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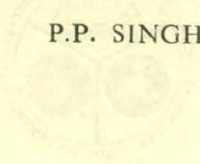
By

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SERIES OF BOOKS ON
CROP PRODUCTION
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प्राक्कथन

यह भारतीय कृषि सांख्यिकीय अनुसंधान संस्थान, सूचना-पत्र खण्ड नौ का द्वितीय अंक है। इसमें इस संस्थान की अप्रैल-जून, 1983 की तिमाही गतिविधियों से सम्बन्धित जानकारी का विवरण दिया गया है।

मुझे आशा है कि यह सूचना-पत्र कृषि अनुसंधान सांख्यिकीविदों तथा अन्य प्रयोक्ताओं के लिए लाभदायक सिद्ध हो रहा है। इसके अगले अंकों में सुधार लाने हेतु किसी भी प्रकार की टिप्पणी और सुझावों का मैं आभार सहित स्वागत करूँगा।

मैं संस्थान के उन सब अधिकारियों तथा उन सदस्यों का आभारी हूँ, जिन्होंने भा०कृ० सां०अ० सं० सांख्यिकीय सूचना-पत्र के इस अंक के लिए अपेक्षित सामग्री प्रदान की है।

मैं श्री सोमदत्त, श्री महाराज सिंह काकरन, श्री अनिल कुमार भल्ला और श्री रघुवर दत्त का भी आभारी हूँ, जिन्होंने इस सूचना-पत्र के संकलन एवं मुद्रण में अपना भरपूर सहयोग दिया है।

प्रेम नारायण
निदेशक

भा०कृ०सां०अ०सं०
नई दिल्ली-110012

PREFACE

This is Vol IX, No. 2 issue of 'IASRI Statistical Newsletter' and covers the activities and allied information in respect of this Institute during the quarter April-June, 1983.

I hope this Newsletter has been proving useful to the Agricultural Research Statisticians and other users. I would welcome and appreciate any suggestions for its improvement in the subsequent issues.

I am thankful to all officers and other members of the staff of the Institute who supplied the requisite material for this issue of the "IASRI Statistical Newsletter".

I am also thankful to S/Shri Som Dutt, M.S. Kakran, Anil Kumar Bhalla and Shri R. Dutt for the help rendered in compilation and printing of this Newsletter.

PREM NARAIN
DIRECTOR
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1. CLUSTER ANALYSIS IN AGRICULTURAL RESEARCH

Cluster analysis encompasses many diverse techniques for discovering structure within complex bodies of data. In a typical example, one has a sample of data units (subjects, varieties, Soil Sample etc.) each described by scores on selected variables. The objective is to group either data units or variables into clusters such that the elements within a cluster have a high degree of 'natural association' among themselves while the clusters are 'relatively distinct' from one another. The approach to the problem and results achieved, depend principally on how the investigator chooses to give operational meaning to the phrases 'natural association' and 'relatively distinct'.

The result of cluster analysis can contribute directly to development of classification schemes. Indeed, in biology and botany one of the principal applications of cluster analysis is to construct 'taxonomies'. In other situations, it may be possible to reduce a very large body of data to relatively compact description through cluster analysis. If the grouping suggested by an algorithm is adopted for operational use, then it may become the 'basis' for classifying new observations. In a more theoretical vein, cluster analysis can be used to develop inductive generalizations. Strictly speaking, a set of result applies only to the sample on which they are based but through appropriate modification they can be extended to describe adequately the properties of other samples and ultimately the parent population.

Since similar observations are grouped together, the individuals tend to assume class-labels and the whole process may give names to things. This aspect of cluster analysis is most prominent in biology where the class name is part of the individuals scientific name.

Divergence analysis is performed to identify the diverse genotypes for hybridization purpose. Cluster analysis of genotypes by various techniques which automatically produce distinct clusters, is useful in this matter.

Various methods of cluster analysis can be grouped into two broad types viz. (i) Hierarchical and (ii) Non-hierarchical.

The hierarchical methods operate on 'distance matrix' (dissimilarity matrix) to construct a tree depicting specified relationships among the entities as in the following figure :

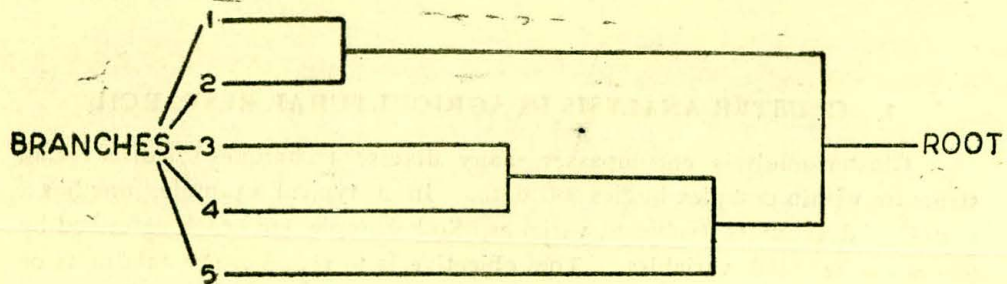


Fig Tree for hierarchical clustering

The branches on the left each represent one entity while the root represents the entire collection of entities. Moving down the tree from the branches towards the root depicts increasing aggregation of the entities into cluster. For a data set of 'm' entities, the hierarchical methods give 'm' nested classifications ranging from m cluster of one member each to one cluster of 'm' members.

The 'distance matrix' can be defined in a number of ways. Further, there are different approaches by which the clusters are formed. The investigator can choose any one of these methods depending upon his problem and availability of time and space on computer.

In non-hierarchical methods, the data units are divided into a single classification of 'k' clusters, where 'k' either is specified a priori or is determined as part of the clustering method. The central idea in most of the methods of non-hierarchical clustering is to choose some initial partition of the data units and then after cluster membership so as to obtain a better partition.

Non-hierarchical methods can be used with much larger problems than the hierarchical methods because it is not necessary to calculate and store the distance (dissimilarity) matrix. Clusters formed by non-hierarchical methods are non-overlapping. There are different approaches for initial partitioning.

A very good computer program for non-hierarchical cluster analysis of data units has been developed by the scientists of Computer Centre. A program for hierarchical cluster analysis using one of the efficient methods is also being developed at the Computer centre,

2. CROP FORECASTING

Reliable pre-harvest forecasts of crop production serve as a decision making basis for the Government, agro-based industries, traders and agriculturists alike. The Government needs them for its policy decisions in regard to procurement, distribution, buffer-stocking, import-export, price-fixation and marketing of agricultural commodities. The agro-based industries and traders need them for properly planning their operations while the agriculturists can use them as a basis for deciding the cultivation of a crop and its acreage for the subsequent season. To meet such needs, crop forecasts, under the prevalent system are being issued by the Directorate of Economics and Statistics. These forecasts are, however, of a subjective nature due to being based on eye-estimates and the final estimates through objective are of limited utility due to becoming available after the harvests. In view of this, there is thus a need for developing an objective methodology for pre-harvest crop forecasting. This involves building up of crop forecast models whose use as a forecasting technique has certain merits over the traditional forecasting method. These include objectivity of the forecast and a measure of the degree of its precision which a forecast through the traditional method cannot provide. Another merit of a forecast through this technique is its ability to reflect the impact of changes in the components of yield over time due to changes in the cultivation of crop varieties and cultural practices etc. Such changes do slightly affect the co-efficients of parameters in the forecast model but the model's responsiveness to these changes is not affected as such.

