srivastava HC Gupta Prem Narain
14.	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
15.	Pilot sample survey for estimating the energy utilization for different levels of adoption of modern technology in agriculture	KK Tyagi PC Mehrotra SK Raheja Satya Pal
16.	A sampling study on utilization of crossbred working animals vis-a-vis non-descripts	KB Singh JP Goyal RS Khatri
17.	Investigations in sampling methods for multiple frames in two stage sampling	BC Saxena AK Srivastava
18.	A study of variability of different components of cost of production of fruits at different stages of sampling and estimation of sample sizes at given levels of precision.	MS Batra Satyal Pal OP Kathuria

1	2	3
19.	Development of survey methodology for estimation of production of agricultural by-products	NK Ohri PC Mehrotra RC Gola
20.	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	MG Mittal
21.	Sample survey to evolve suitable sampling methodology to study impact of command area irrigation project on agricultural production	AS Gupta SK Raheja
22.	A methodological investigation in estimating seasonal fluctuations of post-harvest foodgrains losses (Wheat)	Jagbir Singh HC Gupta OP Kathuria
23.	Pilot sample survey for developing a sampling methodology for estimation of post production losses of milk in rural areas	RS Khatri KB Singh JP Goyal
	Operational Feasibility Studies	
24.	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 KB Singh JP Goyal
	Remote Sensing Technology Applications	
25.	Use of remote sensing techniques in crop yield estimation surveys	Randhir Singh RC Goel BM Singh (IIRS) SK Shah ,,
	Non-Sampling Errors Estimation	
26.	Investigation on the use of imputations for missing data in sample surveys	Randhir Singh T Rai
	Small Area Estimation	
27.	Small area estimation of milk production	Shivtar Singh JP Jain DK Bhatia
28.	Estimation of crop yield for small areas	AK Srivastava DC Mathur DL Ahuja SC Sethi

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

The project aims (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 (v) to evolve a suitable sampling methodology for estimating the cost of cultivation per unit of 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 cost of cultivation data was collected for 2-1/2 years while for marketing 1-1/2 years. The report on the project was under finalisation.

2. Study for estimation of area and production of important vegetable crops on the basis of partial harvest

The objectives of the study are (i) to develop a suitable theoretical frame work for sampling from two dimensional populations spread over space and time with particular reference to vegetable crops, (ii) to apply and test the theory on secondary data collected under earlier vegetable surveys at IASRI in order to develop a suitable methodology for estimating the production of vegetable crops based on partial hasvests, and (iii) to estimate the total production of important vegetable crops and their yield rates on the basis of partial harvest.

The project is based on secondary data already collected under earlier vegetable surveys in Delhi and Pune conducted by the Institute. The picking wise data collected for different vegetables was utilised. For this the data collected for Delhi survey was transferred on floppies and the computer programmes for analysis of data were finalized.

3. Pilot sample survey for estimation of yield of pepper and study of cultivation practices using successive sampling

The objectives of this project are (i) to develop suitable sampling technique for estimation of yield and study of cultivation practices of pepper, (ii) to estimate the changes in yield estimation, and (iii) to study the relative efficiency of yield estimates generated through different patterns of successive sampling.

The field survey work was in progress.

4. Estimation of cost of production of sheep and wool

This project was formulated by the Institute in collaboration with Central Sheep and Wool Research Institute, Avikanagar (Rajasthan) with the objec-

tives to develop a suitable methodology for studying economics of sheep rearing in relation to wool production under stationary type of management, and to secure estimates of different components of cost of rearing of sheep and production of wool.

The survey was initated in Malpura and Tonk tehsils of Tonk district in Rajasthan. A two-stage random sampling design with villages having sheep as the psus' and households rearing sheep in a selected village as the ssus' was adopted in the project. Out of villages having sheep, 16 villages from Malpura tehsil and 24 from Tonk tehsil were selected with probability proportional to sheep population in the village with replacement. For detailed enquiry, 6 sheep rearers were selected from each village.

In the first instance, a preliminary enumeration of all the sheep rearers was carried out in the selected villages. Under detailed enquiry the relevant data on various components of cost of maintenance of sheep and production of wool were collected from selected sheep rearers at a regular interval of one month. The field survey work was in progress.

5. Survey methodology to study economics of keeping goats

The project aims (i) to develop sampling methodology for estimation of cost of rearing and maintenance of goats and income accrued from various sources connected with goat keeping with a reasonable degree of precision, (ii) to study the practices of goat keeping and to develop procedures for evaluation of cost components, and (iii) to study variation in cost and its components due to season and size of flock.

Stratified three stage random sampling with tehsil as strata and panchayats forming the psus' and villages as ssus' and household keeping goats as tsus' was adopted. Collection and compilation of primary data were in progress. The data was being collected in Mathura district of Uttar Pradesh in collaboration with Central Institute of Research on Goats, Makhdoom (Mathura).

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

The objectives of the project are (i) to estimate month-wise/season-wise age specific vital characteristics affecting the growth and structure of poultry population, (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.

Results on vital characteristic revealed that mortality in broilers was maximum (3 per cent) in starter age (0-3

weeks) and gradually declined in succeeding age groups. Culling rate was about one per cent in the starter age group. Both mortality and culling rates declined with the increase in scale of farming. Mortality rates for layers ranged from 2.2 to 2.8 per cent. Leslie type model for broilers production was tested and was found adequate. The total annual broiler meat production in the Union Territory of Delhi was estimated around 1129 tonnes of which 50 per cent was in winter season and 25 per cent each inother two seasons, The project report was finalised.

7. Statistical modelling for projection of bovine populations and prediction of milk availability

This project was initiated with the objectives (i) to identify (and develop, where necessary) suitable models for projection of bovine population in various categories on the basis of empirical studies, (ii) to conduct a comparative study of different models so as to recommend appropriate models for use in varying situations, and (iii) to arrive at a suitable method for prediction of milk availability in future.

Bovine population data from secondary sources, such as quinquennial livestock census was used to fit mathematical curves and to predict future populations from the trend. The latter were also estimated by suitable extrapolation formulae. Processing and analysis of data remained in progress.

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

A pilot sample survey to estimate inland fishery resources and catch was taken up by the Institute in three districts of Orissa viz. Cuttack, Sambalpur and Bolangir. Fresh water ponds and tanks were covered in the first phase of the survey. The sampling design followed was two stage stratified sampling with blocks being the first stage units and gram panchayats as second stage units for the estimation of area under ponds/ tanks. For estimation of fish catch, three stage stratified sampling design was used. A further selection of four water units from each of the selected gram panchayat was made.

The report on the project was finalised and the salient results are as under :

The inventory of all the water units showed that 5278 water units existed in the 10 selected blocks of district Cuttack, 447 water units in the 3 selected blocks of district Sambalpur and 433 water units in the 2 selected blocks of district Bolangir. The average area per water unit in the selected blocks being 0.098 ha, 0.742 ha and 0.511 ha in the districts for Cuttack, Sambalpur and Bolangir respectively. Rainfall was the main source of water in the selected blocks of the three districts. The water units mainly used for fish cultivation were 30.7% in district Cuttack, 14.5% in district Sambalpur and 19.9% in district

Bolangir. Silting was reported to be the main problem in the three selected districts. Weeding was not a major problem in district Cuttack, whereas water units in districts Sambalpur and Balangir had weed problem. Three major species Catla, Rohu and Mrigal were cultured together in most of the water units in districts Cuttack and Sambalpur while in district Bolangir almost all the water units cultured other species. Type of culture was reported to be extensive in most of the water units in selected blocks of the three districts.

Estimates of average area under water units were worked out at district level using two different estimators. Estimator-I was found to be more precise than Estimator-II in all the four modes of collection of area of water units i.e. as per revenue records, at the time of visit, maximum in monsoons and minimum in summer. Estimate of number of water units obtained from Estimator-I was found to be more precise than Estimator-II.

Estimate of fish catch obtained per pond per year was 4021.09 kg. in district Cuttack, 560.87 kg. in district Sambalpur and 664.30 kg. in district Bolangir.

In Cuttack and Bolangir districts most of the catch was recorded during March to July, while in Sambalpur district most of the catch was recorded during March to August.

9. Sampling methodology for estimation of fish catch from a lake

The study was initiated with the objectives (i) to review the data collection procedures and present method of reporting fish catch from lake/reservoir in the state of Orissa, (ii) to develop a suitable methodology for fish catch, and (iii) to see the feasibility of estimating fish catch by using partial data.

The data pertaining to fish catch from Chilka lake was scrutinised.

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

The project aimed (i) to evolve a suitable sampling technique for estimation of production of hides and skins, (ii) to study practices like flaying of slaughtered and fallen animals, curing of hides and skins and their disposal, and (iii) to study socio-economic status of householders keeping livestock.

Chingleput & North Arcot (Tamil Nadu)

The report was published and the salient results are as follows :

The quantum of hides was estimated to be 54.33 and 30.17 thousand in the districts of Chingleput and North Arcot with standard errors of 25.9 and 10.8 per cent respectively. Similary the quantum of skin was estimated to be 234.30 thousand in Chingleput district and 162.97 thousand in North Arcot district with percentage standard errors of 49.9 and 1.4 respectively.

For planning sample surveys for estimation of production of hides and skins in future, it is suggested that if it is desired to estimate the production of hides and skins with a standard error of 20 per cent, a sample of 130 culsters of 3 villages should be observed.

Surat district (Gujarat)

The project report was under finalisation.

11. Pilot sample survey for evolving a sampling methodology for estimation of area and yield of cultivated fodder crops other than berseem and jowar, cost of production and cultivation practices thereof

The objectives of the project are (i) to evolve a sampling methodology for estimation of area and yield of fodder crops other than berseem and jowar, and (ii) to estimate the consumption of different feeds fed to the animals.

The sampling technique employed was stratified multi-stage sampling design with tehsils as strata and villages as psu and plot of specified size as ultimate unit of sampling. Data collection was in progress.

12. 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 Tiruchirapally district of Tamil Nadu.

The method of 'fractional exposures' was used to estimate the group-specific populations exposed to the risk of mortality/fertility. Statistical analysis was continued to work out weighted ratio estimates of mortality and fertility rates.

13. Pilot sample survey for estimation of post-harvest foodgrain losses (Wheat)

The project aimed to develop a statistical methodology for estimation of foodgrain losses at different post-harvest stages.

Survey covered the rural areas, markets and government/public agency godowns in Bulandshahr district. At farm level, the losses were estimated at (i) harvesting, (ii) threshing, (iii) transportation, and (iv) storage stages whereas at market and government/public agency levels the losses were estimated at storage stage only.

The total percentage losses at different post-harvest stages during 1985, 1986 1987 and pooled over years were estimated as 3.25, 3.97, 4.95 and 4.12% respectively. The corresponding total losses at farm level were 3.03, 2.96, 3.80 and 3.31 per cent respectively whereas losses in storage at market level were 0.22, 1.01, 1.15 and 0 81 per cent respectively. Total loss, pooled over years at farm and market levels were 80.3 and 19.7 per cent of the total loss at different

post harvest stages. Losses pooled over years at harvesting, threshing, transportation and storage stages at farm level were estimated as 0 50, 0.34, 0.35 and 2.12 per cent respectively. These losses respectively formed 15.1, 10.3, 10.6 and 64.0 per cent of the total loss at farm level. The losses in storage at government/ public agency godowns were negligible.

14. 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 / improved varieties / fertilisers, plant protection chemicals and cultural and management practices for increasing productivity of land, (ii) to determine the extent to which the protential 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 fields.

The surveys were conducted in 16 selected districts spread over 9 states.

Analysis of data and drafting of report for the first year of the survey was in progress. Data for later years were in various stages of computation and analysis after they had been scrutinized for gap and discrepancies.

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

Estimates of energy utilisation with percentage standard errors and energy output-input ratio for various crops pertaining to rabi 1983-84 and kharif 1984-85 seasons were obtained. Further analysis work was in progress.

16. A sampling study on utilisation of crossbred working animals vis-a-vis non-descripts

The objectives of the study are (i) to compare the utilisation pattern of two types of working animals, (ii) to estimate the extent of utilisation of working animals, and (iii) to study the factors influencing varying levels of utilisation of working animals.

The analysis of data was in progress.

17. Investigations in sampling methods for multiple frames in two stage sampling

The objectives of the study are (i) to investigate the estimation of population parameters like mean, total, ratio, etc. in multiple frame situation for multi-stage sampling, and (ii) to examine simultaneous estimation of various characters in multiple frame surveys.

The work of optimization of weight factors involved in the estimation methodology and sample size with respect to a suitable cost function was in progress.

18. A study of variability of different components of cost of production of fruits at different stages of sampling and estimation of sample sizes at given levels of precision

The present study is based on secon-

dary data drawn from some pilot surveys conducted by the Institute to estimate cost of production of some important fruit crops on the basis of fixed sample sizes in Gujarat state.

After completion of the basic tabulation of secondary data, the work of analysis with regard to determination of variabilities of the different components of cost of production, year-wise and crop-wise was in progress.

19. Development of survey methodology for estimation of production of agricultural by-products

The study aims to develop appropriate procedures for estimation of production of important agricultural by-products, (ii) to develop estimation procedure for straw to grain ratio for a region for maximising the precision of the estimate and to study the extent to which it is effected by different agronomic and management practices, and (iii) to work out the optimum fraction of crop cutting experiments on which the straw yield should be recorded for estimating straw to grain ratio.

The work of tabulation of secondary data from the records of the project 'Sample survey for study of constraints in transfer of new agricultural technology under field conditions' was completed. The type of trend in the straw to grain ratio was studied with the help of scatter diagrams. Further work was in progress.

20. 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 was to examine a suitable reference period and periodicity of enquiry for estimation of employment and income generated per beneficiary family.

Secondary objectives studied were; (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.

The project was taken up in district Alwar (Rajasthan). In the district the identification of beneficiaries was done at village panchayat (consisting of 5 to 10 nearby villages) levels. For selecting the beneficiaries a two stage sampling was adopted with village panchayats as primary sampling units and beneficiaries as second stage sampling unit. From each village panchayat 30 beneficiaries were selected as second stage sampling units.

The report on the project was under finalization.

21. Sample survey to evolve suitable sampling methodology to study impact of command area irrigation project on agricultural production

The objectives of the study are (i) to develop sampling methodology for deter-

mining yield rates of crop in command and non-command areas of irrigation project with a reasonable precision, and (ii) to study the impact of command area on cropped area, cropping pattern, cropping intensity, agronomic and management practices and other development measures.

The data pertaining to two seasons of the years 1988-89 and 1989-90 were coded and transferred from schedules to floppies and the computer programs were being developed.

22. A methodological investigation in estimating seasonal fluctuations of post-harvest foodgrains losses (Wheat)

The study is based on secondary data to be utilised from another project undertaken earlier by the Institute on 'Pilot sample survey for the estimation of post-harvest foodgrains losses.'

Minimum variance linear unbiased estimators of mean and change over years, seasons within years and over the years were developed through projective geometry approach. All the data were arranged according to the partial replacement pattern of the sampling units. Zone-wise elementary estimates for percentage of loss of wheat for each of the matched and unmatched samples at both the harvesting and threshing stages and cultivator-wise loss at harvest stage were obtained for the period 1985-87. The computer programmes were being prepared for working out the above mentioned losses.

23. Pilot sample survey for developing a sampling methodology for estimation of post production losses of milk in rural areas

The objectives of the project are (i) to evolve a sampling technique for estimation of post production losses, and (ii) to estimate the percentage of post production losses at different stages.

The sampling design adopted was one of stratified two stage random sampling with tehsils/taluks forming as strata and villages as psus and households as ssus. A total sample of 20 psus were allocated to different strata in proportion to the number of villages in them. In every selected psu the households were classified as 'Producers' and 'Purchasers' and 5 households each were selected every day from both the classifications for detailed enquiry. In addition to this all the cycle venders and halwaies located in the selected psu will also be observed. The data will be collected by careful enquiry and the reference period will be the day prior to the day of visit of the investigator.

Data collection work in the project was in progress in Rohtak district (Haryana).

24. 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 techniqu e for estimation of livestock products utilizing the normal field agency of stock men/stock assistants in Animal Husbandary Departments of states, and (ii) to obtain estimates of annual production of major livestock products. The report on the project was under finalization.

25. Use of remote sensing techniques in crop yield estimation surveys

With the advent of remote sensing technology, the availability of satellite gathered spectral data provides extensive data base to examine the crop vigour and crop conditions at various points of time of the crop calender. This satellite gathered spectral reflectance will vary according to the condition of the crop and thus can be effectively utilized to stratify/post stratify the crop area according to homogeneous crop growth conditions. Therefore, to make use of the spectral data in crop yield estimation surveys for improving the efficiency of the crop yield estimators, the project was taken up with the following objectives (i) to investigate the usefulness of satellite gathered spectral data for stratification according to crop vigour and growth conditions for wheat crop in major wheat growing regions, and (ii) to obtain improved estimator for crop yield from crop yield estimation surveys using post-stratification based on spectral data.

It was attempted to use the fast colour composite (FCC) for stratification and to compare with the stratification as obtained through the use of vegetation indices.

26. Investigation on the use of imputations for missing data in sample surveys

Various imputation procedures were re-examined in context of survey data. Computer programs to compute biases and variances due to non-response or missing data were prepared.

Data from various surveys conducted by the Institute were examined to see the extent and cause of non-response. The non-response rate was found to be below 2 to 5 per cent in most of these surveys mainly because these were mainly for methodological investigations and were schedule based where the enumerators personally visit each selected unit. As such no further analysis in this regard was attempted.

27. Small area estimation of milk production

The validity of the assumptions made in the models considered for statistical analysis of data was listed and district-wise estimates of milk production using direct, synthetic and composite estimators were obtained and compared them empirically.

It was observed that the synthetic estimator had a smaller variance which indicates that it is more stable than the direct estimator. The synthetic estimator had large bias which was less important for small sample sizes. This was seen for Hamirpur and Bilaspur districts where the sample sizes were small.

For large sample sizes the direct estimators had small standard errors. However, the composite estimator which is a linear combination of the synthetic and the direct estimator could be used for working out district level estimates of milk production.

The project report was being drafted.

28. Estimation of crop yield for small areas

The study was initiated (i) to estimate the crop yields at small area (Block/ Tehsil) level for principal crops utilizing small area estimation techniques.

In this study estimation of average yield of main crops at small area (Block) levels is to be attempted. Most of the small area techniques assume the knowledge about some important auxiliary variables at small area or even lower levels. In this situation the information on the important variables such as irrigation, fertiliser, etc. is not available. Some alternative for estimating these auxiliary variables at small area levels and utilizing these estimates in developing the small area estimates are being worked out. The work of tabulation of secondary data already available at the Institute was in progress.

DIVISION OF BIO-STATISTICS AND STATISTICAL GENETICS

Mandate :

To conduct statistical research in the areas of plant and animal breeding, animal nutrition and epidemiology, physiological and pharmacological kinetics in animal research, ecology, immunoassays, pest control management and crop insurance

Thrust Areas :

—Statistical modelling in plant and animal breeding

—Modelling in animal nutrition and epidemiology

—Development of statistical techniques for crop insurance

Projects in operation thrust-areawise :

No.	Project title	Project leader and associates
	Statistical Modelling in Plant and Animal Breeding	
1.	Statistical analysis of cross-breeding data at military dairy farms	BS Sharma Prem Narain
2.	Direct and maternal additive and heterotic effects in crossbred dairy cattle	RK Jain LK Garg SD Wahi
3.	Studies on spatial patterns and its role in analysis of agricultural field experiments	VK Bhatia Prem Narain JS Samra (CSSRI)
4.	Estimation of repeatability of fruit yield in presence of biennial rhythm	SD Wahi LK Garg PK Malhotra
5.	Modelling curvilinear response among crossbred dairy cows with increasing level of exotic inheritance.	VT Prabhakaran
	Modelling in Animal Nutrition and Epidemiology	
6.	Statistical aspects of physiological kinetics in animal nutrition	PS Rana Prem Narain
	Development of Statistical Techniques for Crop Insurance	
7.	Non-parametric density estimation for determining premium in all-risk crop insurance	JN Garg Prem Narain Indra Singh

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

The objectives of the project are to study the problems associated with adjustment of data by the least squares techniques, genetic divergence among different grades of crossbred cows and GE interactions.

To find the suitability of the grades for life time traits it is required to estimate the additive, dominance and epistatic effects by fitting various genetic models namely additive-dominance model and models suggested by Dickerson, Sheridan, Hill and Mather and Jinks. The fitting of these models was done by weighted least squares techniques taking adjusted grade means as dependent variable (Y), coefficients of parameters in the expected grade means as independent variables (X) and the inverse of the squares of standard errors of grade means as weights (W). The life time data of 32 Holstein Friesian X Sahiwal crossbred grades were used for this purpose

The additive-dominance model was found to be adequate for all the characters considered except milk yield per month of productive life and the improvement in these characters due to fitting other genetic models was very little. The additive effect was significant for total milk yield in first three lactations, average lactation yield in whole life and milk yield per month of total life. The dominance effeet was significant not only in these characters but also in total milk yield in all available lactations, total life and total productive life.

The project report was under finalisation, total life and total production lifes.

2. Direct and maternal additive and heterotic effects in crossbred 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.

The report on the findings in the project was being finalised.

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

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

The procedures used to analyse the collected data from CSSRI, Karnal were mainly concerned with the identification of suitable transformation for estimation of trend effects in the estimation of semi-variograms and construction of krigged

maps. The results clearly pointed out that mere transformation were not enough for eliminating the trend effects but there is a need to build robust estimators of semi-variograms, for which the problem can be looked into through two angles i.e. estimating the mean or central tendency of the population of square differences or that of estimating the variance or scale parameter of the population of differences. Further analysis was in progress.

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

The objectives of the project are (i) to test for the biennial bearing tendency in orange and guava and to correct the data for this effect, (ii) to estimate the usual repeatability index by traditional methods and through principal component analysis, and (iii) to compare the efficiency and stability of different methods with the help of simulated data with known repeatability.

The report on the project was under finalisation.

5. Modelling curvilinear reponse among crossbred dairy cows with increasing level of exotic inheritance

The project aims to formulate various hypotheses explaining curvilinear response and to test these hypotheses through empirical data.

The project was in the initial stage and the work remained in progress.

6. Statistical aspects of physiological kinetics in animal nutrition

The objectives of the project are to examine the existing compartmental models in physiological kinetics in animal nutrition for their adequacy in describing the passage of nutrients through the gut of ruminants, and to develop suitable stochastic models to quantify the rate of passage of undigested nutrients through the digestive tract with special reference to the seasonal and dietary patterns.

The existing compartmental models describing the passage of undigested nutrients through the gastro-intestinal tract of the ruminants are critically examined with special reference to seasonal variations and pattern of intake. The observations led to the fact that classical compartmental models assume constant transfer rate but the experiments suggest that the environmental changes result in marked changes in digestion and thus considerably influence the rate of passage. To incorporate these changes a model is developed assuming that the transfer rates are uniformly distributed over a range of equal length on either side of mean transfer rate. The life time distribution of the particles in the two compartments are (a) exponential in both the compartments, (b) gamma distribution in first and exponential in the second compartment and (c) both compartments have gamma distribution. Another drawback of compartmental modelling in animal nutrition is that the flow rate from one compartment to an-

other is independent of the number of particles present in the compartment. Here we discuss a model wherein the flow rate depends on the number of particles present in the compartment. The third observation points out that a single rate constant is used to describe the flow of digesta even when it is consisting of different characteristic feeds. In the light of this observation a model is obtained by considering different rate constants simultaneously, one for each characteristic feed.

7. Non-parameteric density estimation for determining premium in all-risk crop insurance

The objectives of the study are : (i) to develop suitable methodology for estimating premium based on non-parametric density estimation of crop-yields; and (ii) to undertake a comparative study between parametric and non-parametric density estimation in premium determination.

The premium rates were calculated for taluks of Uttar Pradesh at 80 per cent and 90 per cent indemnity level for paddy and wheat crops. Assuming that crop yields follow a normal distribution, the premium rates were calculated using normal curve technique. The premium rates for paddy crop varied between 0.44 to 11.38 per cent at 80 per cent indemnity level and between 1.83 to 17.28 per cent at 90 per cent indemnity level. In case of wheat crop, the premium rates varied between 0.13 to 6.66 per cent at 80 per cent indemnity level and between 0.76 to 9.57 per cent at 90 per cent indemnity level. It was observed that increasing the level of indemnity from 80 per cent to 90 per cent indemnity level, the premium rates also increased.

If the crop yield follow a normal distribution, the procedure for computing the premium rates is simple and convenient by using normal curve technique. But since it is not always possible to specify the parametric distribution of the crop yields, a non-parametric estimation of density might be of more practicable value. Using such an estimate of density function, the premium rates could be determined by the actual procedures.

In the present investigation, Kernel method of estimation using Epacnechhnikov and Gaussian Kernels was considered.

The optimum value of window width or smoothing parameter h was computed based on (i) standard deviation, and (ii) interquartile range of the yield data. Premium rates were calculated by Kernel method by taking the window-width value as 100, 125, 150, 175 and 200. It was found that when the window width was increased from 100 onwards

to 125, 150, 175, 200 the premium rates tend to decrease.

The parametric approach and the non-parametric density approach to premium rate determination were compared on the basis of percentage standard error [PSE (I)] of the indemnity I. It was found that the non-parametric density approach for premium rate determination is better than the parametric approach for premium determination.

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 biometircal characters, weather parameters and agricultural inputs and also to develop forecast models for the incidence and intensity of pests and diseases.

Thrust Area :

—Crop yield forecast models

Projects in operation thrust-areawise:

No.	Project title	Project leader and associates
	Crop Yield Forecast Models	
1.	A within-year growth model for pre-harvest forecasting of crop yield	RC Jain Ranjana Agrawal KN Singh (IARI)
2.	Pilot studies on pre-harvest forecasting of yield of stick-lac	SK Saha (ILRI) AK Jaiswal (ILRI) BH Singh
3.	Composite forecast of sugarcane yield	SC Mehta Chandrahas
4.	Yield forecast based on weather variables and agricultural inputs on agro-climatic zone basis	Ranjana Agrawal RC Jain SC Mehta
5.	Statistical modelling for forecasting of marine-fish catch	SS Walia Balbir Singh

1. A within-year growth model for pre-harvest forecasting of crop yield

This study was carried out to develop a 'within-year' growth model for forecasting crop yield as an alternative to between year models. In 'between year' models, yield forecast is obtained by substituting the current year weather/plant data in the model developed from previous years. The model which uses repeated observations on growth data from the current year to estimate the parameters needed to forecast the dependent variable [yield component(s)] at maturity is called 'within year' growth model. In this context 2 years data on wheat and crops were collected during 1987-88 and 1988-89 from research farm of IARI, New Delhi. Data on total dry matter accumulation and head/panicle weight were collected at about 6 weeks after sowing and thereafter at weekly intervals till harvest.

The findings of the study are (i) logistic growth model can be used to forecast total dry matter at maturity about one month before harvest in wheat and rice whereas forecast of head/panicle weight can be made about 15 days advance of harvest, and (ii) total dry matter as well as head weight at maturity are over estimated in general when partial data are used. The modified logistic model can be used to adjust the over estimation in total dry matter and head weight at maturity.

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

This project was formulated by the Indian Lac Research Institute in collaboration with this Institute with the objective to develop suitable model for obtaining pre-harvest estimates of yield of stick-lac on the basis of yield affecting characters such as crown of lac hosts, number of inoculable shoots, length of inoculable shoot/tree, weight of bread lac, settlement of trees and number of pests.

Linear regression models were fitted at different stages of crop growth taking yield of stick-lac as dependent variable and its affecting variables in original scale, logarithmic, square root and reciprocal transformation as independent variables. Also a model was developed on the basis of different pest characters as independent variables.

The report on the project was being finalised in consultation with Dr SK Saha of ILRI, Ranchi.

3. Composite forecast of sugarcane yield

The objectives of the project are (i) to explore the feasibility of improvement in the models already developed for obtaining pre-harvest forecast of crop yield on the basis of biometrical characters, (ii) to develop appropriate models for forecasting crop yield on the basis of weather parameters, and (iii) to develop suitable statistical methodology for improving forecast of crop yield by combining the forecasts from two approaches based on weather parameters and biometrical characters.

The forecasts based on weather parameters and biometrical characters will be

combined using various strategies viz. equal weights, weights proportional to inverse of variances and weights involving variances and covariances.

Development of models for improving the forecasts using certain regressions was in progress.

4. Yield forecast based on weather variables and agricultural inputs on agro-climatic zone basis

The study has been taken up on rice and wheat in rainfed area, of M. P. Daily data on various weather parameters were procured from IMD, Pune for different districts of MP from 1969 to 1985. Corresponding yield figures were collected from DES. New Delhi, F.A.I., New Delhi and Agricultural Situation in India. Behaviour of yield on time were studied for various districts. The data on weather were in ASCII codes which could not be processed on the then existing computer system. Therefore, data were converted in EBCDIL code. Data have been screened and analysis work has been taken up.

5. Statistical modelling for forcasting of marine-fish catch

The objectives of the project are (i) to develop appropriate models for forecasting of marine-fish catch, and (ii) to test the adequacy of the models so as to recommend the most appropriate model for each state under study.

The six methods to be studied are simple moving average, double moving average, fundamental exponential smoothing method, double exponential smoothing method, triple exponential smoothing method and winter's method.

The data on quarterly marine-fish catch for all the states under study were collected and processing of data was in progress.

DIVISION OF STATISTICAL ECONOMICS

Mandate :

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

Thrust Areas :

—Technological change and its diffusion in agriculture

—Resource use efficiency in agriculture

—Farm planning under risk and uncertainity

Projects in operation thrust-areawise :

No.	Project title	Project leader and associates
	Technological Change and its Diffusion in Agriculture	
1.	Non-linear statistical models for adoption of HYVs in India	VK Sharma Prajneshu Sushila Kaul
2.	Implications of technological change for input use and output mix in crop production	RK Pandey Shanti Sarup
	Resource Use Efficiency in Agriculture	
3.	Testing relative economic efficiency and determination of factor demand and output supply functions for wheat	SS Kutaula
	Farm Planning Under Risk and Uncertainity	
4.	Study of farmars behaviour towards risk and its impact on cropping pattern, level of resource use and farm income.	SP Bhardwaj VK Mahajan

1. Non-linear statistical models for adoption of HYVs in India

The objectives of the project are (i) to develop non-linear statistical models for adoption of HYVs of various foodgrain crops at state level. Modification of the existing statistical theory for autocorrelated errors will also be undertaken, whereever necessary, (ii) to attempt various theoretical generalization of the adoption models, and (iii) to develop multi-equation statistical models for explaining the spatial differences in the values of the parameters of the adoption process. During the year attempts were made to develop statistical models to describe the path of adoption of HYVs of wheat in different states. Three non-linear models viz. logistic, Gompertz and modified exponential type were found to describe the adoption path over time quite satisfactorily. The dependent variable taken was area under HYVs relative to the total area under the wheat crop.

The major wheat growing states viz., Gujarat, Haryana, Madhya Pradesh, Maharashtra, West Bengal, Punjab, Rajasthan, Uttar Pradesh, Bihar and Orissa were classified on the basis of these models into three groups. Initial values for t=1, ceiling values for t=00, and the rates of growth, 1/y dy/dt were computed for all these states. As the values of growth rates were time dependent, these were worked out at three different points viz. 1/4, 1/2 and 3/4 of the ceiling value of the states. The initial values varied from 0.0286 for Maharashtra to 0.4380 for Bihar. The growth rate at 1/2 of ceiling value was highly correlated with the value of growth rate of 1/4 of the ceiling value. Similarly, the correlation between the rates of growth at 3/4 and 1/2 ceiling values was found to be significant. The rate of growth was observed to be the highest with value 0.496 for West Bengal and the lowest for Rajasthan having value 0.0625 at 1/2 of the ceiling value. The ceiling value ranged from 1.00 for Orissa to 0.6580 for Madhya Pradesh. A multi-equation model was developed to describe variations in the values of the three parameters viz., initial value, rate of growth and ceiling value for the wheat crop. The model revealed that initial value was influenced to a very large extent by the value of the targets set for high yielding varieties programme in different states. The ceiling value was determined by the fraction of area irrigated under the wheat crop. The model also revealed that the rate of growth at 1/4 of the ceiling value was influenced by the per hectare consumption of fertilizers just before the introduction of high yeilding varieties of wheat in these states. One of the possible explanations for this could be that the high yielding varieties need assured irrigation and high doses of fertilizers. So the rate of adoption was higher in these states which already had high per hectare consumption of fertilizers during the mid sixties.

2. Implications of technological change for input use and output mix in crop production

The objectives of the project are (i) to

examine the effects of technical change on factor share and on input use and output mix in case of crop production, and (ii) to examine the suitability of different kinds of functions for studying technical change in agriculture. Cereals and pulses were covered in the first phase. Data collection work on production, area and yields of principal crops for the state of Uttar Pradesh was in progress.

3. Testing relative economic efficiency and determination of factor demand and output supply functions for wheat

The objectives of the project are (i) to test the relative economic efficiency between large and small farms of wheat crops, (ii) to determine the demand for labour and fertilizer in the production, and (iii) to determine the output supply function. The farm level data was used in the study. The results based on single equation estimates applied to profit functions were obtained for the state of Punjab. The analysis of data for joint estimation of economic efficiency and factor demand was in progress.

4. Study of farmers behaviour towards risk and its impact on cropping pattern, level of resource use and farm income

The project was initiated to study farmers' behaviour towards risk with respect to purchased inputs. The determinants of attitude of farmers towards risk as well as impact of risk on cropping pattern, level of resource use and farm income were investigated. The collection of farm level data on various aspects of risks, input use and farming conditions from farmers of Ghaziabad and Alwar districts was in progress.

DIVISION OF COMPUTING SCIENCE

Mandate

To develop computer software based on modern statistical methods for the analysis of agricultural and animal sciences research data and also to provide scientific support in research data analysis to research workers.

Thrust Areas

—Development of software for agricultural research data analysis

—Establishment of data bases and MIS

—Systems modelling

— Simulation

Software Development

—Four new programs were developed and a number of existing programs were modified to meet the requirements of users

—Software for Information System for agronomic practices of major crops, Graphical Text Writer, Decision Support System and Prototype Diagonostic System for rice insect/pests and diseases were developed.

Scientific Support in Research Data Analysis

—No. of Ph.D. Scholars	: 21
—No. of M.Sc. Scholars	: 23
—No. of other research workers	: 18

Computing Facilities

The old system Burroughs B 4700 was replaced by a new super mini COSMOS-486 computer system. All the units of the system are linked through Local Area Network (ETHERNET). The distribution of PCs is as follows :

(a) *Computing labs* : *Three*

lab 1 : equipped with 12 PC (XT) and 4 DMP (Dot Matrix Printers)

lab 2 : equipped with 4 PC (AT), 16 DT (Dumb Terminals) and 4 DMP

lab 3 : equipped with 20 DT and 4 DMP.

(b) *Divisional labs* : *Six*

5 labs : each equipped with 1 PC (AT), 4 DT and 1 DMP

1 lab : equipped with 12 PC (XT) and 9 DMP.

(c) *Graphics lab*

equipped with 1 PC (AT), a Digiti-

ser, a Mouse, 1 Laser Printer, X x Y Plotter, 1 DMP and 1 PC (XT)

(d) *Library*

equipped with 1 PC (XT), 2 DT and 1 DMP

(e) *Director*

equipped with 1 PC (AT) and 1 DMP

(f) *Joint Directors : Two*

each equipped with 1 PC (XT) and 1 DMP

(g) *P.A. to Director*

equipped with 1 PC (XT) and 1 printer

(h) *Heads/Principal Scientists : Thirteen*

each equipped with 1 PC and 1 DMP/printer on stand alone system

(i) *Chief Administrative Officer*

administrative lab equipped with 2 PC (XT) and 1 DMP

Computer Utilization

Details of computer utilisation are as under :

(A) *B-4700-Mainframe*

—No. of production jobs	: 271
—No. of testing jobs	: 226
—No. of listing jobs	: 118

(B) *P.C. System*

1. No. of P.C. users	: 4983
2. No. of hours for PC use	: 9627

For all the regular and ad-hoc training programs for computer application conducted by IASRI, P.C.s were used for practical classes and demonstration purposes.

(C) *Data Entry Unit*

—No. of batches created for recording	: 993
—No. of data records created	: 4.79 lacs
—No. of batches created for transfer from tape to floppies or vice-versa	: 476
—No. of records transferred from tape to floppies and vice versa	: 5.48 lacs

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 :

- Planning, designing and statistical analysis of the data relating to experiments conducted under AICARP on long term fertilizer experiments—Rahuri, Kalyani, Burdwan, Jorhat, Palampur, Bangalore and Coimbatore
- A sampling study on utilization of cross-bred working animals vis-a-vis non-descripts—District Kathua (J & K)
- —Pilot sample survey for estimation of yield of pepper and study of cultivation practices using successive sampling—Sindhudurg (Maharashtra), Kodagu (Karnataka) and Nilgiries and Coimbatore (Tamil Nadu)
- —Estimation of cost of production of sheep and wool—Tonk (Rajasthan)
- —Survey methodology to study economics of keeping goats—Mathura (Uttar Pradesh)
- Pilot sample survey for developing a sampling methodology for estimation of post production losses of milk in rural areas—Rohtak (Haryana)
- —Study of farmer's behaviour towards risk and its impact on cropping pattern, level of resource use and farmer income—Alwar (Rajasthan) and Ghaziabad (Uttar Pradesh)
- —Pilot sample survey to evolve a sampling methodology for estimation of area and yield of cultivated fodder crops other than berseem and jowar crop, cost of production and cultivation practices thereof—Ghaziabad district (U.P.)

UNDP CENTRE OF ADVANCED STUDIES IN AGRICULTURAL STATISTICS AND COMPUTER APPLICATIONS

This Institute was recognised as a Centre of Advanced Studies in Agricultural Statistics and Computer Applications by United Nations/FAO, under their development programmes from October 1, 1983. The main objective was 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. This project which was originally to terminate on March 31, 1991 has since been extended for further period and terminated on March 31, 1992.

During the period of this project the Institute has been able to modernise and reorient its research work and teaching programmes through interaction with consultants and counterpart training of faculty members and viable links have been established with overseas institutions for transfer of knowledge. There were 13 consultants making 19 visits covering 21.5 man-months. A study tour by the SPC and fellowship training for 16 faculty members totaling 80 man-months was completed under the sub-project. The project was also helpful in procuring equipments mostly for modernisation of the computer facilities. A number of recommendations, over 250, have been made by the consultants which have been very useful in development of a Centre of Excellence of the Institute. These recommendations have been summarized under different headings and made available to the Heads of Divisions and Cells for implementation.