Keeping in view the need for obtaining reliable pre-harvest forecasts of crop production and the drawbacks of forecasts being issued at present, research work on this aspect was taken up by the Institute at the instance of the Ministry of Agriculture during the Fourth Five Year Plan period and continued thereafter. Since crop area statistics and yield rate constitute the two components of crop production of which the former become available before harvesting and the latter only after harvesting, this work on forecasting at the Institute was restricted to studies for building up models for pre-harvest forecast of crop yields only. Further, this work was carried out according to two approaches viz, one involving the use of factors like plant biometrical characters as explanatory variables in the forecast regression model and the other involving use of environmental factors like weather parameters as explanatory variables. A report on this work carried out as per former approach is given in this article and that on such work according to the latter approach is proposed to be given in a subsequent article.

Such studies on the basis of biometrical characters were conducted for crops like paddy, wheat, jowar, jute, cotton, sugarcane and tobacco. The data needed for these studies were collected through specially designed pilot sample surveys which lasted 3 to 4 years and covered these crops grown at the cultivators' fields in 2 to 3 typical districts growing each such crop.

Since these surveys involved a study of multiple characters like crop yield and plant biometrical characters, the selection of sample and stratification under these surveys could have been appropriately made on the basis of a suitable index of various biometrical characters. In the absence of such index, however, the sample design adopted was one of stratified multistage random sampling under which stratification was made on the basis of factors like geographical contiguity, similarity of agricultural conditions and administrative convenience. The strata thus selected consisted of the entire set of Village Level Worker Circles in each of four selected Community Development Blocks of a district taken up for the study, the four Blocks thus selected being such that each had sizeable area under the relevant crop. A sample of two villages from each stratum constituted the first stage sampling units while a sample of two or three fields from each selected village constituted the second stage units, the total number of fields thus selected from the district being 250 or so. The third stage sampling units consisted of two plots per field, the size of each such plot being one metre square for wheat as well as paddy and two metre square for jute. The plot size for the other crops which are invariably sown in rows was prescribed as 3 crop rows of length 3 metres each for cotton and 5 crop rows of length 5 metres each for jowar, tobacco and sugarcane.

These surveys for each crop covered about one to three districts, each of which was selected from the typical areas growing the relevant crop. An idea of the coverage under these surveys in respect of aspects like cropwise names of districts selected for the study and period for collection of data can be had from the following Table 1.

Table 1: Cropwise districts and period covered

Crop	District	State	Period
Paddy	Sambalpur	Orissa	1971-72 to 1974-75
	West Godavari	Andhra Pradesh	1971-72 to 1974-75
	Ludhiana	Punjab	1971-72 to 1974-75
Wheat	Ludhiana	Punjab	1971-72 to 1974-75
	Aligarh	Uttar Pradesh	1970-71 to 1973-74
Jowar	Sangli	Maharashtra	1976-77 to 1978-79
Cotton	Baroda	Gujarat	1970-71 to 1973-74
	Jalgaon	Maharashtra	1970-71 to 1973-74
	Aligarh	Uttar Pradesh	1971-72 to 1974-75
Jute	24 Parganas	West Bengal	1970-71 to 1973-74
	Purnea	Bihar	1970-71 to 1973-74
Tobacco	Prakasam	Andhra Pradesh	1976-77 to 1978-79
Sugarcane	Meerut	Uttar Pradesh	1975-76 to 1978-79
	Kolhapur	Maharashtra	1977-78 to 1979-80

The biometrical characters for use as explanatory variables in the forecast regression models were selected on the basis of their high correlation with crop yield. Among these, plant population, and plant height were common for all the crops studied while basal girth/internode girth was common for all such crops except jowar. Other characters included number of tillers, earhead length, number of green leaves for wheat and paddy; number of healthy earheads, earhead-length, earhead circumference, number of green leaves for jowar, plant spread, number of branches, number of bolls for cotton, total as well as harvested number of green leaves, number of curable leaves, length/breadth of leaves for tobacco; and number of shoots/millable canes for sugarcane. Among these observations on certain biometrical characters like plant population and total tillers were recorded on whole plot basis. This, thus, involved taking a complete count of the number of plants and tillers in each selected plot. Such observations, were, however, recorded on the basis of a sub-sample of five plants in each selected plot (i.e. one central and four corner plants) for certain other biometrical characters like plant height, plant girth, number of green leaves, number of branches, earhead length, and number of bolls per plant. The recording of all such observations

commenced after about 3 to 4 weeks of planting or sowing the crop. Thereafter, this recording was done at regular four weekly intervals throughout the crop growth period till harvesting when plot yield was also recorded. Further, for cotton and tobacco crops, the yield data for different subsequent pickings were also recorded. Regarding all such recordings, it is stated that various multi-stage sampling units including plots and plants were kept fixed for the entire crop season.

To ensure the quality of these data, the techniques for their measurement were standardised and a thorough training in such techniques was given to the field staff prior to entrusting them with the collection of these data.

By using these data, different yield prediction models were tried to examine their suitability. This involved carrying out multiple regression analysis of yield on biometrical characters. Since the sample had been selected with villages, fields, plots and plants as different stage sampling units, adjustments in crop yield were made to remove the effect of variation due to villages and fields while fitting the multiple regression equations.

In one regression model tried, the regressand Y (crop yield) and the regressors X_i 's (biometrical characters) were both used in the original scale. In certain other models, however, these were used in the transformed scale. The transformation for both Y and X_i 's for certain models was the same viz, log, square root and reciprocal. In another model, the crop yield Y was used in the original scale while X_i 's were transformed to an approximately normal form. Still another model for cotton crop involved the use of first picking yield alongwith biometrical characters as an additional explanatory variable. The results showed no single model to be superior over others. As such, the model using both Y and X_i 's in the original scale may be preferred due to its simplicity and ease in interpretation.

Another result worth mentioning is that the multiple correlation coefficient R between crop yield Y and the selected biometrical characters X_i 's was significant for all the crops. The amount of variation in crop yield explained by the fitted regression equations in terms of R^2 values, however, differed from crop to crop. Results on these aspects for different crops are summarised as follows :

For wheat crop at the stage of 2 to 3 months after sowing, about 50 to 60 per cent of the variation in crop yield was explained by biometrical characters among which plant population and number of tillers were found to

be significant. A forecast of wheat yield is thus possible on the basis of biometrical characters after 2 to 3 months of sowing the crop which can serve as a workable forecast in the light of the extent of variation explained.

The results for paddy crop were similar to wheat viz., that plant population and number of tillers explained about 50 per cent of variation in yield for 2 to 3 months old crop. A workable forecast for paddy yield was also thus feasible at this stage.

For hybrid jowar, biometrical characters like plant population, their height, leaf-breadth and ear-length at the stage of 10 to 12 weeks old crop explained over 50 per cent of the variation in crop yield. A workable pre-harvest forecast of hybrid jowar was thus feasible after about 10 to 12 weeks of planting or equivalently 1 month before harvesting. For local jowar, however, some further studies are needed as biometrical characters even after 14 to 16 weeks of planting explained only about 30 per cent of the variation in crop yield.

For cotton crop, biometrical characters like plant population and number of bolls explained only 30 to 40 per cent of the variation in crop yield before harvest but the inclusion of first picking yield as an additional explanatory variable in the regression model increased the explained variation in crop yield to about 80 per cent. Since the first picking yield becomes available after about 4 months of sowing the cotton crop while its final harvesting is done after 6 months, the cotton yield forecast on this basis is feasible about 2 months before harvesting.

For tobacco crop when it was 12 weeks old, five biometrical characters viz. plant population, number of curable leaves, plant-height, leaf-dimension, and internode-girth explained 40 to 70 per cent of the flue cured yield of tobacco grown in black soil and about 50 per cent of that grown in red soil. The percentage variation in green leaf yield of tobacco as explained by these very biometrical characters was, however, still larger. So that a workable pre-harvest forecast for tobacco yield is feasible when the crop is about 12 weeks old.

For sugarcane crop, plant biometrical characters like number of millable canes, their height and girth explained over 70 per cent of the variation in yield at the stage of 6 to 7 months old crop. A pre-harvest forecast of sugarcane yield is thus feasible at this stage.

Summarising thus, in view of the extent of variation in crop yield explained by the fitted regression equations which for a number of crops (except cotton, and sugarcane) is of the order of 50 per cent, there is a need to include factors like weather and crop inputs as additional explanatory variables. Such studies are proposed to be taken up during the VI Plan period. In this regard, it is remarked that inclusion of weather variables for paddy crop as per recent studies at the Institute is reported to have improved the forecast models.

3. TRAINING AND BASIC RESEARCH

3.1 Training Activities :

The following lectures/training programmes were arranged during the quarter ending 30th June, 1983.

<i>Organisation</i>	<i>Period of Training</i>	<i>Category of trainees</i>
(i) CSO, New Delhi	13-18 June, 1983	JCC (Specialized training in Agril. Stat.)
(ii) CSO, New Delhi	15-24 June, 1983	JCC (Specialized training in large scale sample surveys)
(iii) ISI, Calcutta/Delhi sponsored by CSO, Delhi.	28th June, 1983	M. Stat. (Functions and activities of IASRI).
(iv) CSO, New Delhi	30th June, 1983	JCC (Specialized training in data Processing).

3.2 Hostel Activities :

Shri S. K. Panda, Prefect of the IASRI Hostels resigned from the Prefectship. In his place, Shri M. N. Haque, Ph. D. III Yr. student was unanimously elected Prefect in the General Body meeting held on 22nd June, 1983.

4. ADVISORY SERVICES

During the quarter under review, technical advice and guidance was rendered to research workers and students of the Research Institutes, Agricultural Universities and other Research organisations in planning of their experimental investigations and statistical analysis/computerisation of their

research data as also in regard to research projects referred to the Institute by the ICAR and other organisations. Some details of the technical advice and guidance by the Institute are given below in brief :

4.1 Crop-Forecasting Methodology :

Gave guidance to Dr. S. Bhide from NCAER on techniques of Crop forecasting methodology.

4.2 Sample Survey Methodology :

Guided Dr. S. Paul, Energy Consultant in India House Developments, N. Delhi in Planning of a survey and framing schedules for data collection regarding energy consumption in Agri./A.H./rural sector and in analysing the data also.

Advice given to Shri Karan Singh, Dy. Director (Stat.) H.P. on mortality rate in poultry birds.

Advice given to Sh. P.S. Kohli, Addl. Secretary, Ministry of Agriculture on yield level & associated practices for important cereals, during the last two plans.

Advice given to the Prog. Director, Lab to Land programme (L.L.P.), ICAR on preparation/printing of proformae for reporting progress of work of L.L.P. from different Transfer Technology Centres (T.T.C).

4.3 Econometric Analysis :

Technical advice given to the project officer and Subject matter Specialist (S.M.S.) of Krishi Gyan Kendra, Bhilwara regarding the project which is operated in O.R.P. area, Bhilwara (Raj.).

4.4 Computer Science & Numerical Analysis

Gave advice to C.S.I.R. Centre for Biochemicals in selecting a Computer System for that institutions work.

5. FIELD SURVEY WORK

5.1 Field Training :

During the quarter under review, field training was imparted in connection with the projects mentioned below at the places shown against them.

- (i) All India Coordinated Agronomic Research Project-Ludhiana (Punjab), Pantnagar (UP). Birsa Agricultural University, Kankee, Ranchi (Bihar), Trichur (Kerala), Coimbatore (T.N.), Vadhodara (Gujarat), Kota (Raj.).

- (ii) Agricultural Field Experiments Information System-Bhubaneswar (Orissa) and Jabalpur (M.P.)
- (iii) Study of employment and income of small farmers and landless labourers-Ludhiana (Punjab)
- (iv) Development of a suitable methodology to study the effects of housing conditions and other related factors on milk production under village conditions-Distt. Gurgaon (Haryana).

5. Field Work Inspection/Supervision

During the period under report the field work of the following schemes was inspected/supervised by the officers of the field unit at the places/areas mentioned against them:

- (i) Pilot Study for developing a suitable methodology for estimation of cost of cultivation of fodder crops-Distt. Jullunder, (Punjab).
- (ii) Pilot sample survey to study the impact of flood on Agricultural production in a region of U.P.-Districts of Ballia and Faizabad (U.P.)
- (iii) Pilot Sample Survey to study the impact of National Demonstration Trials on Crop Production-Distt. Rohtak (Haryana).
- (iv) To study of Assessment of yield constraints in transfer of New farm technology in O.R.P. Area, Bhilwara (Raj)-O.R.P. area Bhilwara (Raj.).
- (v) National Index of Agricultural Field Experiments-Karnataka, Tamil Nadu and Kerala.
- (vi) All India Co-ordinated Agronomic Research Project-Ludhiana (Punjab), Pant Nagar (UP), Ranchi (Bihar)
- (vii) Development of a suitable methodology to study the effects of housing conditions and other related factors on milk production under village conditions-district Gurgaon (Haryana).

6. ABSTRACTS OF SEMINAR TALKS

During the quarter under review, 12 seminar talks were delivered by the Scientists/Staff/Students of the Institute on various topics of interest in the fields of Agricultural Statistics and allied disciplines. The abstracts of Seminar talks are given below.

6.1 Seminar Talks delivered by the Ph. D./M.Sc. Students

6.1.1. Agricultural Statistics :

(a) Ph. D. :

(i) AGARWAL, S.K.—Supplemented Block Designs.

In certain situations sufficient material of the treatments to be tested is not available for required number of replications. In such situation we use two sets of treatments, one set of treatment is the control (replicated r_1 times) or the check treatments and other set of treatments is New treatments replicated r_2 times ($r_1 \geq r_2$). In the seminar Augmented Design (Federer) Reinforced design (Das) and orthogonally supplemented Balanced Design (Calinski) were discussed.

(ii) YADAV, L.R.—Robust Estimation in Finite Populations: Stratification on a size variable

Here stratification on a size variable is considered as a technique for protecting against model failure. The two techniques, stratification and balanced sampling together provide more efficient protection than balanced sampling alone. Definition of strata and allocation of sampling units among strata were also discussed.

(b) M.Sc. :

(i) CHAUDHARY, NARENDRA—A systematic approach to automatic edit and imputation

In this paper, we are concerned with the automatic editing and imputation of survey data using the following criteria:

1. The data in each record should be made to satisfy all edits by changing the fewest possible items of the data (fields).
2. As far as possible the frequency structure of the data file should be maintained.
3. Imputation rules should be derived from the corresponding edit rules without explicit specifications.