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 these, 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 1991-92, 22 students were admitted to various courses : 9 Ph.D. and 4 M.Sc. in (Ag. Stat.) and 9 M.Sc. in (Computer Application in Agriculture). Fifteen students: 4 Ph.D. and 6 M.Sc. in Agricultural Statistics and 5 M.Sc. in Computer Application in Agriculture successfully completed their degree programmes.

Ad-hoc Training Courses

The XII and XIII short-term training courses on Use of Computer in Agricultural Research were organised during Sep. 3-13, 1991 and Sep. 18-30, 1991 respectively. The XII course was for scientific/technical personnel from ICAR Institutions located at Delhi. This was attended by 20 scientists/technical personnel from different Divisions of IARI and from IASRI. The XIII course was for participants from ICAR Institutes (outside Delhi) and State Agricultural Universities. This was attended by 17 participants from Agricultural Universities and ICAR Institutes.

A Valedictory function jointly for the two courses was held on Sep. 30, 1991. Prof. Prem Narain, Director, IASRI delivered the Valedictory Address and distributed certificates to 37 participants.

The XIV and XV short-term training courses on 'Use of Computer in Agricultural Research' were organised during March 3-13, 1992 and March 18-31, 1992 respectively. The XV Course was for scientific/technical personnel from ICAR Institutions located

at Delhi. This was attended by 24 participants. The XV Course was for participants from ICAR Institutes (outside Delhi) and State Agricultural Universities. This was attended by 21 participants. Dr. SK Raheja, Director, IASRI gave the Orientation Talk to participants of both the courses.

The main emphasis in the training was given on practical aspects of using micro computers, features of MS-DOS, Editors, solving of simple problems using BASIC language and use of MICROSTAT, PC CARP and dBASE III plus application packages. Adequate practice on work on PCs was provided to the trainees. A combined Valedictory Function for the two courses was held on March 31, 1992. Dr. SK Raheja gave the Welcome Address. Dr. SK Joshi, Director General, CSIR and Secretary, DSIR was the Chief Guest and distributed the certificates to the participants.

National Workshop-cum-Seminar

The IV Workshop-cum-Seminar on Software Development for Agricultural Extension Personnel was organised at the instance of the Directorate of Extension, Ministry of Agriculture, Govt. of India during August 23-30. Dr. SK Raheja, Joint Director, IASRI was the Course Director and Shri SN Mathur, the Course Coordinator.

The objective of the Workshop was to provide basic training on the use of microcomputers and relevant software to the officers of the Monitoring and Evaluation units under Training and Visit system of agricultural extension in various states. The training included BASIC programming language and software packages such as : WORDSTAR, MICROSTAT, LOTUS 1-2-3, dBase III plus and PC CARP. The faculty for the Workshop comprised Prof. Prem Narain, Director, Dr. SK Raheja, Joint Director, Sh SN Mathur, Prof. (CAA) and all scientists of the Division of Computing Science. The programme consisted of 17 lectures and 11 practicals on PCs covering various applications.

The Workshop was inaugurated by Shri SV Giri, the then Special Secretary to Govt. of India, Ministry of Agriculture on August 23. There were 20 participants from 10 states out of which 11 were from Agriculture Directorates and 9 from Animal Husbandry Departments. As a part of the course the participants were taken to NIC, New Delhi and were shown the working of National Computer Network (NICNET). A book exhibition of latest computer books was also arranged for information of the participants. The Valedictory Function was held on August 30, 1991. Dr SK Raheja, Joint Director and Course Director presented the main features of the workshop. Prof Prem Narain, Director, IASRI distributed the certificates and delivered the Valedictory Address.

Refresher Course in Agricultural Statistics

The Refresher Course in Agricultural

Dr SK Joshi, Director General, CSIR and Secretary, DSIR addressing the participants at the combined Valedictory Function of XIV and XV short-term training courses on 'Use of Computers in Agricultural Research'

Dr SK Raheja, Joint Director and Course Director addressing the participants of the Workshop-cum-Seminar on Software Development for Agricultural Extension Personnel

Statistics was organised for the benefit of scientists and other personnel working in ICAR Institutes and Agricultural Universities.

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 Fourth Refresher Course in Statistics for Agricultural Scientists was organised in the Institute from Dec 16, 1991 to March 13, 1992. The Valedictory Function was held on March 12. Dr VL Chopra, Director General, ICAR and Secretary, DARE delivered the Valedictory Address and distributed the certificates to the 12 participants.

International Training Course

The Fourth International Training Course on 'Techniques of estimation of output of food crops' was organised at this Institute during Feb 3-Mar 12, 1992. The course was jointly organised by Ministry of External Affairs, Govt. of India under its ITEC programme and Afro Asian Rural Reconstruction Organisation (AARRO). Ten participants from 7 Afro-Asian countries—2 each from Egypt, Yeman & Sudan and one each from Sierra Leone, Philippines, Malaysia and Jordon attended the training course. The training course was inaugurated by Shri Ahmed A Khalil, Secretary General, AARRO on Feb 23, 1992.

The training programme comprised lectures and practicals on sampling methods, statistical methods, computer programming and use of application software and storage and marketing system of food grains in India. Particular emphasis was laid on methods of area and yield estimation followed in India for estimating the production of food grains. For this purpose besides giving lectures on the subject of area and yield estimation the participants were also taken to the states of Karnataka and Kerala for practical demonstration of area and yield estimation in non-land records and land record states.

A combined Valedictory Function of this course and the Fourth Refresher Course in Agricultural Statistics was held on March 12, 1992 in which Dr VL Chopra, Director General, ICAR and Secretary, DARE was the Chief Guest. Dr SK Raheja, Director, IASRI welcomed the Chief Guest and gave introductory remarks. The Chief Guest delivered the Valedictory Address and distributed the certificates.

Commonwealth Training Course

A training course on Methodology of Agricultural Sample Surveys, Crop Yield Modelling and Computer Programming was conducted by the Indian Agri-

cultural Statistics Research Institute in collaboration with Food Production and Rural Development Division of Commonwealth Secretariat, London. The funds for the training course were provided under the Fellowship and Training programme of the Commonwealth Fund for Technical Cooperation, London. The training course was organised in pursuance of the recommendations of two workshops on Food Supply Information Systems in Africa held at New Delhi, India during Oct 13-25, 1986 and at Nairobi, Kenya during Mar 13-17, 1989.

The training course was organised at IASRI, New Delhi during the period Mar 17—Apr 30, 1992. Thirteen participants from 10 Commonwealth African countries viz. Botswana, Ghana, Gambia, Kenya, Lisotho, Malawi, Nigeria, Sierra Leone, Uganda and Zambia attended the training course. Prof. Ben Kiregyera, FAO Agricultural Statistician and Census Adviser, Lusaka, Zambia served as the Resource Person and a member of the Faculty for the training course.

The training course was inaugurated by Prof. VL Chopra, Director General, ICAR and Secretary, DARE. He was welcomed on behalf of IASRI by Dr. SK Raheja, Director and on behalf of Commonwealth Secretariat by Mr. JK Muthama, Director, Food Production and Rural Development Division. Mr. GL Bailur, Assistant Director, FPRD explained the genesis of the training course and the Vote of Thanks was given by Dr. OP Kathuria, Course Co-ordinator.

In his welcome address, Dr. Raheja referred to the role played by the Institute in developing agricultural statistics system in India. He recalled the process of evolution of the Institute from a small Statistical Section of ICAR in 1930 to its present status as a premier Institute whose aims are to promote and conduct research in agricultural statistics and computer application in agriculture for improving the planning and evaluation of agricultural research and development. The method of estimation of yield of principal crops through crop cutting experiments in randomly located farmers fields, he said, is regarded by far the most significant contribution of the Institute. This technique is now being widely adopted for estimating production of the principal crops not only in India but also in other countries in Asia and Africa. It was in this context that the Commonwealth Secretariat and the Economic Commission for Africa desired that the expertise available at the IASRI should be utilized to acquaint statisticians in African countries with the statistical methodologies developed at this Institute. The present training course is an outcome of these efforts, he said. Mr. Muthama in his remarks stated that the Commonwealth Secretariat, which is an inter-governmental organisation charged with the task of exchange of information, organisation of consultations and execution of co-operative and collaborative programmes as mandated

Dr VL Chopra, Director General, ICAR and Secretary, DARE delivering the Valedictory address at the combined function of Refresher Course in Agricultural Statistics and International Training Course on Techniques of Estimation of Output of Food Crops

Dr SK Raheja, Director delivering his Welcome address at the Inaugural Function of Commonwealth Training Course on Methodology of Agricultural Sample Surveys, Crop Yield Modelling and Computer Programming

by the Commonwealth Heads of Governments and Ministers at their periodical meetings. He stated that the aim of FPRD is to assist Commonwealth member countries in increasing food security and improving quality of life of rural people through exposure to new techniques in technology, training and exchange of experience and discussion of policy options. The present training course had been designed to fulfill these objectives, he said. Commonwealth Fund for Technical Cooperation (CFTC) is the operational arm of the Secretariat and provides assistance for development to member countries. The present training course has been financed by the CFTC under its Fellowship and Training Programme, he said. In his Inaugural Address Prof. VL Chopra, Director General, ICAR emphasised the important contributions made by statisticians like Mahalanobis, Sukhatme and Panse in agricultural planning and policy making in the country. He noted that in the past, India has passed through periods of low productivity and stagnation in average yields until the introduction of high yielding varieties during early 70's brought a quantum jump in its agricultural productivity and production. He stated that cropping and climatic conditions in several African countries are similar to those prevailing in many parts of India. These countries could therefore derive maximum benefit from the Indian experience. He appreciated the role played by Commonwealth Secretariat in arranging the present training course at IASRI which has earned recognition for its outstanding contributions in development of statistical methodologies for estimating output of crops, livestock and fisheries.

Training programmes organised for trainees from other organisations

Sl. No.	Name of programme	Dates	No. of trainees	Agency sponsoring the programme	Lectures delivered by
1	2	3	4	5	6
1.	M. Stat., ISI, Calcutta	June 06	30	CSO, New Delhi	Dr SK Raheja Sh PN Bhargava Dr PC Mehrotra Dr BS Sharma Dr Ranjana Agrawal Sh Shanti Sarup
2.	JCC in Statistics specialised training in 'Organisation of Large Scale Sample Survey'	June 11-18	3	CSO, New Delhi	Dr HP Singh Dr PC Mehrotra Dr AK Srivastava Sh VS Rustogi Dr MG Mittal

1	2	3	4	5	6
					Dr Shivtar Singh Dr HVL Bathla Sh Anand Prakash Sh TB Jain Sh RL Rustagi Sh KB Singh Dr KK Tyagi Sh MS Batra Dr DL Ahuja Sh SN Arya Sh KPS Nirman Sh Satya Pal Sh JP Goyal Sh HC Gupta
3.	Participants of regular course of International Statistics Education Centre, Calcutta	Oct 10 and Nov 06	12	CSO, New Delhi	Sh PN Bhargava Dr HP Singh Dr PC Mehrotra Dr VK Sharma Sh R Gopalan Dr Ranjana Agrawal Dr VK Bhatia Dr RC Jain
4.	Participants of Junior Certificate Course in Statistics	Feb 19, 1992	9	CSO, New Delhi	Dr SK Raheja Dr PR Sreenath Dr Ranjana Agrawal
5.	M.Sc. (Stat.)	Mar 25, 1992	24	Punjab University, Chandigarh	Dr SK Raheja Sh SK Sablania

Research Fellowships

During 1991-92, 24 M. Sc. and 22 Ph. D. students received reserch fellowship. M. Sc. students received fellowship at the rate of Rs. 1200/ p.m. each besides Rs. 3000/ per annum as contingent grant. Out of the 22 Ph. D. students 8 received fellowship at the rate of Rs. 1800/- p.m. each in the I and II year and 14 students received fellowship at the rate of Rs. 2100/- p.m. in the III year in addition to Rs. 5000/- per annum as contingent grant.

Hostels

There was two well furnished hostels viz. Panse Hostel and Sukhatme Hostel

Group photograph of IASRI students with Director and Faculty Members after receiving degrees at XXX Convocation of IARI, New Delhi

Sh Kishori Lal, Director (Personnel), ICAR releasing the Souvenir at Students' Annual Day Function

to cater to the residential requirements of the students of M.Sc. and Ph. D. coures at the Institute within its premises. Officers and other trainees to the various other refresher, short-term and ad-hoc courses organised at the Institute are also provided residential accommodation in the Panse Hostel. Ample facilities exist for cultural activities and sports for the hostel in-mates. Hostel mess is run by the students on cooperative basis. The general management of the hostels is vested in the Warden, who is assisted by Prefect and the other students. Dr. BS Sharma, Principal Scientist took over as warden from Dr PR Sreenath, Principal Scientist in December, 1991. During the year under report the main activities in the hostels are given below :

—Annual sports meet of students was organised.

—Election of General Body meeting of students held during October, 1991 at which a new Executive Committee for the season 1991-92 was elected.

—Annual Day of the Hostel was celebrated on July 2, 1991.

—Diwali, Christmas, New Year Day and Holi were celebrated.

—Students of IASRI receiving M. Sc. and Ph. D. degrees were felicitated jointly by the Director and the faculty of the Institute.

—Students participated in the IARI sports meet and won several prizes in team as well as individual events.

Students Annual Day

The Students Annual Day was celebrated on July 2, 1991 alongwith the Annual Day of the Institute. On this occasion, sports events were also organised. Sh Kishori Lal, Director (Personnel), ICAR was the Chief Guest at the function Dr SK Raheja, Acting Director, IASRI welcomed the Chief Guest and staff members to the students' function. A Souvenir was brought out by the students on the occassion. The Prefect of the Hostels presented a brief report on the activities of the students. The Chief Guest distributed prizes to the students for various athletics, team and other sports events. Dr PR Sreenath, Warden of the Hostel gave the Vote of Thanks. The function was followed by a variety entertainment programme organized by the students.

Seminars

The results 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. In addition, eminent persons in agriculture and allied fields are also invited to deliver seminar talks for the benefit of scientists and students of the Institute. During the period under report, 75 talks were delivered by the scientists, research scholars and outside experts. The invited talks delivered by eminent scientists are given below :

Sl. No.	Speaker	Topics
1.	Sh KS Aneja, Honorary Chief Executive, Consumer Education and Research Centre, Ahemdabad	Individual consumer environmental protection
2.	Dr BD Tikkiwal, Ex Sr Prof. of Statistics, University of Rajasthan, Jaipur	(i) The role of fixed and mixed effects ANOVA models in simulation of experimental data (ii) The problem of small domain estimation (iii) SRA techniques and its role in crop estimation at district and lower levels
3.	Sh Pratap Narain, Ex Director, FAI	Policy imperative for growth of fertilizer industry in India
4.	Dr Virendra Kumar, General Manager (Marketing), IFFCO	Fertilizer scenario in India and its use efficiency
5.	Dr Joseph Kurian, Associate Professor, Department of Mathematics and Computer Science, Grambling State University, Grambling, Loisiana, U.S.A.	(i) The most generalized matrix eigen-value problem and its applications (ii) Unix-simple system administration.

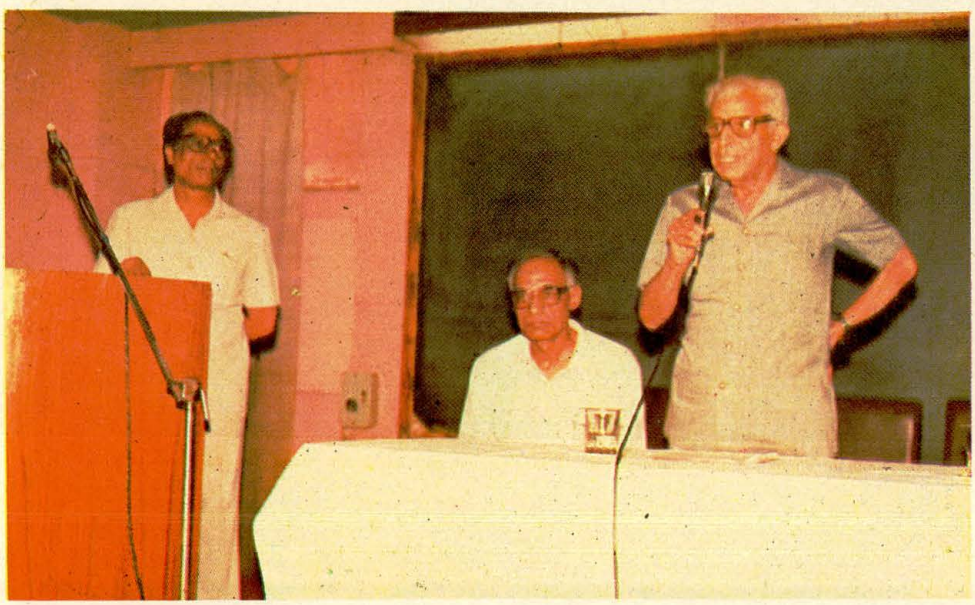
Summer Institute

A Summer Institute on 'Forecasting Technology with special reference to Agriculture' sponsored by Indian Council of Agricultural Research, New Delhi was organised at IASRI, New Delhi during November 11 to 30. The objectives of the Summer Institute were to educate the participants on the state of art in forecasting techniques to acquaint the participants on latest developments in related fields and to identify gaps and needs in the field of forecasting research. There were 23 participants from various organisations in 14 states and New Delhi.

The Summer Institute consisted of lectures/practicals / demonstrations/group discussions on various topics, In all, there were 60 lectures and 10 practicals. The topics covered were :

(i) Use of software packages on PC, statistical methods, sampling techniques and planning of ex-

Dr A Ahmed, DDG (Education), ICAR delivering the Valedictory address to the participants of Summer Institute on Forecasting Technology with special reference to agriculture



Dr GR Seth, Former Director, IASRI giving expert comments at the session on 'Highlights of the Institute research activities' at the Annual Day Function of the Institute

periments relating to forecast studies.

(ii) Agrometeorology and weather forecasting.

(iii) Crop physiology, growth conditions and major diseases/pests of the crop.

(iv) Crop growth simulation models

(v) System dynamics

(vi) Agrometeorological crop monitoring

(vii) Time series analysis, and

(viii) Various approaches to forecasting

The faculty was drawn from IASRI, IARI, ICAR, CES, DSTG, IMD, NISTADS, CSIR, IRMS (ICMR), ISI and University of Delhi.

Dr A Ahmed, DDG (Education), ICAR delivered the Valedictory Adress on Nov 30 and distributed certificates to the participants.

Advisory Service

The Institute continued to play the important role of giving technical advice and guidance in regard to problems in Agricultural Statistics particularly in the statistical aspects of the projects financed by the ICAR.

Technical advice and guidance were also provided to research workers and students of the various research Institutes. Agricultural Universities and other research organisations in planning of their investigations and in the processing and analysis of data on the computer. During the year under report the technical advice and guidance were provided to the following.

—Joint Secretary and Extension Commissioner, Directorate of Extension, Govt. of India on planning of study 'Functioning of Monitoring and Evalutaion Units' in different states.

—DDG, ICAR and Project Director, PDCSR for planning of experiment under AICARP (ICAR).

—Indian Grain Storage Institue, Hapur regarding the project formulation for estimating post—harvest losses of wheat and paddy.

—Statistician, Department of Agriculture, H.P., Shimla on monitoring and evaluation of Training and Visit programme in H.P.

—Joint Secretary (Extn.), Ministry of Agriculture, New Delhi, in finalization of Monitoring and Evaluation Manual

—Dr Hammond Murray Rust, Project Coordinator, International Irrigation Management Institute, Colombo on planning of survey for evaluation of irrigation system

—Head (Extension) and Project Leader, IARI, New Delhi, in the planning of yield estimation survey for study of effect of improved package of practices on mustard crop.

LIBRARY AND DOCUMENTATION SERVICES

Resource Building

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

Total number of publications as on March 31, 1992

Books	—	22,279
Hindi Books	—	279
Journals	—	2,975
Reports etc.	—	6,395

Number of publications added during 1991-92

Books	—	656
Journals	—	1100 issues
Reports etc.	—	195
Journals subscribed		
Indian	—	60
Foreign	—	125

Bulletin/Newsletters received on gratis/exchange — 90

Number of reprints procured during 1991-92

For exchange	—	4
For users	—	107

Maintenance

Publications bound — 688

Library Usage

Working hours	: 9.30 A.M. to 4.30 P.M.
Number of readers consulted the library	: 26,200
Number of publications issued from the library	: 28,800

Library Users

Number of bonafide library members	—305
Number of students (regular) members	—30
Number of ad-hoc trainee users	—80

Library Services

Number of documents borrowed or lent out on inter library loan basis	—55
Number of pages of scientific and technical nature reprographed	—89,731
Number of issues of 'Current Content Mirror' brought out	—24

Library Management

The management of the library is looked after by a Library Committee

with Director as Chairman and Heads of Divisions and Professors as members.

Art and Photography Unit

Art Unit assisted the scientists in preparing diagrams, charts, histograms and maps for research publications 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 500 photographs taken on various important occasions and of important research and extension activities of the Institute were undertaken. In addition, enlargement of a large number of photographs was 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 added to the existing ones depicting current research findings. Photographs taken at the special occasions were also displayed.

PUBLICATIONS

Research Papers

The major publications of the Institute comprised over 50 papers and popular articles the details of which are as follows :

Research Papers Published

1. ARYA, SN (1991). A survey of demographic research relating to bovine populations in rural India. *Agricultural Reviews*, 12 (1) : 37-48.
2. BAROH, GS; CHAUDHRY, ML; SANDHU, ML and DUTTA, OP (1991). Inheritance of egg-specific gravity and related egg-characters and inter-relationships with other economic traits in chicken. *Ind. J. Animal Sciences*, 61 (10) : 1112-1116.
3. BASANT LAL (1991). Stability of different agronomic systems followed in pigeon pea (cajanus cajan)-green gram (phoseolus radiatus) intercropping. *Ind. J. Agri. Sciences*, 61 (3) : 190-92.
4. BATHLA, HVL; KATHURIA, OP and WALIA, SS (1991). Estimation of fish catch from ponds and tanks and its disposal. *Punjab Fisheries Bulletin*, 15 (1) : 17-20.
5. BHATIA, VK (1992). A note on the modified regression analysis for assessing stability of crop varieties, *Annals of Agril. Research*, 12 (4).
6. BHATIA, VK; NARAIN, P and MALHOTRA, PK (1992). Comparison of culling patterns of different categories of dairy animals—Non-parametric approach. *Ind. J. Dairy Sci.*, 45 (3) : 114-118.
7. CHANDRAHAS and SINGH, BH (1991). Study of sample size in surveys on crop yield forecasting. *Agri. Sci. Digest*, 11 (1) : 11-15.
8. DEY, A; SRIVASTAVA, R and GUPTA, VK (1991). Robust designs—A review and bibliography. *C. du. CERO*, (1-2) : 51-61.
9. GUPTA, VK; SISODIA, BVS and AGARWAL, SK (1991). A study of the performance of an alternative estimator of population total for unequal probability sampling procedures. *Cahiers DU CERO*, 33(1-2); 71-78.
10. JAIN, RC and AGRAWAL, RANJANA (1992). Probability model for crop yield forecasting. *Biom. J.*, 34(3).

11. JAIRATH, MS and SARUP, SHANTI. Regional variation in agricultural development—A case study of hilly state. *Agricultural Situation in India*, 46(7) : 515-519.

12. LALCHAND (1990). Use of discriminant function to study the relationship among different genetic groups based on multiple traits in dairy animals. *Indian J. Dairy Sci.*, 43(2) : 214-220.

13. MAHAJAN, RK end SRIVASTAVA, AK (1991). Sampling from two dimensional population. *J. of Indian Soc. of Agri. Statistics*, 43(2) :

14. NARAIN, P (1991). Some theoretical studies in population genetics. *Proceedings of Seminar on Genetic Studies in India—Impact of Haldane, Ed. JS Murty, Usmania University*, Hyderabad (1990).

15. NARAIN, P; BHARGAVA, PN and BHATNAGAR, KC (1991). Economics of zinc use in cereal crops. *Proc. of National Seminar on 'Importance of Zinc in Agriculture'*, Lucknow : 65-81.

16. NARAIN, P; RAI, SC and SARUP SHANTI (1991). Statistical evaluation of development on socio-economic front. *J. of Indian Soc. of Agri. Statistics*, 43 (3) : 329-345.

17. PANDEY, RK and BHARDWAJ, SP (1990). Analysis of international trade in sugar. *J. Indian Sugar, 39, March* : 919-923.

18. SHARMA, BS and PIRCHNER, F (1991). Heterosis in Friesian X Sahiwal crosses. *J. Animal Breed. Genet.*, 1-8 : 241-252.

19. SRIVASTAVA, R; GUPTA, VK and DEY, A (1991). Robustness of some designs against missing data. *J. Appl. Statist.*, 18(3) : 313-318.

20. SRIVASTAVA, SS (1991). Bibliometrical study on research collaboration in the field of statistical sciences. *Proc. of Workshop on Productivity and Impact of Research : Scientometric and Bibliometric held on June 25-29, 1991 at NAARM, Hyderabad.*

21. VERMA, D and JAIN, JP (1991). Admissible correlation estimator of heritability. *J. of Indian Soc. of Agri. Statistics*, 43(2) : 158-162.

22. VERMA, D and JAIN, JP (1991). Improved estimation of heritability through scaling. *Biom. J.*, 33(7) : 851-854.

23. WAHI, SD (1991). Comparative performance of two linear procedures of discrimination in clustering different grades of sheep. *Indian J. Heridity*, 22(1) : 24-31

24. WAHI,S D and BHATTACHARJEE, SK and SUMAN, CL (1991). Factor analysis in Gerbera. *Indian J. Agri. Research*, 25(4) : 194-198.

25. WAHI, SD and KHER, KK (1991). A comparison of clustering procedures based on multiple traits in Gerbera and Dohlia. *Indian J. Genet.*, 51(3) : 61-69

Papers Accepted for Publication

1. ARYA, SN and BHATIA, DK. Incidence of some livestock diseases in Tamil Nadu. *Indian J. Animal Sci.*

2. BHATIA, DK; NIGAM, AK; BAJPAI, SN and MATHUR, DC. Statistical evaluation of animal nutrition experiments. *Indian J. Animal Sci.*

3. CHAUDHARY, BL and BHATIA, AK. Mixed Vs intercropping for wheat and mustard. *Annals of Agril. Res.*

4. GUPTA, VK and SRIVASTAVA, R (1991). Investigations on robustness of block design against missing observations. *Sankhya*, 53, Series B : 3

5. JAIN, RC and DAS, MN. Efficiency balanced block designs using orthogonal arrays. *Cal. Stat. Assoc. Bulletin*

6. JAISWAL, UC; JAIN, JP and KHANNA, AS. Bending of parameter estimates in non-orthogonal data to improve expected genetic gain through index selection. *Biom. J.*

7. KUTAULA, SS (1991). Application of stochastic frontier for the measurement of technical efficiency of paddy crop grown under land reclaimation technology. *J. Agril. Econ. Res. Review*, 4(2)

8. KUTAULA, SS. Resource use efficiency and its relevance in agriculture. *J. Ind. Soc. Agril. Sci.* (Seminar issue)

9. MAHAJAN, RK and SRIVASTAVA, AK. Sampling from two dimensional populations. *J. of Indian Soc. of Agri. Statistics.*

10. MURALIDHARAN, K and JAIN, JP. Response to selection under non-random mating. I. Partitioning genetic variance. *Biom. J.*

11. MURALIDHARAN, K and JAIN, JP. Response to selection under non-random mating II. Prediction. *Biom. J.*

12. MURALIDHARAN, K and JAIN, JP. Gene flow technique for response to selection under non-random mating. *Biom. J.*

13. NARAIN, P; JAIN, JP and PANDEY, RK. Statistical research in agriculture in nineties. *Annals of Agricultural Research*

14. PANDEY, RK and SARUP, SHANTI. Study of growth and factors affecting rice production in Orissa. *J. Agril. Issues.*

15. RAI, T; MOHAN LAL and BATRA, MS. Variety-wise production functions of banana under climatic conditions of Gujarat state. *J. Agril. Sci. Digest*

16. RAI, T and SATYAPAL. Adopted doses of fertilizer nutrients for optimum rice production. *Indian J. Agril. Sci.*

17. RANA, PS. A note on the performance of crossbred cows at military dairy farms, *J. CHEIRON.*

18. RANA, PS. On stochasticity in compartment models for physiological kinetics. *Proceeding of the National Symposium on Modelling : Stochastic Processes and O.R.*

19. RANA, PS. Modelling in animal nutrition. *Agricultural Review*

20. SAKSENA, ASHA; MEHTA, SC and BHARGAVA, PN. Drought threshold for a rainfed crop. *J. of Indian Soc. of Dryland Agriculture.*

21. SATYAPAL and RAI, T. Adopted doses of fertilizer nutrients for optimum wheat production. *Indian J. Agril. Sci.*

22. SHARMA, VK. Estimation of seemingly unrelated regression with unequal numbers of observations. *Sankhya.* Series B.

23. SINGH, JAGMOHAN and SINGH, BH. Forecasting of yield of field crops in flood-affected areas in UP. *J. of Agricultural Sci. Digest.*

24. SINGH, RAJENDRA and KATHURIA, OP. Supplimentary information randomised response model. *J. of Indian Soc. of Agri. Statistics, April, 1992*

25. SINGH, RANDHIR; GOYAL, RC; SAHA, SK and CHHIKARA, RAJ S. Use of satellite spectral data in crop yield estimation surveys. *International J. of Remote Sensing.*

26. WAHI, SD and BHATIA, VK (1992). Use of bootstrap method in comparing the performance of linear discriminent function. *J. of Indian Soc. of Agri. Statistics.*

27. WAHI, SD and KHER, KK. Cluster analysis using multiple traits (based on D^2 statistics). *J. Genet & Plant Breeding*

Research Reports

1. ANAND PRAKASH; SEXENA, BC and MAINI, JS (1991). Estimation of area of grazing land and its utilisation, Chingleput district, Tamil Nadu.

2. ARYA, SN and NADKARNI, UG (1989). A comparative study of some methods for estimating mortality rates in bovines.

3. BANERJEE, AK; AHUJA, DL; JAIN, VK; KATHURIA, OP and RAHEJA, SK (1991). Pilot sample survey for estimation of cost of cultivation of oilseeds and pulses crops.

4. BATRA, MS and KATHURIA, OP (1991). Pilot sample survey for determining the cost of production of chikoo and studying its marketing practices in Valsad district of Gujarat.

5. BHATIA, VK and MALHOTRA, PK (1990). Statistical studies in animal epidemiology.

6. GOYAL, JP; MAINI, JS; SINGH, KB and KHATRI, RS (1991). Pilot sample survey for estimation of production of hides and skins, Tamil Nadu.

7. LAL CHAND and NARAIN, PREM (1991) Investigations on appropriate statistical methods for comparing genetic groups based on multiple traits in dairy animals.

8 NIRMAN, KPS; JAIN, JP and BALBIR SINGH (1991). Pilot survey to develop statistical models for production and culling patterns in poultry.

9. PRABHAKARAN, VT and BHAGWAN DASS (1991). Development of a suitable methodology to study the effect of housing conditions and other related factors on milk production under village conditions.

10. SINGH, BH; JAIN, RC and MADAN MOHAN (1991). Pilot studies on pre-harvest forecasting of yield of ground-nut crop on the basis of data on biometrical characters, weather variables and agricultural inputs, Rajkot district (Gujarat), 1984-86.

11. SINGH, HP; JAIN, JP and SAXENA, BC (1991). Pilot studies for assessing losses due to diseases and pests in bovines.

12. SHIVTAR SINGH; RUSTAGI, RL and AGARWAL, HO (1989). Studies on comparative performance of mixed farming involving crops, livestock, poultry, and fish.

Books Published

Recent Advance in Agricultural Statistics Research, 1991. Selected papers presented at the symposia on (i) Growth and Instability in Agriculture, (ii) Sample Surveys in Indian Agriculture—Problems and Prospects, and (iii) Statistical Ecology organised at IASRI during the 40th Anniversary of India's Independence, edited by P. Narain et. al., Wiley Eastern Ltd., New Delhi.

JAIN, J.P. 1992. *Statistical Techniques in Quantitative Genetics*, 2nd Edn. Hindustan Publishing Corp., Delhi.

Jain, J.P. and V.T. Prabhakaran, 1992. *Genetics of Populations.* South Asian Publishers, New Delhi.

Dissertations Approved

Ph. D. Degree

1. KAMALESH NARAIN SINGH—A study of errors of measurement

Sampling and non-sampling errors are responsible for lessening the reliability of results derived from any sample survey. Even a complete count of the population involves the so called non-sampling errors, which may in many cases be more serious than the sampling error. Therefore, it is of paramount interest to study the contribution of non-sampling errors towards the variance of the estimator. The present thesis deals with the study of some aspect of measurement errors and estimation of variance when data contains measurement errors as well as imputation errors.

The study of measurement errors arising due to enumerator and respondents simultaneously and estimation of the enumerator effect respondent effect and the interaction effect caused by enumerators and respondents have been attempted using a general linear model. Further the problem of testing the significance of contributions towards variance due to these factors have also been tackled.

In situations where data is subject to large response errors and imputation errors, the contribution towards total variance due to these non-sampling errors components may be quite significant and the usual unbiased estimation of variance may be seriously biased. The problem of estimation of variance in the presence of response errors and imputation errors has also been attempted. Four different variance estimators have been developed. The first estimator is obtained by usual design unbaised variance estimator available in classical sampling theory replacing the true values by the observed values. This estimator becomes biased due to presence of non-sampling errors. This bias depend upon distribution of the response errors or imputation errors. The second estimator of variance is also a biased estimator. But the bias of this estimator is independent of the distribution of the response errors or imputation errors. The third variance estimator is based on quardratic function of observed values. It is also a biased estimator which can be reduced or eliminated altogether through proper choice of the coefficients. Fourth variance estimator is based on quadratic function of observed values. It is assumed here that the sample units can be divided into two groups, such that each ordered pair of sample units fall into one of the two sets. This estimator is also biased, but this bias can be reduced to zero in certain situation.

(Guide: Dr. Randhir Singh)

2. PRAGGYA DASS—Studies on optimality of designs

Universal optimality of designs in various classes of connected binary block designs has been studied under a fixed effects, additive linear model with the errors following a general variance—covariance structure. Several methods of construction of proper and non-proper universally optimal designs are given.

E-optimality and universal optimality of block designs, with equal and unequal block sizes, in various classes of connected block designs is studied under uncorrelated and heteroscedastic error model as well as under homoscedastic model with constant correlation (not equal to zero) among observations.

Some incomplete block designs for symmetrical parallel line assays have also been studied. Optimality criteria for bioassays are defined and optimal designs for symmetrical parallel line assays as per these criteria are obtained for multiple test preparations. The analysis of such designs are also provided.

(Guide : Dr. VK Gupta)

3. **RAJENDER PARSAD—Studies of optimality of incomplete block designs with unequal block sizes for making test treatments control comparisons under a hetroscedastic model**

In this investigation, we consider the experimental settings in which it is desired to compare v-test treatments with our control treatments via experimental designs in which experimental units are arranged with blocks of different sizes (mostly natural blocks). Since we are dealing with block designs with unequal block sizes, the assumption of constant variances of observations may not hold if the block sizes differ widely. Under such situations, one has to assume as appropriate, realistic heteroscedastic model. For this purpose, it is assumed that intra block variances of observations are certain non-negative integral power of block sizes. Under this heteroscedastic setting we find Balance Test Treatments Incomplete Block Designs with Unequal Block sizes (BTIUB Designs) of type G. Some sufficient conditions are obtained to establish the treatment controlled comparable designs under the heteroscedastic model, the class of competing designs comprises of designs with unequal block sizes. A necessary condition for A-optimality of BTIUB Designs of type G is also given. Some general methods of contribution of BTIUB Designs of type G are given. A-efficiencies of these designs are investigated and catalogued along with their design parameters. Also a catalogue of A-optimal binary BTIUB Design of type G is also prepared. Unfortunately, a BTIUB Design of type G does not exist for every parametric combination. In such situation, one has to look for designs which although do not make all test treatment control comparisons with the same variance, but have high efficiencies. Keeping this fact in view, we introduced group divisible treatment designs with unequal block sizes (GDTUB Designs) of type G as a natural extension of BTIUB Designs of type G. A GDTUB Design of type G is also an extension of the concept of Group Divisible Treatment Designs, introduced by Jacroux (1987). The conditions for the D-optimality of GDTUB Designs of type G are given in the class of designs which are binary in test treatments and control treatment is added same number of times to each block of same size, and it is done

in at least one set of block. Two methods of construction of GDTUB Designs under a homoscedastic model as well as a catalogue of A-optimal GDTUB Design of type G when the intra block variances are proportional to block sizes are also given.

(Guide: Dr. RC Jain)

M Sc. (Ag. Stat.)

1. BIDYUT KUMAR—Prototype diagnostic system for rice insect—pests and diseases

Diagnostic systems are knowledge system which manipulate knowledge to solve problem efficiently and effectively in a narrow problem area. Knowledge system development potential exists in agriculture and farm management. These systems could help to make non-domain knowledge more frequently available to farmers and farm managers Insect-pest and disease diagnosis based on plant damage symptoms and insect-pest description observed, is an important application area of knowledge system. A rule based knowledge system called 'Prototype Diagnostic System for Rice Insect-Pests and Diseases' was developed. The prototype uses knowledge engineering techniques to provide disease or insect identification and control advice to users. The prototype uses knowledge system techniques to ask questions and gives advice and recommendations. Identification and control knowledge for insects and diseases, derived from written sources was effectively captured in the rule-based prototype knowledge system. The use a knowledge system similar to this prototype developed, would allow farmers and extension workers rapid access to expert-advice about the identification and control of agriculturally important insect-pests and diseases.

(Guide : Shri SN Mathur)

2. JB MURLIDHAR—Sampling methodology for estimation of total number of pigs and number of pigs s'aughtered in a district

Various estimators for estimating the total number of pigs and number of pigs slaughtered are discussed. The efficiency of various estimators has been studied empirically. For this purpose the data collected under the pilot survey for estimation of number of pigs slaughtered and study of attendant swine practices for Aligarh district of Uttar Pradesh for the year 1978-79 has been utilised. For the most efficient estimator the sample size required for estimating the total number of pigs and number of pigs slaughtered with given precision has also been determined. The various estimators considered are (1) Simple estimator, (2) Separate ratio estimator, (3) Combined ratio estimator, (4) Generalised ratio estimator, (5) Unbiased ratio estimator and (6) Regression estimator. The following auxiliary characters have been tried viz , (a) Number of pigs as per livestock census 1978, (b) Number of persons of scheduled castes according

to 1971 population census and (c) Number of persons of scheduled castes according to 1981 population census.

(Guide : Shri VS Rustogi)

3. **K THENNARASU—Studies on projection of livestock population and their products**

For the implementation of livestock development programmes on scientific lines, the need for the projection of different categories of livestock for future years is a prerequisite. In this dissertation, a detailed analysis of the various categories of livestock data has been carried out. First chapter includes a detailed note on present livestock position of India in the world and vis-a-vis developed and developing countries along with their number and production figures.