A set of procedures is developed for identifying the fewest number of fields which may be changed to make the resulting data satisfy all edits.

The advantages of the proposed method, may be categorically methodological systems and subject matter benefits, are having its major significance in their evaluation possibilities.

(ii) DASS, JAGANNATH--Group Divisible Rotatable Designs in its General Form.

The class of rotatable designs for first evolved by Box and Nilson (1951) and its mathematical interpretation in full details was developed by Box and Hunter (1957). Hereberg (1966) relaxed the restrictive conditions for rotatability and introduced the concept of Cylindrical rotatability designs in (1966). Das and Dey (1967) introduced the concept of group divisible rotatability. This concept though introduced independently of Hereberg, is essentially the same as that of Cylindrically rotatable design. These Cylindrically rotatable designs are rotatable with respect of all the factors except for one. But Das and Dey made a modification (independently) by making that one factor with some other factors a group and the preceding to these factors as another group such that they are mutually orthogonal i.e. $(x_1, 0, x_{20}, \dots, x_{p0}, 0)$ and $(0, \dots, 0, x_{\bar{p}+1}, 0, x_{\bar{p}+2}, 0, \dots, x_v, 0)$ are two mutually orthogonal space out of the original v -dimensional space. These two mutually orthogonal spaces (design) will not be certainly rotatable in the v -dimensional space, but they will be rotatable in the p -dimensional space for all those points whose projection in the $(v-p)$ dimensional space at a constant distance from the origin and vice-versa.

But further attempts can be made to generalize this 2nd order GDR for two groups to d 'th order GDR for 'm' groups ($m=2, 3, \dots$). From their (Das and Dey) Philosophy attempts also can be made to construct.

(i) $(x_{10}, x_{20}, \dots, x_{p0}, \dots, 0)$ p -dimensional

(ii) $(0, 0, \dots, 0, x_{\bar{p}+1}, 0, x_{\bar{p}+2}, 0, \dots, x_{q0}, 0, \dots, 0)$ q -dimensional.

(iii) $(0, 0, \dots, 0, \dots, 0, x_{q+1}, 0, \dots, x_v, 0)$ $(v-p-q)$ dimensional and so on. We can make $m=3, 4, \dots$, mutually orthogonal spaces such that one orthogonal space (design) will be rotatable in its respective dimensional space while others held constant. In the present seminar attempts were made to summarize the evaluation of GDR.

(iii) JHA, P. K.—A Review of Fertilizer response relationships.

A large number of experiments are conducted at various model agronomic experimental stations and on cultivators' field to work out the suitable optimum size of fertilizer for adoption by the cultivators under different agro-climatic conditions. Some of the models, which have been tried to circumvent the discrepancies are discussed here.

(iv) RAJU, S. DURAI—A Generalized Estimator for the mean of a finite population using multi-auxiliary information.

For estimating the mean of a finite population using information on P auxiliary characters x_1, x_2, \dots, x_p , a class of ratio type estimators is considered. For any function $F(u_1, \dots, u_p) = F(u)$ where $u_i = x_i/X_i$, $i=1, 2, \dots, P$, the ratio of the simple random sample mean and the population mean of the character X_i such that $F(e) = 1$ $e_i = 1$, $i=1, 2, \dots, P$ and such that it satisfies the condition (1), (2) and (3), the estimator considered is $\bar{y}_h = \bar{y} F(u)$. Asymptotic expressions for the bias and the variance of the estimator are obtained and it has been shown that ratio estimator of the form \bar{y}_h are asymptotically no more efficient than the regression estimator. The efficiency of proposed estimator is shown over Olkin's multivariate ratio estimator and Srivastava's estimation separately.

(v) SHEKHAWAT, SUDHIR—A modified Ratio Estimator using coefficient of variation of Auxiliary variable.

This seminar topic deals with a modified ratio estimator using coefficient of variation of auxiliary variable X is proposed. It is found that the absolute bias of the modified ratio estimator is always less than of the ratio estimator when α is positive and greater than βC_x . The proposed estimator is found to be more efficient than both ratio and sample mean estimator when P lies between a certain range.

(vi) SUDHANSHU, A.K.—On Estimation of Price spread.

The study of price spread helps in ascertaining from time to time the share of the producer and the margins of various intermediaries involved in the sale and purchase of commodity at various stages of marketing in the consumer's rupee. In this paper, four sampling schemes have been considered for the estimation of price spread. Almost unbiased estimators (i.e. estimators whose bias is zero upto first order of approximation). Of different components of the price spread have been suggested alongwith the combined measure of the error associated with these estimators. The relative efficiencies of different sampling schemes have been considered.

6.1.2 Agricultural Economics :

Ph. D. :

(i) CHAKRAVARTY, M.—Comparative performance of high yielding varieties of paddy in the State of Orissa—A review

Agriculture forms backbone of Indian Economy and despite concentrated industrialization during the last two decades agriculture occupies a place of pride. According to National Income Committee and Central Statistical Organisation agricultural and allied occupation contributed 52 percent national income in 1960-61 which declined to 41 percent in 1976-77.

Rice occupies an area of 38605.6 million hectares in the country out of which Orissa, a major paddy growing state in Eastern India, constitutes 11.34 percent of the total area (4379.5 thousand hectares) with a production of 4950.1 thousand tones which comes to 7.69 percent of the total rice production in the country. Average productivity is 1.13 tonnes/ha. of the total paddy area in Orissa, 991.0 thousand hectares was put under high yielding varieties in 1979-80.

Rice production in Orissa as compared to other parts (northern and southern) of country over the past one and a half decade is not satisfactory. The main reasons are not only physical and economic factors but also due to minor changes in institutional and attitudinal factors and less emphasis on non-monetized inputs.

- (ii) **ATTERI, B.R.**—Quantitative and Qualitative Impact of Training and Visit System on different group of farms—A case study of Hooghly District, West Bengal

Objectives :—

1. To examine the changes in Cropping pattern and cropping intensity after the introduction of T and V system on different Farm sizes.
2. To examine the changes in productivity and labour employment pattern due to adoption of the T and V system
3. To compare the marginal productivity of inputs with and without T and V system.
4. To study the extent of adoption of different improved practices before and after implementation of the T and V system.

Linear Programming technique and linear Regression model were used to study the above objectives.

Results

The study points out that before the implementation of the T and V system, most of the cultivated area was under traditional crop varieties (50 percent and 65 percent on group I and II) the introduction of T and V system has resulted in increase in cultivated area under HYV (80 percent and 90 percent on group I and II). The new knowledge of farming, disseminated by the T and V System has the potential to increase the cropping intensity, Employment of family labour, Marginal Value Productivity of all inputs and the extent of

adoption of recommended practices on both the categories of Farms. However, the impact of this is found more on the small holdings as compared to the large. The ratio of MVP to the factor price 9 (of that input) was found to be highest (17,25 and 20,25 on group I and II) on both the groups, the ratio for family labour was negative on both the Farms, indicating over utilisation of it on both the farms.

Thus the study clearly indicated that the T and V system has made a considerably positive impact on the different size of farms.