In the second chapter, a brief of the previous work done in the field of trend analysis and the curve fitting has been given. It includes various smoothing aspects also. In particular, the technique of exponential smoothing has been discussed at length. The details of the material and methods used for the study are discussed with their advantages and disadvantages like the classification of the categories of livestock. The various categories of livestock are given in detail. The source of the data for the milk and meat production are given. The need for a meat production. Statistical publication can be seen with the less number of available data point, and the accurate data relating to the number of animals slaughtered and the average production per animal were discussed.

The fourth chapter pertains to statistical analysis which includes discussion on the procedures and the methodologies along with various trend curves with their fitting aspects. Various projections have been described in terms of graphs and the percentage error of forecast for the period 1982 has been calculated for the suggested models and the best fitted models with their R^2 are given in detail.

(Guide : Dr HP Singh)

4. **MS ANURADHA—Analysis of data from intercropping experiments**

Interpretation of intercropping data and its analysis presents considerable problems since the magnitude or even the existence of yield advantage over sole cropping is not immediately apparent. The usual assumption of homoscedasticity may not be valid in intercropping experiments because the factors like spacing, crop geometry, intercropping proportions etc. could be responsible for heteroscedasticity.

In the present study, eleven sets of data on intercropping experiments, with wheat and gram crop as component crops were studied. It was observed that the heteroscedasticity is more prevalent in gram crop than in wheat crop component. This could possibly be attributable to the fact that the CV of the proportional areas occupied by the gram crop and wheat crop components were nearly

in the ratio 11 : 5. The relative values of the unequal variances associated with the different levels of a factor were estimated with the help of components of error mean square and were used for drawing conclusions with the help of approximated distributions.

A comparison of the bivariate method of analysis and the univariate method showed that the bivariate method tends to show the significance of different effects more often than they actually exist. Drawing of contours might help for the pairwise comparison of the levels of different factors in case of real significance under the bivariate method. However, this has certain limitations. The univariate method of analysis has provided methods for drawing the conclusions of the significance of various main effects, interactions and other treatment contrasts under different situations/ criteria.

(Guide : Dr. PR Sreenath)

5. PK DAS—Statistical studies on single species growth models

Mathematical models play an important role in agricultural research. Non-linear growth models are an important tool to study the growth of an organism, plants and animals. In this thesis, review of single species growth models, viz. Malthusian, monomolecular, logistic, Gompertz and Richards has been done. Their derivations and properties have also been investigated. One drawback of all these models is that they are deterministic in nature. They can be replaced by more realistic statistical models by adding an error term on the right hand side of the underlying equations. The main assumptions made for the errors are that they are independent and normally distributed.

Some applications of growth models in different branches of agriculture such as Fishery harvesting and management. Adoption of high yielding varieties, Poultry management and Plant disease epidemiology have been discussed. The utility of such models is that, on one hand, they provide us insight into the underlying mechanism while, on the other, they help us in efficient management.

As the resulting statistical models are non-linear; the usual method of least squares for estimation of parameters is not valid. Accordingly, methods of parameter estimation for non-linear statistical models, viz. linearization, steepest descent and Levenberg-Marquardt method have been studied. Levenberg-Marquardt method has been found to be most appropriate as it incorporates the best features of linearization and steepest descent while avoiding their most serious limitations.

An attempt has been made to apply some of the growth models, viz., logistic. Gompertz and Richards to wheat production data of the country. The parameters of these models have been estimated using Levenberg-Marquardt algorithm. The three models have been compared

considering R^2, RMSE, MAE, MSE, $\hat{A}$ OSAF and r (N, N). On the basis of these statistics, Gompertz model has been found to be inappropriate for describing wheat production data. The final selection has been made between logistic and Richards model using analysis of variance technique. Logistic model has been found appropriate for describing the wheat production data. The examination of residuals showed that they have been independent and normally distributed which is in agreement with the assumptions. Finally, the logistic model has been used to forecast the future wheat production of the country.

(Guide : Dr. Prajneshu)

6. VV RAMANA DAVULURI—Some investigations on robustness of designs against a single missing observation

Robustness of designs against a single missing observation is investigated in this thesis. A necessary and sufficient condition for a design to be robust in a general setup is obtained. As a special case, the robustness of designs for one-way, two-way and multi-way elimination of heterogeneity settings is investigated. The efficiency of the residual design is evaluated. A lower bound to the efficiency of the residual design is also obtained. The investigation identifies designs which are robust according to two criteria of robustness.

(Guide : Dr. VK Gupta)

M.Sc. (CAA)

1. PARAM KUMAR — Information system for agronomic practices of major crops

In the present work entitled "Information System for Agronomic Practices of Major Crops", an attempt has been made to develop an Information System which provides information regarding the manner in which different crops should be grown. This work will actually act as a prototype for developing different types of information systems for the vast information related to Agriculture. It was not possible to cover all aspects of informational needs related to agronomic practices within the limited time, but the scope of further expansion is always there. The modules dealt with in the present study are :

(1) Soil and climate information
(2) Field preparation and sowing information
(3) Fertilizer and irrigation information
(4) Plant protection information
(5) Harvesting and threshing information.

Source of data for this work are as follows :

(1) State Agricultural Universities
(2) Agronomy Division of IARI
(3) Published available work in the form of journals etc.

The study was confined to three Northern states namely, Haryana, Punjab and U.P. but all regions of these states could not be taken into account.

These can be easily considered while expanding this work.

The software has been developed by using the programming facilities of dBASE III PLUS. There are about 20 programs which perform the required functions of information retrieval, updation etc. The package is totally menu-driven i.e., user just to select his choices from the list of options. Knowledge of computer programming is not at all needed to use this package, by following the instructions on the screen, the user can get his job done very easily. A hardcopy of the output can also be obtained by chosing the printer option.

(Guide : Shri Mahesh Kumar)

2. POONAM WADHWA—Decision support system

Decision support system (DSS) is a system support to managerial decision makers in unstructured decision situations. Though it is implied that DSS must be used by managers but this is not a necessary condition for DSS users. What DSS users have in common in that all are either decision makers or the people who need to understand decision alternatives. The students of I.A.R.I. also belong to such class of users.

Typical DSS applications are computer-added, stock portfolio management, budget preparation allocation of personnel to service area and District agricultural planning etc.

The present work was conducted with the underlying objectives. Identification of the need for developing a DSS for student's PPW, determination of the students' information requirements, procedural details and sources of input to the system, developing a suitable design of a new system, preparation of I/O specification design of a database for managing statistical data and providing some software for DSS operation and finally devising a method of system testing.

According to the course-credit system followed at I.A.R.I. students have to make minor field(s) apart from the major field for which they have been selected. The various things which influence their decision making for minor selection and the associated problems in the existing system have been discussed in detail.

To know the strategies and other procedural details of the system, fact finding techniques like interview and record review were used. In this process, various Professors, Heads and senior students of different divisions were interviewed. The information thus captured has been consolidated using the techniques of decision tables. This information helped in bringing in some structure into this problem by setting some general rule for selection of the minors. The contents of tables summarise the most commonly met with situations and as such do not highlight the complexity of problem. However, the information throws light on the nature of the problem and the extent of complexity is brought out in tables for two disciplines, viz. Agricultural Statistics and CAA.

An attempt was made to design a

computer based system using the above information as input with suitable modifications. Considering the fact that the user of the proposed system may be naive in use of computers, a computer interface is provided, where the system asks the user a question and which the user is required to answer, mostly yes or no, or some cases he is given some alternatives and he is supposed to select one out of them. Here the judgement of the users is being used for deriving the results. In some cases following the Q/A interface, the system will come out with more than one possible alternatives i.e. the system will accomplish the work of narrowing the problem domain. To further assist the users in such cases, users are given other choices for their decision making process by providing information regarding the minor fields taken by senior students in previous years. For this purpose a suitable database is designed and output is presented to the users in a report format which they can interpret easily. To pursue this work further, formulation of simple mathematical model involving some quantum variables and solving them with the help of statistical databases and optimisation techniques have also be discussed briefly although no such attempt was made in the present work.

The software for the operation of the DSS thus evolved has been explained and tested with some examples.

(Guide : Shri R Gopalan)

3. VIJAY KUMAR SHAH—Graphical text writer

Graphical presentation of facts and figures helps management to take right decisions for the organisation. Anything when presented in a visual form is easily assimilates, helps quick comprehension and interpretation becomes easy. In this dissertation work an attempt has been made to meet the objectives of developing a simple text editor for creating a text file, providing the facility of editing mathematical/graphical symbols and scientific notations and drawing Text charts, Bar charts and Pie charts on plotter.

The output can be taken on transparency or on paper. This is very useful in presenting seminars in a research organisation or educational Institute.

The program contains following four modules :

Module I : Text Module

This module is f or creating a text file. This file can have three pages to begin with and each page can contain 24 rows and 40 columns. The text editor is RAM—based editor.

Module II : BAR—Module

This module is for drawing Bar charts with the help of plotter. With this program package maximum of 6 bars in a Bar chart can be drawn.

Module III : PIE—Module

This module is for drawing Pie charts with the help of plotter. With this package a maximum of six sectors or slice can be drawn in a pie chart. The user can fill these slices by solid-fill colour, parallel lines or cross hatching or leave them blank.

Module IV : Output Module

This module is used to output the created text file. The user can take output of any page of a file. The user can select different pen/colour for heading, italics and normal text words.

The package is menu driven and user friendly. (Guide : Shri OP Dutta)

AWARDS/HONOURS/SPECIAL RECOGNITION

Prof Prem Narain

—Om Prakash Bhasin Foundation Award for Science and Technology for 1990 in the field of Agriculture and Allied Sciences.

—Sankhyiki Bhushan Award of the Indian Society of Agricultural Statistics for significant contribution in the field of Agricultural Statistics.

Dr VK Bhatia

—First prize for best paper published for 1990 in Indian Journal of Dairy Science by Indian Dairy Association, New Delhi.

SEMINARS/WORKSHOPS/SYMPOSIA AND CONFERENCES ATTENDED BY THE SCIENTISTS

Sl. No.	Names of the Scientists	Programme title	Place	Period
1	2	3	4	5
1.	Dr SK Raheja Smt. Asha Saksena	International Conference on Extension Strategy for Minimizing Risk in Rain-fed Agriculture	ISEE, New Delhi	Apr 06-09
2.	Dr SK Raheja	Regional Workshop (Eastern Region) of All India Coordinated Project on Cropping Systems Research	Patna	Apr 29
3.	Dr SK Raheja	Regional Workshop (Western Region) of All India Coordinated Project on Cropping Systems Research	Pune	May 10
4.	Sh TB Jain Sh OP Dutta	Productivity and Impact of Research : Scientometric and Bibliometric Measures and Influencing Factors	NAARM, Hyderabad	Jun 25-29
5.	Dr NK Ohri Sh KC Bhatnagar	Workshop on 'Meaningful Learning in Communication Process'	NAARM, Hyderabad	Jul 09-12
6.	Dr SK Raheja	4th Orientation Workshop on concurrent Evaluation of IPRD, OPP and NPDP organised by Agril. Finance Corporation Ltd., New Delhi	IARI, New Delhi	Jul 29-Aug 01

1	2	3	4	5
7.	Dr VK Bhatia	The 24th Indian Dairy Conference	New Delhi	Sep 01-03
8.	Prof Prem Narain	48th Session of the International Statistical Institute	Cairo, Egypt	Sep 11
9.	Prof Prem Narain	The Satellite Conference on Order Statistics and Non-Parametrics : Theory and Applications	Alexandria	Sep 18-20
10.	Prof Prem Narain Dr Randhir Singh	The IX Annual Conference of Indian Society of Medical Statistics and National Seminar on Statistics in Maternal and Child Health	New Delhi	Sep 26-28
11.	Dr SK Raheja	National Consultation on Fertilizer Pricing : An Aspect of Public Policy	Jaipur	Oct 01
12.	Dr SK Raheja Sh PN Bhargava Sh KC Bhatnagar	The National Seminar on Importance of Zinc in Agriculture	IISR, Lucknow	Oct 10
13.	Dr JP Jain	UNESCO/STEPAN Workshop on 'Science and Technology for Development and Science and Technology Information Management in Asia', organised by NISTADS	Park Hotel, New Delhi	Oct 14-25
14.	Prof Prem Narain Dr SK Raheja	Symposium on 'Population, National Resources and Food Security', organised by the National Academy of Agricultural Sciences	IARI, New Delhi	Oct 21-22

1	2	3	4	5
15.	Prof Prem Narain* Dr RK Pandey** Dr JP Jain Sh Jagmohan Singh Dr SS Kutaula	National Seminar on 'Agriculture in Nineties : Challenges and Research Needs' organised by the Indian Society of Agricultural Sciences	IARI, New Delhi	Oct 23-25
16.	Sh Mahesh Kumar	The National Seminar on Policy Issues in Generation, Reliability and Retrieval of Database on Indian Agricultural Sector for Social Science Research	NAARM, Hyderabad	Nov 13-15
17.	Sh PN Bhargava Sh KC Bhatnagar	The National Conference on Agricultural Resources and Products—A Quality Analysis	IICB, Jadavpur, Calcutta Univ., Calcutta	Nov 23-24
18.	Prof Prem Narain Dr OP Kathuria Dr PR Sreenath Sh R Gopalan*** Dr AK Srivastava Dr Shivtar Singh Sh TB Jain Sh RL Rustagi Dr GC Chawla Dr VK Bhatia**** Sh Jagmohan Singh Sh GL Khurana Sh DK Bhatia Sh Tribhuwan Rai Sh Satya Pal Sh CH Rao Dr Jagbir Singh	The 45th Annual Conference of Indian Society of Agricultural Statistics	NDRI, Karnal	Nov 27-29

*Presided over the Inaugural Function.

**Acted as Rapporteur in the Plenary Session.

***Convened a session on Statistical Computing during the Conference.

****Convened a symposium on National Selection for Evaluation of Quantitative Characters during the Conference.

Dr Just Falaand, DG, International Food Policy Research Institute, Washington, DC in discussion with Dr SK Raheja, Director of the Institute

Dr VT Prabhakaran, Senior Scientist explaining the findings of the paper presented in a Poster Session of the V International Conference on Goats

1	2	3	4	5
19.	Prof Prem Narain Dr SK Raheja Dr RK Pandey Sh PN Bhargava Dr VK Sharma	FAI National Seminar on 'Optimizing Fertilizer Production, Distribution and Usage'	Taj Palace Hotel, New Delhi	Dec 05-07
20.	Dr RK Pandey Sh SP Bhardwaj	The 51st Annual Conference of Indian Society of Agricultural Economics	Andhra Pradesh Agril. University, Hyderabad	Dec 18-20
21.	Dr KK Tyagi	The National Workshop on Utilization of Solar Energy organised by Electro-Chemical Society of India (ECSI)	IIS, Bangalore	Jan 30-31
22.	Dr SK Raheja	National Seminar on Agricultural Extension	Directorate of Extension, New Delhi	Feb 25-26
23.	Dr SK Raheja Dr JP Jain Dr HP Singh Dr BS Sharma Dr IC Sethi Sh TB Jain Dr VT Prabhakaran Dr VK Bhatia Dr PK Malhotra Sh RL Rustagi Dr PS Rana Sh SD Wahi Sh RS Khatri Sh JP Goyal	V International Conference on Goats	Ashoka Hotel, New Delhi	Mar 02-08

PAPERS PRESENTED AT WORKSHOPS/SYMPOSIA AND CONFERENCES

Sl. No.	Authors	Paper title	Programme title	Venue	Period
1	2	3	4	5	6
1.	Saksena, Asha Narain, P Bhargava, PN	Risk management in dry-land agriculture—A case study	International Conference on Extension Strategy for Minimizing Risk in Rainfed Agriculture	ISEE, New Delhi	Apr 06-09
2.	Raheja, SK	Indicators for monitoring and evaluation of agri-culture	4th Orientation Workshop on concurrent Evaluation of IPRD, OPPand NPDP	IARI, New Delhi	Jul 29—Aug 01
3.	Narain, Prem	Training of agricultural statisticians in develop-ing countries	48th Session of the International Statistical Institute	Cairo, Egypt	Sep 11
4.	Narain, Prem	Use of density estimation for determining premium rates in crop insurance	The Satellite Conference on Order Statistics and Non-Parametrics: Theory and Applications	Alexandria, Egypt	Sep 18-20
5.	Raheja, SK	Output elasticities of fer-tilizer use in India	National Consultation on Fertilizer Pricing: An Aspect of Public Policy	Institute of Deve-lopment Studies, Jaipur	Sep 30—Oct 02

1	2	3	4	5	6
6.	Narain, P Bhargava, PN Bhatnagar, KC	Economics of zinc use in cereal crops	The National Seminar on 'Importance of Zinc in Agriculture'	IISR, Lucknow	Oct 10
7.	Kutaula, SS	Resource use of efficiency and its relevance in agriculture	The National Seminar on Agriculture in Nineties : Challenges and Research Needs organised by Indian Society of Agricultural Sciences	IARI, New Delhi	Oct 23-25
8.	Narain, P Jain, JP Pandey, RK	Statistical research in agriculture in the nineties	,,	,,	,,
9.	Singh, Jagmohan Mehrotra, PC	A new multi-purpose scheme for collection of agricultural statistics	,,	,,	,,
10.	Sharma, VK	Estimation of seemingly unrelated regressions when numbers of observations are unequal	The 28th Annual Conference of the Indian Econometric Society	Deptt. of Economics, University of North Bengal, Raja Rammohanpur Roy, Darjeeling	Oct 29-31

1	2	3	4	5	6
11.	Malhotra, PK Mahesh Kumar	Methodology of data collection and development of data-bases in dairying	National Seminar on 'Policy Issues in Generation, Reliability and Retrieval of Data Base on Indian Agricultural Sector for Social Science Research'	NAARM, Hyderabad	Nov 13-15
12.	Bhargava, PN Bhatnagar, KC	Experiments on cultivator's fields—A linkage in research development	National Conference on 'Agriculture Resources and Products - A Quality Analysis' organised by Indian Association for Productivity Quality and Reliability, Deptt, of Statistics, Calcutta	IICB, Jadavpur, Calcutta University, Calcutta	Nov 23-24
13.	Amrit Pal, Kaur Narain, Prem	Index selection with continuous and all-or-none traits	The 45th Annual Conference of Indian Society of Agricultural Statistics	NDRI, Karnal	Nov 27-29
14.	Bhatia, DK Arya, SN Singh, HP	Livestock epidemiology : Trends in intensity of diseases in Tamil Nadu	,,	,,	,,
15.	Chawla, GC	Change-over designs	,,	,,	,,

1	2	3	4	5	6
16.	Chawla, GC	Use of mixed model for studying the protein levels and litter-floor densities for poultry production	The 45th Annual Conference of Indian Society of Agricultural Statistics	NDRI, Karnal	Nov 27-29
17.	Jain, TB	Cost of rearing a non-descript pig upto different ages	,,	,,	,,
18.	Kathuria, OP Bathla, HVL Kher, KK	Sample survey for estimation of area under fish ponds and catch from them	,,	,,	,,
19.	Khurana, GL Bhatnagar, KC Bhargava, PN	Applications of analysis of means in agricultural field experiments	,,	,,	,,
20.	Khurana, GL Bhatnagar, KC Bhargava, PN	Interactions at reduced levels of agronomic factors for higher productivity	,,	,,	,,
21.	Pandey, PS Kathuria, OP	Some composite estimators for small area estimation	,,	,,	,,
22.	Prajneshu, Das, PK	Modelling wheat production in India	,,	,,	,,

1	2	3	4	5	6
23.	Rai, Anil Kathuria, OP	An evaluation of modified Chisquare test statistics for survey data	The 45th Annual Conference of Indian Society of Agricultural Statistics	NDRI, Karnal	Nov 27-29
24.	Rai, T Batra, MS Mohan Lal Pathak, GM	Economic return through intercropping in chikoo orchard	,,	,,	,,
25.	Rajendra Prasad Gupta, VK Prasad, NSG	On A-efficiency of balanced test treatment incomplete block designs	,,	,,	,,
26.	Rao, CH Bhatnagar, KC	An approach for the evaluation of composite yardsticks	,,	,,	,,
27.	Rao, CH Bhatnagar, KC	Economics of fertiliser application to wheat	,,	,,	,,
28.	Rustagi, RL Singh, Shivtar	Farming efficiency in crop-dairy-poultry-fish enterprises	,,	,,	,,
29.	Satya Pal Rai, T	Adopted doses of fertilizer nutrients for optimum wheat production	,,	,,	,,
30.	Singh, Jagbir Kathuria, OP	Sampling on two occasions with two correlated characters	,,	,,	,,

1	2	3	4	5	6
31.	Singh, Jagmohan Singh, BH	Forecasting the effects of inputs on yield of crops in flood affected and un-affected fields	The 45th Annual Conference of Indian Society of Agricultural Statistics	NDRI, Karnal	Nov 27-29
32.	Singh, Randhir Al Abraham	Use of remote sensing data in Markov chain model for crop yield modelling	,,	,,	,,
33.	Singh, Shivtar	Small area estimation : application to milk production	,,	,,	,,
34.	Sreenath, PR Handa, DP Rajpali, SK	Efficiency of latin square design for experimentation with natural grasses	,,	,,	,,
35.	Srivastava, AK	Multiplicity, sampling and overlapping of clusters	,,	,,	,,
36.	Bhatia, VK	Use of spatial pattern analysis techniques in studying the evolutionary processes of natural populations	Symposium on 'Natural Selection for Evolution of Quantitative Characters' during the above Conference	,,	,,
37.	Narain, Prem	On evolutionary dynamics of quantitative traits	,,	,,	,,

1	2	3	4	5	6
38.	Prajneshu	A stochastic Lotkavoltera prey-predator of model with switching effect	The 12th Indian Conference of Society for Probability and Statistics	Cochin University, Cochin	Dec 09-12
39.	Bhardwaj, SP Gupta, HC Dixit, UN	Optimum utilization of land resource—A micro level study	The 51st Annual Conference of Indian Society of Agricultural Economics	APAU, Hyderabad	Dec 18-20
40.	Bhardwaj, SP Dixit, UN Gupta, HC	Impact of risk on resource allocation and cropping pattern—A case study	,,	,,	,,
41.	Pandey, RK, Kiresur, V	Economic study of land markets in Karnataka	,,	,,	,,
42.	Tyagi, KK	Some aspects of statistical estimation methodology in solar energy	The National Workshop on Utilisation of Solar Energy organised by Electro-Chemical Society of India (ECSI)	IIS, Bangalore	Jan 30-31
43.	Raheja, SK Prabhakaran, VT Jain, JP	On improved estimation of heritability	V International Conference on Goats (Poster Session)	Ashoka Hotel, New Dclhi	Mar 02-08
44.	Raheja, SK Rustagi, RL	Sampling methodology and need of reliable data base for goat statistics	,,	,,	,,

OTHER INFORMATION ABOUT SCIENTISTS

Fellowship/Membership of Scientific Societies

Dr SK Raheja

—Indian Society of Agricultural Statistics, New Delhi

—Indian Society of Agricultural Science, New Delhi

—Indian Association of Statistics and Applied Research, Hisar

—Indian Society of Medical Statistics, New Delhi

—Federation of Agricultural and Allied Services Association, New Delhi

—Computer Society of India, New Delhi

—Centre for Agricultural and Rural Development Studies, New Delhi

—Centre for Land, Water and Environmental Studies, New Delhi

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, New Delhi

—Indian Society of Genetics and Plant Breeding, New Delhi

—Indian Society of Agricultural Science, New Delhi

—Bernoulli Society for Mathematical Statistics and Probability

—Indian Society of Medical Statistics, New Delhi

—Indian Society of Human Genetics

—Indian Econometric Society

—Indian Society of Mathematical Statistics

—Computer Society of India, New Delhi

—National Academy of Agricultural Sciences, New Delhi

—Biometric Society, Washington, USA

Dr RK Pandey

—Indian Society of Agricultural Economics, Bombay

—Indian Society of Agricultural Science, New Delhi

—Indian Academy of Social Sciences, Allahabad

Dr OP Kathuria

—Indian Society of Agricultural Statistics, New Delhi

—International Association of Survey Statisticians

Dr JP Jain

—Indian Society of Agricultural Statistics, New Delhi

—Indian Society of Agricultural Science, New Delhi

—Indian Society of Genetics and Plant Breeding, New Delhi

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—Indian Society of Agricultural Statistics, New Delhi

—Association of Statistics and Applied Research, Hisar

Sh SN Mathur

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Dr BS Sharma

—Indian Society of Agricultural Statistics, New Delhi

—Biometric Society, Washington, USA

Dr VK Sharma

—Indian Econometric Society, Delhi

—Agricultural Economics Research Association, New Delhi

Dr Shivtar Singh, Dr GC Chawla, Dr Basant Lal, Sh Jagmohan Singh, Sh Satya Pal and Sh T Rai

—Indian Society of Agricultural Statistics, New Delhi

—Indian Society of Agricultural Science, New Delhi

Dr VK Gupta

—Indian Society of Agricultural Statistics, New Delhi

—International Institute, Netherlands

Sh TB Jain

—Indian Society of Agricultural Statistics, New Delhi

—Indian Society of Agricultural Economics, Bombay

Sh Mahesh Kumar

—Society for Information Science

Sh Shanti Sarup

—Indian Society of Agricultural Statistics, New Delhi

—Indian Academy of Social Sciences, Allahabad

Sh OP Dutta

—Computer Society of India, New Delhi

Dr VK Bhatia

—Indian Society of Agricultural Statistics, New Delhi

—Biometric Society, Washington, USA

—Indian Society of Agricultural Science, New Delhi

Dr PK Malhotra

—Indian Society of Agricultural Statistics, New Delhi

—Computer Society of India, New Delhi

Dr Chandrahas

—Biometric Society, Washington, USA

Dr PS Rana

—Indian Society of Agricultural Statistics, New Delhi

—Biometric Society, Washington, USA

—Acta Cincia Indica

Sh RS Khatri

—Indian Society of Agricultural Statistics, New Delhi

—Association of Statistics and Applied Research, Hisar

—Indian Dairy Association, New Delhi

Dr Jagbir Singh

—Indian Society for Medical Statistics, New Delhi.

—Indian Society of Agricultural Statistics, New Delhi

Smt Sushila Kaul, Dr SS Kutaula and Sh Ashok Kumar

—Agricultural Economics Research Association, New Delhi

Dr PC Mehrotra, Dr AK Srivastava, Sh VS Rustogi, Dr (Mrs) Ranjana Agrawal, Dr HVL Bathla, Dr SS Shastri, Dr RC Jain, Dr NK Ohri, Dr VT Prabhakaran, Sh RL Rustagi, Sh MS Batra, Dr KK Tyagi, Sh Lal Chand, Sh SP Verma, Sh SN Arya, Dr VK Mahajan, Sh SD Wahi, Sh KPS Nirman. Sh AS Gupta, Sh KC Bhatnagar, Sh DC Mathur, Sh BH Singh, Sh JP Goyal, Sh DK Bhatia, Sh SC Sethi, Sh VK Jain, Sh PM Ramesan, Sh CH Rao

—Indian Society of Agricultural Statistics, New Delhi

Offices in Professional Societies

Dr SK Raheja

—Vice-President, Indian Association of Statistics and Applied Research (IASAR), Hisar

—Member, Editorial Board of the Journal of IASAR, Hisar

—Secretary, Centre for Agricultural and Rural Development Studies, New Delhi

—Treasurer, Centre for Land, Water and Environmental Studies, New Delhi

Prof Prem Narain

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

—Council Member, International Statistical Institute, Netherlands

—President, Indian Society of Agricultural Science, New Delhi

—Secretary-General, Federation of Indian Societies of Agricultural Science 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

—Treasurer, National Academy of Agricultural Sciences

Membership of Committees/Panels/Working Groups

Dr SK Raheja

—PG Faculty of PG School, IARI, New Delhi

—Jury of Appeals for ICAR, Zone IV Inter-Institutional Sports Tournament, IARI, New Delhi held from Dec 18-22

—President, Sports Committee of IASRI

—Direction Committee of Computer Science and Numerical Analysis, IASRI, New Delhi w.e.f. 6.2.1992

—Chairman, Advisory Board on Training Courses, IASRI, New Delhi w.e.f. 6.2.1992

—Chairman, Panel on Design of Experiments (MSD-3 : 1/P/4), Bureau of Indian Standards, New Delhi

—Sectional Committee of Statistical Methods for Quality and Reliability (MSD-3), BIS, New Delhi

Academic Council, IARI, New Delhi w.e.f 6 .1992

Sampling Methods Sectional Committee MSD 3 for preparation of Standard of Statistical Quality Control of the Bureau of Indian Standards, New Delhi

—Chairman, Management Committee, IASRI, New Delhi

—The reconstituted National Advisory Board on Statistics of the Department of Statistics, Planning Commission, Govt. of India, New Delhi w.e.f. 6.2.1992

—Chairman, reconstituted Technical Advisory Committee of Direction for Improvement of Animal Husbandry and Dairying Statistics of the Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India w.e.f. 6.2.1992

—National organising Committee and Finance and Administration Committee for the V International Conference on Goats held on Mar 2-8, 1992 at New Delhi

—Chairman, National Organising Committee, National Seminar on Agricultural Policy Frame to be organised jointly by IASRI and FAASA in June, 1992 at New Delhi

Prof Prem Narain

—Indian Science Congress Association, Calcutta

—Editorial Board of the Journal of Energy from Bio-mass 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 (Upto Feb 5, 1992)

—Chairman, Advisory Board on Training Courses, IASRI, New Delhi (Upto Feb 5, 1992)

—Academic Council, IARI, New Delhi (Upto Feb 5, 1992)

—Committee on Improvement of Agricultural Statistics, National Sample Survey Organisation, New Delhi

—Committee on Improvement of Agricultural Statistics, Directorate of Economics and Statistics, New Delhi

—Faculty of Mathematics, University of Delhi

—Chairman, Management Committee, IASRI, New Delhi (Upto Feb 5, 1992)

—The reconstituted Technical Advisory Committee for Applied Statistics, Surveys and Computing Division of the Indian Statistical Institute, Calcutta

—The reconstituted Technical Advisory Committee for Biological Sciences, Division of the Indian Statistical Institute, Calcutta

—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 (Upto Feb 5, 1992)

—The ICAR Steering Committee to oversee the computerisation process and to identify priority areas for computerisation

—The Steering Committee for monitoring the effective implementation of the Study on Fertilizer Consumption and Quality Seeds : Constraints on their increased use by National Council of Applied Economic Research, New Delhi. The Committee was constituted by Ministry of Agriculture, Govt. of India, New Delhi

—The Board of Directors of the Centre of Advanced Development Research (CADR), Lucknow

—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 Science and Technology, New Delhi

—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 Subhumid Sutej-Ganga Alluvial Plains comprising the States of Punjab, Delhi, Uttar Pradesh Plains and Bihar for a period of 3 years w.e.f. Sep 25

—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 model qualification for all the categories of scientists and science coordinators and administrators of the ICAR system

—Selected as Reviewer at 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 and Cooperation, Ministry of Agriculture, Govt. of India (Upto Feb 5, 1992)

—The reconstituted Working Group on Agricultural Statistics of the Govt of India, Ministry of Planning Department of Statistics, NSSO, New Delhi

— Expert Committee for Review of Methodology of Cost of Production of Crops

—The Committee for revision of Agricultural Service Rules

—National Advisory Board of the JBS Haldane Centenary Celebrations to be observed in 1992 at the Indian Statistical Institute, Calcutta

—The Standing Committee for the Promotion of Statistics in the Life Sciences of the International Statistical Institute, Netherlands

Dr RK Pandey

—Board of Studies, Agricultural Economics, Banaras Hindu University, Varanasi

—Editorial Board of Annals of Agricultural Research

—Board of Studies, Agricultural Economics, IARI, New Delhi

Dr JP Jain

—PG Faculty of PG School, IARI, New Delhi

—Liaison Officer of IASRI for looking after the interest of the SC/ST employees

—Course-Progress Review Committee of the Institute

—Chairman, Technical Evaluation-cum-Purchase Committee of DTP system

—In-charge, Seating Plan of the Institute

—UNDP Recommendations Implementation Committee

—Sub-Committee of TCD for Improvement of Animal Husbandry Statistics

—Chairman, Grievance Committee of the Institute

—Committee for 'Out of tern allotment of quarters' of IASRI

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

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

—Editorial Board, Annals of Agricultural Research, New Delhi

Dr HP Singh

—Management Committee of IASRI, New Delhi

—PG Faculty of PG School, IARI, New Delhi

Dr PC Mehrotra

—PG Faculty of PG School, IARI, New Delhi

Dr AK Srivastava

—PG Faculty of PG School, IARI, New Delhi

—Editorial Board, Journal of ISAS, New Delhi

Sh VS Rustogi

—PG Faculty of PG School, IARI, New Delhi

Dr Prajneshu

—Sectional Committee of 'Statistical Methods for Quality and Reliability' of Bureau of Indian Standards, New Delhi

Dr Randhir Singh

—Chairman, Board of Studies, Agricultural Statistics, IASRI, New Delhi

—Academic Councli, PG School, IARI, New Delhi

—PG Faculty of PG School, IARI, New Delhi

—Chairman, Sub-Committee to review syllabi for MSc/PhD courses in Agricultural Statistics

—Study Committee on Courses, Curricula and Academic Affairs, PG School, IARI, New Delhi

Dr (Mrs) Ranjana Agrawal

—PG Faculty of PG School, IARI, New Delhi

Dr Shivtar Singh

—Sub-committee for indepth examination of the statewise estimates of production of milk and eggs

—Committee on Economics of Sheep and Goat Production constituted by ICAR

Dr BC Saxena

—PG Faculty of PG School, IARI, New Delhi

Dr RC Jain

—PG Faculty of PG School, IARI, New Delhi

—Indian Science Congress Association, Calcutta

—Sectional Committee of the Section of Statistics of ISCA for 1991-92

Dr HVL Bathla

—PG Faculty of PG School, IARI, New Delhi

—Secretary, Staff Research Council, IASRI, New Delhi

Dr VK Gupta

—Panel on Design of Experiments (MSD-3 : 1/P-4), Bureau of Indian Standards, New Delhi

—PG Faculty of PG School, IARI, New Delhi

Dr VT Prabhakaran

—Editorial Board, Journal of PG School, IARI, New Delhi

Dr VK Bhatia

—PG Faculty of PG School, IARI, New Delhi

Sh OP Dutta

—Secretary, Divisional Research Committee of Computing Science, IASRI

—Management Committee of IASRI

—Joint Secretary, Seminar Association of IASRI

Dr PK Malhotra

—Convenor, Watch and Review Committee for monitoring the progress of MSc (CAA) students

—Secretary, Board of studies in Computer Application in Agriculture

Sh SN Arya

—Secretary, Joint Staff Council, IASRI, New Delhi

—Working committee of the Kendriya Sachivalaya Hindi Parishad—IASRI Branch

Dr GC Chawla

—PG Faculty of PG School, IARI, New Delhi

Dr UN Dixit

—Convenor, Sports Committee, IASRI, New Delhi

—Secretary, Recreation and Welfare Club, IASRI, New Delhi

Sh BH Singh

—PG Faculty of PG School, IARI, New Delhi

Special lectures, Training, Study tour and Meetings

Dr SK Raheja

—Chaired

* The meeting of the IJSC held on May 25, 1991 at the Institute

* The meeting of National Committee on Hindi Terminology for Statistical Text Books held on May 25, 1991 at IASRI

* The meetings of Hindi Rajbhasha Implementation Committee of IASRI on June 10, Oct 8, 1991 and March 4, 1992

* The meetings of the Institute Management Committee on July 22, 1991 and Feb 29, 1992

* The meetings of Staff Research Council of the Institute on July 29-30, 1991

* The meeting of Heads of Divisions and Principal Scientists with Dr MR Lauds and Dr EW Denny from USDA, Washington, DC, on Feb 13, 1992

* The General Body meeting of Institute Branch of Central Secretariat Hindi Council on Feb 27, 1992

* The meeting of the Construction and Works Committee of IASRI, New Delhi on Mar 10, 1992

—Attended

* The meeting of the state level committee for planning of survey on fruits and vegetables in Punjab, Chandigarh on May 27, 1991

* The meeting of the Panel on Statistical Methods for Quality and Reliability (MSD-3) organised by Bureau of Indian Standards, New Delhi on June 14, 1991

* The meeting of the Sub-committee on Finance and Administration of V International Conference on Goats, New Delhi on Jan 6, 1992

* The meetings of the Academic Council, IARI, New Delhi on Aug 31, 1991 and Feb 6, 1992

* The meetings of the National Organizing Committee of V International Conference on Goats, New Delhi on Mar 30

—Delivered

* Lectures entitled 'Introduction to computers in agriculture' and 'Software development for extension and data processing' at the IV Workshop-cum-Seminar on Software Development for Extension Personnel held during Aug 23-30

* Introductory Talks to the participants in the Orientation Programme of the XIV and XV Short Term Training Courses on "Use of Computer in Agricultural Research" IASRI, New Delhi, on Mar 3 and Mar 18, 1992 respectively

Prof Prem Narain

—Chaired

* The meeting of the Executive Council-cum-Editorial Board of the Indian Society of Agricultural Science on Aug 26

* The meetings of the Executive Committee-cum-Editorial Board of the Indian Society of Agricultural Science on Oct 1, 4 and 15

* The Institute Joint Staff Council meeting on Nov 1

* The Staff Research Council meetings of the Institute on Dec 4 and Dec 7

—Attended

* The meeting of the IARI Academic Council on Aug 31

* The Council meetings of the International Statistical Institute at Cairo (Egypt) on Sep 8 and Sep 17

* The 57th Annual Meeting of the Indian Academy of Sciences at Pune during Nov 8-10 and took active part in the deliberations of its various sessions

* The meeting of the Standing Committee for Emeritus Scientists of the Council of Scientific and Industrial Research held at New Delhi on Dec 13

* The meeting of the Programme Committee of the XXX Convocation of IARI on Jan 17

* The meeting of the Executive Council of the National Academy of Agricultural Sciences at New Delhi on Jan 29

—Delivered

* Lecture entitled "Computers in Agricultural Extension" to the participants of IV Workshop-cum-Seminar on Software Development for Extension Personnel held at IASRI, New Delhi on Aug 24

* Lecture entitled "Statistical Aspects of Comprehensive Crop Insurance Scheme" to the participants of CSO-ISAS Training Course on Organization of Surveys-Recent Developments in Sample Survey Methods and their Applications at IASRI, New Delhi on Sept 27

* Lectures entitled 'Computerisation of databases for agricultural survey planning' and 'Human Genetics' to the participants of CSO—ISAS Training Course on Organisation of Surveys—Recent Developments in Sample Survey Methods and their Applications at its 48th Session at IASRI on Oct 1, 4 and 11

* Lecture entitled 'International Statistical Institute – Deliberations at its 48th Session' at IASRI on Oct 11

Dr RK Pandey

—Chaired

* The meeting of Institute Branch of Central Secretariat Hindi Council on Aug 14

* The General Body meeting of IASRI Hindi Parishad on Feb 27

—Attended

* The meeting of "Hindi Implementation Committee" of the Institute on June 10

* The meetings of Executive Council-cum-Editorial Board of Indian Society of Agricultural Science on Sep 28, Oct 1 and 15 and Dec 30

* The meetings of Board of Studies in the Division of Agricultural Economics on Nov 26 and Mar 5

—Delivered

* Two lectures on "Technical change in agricultural and its measurement" in a summer institute "Recent Advances in Quantitative Technique for Policy Analysis in Agricultural Economics" held at IARI, New Delhi on July 15

Dr JP Jain

—Delivered

* Lecture on "Impact surveys" to trainees who attended the programme on 'Organisation of Surveys-Recent Developments in Sample Survey Methods and their Applications' organised by the ISAS at IASRI, New Delhi

Sh SN Mathur

* Delivered a Radio talk (in Hindi) on 'Use of Computer in Agriculture' on All India Radio on Jan 2

Dr Shivtar Singh

—Delivered

* Lecture on "Cost of rearing livestock" to senior level officers who attended the training programme 'Organisation of Surveys—Recent Developments in Sample Survey Methods and their Applications' on Sep 27

Dr HVL Bathla

* Attended the meetings of Institute Management Committee as a special invitee on July 22 and Feb 29

Dr VK Gupta

—Attended the meeting of Sectional Committee of Statistical Methods for Quality and Reliability (MSD-3), BIS, New Delhi

Sh TB Jain

—Attended the Staff Research Council meeting of CSWRI, Avikanagar on Nov 13 and participated in the discussion on the progress of collaborative research project 'Estimation of cost of production of sheep and wool'

Sh SN Arya

—Convened meetings of the Institute Joint Staff Council on May 25 and Nov 1

Dr GC Chawla

—Attended

* Course on 'Management of Human Resources' held at NAARM, Hyderabad during Aug 20-31.