6.1.3 Genetics :

Ph. D. :

BENDALE, V.W.—Line X Tester analysis for combining ability

The improvement of any crop depends on the ability of the parents to combine well in the hybrid combination. Higher expression of F_1 may be due to fixable (additive) type of gene action, coupled with, non fixable (non-additive) type of gene action in relatively higher proportion. In this context combining ability deciphers the role of various types of gene actions.

The concept of GCA and SCA as a measure of gene action was proposed by Sprangne and Tatum (1942). The concept was further extended and explained by various workers (Haymen, 1954, Sprangne, 1956 and Griffing, 1956 a and 1956 b). The most important mating design employed for estimation of GCA and SCA variances in plant breeding is Line X, tester developed by Kempthorne (1957). The design is extensively used as it requires only one generation and relatively large number of parents can be tested.

6.1.4. Agricultural Engineering :

Ph. D. :

DOGRA, A.K.—Systematic calculation of Dimensionless products

For a set of n pertinent quantities with m fundamental dimensions of which the rank of the dimensional matrix is $r=m$, there are infinite number of possible sets of dimensionless numbers (π -terms) with $(n-m)$ π terms in each set. If each π term within each set contains a unique pertinent quantity linear independence of the π -terms is assured and the total number of sets of π -terms is reduced to $n!/m!(n-m)!$. A systematic approach for determining all possible such sets of dimensionless numbers with the aid of a computer program allows the investigator to review these sets without making exhaustive calculations and then to choose one that best fits his experimental capabilities.

7. ABSTRACTS OF PAPERS PUBLISHED BY THE SCIENTISTS OF THIS INSTITUTE.

- 7.1 AGRAWAL, RANJANA, JAIN, R.C. and JHA, M.P.—Joint effects of weather variables on rice yield. *Mausam*, Vol. 34, No. 2, pp. 189-194, 1983.

An attempt has been made to study the joint effects of climatic variables on rice yield at different stages of crop growth. The weekly weather parameters viz. maximum temperature, relative humidity (14 hrs) and total rainfall were considered. Results on joint effects of maximum temperature and relative humidity revealed that beneficial effects of above average maximum temperature on yield increased with rise in humidity during active vegetative phase while detrimental effects decreased in other phases of crop growth. The adverse effect was pronounced during flowering stage of the crop. The rise in humidity had small beneficial effects in general throughout the crop season. Beneficial effect was pronounced at the time of flowering. The effects increased with increase in temperature. Joint effects of maximum temperature and rainfall revealed that rise in temperature associated with high rainfall had beneficial effects during growth phase of the crop. The increase in rainfall with sufficient temperature was beneficial except towards the end of initial growth and ripening phases of the crop.

- 7.2 BATRA, M.S. and NARAIN, PREM—Discriminatory analysis in wheat and triticale with the help of Diallel Cross data. *Ann. Agric. Res.* Vol.1, No. 2, pp. 182-188, 1980.

From analysis of diallel cross data in respect of five characters in wheat and triticale, a linear discriminant function was obtained by maximising the difference between triticale and wheat representing two different populations. Using this function, discriminant scores were obtained for each of the individual observations in the two crops. Diallel tables of the scores were analysed and heritability estimate worked out. The discriminant score, representing the plant type, was largely determined by the plant height and number of spikelets per ear. The contributions of these two characters together, to the D^2 -statistic amounted to about 95 per cent. G.c.a. and S.c.a. were, in general, highly significant in almost all the cases. Heritability estimates of the discriminant scores both for wheat and triticale were quite appreciable, being around 0.50.

- 7.3 JAIN, J. P.—Methods for appraising progeny tests of dairy bulls under field conditions. *Ind. Jour. Anim. Genet. and Breeding* 3(1) : 1-4, 1981.

Two methods of ranking dairy bulls based on the intra-Village intra-management level deviations of their daughters records from contemporary

averages have been proposed for use under A.I. field conditions. In addition, empirical investigations which must precede before these methods can be used have been outlined.

- 7.4 NARAIN, PERM, MALHOTRA, P. K. and WAHI, S. D.—The use of auxiliary traits in combined selection for poultry improvement. *Ind. Jour. Poultry Sci.*, Vol. 18, pp. 37-47, 1983.

The genetic improvement of production traits is normally achieved by selecting genetically superior individuals for the given trait and mating them to produce the next generation. The genetic superiority of the individuals can however, be determined either on the basis of their own performance or of their relatives such as full-sibs and half-sibs or else an optimum combination of several such information all for the same trait. The latter selection scheme involves construction of a selection index and is known as combined selection. In this paper a new selection index which combines information on several auxiliary traits with the information on the trait under improvement for the individual as well as its relatives, such as full-sibs, half-sibs and dams has been developed. Its efficiency has been found to be more than the efficiency of an index without any auxiliary trait, the increase in efficiency depending on several parameters. The theoretical results have been supplemented with practical results on poultry data analysis involving egg production upto 240 days of age as the main trait and age at first egg and egg weight as the two auxiliary traits. The use of age at first egg as the auxiliary trait results in an increase in the efficiency of the index by about 8 to 9 per cent whereas the use of the egg weight increases it by about 6 to 7 per cent. When both of these traits are used, the efficiency increases by as much as 14 to 16 per cent. The inclusion of dams performance is found to decrease the efficiency of the new index by about 1 per cent.

8. STATISTICAL ABSTRACTS OF PAPERS PUBLISHED BY THE SCIENTISTS OTHER THAN OF THIS INSTITUTE

During the quarter under report the following articles published in various journals were abstracted by the Scientists of this Institute whose names are given at the end of each abstract. The topics of the articles are broadly on Sample Survey (Theory and application, including good case studies, if any), Design of Experiments (all aspects including combinatorial aspects) Statistical Genetics, Plant and Animal Breeding (with sufficiently new statistical methodo-

logy), Statistical inference, sequential analysis and Stochastic Process with biological applications, etc., Econometrics and Computer Services and Numerical Analysis, etc.

- 8.1 NATHAN, G. AND HOLD, D.—The effect of survey design on regression analysis, *J. R. Statist. Soc. B. Vol. 42, No. 3, pp 377-386 (1980)*.

Data arising from sample surveys are usually the result of complex survey design involving such techniques as stratification, multistage selection and the use of auxiliary information through unequal probability selection. These resulting data are often analysed using regression techniques without further regard to the sample design. This paper shows that, in general ordinary least squares (OLS) regression will be biased in this situation even for large samples, although in the important class of most equal probability of selection method (epsem) designs asymptotic unbiasedness of least square estimation is preserved. Alternative estimators are considered which yield unbiased estimates of the simple regression coefficient. Variances of all the estimators are derived and comparison made. The usual OLS estimator of variance is also examined and found to be biased in general, even when used in conjunction with an epsem design for which OLS estimator itself is unbiased. The theoretical results have also been confirmed through an empirical investigation.

(Abstracted by Sh. P. C. MEHROTRA)

- 8.2 REDDY, V.N. and RAO, T. J.—Modified PPS method of estimation. *Sankhya, Series C, Volume 39, pp. 185-197 (1977)*.