Dr VT Prabhakaran, Dr VK Bhatia, Sh TB Jain, Mrs Rajinder Kaur, Sh Ramesh Kumar, Sh VK Mishra, Mrs Jyoti Gangwani, Sh Pratap Singh and Sh Anil Kumar

* Attended XII short-term training course on 'Use of Computer in Agricultural Research" from Sep 3-13 at IASRI, New Delhi.

Sh SC Mehta, Sh Madan Mohan and Sh SS Walia

* Attended the Summer Institute on 'Forecasting Technology with special reference to Agriculture' from Nov 11-30 at IASRI, New Delhi

Dr Jagbir Singh

* Attended the Selection Committee Meeting held at the Institute for Research in Medical Statistics, New Delhi on Nov 25

Sh SS Srivastava

—Attended

* The meetings of Delhi Library Networking (DELNET) and Consultative Committee for Rationalisation of Periodicals (CCRP) for Delhi Libraries at Indian International Centre, New Delhi on Sep 11, 1991 and Jan 1, 1992

* Meeting of Librarians held on Jan 6, 1992 at Indian International Centre, New Delhi

* One day meet on Indo-UK Information Resources held at INSDOC, New Delhi on Jan 17, 1992.

Participation in ICAR Scientific Panel Meetings

S. No.	Name of the Scientist	Name of the Scientific Panel	Date
1.	Dr SK Raheja	Economics, Statistics and Marketing	Feb 20-21
2.	Dr HVL Bathla	Fisheries	Jun 25-26
3.	Dr VK Bhatia	Plant Breeding and Genetics	Aug 08-09
4.	Dr Chandrahas	Plant Pathology	Aug 01-02 Feb 25-27
5.	Dr GC Chawla	Animal Physiology	Dec 30

Dr SK Raheja

—Acted as Director of the Institute during April 15-Aug 11, 1991 and Feb 6, 1992 onwards

—Acted as Chief Supervisor of the combined competitive examination for the post of FAO's/AO's conducted by ASRB during June 5-8

—Acted as Course Director for the IV Workshop-cum-Seminar on 'Software Development for Extension Personnel' organised at the Institute from Aug 23-30

—Visited Jaipur to review the progress of Monitoring and Evaluation Unit work under Training and Visit Programme, Dte. of Agriculture, Rajasthan on Jan 27, 1992

—Attended XXX Convocation of IARI, New Delhi on Feb 7, 1992

- Delivered Farewell Address to the IASRI students on Feb 7, 1992

—Acted as Chief Supervisor for the ARS Examination-1991, Delhi Centre, conducted by ASRB during Feb 8-9, 1992

—Chaired

* The Talk on "Tax planning for scientists and officers in fixed income category" given by Dy. General Manager, State Bank of India at IASRI, New Delhi on Feb 17, 1992

* The Country Discussion of the participants of International Training Course on "Techniques of estimation of output of foodgrains" sponsored by the Afro-Asian Rural Reconstruction Organization held at IASRI, New Delhi on Feb 28, 1992

* The Group Discussion on 'Institutional Framework for Agricultural Statistics in India and Africa' with the participants of International Training Course on "Methodology of Agricultural Sample Surveys, Crop Yield Modelling and Computer Programming" sponsored by Commonwealth Secretariat held at IASRI, New Delhi on Mar 27, 1992

—Attended the Group Discussion on 'Agricultural Surveys in India and Africa' with the participants of International Training Course sponsored by Commonwealth Secretariat held at IASRI, New Delhi on Mar 23, 1992

—Presided over the combined Valedictory Function of XIV and XV Short-term Training Courses on 'Use of Computer in Agricultural Research' held at IASRI, New Delhi on Mar 31, 1992

Prof Prem Narain

—Deputed to attend the 48th session of the International Statistical Institute held at Cairo as well as Satellite Conference on Order Statistics and Non Parametrics : Theory and Appli-

cations at Alexandria (Egypt) from September 9-20, 1991

—Delivered the Presidential address in the inaugural function of the Seminar on 'Agriculture in Nineties : Challenges and Research Needs' organised by the Indian Society of Agriculture Science at IARI, New Delhi from Oct 23-25.

—Addressed the participants of the Summer Institute on 'Forecasting Technology with special reference to Agriculture' in the Orientation Programme on Nov 11.

—Presided over the inaugural function of the two-week training course 'RFLP Mapping in Wheat' in the Bio-chemistry Division of IARI on Dec 30 sponsored by the Department of Biotechnology, Govt. of India, New Delhi

Dr RK Pandey

—Acted as Director, IASRI, New Delhi during April 28-30, May 9-10 and on May 27.

Dr OP Kathuria

—Worked as

* Course Director of Training Course on Techniques of Estimation of Output of Food Crops sponsored by Afro Asian Rural Reconstruction Organisation held at IASRI, New Delhi during Feb 3—Mar 12, 1992

* Course Coordinator of Commonwealth Secretariat sponsored Training Course on Methodology of Agricultural Sample Surveys, Crop Yield Modelling and Computer Programming (Mar 17—Apr 30, 1992)

Dr JP Jain

—Reviewed the book 'Advances in Statistical Methods for Genetic Improvement of Livestock', 1990, (Eds), Gianola, D and Hammond K, Springer-Verlag, Indian J. Animal Sci., 61 : 915.

—Acted as Head, Division of Forecasting Techniques for Crops, Diseases and Pests from Dec 17, 1991 to Mar 6, 1992

Dr HP Singh, S/Shri TB Jain, RL Rustagi, RS Khatri and JP Goyal

—Nominated as members of the Arrangement Committee for organising the V International Conference on Goats held at Ashoka Hotel, New Delhi during March 2-8

Dr PC Mehrotra

—Acted as Head of Division of Sample Survey Methodology and Analysis of Survey Data from Jan 1-22, 1992

Dr AK Srivastava

—Worked as associate Course Director of the International Training Course on Techniques of Estimation of Output of Food Crops sponsored

by AARRO at IASRI, New Delhi during Feb 3 to Mar 12, 1992

Dr KK Tyagi

—Nominated as Chef-de-Mission of IASRI Sports contingent in the ICAR Zone-II Inter Institutional Tournaments held at CSWCR and TI, Dehradun.

—Participated along with Shri GM Pathak in the 'Pusa-Table-Tennis Open Tournament' organised at Pusa Campus, New Delhi during Dec 19-20 and won the Open Doubles Title.

Dr SS Shastri

—Deputed for a period of two weeks under Indo-Syrian Bilateral Agreement to Damascus, Syria during May 6-20. He worked in Atomic Energy Commission, Damascus, Syria and delivered a series of lectures to researchers (Post Doctorates) and employees working in various disciplines in Department of Agricultural Applications.

Sh KC Bhatnagar

—Attended the short-training for agricultural inspectors working on "ON FARM" trials under AICARP on June 17 at HAU, Hisar.

COORDINATION AND MONITORING CELLS

COORDINATION 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 Principal Scientists and Heads of Divisions of the Institute from time to time.

Reports/Newsletters/Quarterly Progress Reports

- —Annual Report, 1990-91
- —IASRI Newsletter, Jan-Mar, 1991
- —IASRI Newsletter, Apr-Jun, 1991
- —IASRI Newsletter, Jul-Sep, 1991
- —IASRI Newsletter, Oct-Dec, 1991
- —Quarterly Progress Report, Jan-Mar, 1991
- —Quarterly Progress Report, Apr-Jun, 1991
- —Quarterly Progress Report, Jul-Sep, 1991
- —Quarterly Progress Report, Oct-Dec, 1991

Communication of Research Material

ICAR

- —Material for inclusion in
  - (i) ICAR REPORTER (A quarterly publication of ICAR) for the quarters falling due upto March, 1992
  - (ii) Annual DARE Report for the year 1991-92
  - (iii) Annual Report of ICAR for the year 1991-92
- —Six monthly programme of Conferences/Seminars/Symposia/Workshops/Meetings etc. proposed to be held upto June, 1992
- —Material for UNSFTD/UNDP Guide to Information Systems for UNDP Field Offices for onward transmission to the Department of Economic Affairs, Ministry of Finance
- —Half Yearly Report on Patents obtained on the devices and technological know-how developed by the Institute for the period ending December 31, 1990
- —Information for comprehensive time-bound publicity coverage programme

for various events/functions proposed to be held during July-December, 1992

CSO, New Delhi

—Material for inclusion in the Statistical Newsletters of Central Statistical Organisation for the quarters falling due during January-December, 1991

—Information for Statistical System in India, 1991 (Ad-hoc Publication of CSO)

CSIR, New Delhi

—Information on Experts and their area of specialization

—Regarding Development of Human Resource in the field of Science and Technology (An information on the number of persons who have obtained training/research from 1985-1991)

NISTADS, New Delhi

—Information on programmes of bilateral and multilateral external technical assistance—A study on S and T Manpower trained abroad during the period 1980-90

Ministry of Environment and Forests

—Information regarding prevention of cruelty to animal act, 1960 as per CPCSEA questionnaire

Water and Land Management Institute, Aurangabad, Maharashtra

—Information about organisations working in the field of Irrigation Water Management

SAARC Agricultural Information Centre (SAIC), Dhaka

—Information for compilation of Directory of Agricultural Scientists and Technologists in the SAARC Region

Chief Editor, SAARC Poultry Year Book, 1991-92, New Delhi

—Information for SAARC Poultry Year Book, 1991-92

Watt Publishing Company, USA

—Revised information for inclusion in the 'Who's Who International in the Egg and Poultry Industries', Govt. and Association Section for September 15, 1991 Issue

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 :

—Monitoring report of on-going research projects for the periods Oct 1990—March, 1991 and Apr-Sep, 1991

—Preparation of EFC Memo (Memorandum for Expenditure Finance Committee/Project Implementation Committee of DARE) for 1991-92

—Preparation of information regarding research projects of SSM & ASD Division for the period 1983-89 in connection with the questions asked by a MP.

—Collection of information regardin g 'Current Agricultural Research Information System' (CARIS) as desired by ICAR as per their proforma from the different Divisions.

—Revision of EFC memo of the VIII Plan for submission to ICAR

—RPF's for different years from different divisions of the Institute

STAFF WELFARE ACTIVITIES

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

JOINT STAFF COUNCIL

The Institute has a 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 the service.

Two meetings of earlier Joint Staff Council were held on May 25 and Nov 1, 1991 under the chairmanship of the Director.

The Institute Joint Staff Council was reconstituted as under for a period of 3 years w.e.f. March 13, 1992.

I Director —Chairman

II Official representatives :

1. Dr RK Pandey —Principal Scientist
2. Dr NK Ohri —Sr. Scientist
3. Sh SS Gupta —Scientist (SG)
4. Sh GC Sharma —Chief Administrative Officer
5. Smt. Sangeeta Duggal —Finance & Accounts Officer

III Elected representatives :

1. Sh RK Singh, Tech. Officer —Secretary (CJSC)
2. Sh PS Rai, Asstt. — Secretary (Staff side)
3. Sh Santosh Kumar, Tech Asstt.
4. Sh Asha Ram Sharma, Tech. Asstt.
5. Sh Dilbag Rai, Field Investigator
6. Sh DN Bhatia, Supdt.
7. Sh Raj Pal, SS Gr. I
8. Sh Bhagwat Rai, SS Gr. III

GRIEVANCE COMMITTEE

The Grievance Committee of the Institute (constituted as per ICAR rules) provides the employees a forum to ventilate their grievances relating to official matters and for taking remedial measures. A meeting of the Grievance Committee was held on Nov 22, 1991.

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. An amount of Rs. 1684/- was collected in the account of Benevolent Fund contribution from April 1, 1991 to March 31, 1992.

COOPERATIVE THRIFT AND CREDIT SOCIETY

The Society which is registered with the Registrar, Cooperative Societies, Delhi Administration, Delhi continued its activities in the similar manner as during the past years by advancing loans to its members and looking after their welfare. The source of funds of the Society are share money, compulsory deposits and fixed deposits from the members of the Society. The number of members on the roll of the Society on March 31, 1992 was 511. The General Body meeting of the Society was held on August 13, 1991 in which the accounts for the year 1990-91 were presented and passed.

The election of new Managing Committee was held on Aug 5, 1991. Prior to this the Managing Committee elected on March 6, 1990 was responsible for the work during the year 1990-91.

During the accounting year 1990-91 the Society advanced Rs. 19, 92, 800 as loan to its members.

Financial help was extended from the members' welfare fund to the tune of Rs. 1500 to the breaved family of one member and also Rs. 51 were given as gift to each of the 7 members on their retirement from the Institute.

COOPERATIVE 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 total membership of the Society as on March 31, 1992 was 451.

RECREATION AND WELFARE CLUB

The Institute has a Recreation and Welfare Club which provides facilities for indoor and outdoor games, promotes social and friendly relations among the members and looks after the general welfare of its members.

SPORTS COMMITTEE

The IX ICAR Zone-II inter-Institutional Tournaments for the year 1990-91 were organised by Central Soil and Water Conservation Research and Training Institute, Dehradun during Oct 4-11, 1991. The sports contingent of the Institute won the winners-up Trophies for the Institute in Table Tennis (Team Events) and Kabaddi and runner-up Trophies in Football and Volley Ball (Smashing) Sh DPS Mann was adjudged the best sportsman in the tournament and was awarded the Trophy.

हिन्दी के प्रगामी प्रयोग में प्रगति

अप्रैल 1991 से मार्च 1992 के दौरान, संस्थान में राजभाषा के प्रयोग को गति प्रदान करने के लिए, निम्नोक्त मदों के अन्तर्गत विभिन्न निर्णय लिए गए तथा अनेक गतिविधियां एवं आयोजन हुए :

1. राजभाषा कार्यान्वयन समिति :

निदेशक महोदय की अध्यक्षता में, संस्थान की राजभाषा कार्यान्वयन समिति की तिमाही बैठकें दिनाँक 10 जून 1991, 8 अक्तूबर 1991, एवं 4 मार्च 1992 को हुई जिनमें अनेक महत्व-पूर्ण विषयों पर विचार-विमर्श हुआ और निर्णय लिये गये।

गृह मंत्रालय के राजभाषा विभाग से प्राप्त वर्ष 1991-92 के वार्षिक कार्यक्रम के लक्ष्यों को मदवार पूरा करने के लिये निदेशक महोदय ने सभी सम्बद्ध अधिकारियों से अनुरोध किया।

कृषि सांख्यिकी समाचार नामक तिमाही हिन्दी संस्करण का प्रकाशन फिर से आरम्भ करने का निर्णय लिया गया और इसके सामायिक मुद्रण पर जोर दिया गया।

कम्प्यूटरों में द्विभाषिक प्रणाली प्रारम्भ करने पर विचार-विमर्श के दौरान बताया गया कि द्विभाषिक प्रणाली वाले कम्प्यूटर आ गये हैं जिनके माध्यम से देवनागरी तथा अंग्रेजी दोनों भाषाओं के अतिरिक्त कुछ और भाषाओं का कार्य भी आरम्भ किया जा सकता है। ऐसे अन्यानेक महत्वपूर्ण निर्णय लिये गये और उन्हें कार्यान्वित किया गया।

निदेशक महोदय की अध्यक्षता में निर्णय लिया गया कि संस्थान में ली जाने वाली सभी विभागीय अथवा अन्य परीक्षाओं में हिन्दी माध्यम से उत्तर देने और छात्रों द्वारा अपने शोध-प्रबन्ध (थीसिस) हिन्दी में प्रस्तुत करने की छूट देने की व्यवस्थाओं को प्रचलित किया जाये। इस विषय पर प्रशिक्षण-प्रशासन कक्ष द्वारा निदेशक महोदय की ओर से परिषद को पहले ही अपेक्षित आश्वासन का एक पत्र भेज दिया गया है।

"आज का शब्द" को और अधिक प्रचलित करने के लिए 10 अतिरिक्त पट्टिकाएं लगवाने का निर्णय लिया गया। इसके अतिरिक्त, स्वयं अध्यक्ष महोदय के प्रस्ताव पर, यह भी निर्णय लिया गया कि वैज्ञानिक अथवा अन्य रुचिकर विषयों पर हिन्दी गोष्ठियां/व्याख्यान माला आयोजित की जाएं।

2. केंद्रीय सचिवालय हिन्दी परिषद शाखा

शाखा प्रधान, डा. रमाकान्त पाण्डेय, की अध्यक्षता में संस्थान शाखा की तीन बैठकें हुईं। डा. (श्रीमती) रंजना अग्रवाल की अध्यक्षता में छः सदस्यों की एक समिति का गठन किया गया जो संस्थान के दिन प्रतिदिन के कार्यों में प्रयुक्त

होने वाले शब्दों से सम्बद्ध एक हिन्दी-अंग्रेजी शब्दकोष तैयार करें। इस समिति की कई बैठकें हो चुकी हैं और पहले चरण का काम लगभग पूरा हो चुका है, शाखा सदस्यता के अभियान को गति प्रदान की गई । दिनांक 19 अगस्त, 1991 से हिन्दी व्यवहार पखवाड़ा मनाया गया जिस दौरान अपना सभी काम हिन्दी में करने के लिए लोगों ने संकल्प लिया। अन्यानेक गतिविधियों के अलावा अनेकों हिन्दी प्रतियोगिताओं के आयोजन से सम्बद्ध निर्णय लिये गए और परिणाम स्वरुप अधोलिखित प्रतियोगिताओं का सफल आयोजन भी हुआ :