Under certain circumstances it is well known, that the probability proportional to size (PPS) method of estimation provides highly efficient estimator. However, it was noted by Des Raj (1954) that the estimator based on the PPS with replacement scheme turns out to be inefficient compared to the simple unbiased estimator based on the SRS with replacement scheme if the regression line of y on x is far from the origin. In this case the authors suggest a PPS estimator with a transformation on the auxiliary variate. The transformed auxiliary variate uses information on the population parameter $k = \frac{\beta}{R}$ where β is the regression coefficient of y on X and R is the ratio of population totals of Y and X . The suggested PPS estimator is found to be highly efficient in most of the situations met with in practice. The empirical efficiency of the suggested PPS estimator is compared those of Horvitz-Thompson estimator, Rao-Hartely-Cochran estimator and Symmetrized Des Raj estimator. The results are extended to the case when

Y and X are negatively correlated and are illustrated with empirical examples. Finally, a comparison between the two estimators which make use of information on k, one based on SRS without replacement and the other based on PPS with replacement design, is made by assuming a linear finite-population model.

(Abstracted by Dr. H.V.L. BATHALA)

- 8.3 ROYALL, RICHARD M. and GUMBERLAND, WILLIAM G.—Variance Estimation in Finite Population Sampling. *Janr. of American Statistical Association*, Vol. 73, pp. 351-358, March-Dec., 1978.

Under linear regression model, the best linear unbiased estimator (BLUE) for a finite population total can be obtained. The problem studied here is that of estimating the variance for setting large sample confidence intervals about the BLUE when the model generating this estimate is inaccurate. A robust variance estimator is derived and its sympototic properties are shown to compare favourably with those of the weighted least-squares variance estimator. The robust variance estimator is shown to be asymptotically equivalent to the jackknife variance estimator under rather general conditions. These are extensions of results previously established for the ratio estimator by Royall and Eberhardt (1975).

(Abstracted by Dr. M.G. MITTAL)

- 8.4 KUCZYNSKI, M. (Department of Applied Mathematics, Agricultural Academy, Lublin, Poland)—Analysis of covariance in split block design. *Biometrical Journal*, Vol. 24, No. 7, (1982)

In Statistical literature a split-plot block design has also been denoted as two way whole plot design and as a strip block design. The analysis of covariance with one concomitant variable in this design was presented by FEDERER (1955) but in this paper the analysis of covariance with many concomitant variables is presented. Here the split block is discussed for the situations when both whole plot treatments A and B are in randomised complete block design. The experimental units for the levels of factor A go across all b levels of factor B. For linear model for the analysis of covariance it is assumed that the vectors of regression coefficients associated with residual variables are mutually different. In the presentation of the model three kinds of regression coefficients for individual sources of variable are taken into consideration. It

is shown that for every estimable function of fixed effects, the best linear unbiased estimator under the assumed model is the same as the best linear uncovariance matrix equal to identity matrix multiplied by a positive constant. A variance of this estimator can be calculated by the method presented in the paper. Test functions for standard hypothesis concerning fixed effects are also obtained.

(Abstracted by Sh. M. R. VATS)

- 8.5 GAFFKE, N. and KRAFTT, O.—Exact D—Optimum Designs for Quadratic Regression, *Jour. of Royal Stat. Soc., Series B, Vol. 44, No. 3, pp. 394-97, (1982).*

For a quadratic regression model with errors uncorrelated and having same variance, let

$$M_n(x) = \begin{bmatrix} n & \Sigma x_i & \Sigma x_i^2 \\ \Sigma x_i & \Sigma x_i^2 & \Sigma x_i^3 \\ \Sigma x_i^2 & \Sigma x_i^3 & \Sigma x_i^4 \end{bmatrix}$$

where $x = (x_1, \dots, x_n) \in [a, b]^n$.

A vector $x^* \in [a, b]^n$ is called an exact D—optimum design if $\det M_n(x^*) \geq \det M_n(x) \forall x \in [a, b]^n$.

Assume, without any loss of generality, $[a, b] = [-1, 1]$. The exact D—optimum design $x^* = (x_1^*, \dots, x_n^*)$ on $[-1, 1]$ is obtained by choosing the $x_i^* \in [-1, 0, 1]$ in such a way that $3-t$ of the values $-1, 0$ and 1 occur p times and t of them $p+1$ times, where $t=1$ or $t=2$. For such designs $n=3p+t$. This result provides another example in which the Kiefer—Wolfowitz (ref. 1) equivalence theorem does not carry over to the exact case.

(Abstracted by Dr. V. K. GUPTA)

- 8.6 WOOD, C. L. (University of Kentucky) and CADY, F.B. (Cornell University)—Intersite Transfer of Estimated Response Surfaces—*Biometrics, Vol. 37, No. 1, 1981.*

Applicability of experimental results, particular response surfaces obtained at a set of sites to new sites of the same soil family is examined. A transfer conjecture whose statistical analysis involves (1) identification and estimation of response surface model which adequately relates crop yields from

several experimental sites to both the applied fertilizer levels and measured site variables and (2) evaluation of the predictive ability of the resulting estimated response surface for sites within the same soil family, but not included in the estimation process, is suggested. The approach utilizes a sum of squares criterion to compare the magnitude of transfer residuals to the ordinary within site residuals. The methodology is illustrated.

(Abstracted by Miss C.R. LEELAVATHI)

- 8.7 HILLS R. C. and MORGAN, J. H. T. (Australian National University, Canberra)—Rain fall statistics : An Interactive Approach to Analysing Rainfall Records for Agricultural Purposes. *Experimental Agriculture*, Vol. 17, pp. 1-16, 1981.

The authors have prepared a simple but robust analysis programme for analysing rainfall records to meet the practical requirement for agricultural development in developing countries. It is formed keeping in mind certain considerations like, simplicity; ability to handle poor data with gaps and short records; range of time scale and provision for probability levels to be selected by the user.

The programme provides the following information :

1. Probability distribution of the amount of rainfall in periods of fixed length. This is done by transforming the data on logarithmic scale and fitting normal distribution for any specified value of q , $z(q)$ is determined from normal probability tables. Where

$$q = \int_{-\infty}^{z(q)} \frac{1}{\sqrt{2\pi}} \exp \left(-\frac{1}{2} Z^2 \right) dZ$$

The value of $z(q)$ the q th quantile is finally obtained by transforming back.

2. Probability distribution of time (days) to the next wet day.

A gama distribution is fitted to the waiting time for next wet day at the i^{th} prescribed date. Mean and variance of the waiting time are obtained. Also for a preassigned probability q the waiting time (days) for next wet spell at the i^{th} date is obtained by the fitted distribution.

3. The programme also provides the cummulative distribution of soil-moisture at ten day intervals according to a simple moisture budget procedure.

(Abstracted by Mrs. ASHA SAKSENA)

- 8.8 PETERSON, R. G., NASH, T. E. and SHELFORD, J.A.—Heritabilities and Genetic Correlations for Serum and Production Traits of Lactating Holsteins, *Jour. of Dairy Science*, Vol. 65, pp. 1556-1561, (1982).

Selection for milk and milk constituents in dairy cattle has received attention recently. Milk yield is controlled by a polygenic system, and phenotypic variability animals can be attributed partially to genetic differences. These genetic differences arise from genetic variation in one or more of the physiological pathways controlling milk secretion. Blood samples and production records were obtained from 545 lactating purebred and grade Holstein cows in 35 commercial dairy herds in the eastern Fraser Valley of British Columbia. The animals represented 29 sire groups with four or more daughters in two or more herds. Heritabilities and genetic correlations were estimated from half-sister analyses in the usual manner. Heritabilities for alkaline phosphatase, creatinine, and amylase were 0.52, 0.44 and 0.43. Heritabilities were lower for blood urea nitrogen, uric acid, total protein, albumin, serum glutamic oxaloacetic transaminase, and potassium. Genetic correlations between alkaline phosphatase and milk, fat, and protein yields were $-.94$, $-.91$ and $-.89$. Blood urea nitrogen, creatinine, and potassium also had large genetic correlations with production traits. Metabolic traits may be useful predictors of production in dairy cattle when the blood sample is taken during production.