1.	हिन्दी टिप्पण एवं प्रारुपण प्रतियोगिता	28 अगस्त
2.	हिन्दी लेखा "	29 अगस्त
3.	हिन्दी अनुवाद "	30 अगस्त
4.	हिन्दी टंकण "	31 अगस्त
5.	हिन्दी आशुलिपि "	3 सितम्बर
6.	हिन्दी वाद-विवाद "	10 सितम्बर
7.	हिन्दी अन्ताक्षरी "	10 सितम्बर
8.	हिन्दी व्यवहार " (सामूहिक—प्रभागादि)	निरीक्षण तिथियों में
9.	हिन्दी व्यवहार (सामूहिक अनुभागादि)	
10.	हिन्दी व्यवहार (वैयक्तिक)	
11.	प्रश्न मंच प्रतियोगिता	30 अक्टूबर

हमारे संस्थान में किए जा रहे हिन्दी कार्यों का निरीक्षण संस्थान की राजभाषा कार्यान्वयन समिति द्वारा नवगठित निरीक्षण उप-समिति ने दिनांक 15, 20 तथा 22 अक्टूबर 1991 को किया, जिसके आधार पर अपना अधिकांश कार्य हिन्दी में करने वाले लेखा-परीक्षा अनुभाग को चल-शील्ड एवं उत्साही तथा हिन्दी में अच्छा कार्य करने वाले कर्मचारियों को व्यक्तिगत तौर पर तथा प्रभागानुभागादि को सामूहिक तौर पर पुरस्कृत किया गया।

दिनांक 30 अक्टूबर, 1991 को संस्थान में हिन्दी दिवस/वार्षिकोत्सव 1991 मनाया गया। केन्द्रीय सचिवालय हिन्दी परिषद की संस्थान शाखा के संरक्षक एवं निदेशक प्रो. प्रेम नारायण ने इस समारोह की मुख्य अतिथि, सूचना एवं प्रसारण उपमंत्री डा. (कुमारी) गिरिजा व्यास जी, का स्वागत किया। शाखा मंत्री श्री चरण सिंह वर्मा, ने संस्थान की विभिन्न हिन्दी गतिविधियों से अवगत कराते हुए वार्षिक रिपोर्ट प्रस्तुत की। "आज का शब्द" नामक पट्टिकाओं पर लेखन का शुभारम्भ तथा हिन्दी प्रसारिका के वार्षिक संस्करण का विमोचन मुख्य अतिथि द्वारा किये गये। लगभग 58 विजेता प्रतियोगिताओं को मुख्य अतिथि ने पुरस्कृत किया। मुख्य अतिथि, डा. (कुमारी) गिरिजा व्यास ने संस्थान में किए जा रहे हिन्दी कार्य एव आयोजकों की सराहना की तथा हिन्दी कार्य को दिनों-दिन बढ़ाने की प्रतिबद्धता को कायम बनाए रखने की इच्छा जाहिर की, विजेताओं को मुबारकबाद दिया तथा सभी हिन्दी प्रेमियों को प्रेरित प्रोत्साहित किया। संस्थान के प्रमुख वैज्ञानिक एवं शाखा प्रधान, डा. रमाकान्त पाण्डेय, ने धन्यवाद प्रस्ताव के माध्यम से मुख्य अतिथि एवं अन्य उपस्थितों और आयोजकों की भूमिका एवं योगदान की भूरि-भूरि प्रशंसा की।

शाखा संरक्षक एवं संस्थान के निदेशक, डा. सुदर्शन कुमार रहेजा की अध्यक्षता में दिनांक 27 फरवरी 1992 को संस्थान की केन्द्रीय सचिवालय हिन्दी परिषद शाखा की आम सभा की बैठक हुई। शाखा मंत्री, श्री चरण सिंह वर्मा ने

Dr VL Chopra in conversation with the senior officers of the Institute at the Felicitation Function after assuming charge of the post of Director General, ICAR and Secretary, DARE

डा. (कु.) गिरिजा व्यास, केन्द्रीय सूचना एवं प्रसारण उपमन्त्री, हिन्दी वार्षिकोत्सव में मुख्य अतिथि के रूप में भाषण देते हुए ।

वार्षिक प्रतिवेदन प्रस्तुत किया तथा कोषाध्यक्ष, श्री शब्द शरण श्रीवास्तव द्वारा प्रस्तुत वार्षिक लेखों के आम सभा द्वारा अनुमोदन के पश्चात, चुनाव प्रक्रिया हुई जिसमें सर्वसम्मति से सभी पदाधिकारियों, कार्यकारिणी के सदस्यों तथा केन्द्रीय प्रतिनिधियों का विधिवत चुनाव सम्पन्न हुआ और फलस्वरुप निम्नोक्त शाखा कार्यकारिणी का गठन किया गया :

पद	नाम
1. संरक्षक	डा. सुदर्शन कुमार रहेजा
2. प्रधान	डा. रमा कान्त पाण्डेय
3. उप-प्रधान	1. डा. (श्रीमती) रंजना अग्रवाल
	2. श्री रघुवंश कुमार सिंह
4. मंत्री	श्री चरण सिंह वर्मा
5. उपमंत्री	1. श्री रणधीर सिंह खत्री
	2. श्री जगदीश कुमार कसौटिया
6. कोषाध्यक्ष	श्री के. सी गुप्त
7. लेखा परीक्षक	डा. चन्द्र हास

कार्यकारिणी सदस्य :

1. डा. ओमप्रकाश कथूरिया
2. डा. हरपाल सिंह
3. डा. जे. पी. जैन
4. श्री ज्ञान चन्द शर्मा
5. डा. श्रीनाथ
6. डा. बी. एस. शर्मा
7. डा. पी. सी मेहरोत्रा
8. डा. रणधीर सिंह
9. डा. शिवतार सिंह
10. डा. एच. वी. एल. बाठला
11. श्री शब्द शरण श्रीवास्तव
12. श्रीमती आशा सक्सैना
13. श्री डी. एन. खरबन्दा
14. श्री प्रेम शंकर राय
15. श्रीमती रजनी ग्रोवर
16. श्री रमेश चन्द्र त्रिपाठी
17. श्री केशव चरण
18. श्रीमती पुष्पा बरेजा
19. श्री राम नरेश
20. श्री आनन्द प्रकाश वर्मा

केन्द्रीय प्रतिनिधि :

1. श्री फगुनी राम
2. श्री सत्यपाल सिंह
3. श्री पाल सिंह

IASRI PERSONNEL

(As on 31.03.1992)

Dr SK Raheja, Director

Heads of the Institute since inception

Dr PV Sukhatme	...	Sep 1940—Jul 1951
Dr VG Panse	...	Aug 1951—Mar 1966
Dr GR Seth	...	Apr 1966—Oct 1969
Dr D Singh	...	Nov 1969—May 1971
Dr MN Das	...	Jun 1971—Oct 1973
Dr D Singh	...	Nov 1973—Sept 1981
Dr Prem Narain	...	Oct 1981—Jan 1992
Dr SK Raheja	...	Feb 1992 onwards

Division of Design of Experiments and Analysis of Experimental Data

Dr PR Sreenath,
Principal Scientist and Head

Sr Scientists/Scientists (SG)

Dr VK Gupta
Dr BL Chaudhary
Mrs Asha Seksena
Sh RK Ghai
Sh JK Kapoor
Dr GC Chawla
Dr Ravindra Srivastava
Sh PK Batra,
Sh KC Bhatnagar

Scientists

Mrs Rajinder Kaur
Sh Onkar Sarup
Sh CH Rao
Sh DK Mehta
Sh GL Khurana
Sh DK Sehgal
Sh Aloke Lahiri
Sh NK Sharma
Mrs Ajit Kaur Bhatia

Division of Sample Survey Methodology and Analysis of Survey Data

Dr HP Singh,
Principal Scientist and Head

Principal Scientists

Dr JP Jain
Dr PC Mehrotra
Dr AK Srivastava
Sh VS Rustogi
Dr MG Mittal

Sr Scientists/Scientists (SG)

Dr Randhir Singh
Dr Shivtar Singh
Dr HVL Bathla

Dr BC Saxena
Sh SS Gupta
Sh Anand Prakash
Sh TB Jain
Dr SS Shastri
Dr NK Ohri
Sh RL Rustogi
Sh SN Arya
Sh MS Batra
Dr DL Ahuja
Sh KPS Nirman
Sh GS Bassi
Sh AS Gupta
Dr KK Tyagi
Sh RS Khatri

Scientists

Sh JP Goyal
Sh HC Gupta
Sh DC Mathur
Sh MS Kaushik
Sh RC Gola
Dr Jagbir Singh
Sh SC Agarwal
Sh DK Bhatia
Sh SC Sethi
Sh Bhagwan Dass
Sh MS Narang
Sh Satya Pal
Sh KK Kher
Sh T Rai
Sh VK Jain
Sh RM Sood
Sh K Chugh

Division of Statistical Economics

Dr RK Pandey,
Principal Scientist and Head

Sr Scientists/Scientists (SG)

Dr VK Sharma
Sh Shanti Sarup
Dr UN Dixit
Dr VK Mahajan

Scientists

Sh Ashok Kumar
Smt Sushila Kaul
Sh Ant Ram
Sh SP Bhardwaj
Dr SS Kutaula

Division of Forecasting Techniques for Crops, Diseases and Pests

Dr OP Kathuria,
Principal Scientist and Head

Sr Scientists/Scientists (SG)

Dr (Smt) Ranjana Agrawal
Dr RC Jain
Sh GN Bahuguna
Dr Chandrahas
Sh Jagmohan Singh

Scientists

Sh SC Mehta
Sh BH Singh
Sh SS Walia
Sh Madan Mohan

Division of Bio-Statistics and Statistical Genetics

Dr BS Sharma,
Principal Scientist and Head

Sr Scientists/Scientists (SG)

Dr Prajneshu
Dr VT Prabhakaran
Dr VK Bhatia
Sh SD Wahi
Sh Lal Chand
Sh SP Verma
Dr PS Rana

Scientists

Sh RK Jain
Sh Indra Singh

Division of Computing Science

Sh SN Mathur,
Principal Scientist and Head

Principal Scientist

Sh R Gopalan

Sr Scientists/Scientists (SG)

Dr IC Sethi
Sh Mahesh Kumar
Sh OP Dutta
Dr PK Malhotra
Sh KC Gupta
Sh ML Chaudhary
Dr RC Goyal

Scientists

Sh HO Aggarwal
Sh Balbir Singh

Coordination Cell

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

Monitoring Cell

Dr PC Mehrotra, Principal Scientist and Head

UNDP Cell

Dr PR Sreenath, Principal Scientist and Head

Training Administration Cell

Dr Randhir Singh, Prof (Ag. Stat.)
Sh SN Mathur, Prof (CAA)

Technical Officers

Sh SK Suri. Field Officer
Sh SD Sharma, Field Officer
Sh SS Srivastava, Librarian
Sh SK Sublania, MTO
Sh SK Mahajan, Technical Officer
Sh DC Pant, Technical Officer
Sh Amar Ranjan Paul, Sr. Artist

Administration

Sh GC Sharma, Chief Administrative Officer

Sh JR Nirwal, Senior Administrative Officer

Smt Sangeeta Duggal,
Finance & Accounts Officer

APPENDIX—II

SANCTIONED AND FILLED-UP POSTS

(As on 31-03-92)

S. No.	Designation	Scale of Pay (Rs.)	No. of Posts		No. of SC/ST Employees	
			Sanctioned	Filled	SC	ST
1	2	3	4	5	6	7
1.	Director	4500-7300	1	1	—	—
2.	Joint Director	4500-7300	2	—	—	—
3.	Principal Scientist	4500-7300	21	17	—	—
4.	Scientist (SG)	3700-5700	29	47	—	—
5.	Scientist	2200-4000	65	41	3	—
6.	Experimental Scientist	1740-3000	35	3	—	—
7.	Chief Admn Officer	3000-5000	1	1	—	—
8.	Sr Admn Officer	3000-4500	1	1	1	—
9.	Finance and Accounts Officer	2200-4000	1	1	—	—
10.	Field Officer	2200-4000	3	2	—	—
11.	Mech Tabu. Officer	2200-4000	1	1	1	—
12.	Librarian	2200-4000	2	1	—	—
13.	Tech Officer	2200-4000	3	2	—	—
14.	Sr Artist	2200-4000	1	1	—	—
15.	Asstt Field Officer	2000-3500	1	1	—	—
16.	Asstt Engineer	2000-3500	1	1	—	—
17.	Asstt Admn Officer	2000-3500	3	3	1	—

1	2	3	4	5	6	7
18.	Asstt Director (OL)	2000-3500	1	1	—	—
19.	Security Officer	2000-3500	1	—	—	—
20.	Electronic Computer Operator	1640-2900	8	—	—	—
21.	Artist	1640-2900	1	1	—	—
22.	Superintendent	1640-2900	8	7	1	1
23.	Sr. Personal Asstt	1640-2900	1	1	—	—
24.	Photographer	1400-2300	1	1	—	—
25.	Tech Asstt (Stat)	1400-2300	155	124	20	1
26.	Tech Asstt (Eco)	1400-2300	8	8	—	—
27.	Tech Asstt (Lib)	1400-2300	2	2	—	—
28.	Asstt EC Operator	1400-2300	6	3	—	—
29.	Field Inspector	1400-2300	2	2	—	—
30.	Hindi Translator	1400-2300	2	2	—	—
31.	Assistant	1400-2300	25	25	7	1
32.	Stenographer	1400-2300	11	11	1	—
33.	Jr Stenographer	1200-2040	18	12	3	—
34.	Sr Clerk	1200-2040	21	21	3	—
35.	Field Supervisor	1200-2040	6	4	—	—
36.	Punch Supervisor	1200-2040	3	3	1	—
37.	Card Librarian	1200-2040	1	1	—	—
38.	Receptionist	975-1540	1	1	—	—
39.	Electrician	975-1540	1	1	—	—
40.	Key Punch Operator	975-1540	45	43	4	1
41.	Field Investigator	975-1540	30	29	5	—
42.	Coders	975-1540	10	2	—	—
43.	Reference Asstt	975-1540	1	1	1	—
44.	Counter Asstt	975-1540	1	1	—	—
45.	TelephoneOperator	975-1540	3	3	—	—

1	2	3	4	5	6	7
46.	Tubewell Operator	975-1500	2	2	2	—
		950-1400	1	1	1	—
47.	Sr Gestetner-Operator	950-1400	1	1	—	—
48.	Carpenter	975-1540	1	1	—	—
49.	Driver	975-1500	2	2	2	—
		950-1500	4	2	2	—
50.	Zerox Operator	950-1500	1	1	—	—
51.	Jr Clerk	950-1500	38	30	6	1
52.	Jr Gestt Operator	800-1500	1	—	—	—
53.	Supporting Staff					
	Grade-I	750-940	55	46	10	1
	Grade-II	775-1025	27	25	7	1
	Grade-III	800-1150	13	10	4	—
	Grade-IV	825-1200	7	7	4	1

APPENDIX—III

APPOINTMENTS, PROMOTIONS, TRANSFERS, DEPUTATIONS, RETIREMENTS AND RESIGNATIONS

Appointments

Name	Designation	Grade (Rs.)	w.e.f.
1. Dr SK Raheja	Director (Adhoc)	4500-7300	0[illegible].02.1992
2. Sh Lakhmi Chand	Reference Assistant	975-1540	09.04.1991
3. Sh Rajinder Singh	Zerox operator	950-1500	12.04.1991
4. Sh Ratan Singh	Carpenter	975-1540	25.03.1992

Promotions

Name	Designation	Grade (Rs.)	w.e.f.
1	2	3	4
1. Sh Ramji Lal	T-II-4	1640-2900	01.07.1991
2. Smt Vinod Narang	T-II-4	1640-2900	01.01.1987
3. Sh Mohan Lal	T-5	2000-3500	01.01.1987
4. Sh Rajesh Kumar Jain	T-5	2000-3500	01.01.1991
5. Km Vijay Bindal	T-5	2000-3500	01.01.1991
6. Smt Geetam Johri	T-5	2000-3500	01.01.1991
7. Sh Som Dutt	T-II-4	1640-2900	01.07.1990
8. Sh Pramod Kumar	T-5	2000-3500	01.01.1989
9. Sh SP Jain	T-5	2000-3500	01.01.1989
10. Sh RC Tripathi	T-5	2000-3500	01.01.1989
11. Sh RG Kondapali	T-II-4	1640-2900	01.07.1989
12. Smt Sudesh Vaid	T-5	2000-3500	01.01.1990

1	2	3	4	5
13.	Sh Dharam Pal Singh	T-II-4	1640-2900	01.01.1990
14.	Sh Santosh Kumar	T-II-4	1640-2900	01.07.1990
15.	Sh SK Sharma	T-II-4	1640-2900	01.07.1990
16.	Sh Ramesh Chand	T-II-4	1640-2900	01.01.1991
17.	Sh Sohan Lal	Driver	1400-2300	01.07.1990
18.	Sh Mohan Singh	Electrician	1200-2040	01.01 1991

Transfers

(*a*) *On transfer from other Institutes*

	Name	Designation	Grade (Rs)	From	Date of joining
1.	Sh GC Sharma	CAO	3000-5000	CSIR, New Delhi	21.05.1991
2.	Sh JR Nirwal	Sr. AO	3000-4500	ISRI, Lucknow	10.05.1991
3.	Smt Sangeeta Duggal	F & AO	2200-4000	ICAR, Head quarters	13.05.1991

(*b*) *On transfer from this Institute*

	Name	Designation	Grade (Rs.)	Place of Joining	Date of Relieving
1.	Prof Prem Narain	Principal Scientist	4500-7300	IARI, New Delhi	05.02.1992
2.	Sh SN Jha	CAO	3000-5000	IARI. New Delhi	27.07.1991

Deputation

	Name	Designation	Grade (Rs.)	Office	Period
1	2	3	4	5	6
1.	Sh DC Dahiya	Assistant Director	2200-4000	Ministry of Agriculture, Krishi Bhavan, New Delhi	16.08.1990 to 31.03.1992

1	2	3	4	5	6
2.	Sh Ram Singh Pal	Librarian	1640-2900	Central Fertilizer Quality Control and Training Research Institute, Faridabad	30.09.1991 to 06.01.1992
3.	Sh KS Mishra	Assistant	1400-2300	Directorate of Cropping Systems Research, Modipuram, Meerut	31.10.1991 onwards

Retirements

	Name	Designation	Grade (Rs.)	Date of retirement
1.	Sh PN Soni	Principal Scientist	4500-7300	30.04.1991
2.	Sh PN Bhargava	,,	4500-7300	31.01.1992
3.	Sh SP Doshi	Scientist (SG)	3700-5700	30.09.1991
4.	Dr JN Garg	,,	3700-5700	31.01.1992
5.	Sh Narain Singh	AAO	2000-3500	29.02.1992
6.	Sh JN Sharma	Field Inspector	2000-3500	31.03.1992
7.	Sh Jagan Nath	SS Grade III	800-1150	31.10.1991

Resignations

	Name	Designation	Grade (Rs.)	Date of resignation
1.	Sh Kashi Prasad	T-II-3	1400-2300	12.06.1991
2.	Sh Satya Pal	T-II-3	1400-2300	04.09.1991

Obituary

	Name	Designation	Grade (Rs.)	Date of expire
1.	Sh Satya Pal	Scientist (SG)	3700-5700	20.12.1991
2.	Smt Manju Magan	Jr Clerk	950-1500	28.08.1991
3.	Smt Nakshi Devi	SS Grade I	750-940	13.08.1991

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