(Abstracted by Sh. L. K. GARG)

- 8.9 COFFEY, E.M., PEARSON, R. E., DOUGLASS, L. W. and MILLER, R. H.—Methods of estimating energy intake by production traits and body weight. *Jour. Dairy Sci*, 65 (11) : 2102-10 (1982).

Energy intake of individual lactations in dairy cattle was estimated by three alternative expressions. The data used for the study were on 167 first calvers of US Department of Agriculture Holstein-Friesian herd at Beltsville, MD. The cows were fed ad libitum one of two mixed rations, differing in the proportions of concentrate, corn silage and grass silage, supplemented with 1.8 kg. of alfalfa hay daily. The first estimate (E_1) of net energy (Megacalories) for lactation was obtained from individual heifer variables (milk and fat yields, average body weight, days in milk and change in weight) and net energy requirements for production, maintenance and growth from the National Research Council. The other two estimates (E_2 and E_3) were calculated from individual consumption data and the Council's estimates of net energy content of the feed components. While dry matter for each component was constant during

the period of study in computing E_2 , dry matter intake totals which accounted for weekly variation were used to obtain E_3 . The three estimates of energy intake were highly correlated. E_1 explained 88 and 91 per cent of the variation in E_2 and E_3 respectively indicating that accounting for weekly variation in dry matter improved the relationship only slightly. Addition of protein yield in estimating E_1 increased accuracy only marginally.

(Abstracted by Sh. S. N. ARYA)

8.10 SENTS, A. E., WALTERS, L. E. and WHITEMAN, J. V.—Performance and carcass characteristics of ram lambs slaughtered at different weights. *Jour. of Ani. Sci.* Vol. 55, No. 6, 1982.

The objectives were to determine changes in growth efficiency, carcass composition and meat tenderness of the ram lambs over a wide range of market weights. As such, in all 144 crossbred ram lambs (the progeny of Hampshire, and suffolk straight bred and reciprocal cross rams mated to crossbred wes consisting of various levels of Rambouillet, Dorset and Finnsheep breeding) born at three different times of the year were selected from an 8-mo lambing interval project. The lambs were fed in four groups according to year and time of birth and they were slaughtered between 39.5 and 84.8 kg. live weight. When 12 lambs identical in weight and age averaged roughly 31.8 kg., they were started as a pen and put on trial. The lambs in the pen were sorted into upper, average and lower one-third weight groups. Three lambs from each pen i.e. one lamb from each group of the pen were slaughtered at an average pen weights of 45.4, 54.4, 63.5 & 72.6 kg. The procedure ensured each lamb an equal chance of being slaughtered. The measurements on carcass were obtained and the carcass cut out data collected from the right side. performance data were analysed by pen for the four weight gain intervals. Carcass data were analysed by regression analysis technique.

Daily gain decreased ($p < .01$), feed intake increased and then decreased ($p < .01$) and feed to gain ratio increased ($p < .05$) as slaughter weight decreased. The increasing trend in feed to gain ratio could not continue owing to fall in feed intake and daily gain. With an increase in live weight, all carcass measurements and component weights also increased ($p < .0001$). A quadratic effect approached significance pointing thereby that lean weight increased at a faster rate as live weight increased. However, it was not appreciable for other variables. The kilograms of lean, fat and bone increased in the 72.6 kg. lambs at a similar rate as in the 45.4 kg. ram lambs. While percentage lean decreased 5.7% on a carcass basis, it declined only 1.2% on a live weight basis bet-

ween 45.4 and 72.6 kg. This indicated the largest changes in percentage composition of the live animal. The quality score of these ram lamb carcass did not change substantially throughout the weight range of the study. The average tenderness of these ram lambs was considered acceptable at all weights.

(Abstracted by Sh. S. P. VERMA)

- 8.11 STRITRUE, DEBI J. and WHITEMAN, J. V.—Lamb growth pattern following different seasons of birth *J. Anim. Sci.*, Vol. 55, No. 5, 1002-1007 (1982).

In this paper Fall, winter, and summer born lambs were compared for birth weight, 70-d weight and average daily gain (ADG, 70-d to market). Data were collected on 457, 510 and 640 lambs born during the fall (October, November), summer (June, July) and winter (January, March) respectively. Lamb birth weight was recorded with 8 hours of birth. Lambs were managed and fed similarly during all three seasons-

Winter born lambs (4.78 ± 0.08) were .33 kg. heavier at birth than summer born lambs (4.45 ± 0.08) and 1.28 kg. heavier than fall born lambs (3.50 ± 0.08).

At 70-d of age winter born lambs ($28.55 \pm .82$) weighed 2.93 kg. more than fall born lambs ($25.62 \pm .82$) and 3.79 kg. more than summer born lambs ($24.76 \pm .82$). Winter born lambs required 30-d less to reach a market weight of 45.5 kg. than summer born lambs and 16 days less than fall born lambs.

At interaction between sex and season was observed for average daily gain. There was a smaller average difference (40 g/d) between ram and ewe lambs born in the summer than between ram and ewe lambs (90 g/d) born in the fall and winter.

Results suggest that difference in birth weight and 70-d weight existed between fall, winter and summer born lambs under conditions were lambs were creep fed the same diet and ewes were well fed.

(Abstracted by Sh. K.P.S. NIRMAN)

- 8.12 BICKEL, PETER J. and DOKSUM KJELL A.—An Analysis of Transformations Revisited. *Jour. of American Statistical Assoc.*, Vol. 76, No. 374, pp. 296-311, (1981).

The performance of Box—Cox type procedures in the analysis of transformations is studied under various structured and unstructured models.

In structured models with small to moderate error variances, the asymptotic variances of the estimates are much larger when the transformation parameter is unknown than when it is known. In unstructured models with moderate to large error variances, the cost of not knowing is moderate to small. The performance of these procedures is unstable and highly dependent on the parameters in structured models with small to moderate error variances.

(Abstracted by Dr. A.K. NIGAM)

- 8.13 VIANA, MARLOS A.G.—Combined Estimators for the Correlation Coefficient. *Communication in Statistics—Theory & Methods*, 11(13), pp. 1483—1504, 1982.

The paper considers three combined estimators for the bivariate normal correlation parameter ρ for the case of data which provide k independent sample correlation coefficients r_1, r_2, \dots, r_k based on samples of sizes N_1, N_2, \dots, N_k assuming ρ to be the common underlying correlation parameter. Of the combined estimators considered, one is an approximation to the maximum likelihood estimators of ρ and the other two are linearly combined estimators based on weighted sums $\sum_i w_i y_i$ and $\sum_i w_i z_i$

where $0 < w_i < 1$, with $\sum_i w_i = 1$,

$$Y_i = r_i + \frac{r_i(1-r_i)}{2(N_i-4)} \quad \text{and} \quad z_i = \log [(1+r_i)/(1-r_i)]^{1/2}$$

$i=1, 2, \dots, k$. That is to say, the combined estimator $\sum w_i y_i$ is an approximation to the minimum variance unbiased estimator of ρ studied by Olkin and Pratt while $\sum w_i z_i$ is based on Fisher's z -transformation of the sample correlations. The three estimators have been compared through a computer simulated study for $k=3$ and different values 10, 20, 30, 35, 50 of N_1, N_2 and N_3 each. This comparison shows that the combined approximate MLE of ρ has a slightly smaller estimated mean squared error as compared to its other two combined linear estimators but this is at the expense of a relatively larger bias.

(Abstracted by Mrs. RANJNA AGRAWAL and Dr. K.G. ANEJA)

- 8.14 JOLLIFFE, LAN T.—A Note on the Use of Principal Components in Regression Analysis. *Applied Statistics*, Vol. 31. No. 3, 1982.

The paper deals with the problem concerning decisions for discarding some of the principal components when using them as regressors in multiple

regression analysis. Usually the principal component corresponding to a small eigen value or equivalently that accounting for a small proportion of the variation is discarded in such cases. This note demonstrates that such components can also be equally important as those explaining a large proportion of the variation. The point has been illustrated in this note with examples. This implies that the relationship between the dependent variable and all the principal components should be examined before discarding any since it is possible that one of the principal components with small variance may be related with the dependent variable.

(Abstracted by Sh. R.C. JAIN)

8.15 KAKWANI, NANAK—"On a class of poverty measures". *Econometrica*, Vol. 48, No. 2, March 1980, pp. 437-446.

The paper gives a generalization of Amartya Sen's poverty measure. The generalization is motivated by the failure of Sen's poverty measures to satisfy some transfer-sensitivity axioms proposed in this paper. A numerical method of computing the alternative poverty measures is provided alongwith an illustration based on the data from the Australian households expenditure survey carried out during 1974.

Most of the existing literature on the measurement of poverty is concerned with counting the number of people under the poverty line which does not reflect the intensity of poverty suffered by the poor. If the deviation of a poor man's income from poverty line is assumed to be proportional to the degree of misery suffered by him, then the sum total of these deviation divided by the number of poor may be considered a desirable measure of poverty. This is called the poverty gap.

Kakwani has derived a poverty measure similar to that of Sen by an alternative approach of transfer of income from rich to poor so that the income of every poor is brought to the poverty line.

(Abstracted by Sh. A.K. MITTAL)

8.16 MCDONALD, JAMES B, and RANOM, MICHAEL R—"An analysis of the bounds for the GINI COEFFICIENT". *Journal of Econometrics* Vol. 17, pp. 177-188 (1981).

The bounds on the Gini Coefficient obtained by Gastawirth for the cases of grouped data are considered. While the population bounds will always include

the value of the population Gini Coefficients and the estimated bounds will always include a suitably chosen estimate of the Gini Coefficient, estimated bounds need not include the value of the population Gini Coefficient.

The distribution of the estimators of the bounds are considered and it is shown that a failure to take account of sampling variation can lead to very misleading results. In fact, increasing the number of income groups used tends to decrease the difference between the bounds, but the relative frequency with which the estimated bounds includes the population Gini Coefficient decreases. The relationship between sample size, the nature of income groups and estimator precision is considered.

(Abstracted by Sh. A.K. MITTAL)

8.17 SALAZAR, D.—“Structural changes in time series Models”. *Journal of Econometrics*, Vol. 19, pp. 147-163 (1982).

It has been experienced that many parameters of economic models have undergone structural changes. When a parameteric model changes parameter values, it is important to know the time when the changes occurred and the pre and post-changes values of parameters.

In the paper, changes in the regression parameters of the first and second order auto-regressive models are presented. Also the structural changes in the regression model with autocorrelated error are examined. Gradual changes in the parameters are examined. The numerical study of some of the above models is also conducted in the paper.

(Abstracted by Sh. A. K. MITTAL)

8.18. ZANIOLO, CARLO—A New Normal Form for the Design of Relational Database Schemata. *Journal, ACM Transactions on Data base systems*, September, Vol. 7, Number 3 1982.

This paper addresses the problem of database schema design in the frame work of the relational data model and functional dependencies. It suggests that both third Normal Form (3NF) and Boyce Codd Normal Form (BCNF) supply an inadequate basis for relational scheme design. The main problem with 3NF is that it is too forgiving and does not enforce the separation principle as strictly as it should. On the other hand, BCNF is incompatible with the principle of representation and prone to computational complexity. Thus a new normal form, which lies between these two and captures the salient qualities of both is proposed. The new normal form is stricter than 3NF,

but it is still compatible with the representation principle. First a simpler definition of 3-NF is derived, and the analogy of this new definition to the definition of BCNF is noted. This analogy is used to derive the new normal form. Finally, it is proved that Bernstein's algorithm for schema design synthesizes schemata that are already in the new normal form.

(Abstracted by Sh. D. K. AGRAWAL)

- 8.19 WONG, EUGENE—A Statistical Approach to Incomplete Information in Database Systems. *Journal, ACM Transactions on Data base Systems, Vol. 7, Number 3, September, 1982.*

There are numerous situations in which a database cannot provide a precise answer to some of the questions that are posted. Sources of imprecision vary and include examples such as recording errors, incompatible scaling, and obsolete data. In many such situations, considerable prior information concerning the imprecision exists and can be exploited to provide valuable information for queries to which no exact answer can be given. The objectives of this paper is to provide a framework for doing so.

(Abstracted by Sh. D. K. AGRAWAL)

- 8.20 WALSH, STUART—Software Security. *Journal, Data Processing, Vol. 25, No. 3, April, 1983.*

Computer accidents, errors and breaches of security can be very expensive for a company. Management must ensure that the Computer is protected. Using packaged software can provide extra controls against system abuse.

(Abstracted by Sh. D.K. AGRAWAL)

9. PAPERS ACCEPTED FOR PUBLICATION

- 9.1 JAIN, R.C., AGRAWAL, RANJANA and JHA, M.P.—Use of Growth Indices in Yield Forecasting, *Biometrical Journal.*
- 9.2 KHOSLA, S.K., GILL, S.S. and MALHOTRA, P.K.—Effect of Non-Genetic Factors on Lactation Length and Lactation Yield in Herd-book Registered Murrah Buffaloes Under Village Conditions. *Ind. Jour. Anim. Sci., Vol. 53, No. 12, 1983.*

- 9.3 NADKARNI, U.G.—On Cost of Maintenance of Pigs. *Ind. Jour. Anim. Sci. Vol. 53, No. 8, Aug. 83.*
- 9.4 SAXENA, B.C., NARAIN, PREM and SRIVASTAVA, A.K.—Multiple frame surveys in two stage sampling—*Sankhya-Series B.*
- 9.5 SOMAYAZULU, L.B.S.—Study of Growth of Large White York Shire and Landrace Pigs under different feeding levels. *Ind. Jour. of Anim. Sci.*
- 9.6 SUKHATME, P.V. and NARAIN, PREM—Intra-individual variation in energy requirement and its implications. *Ind. Jour, Med. Res.*

10. COMPUTER SCIENCE AND NUMERICAL ANALYSIS

10.1 Data Processing :

During the Quarter under report, the division of Computer Science & Numerical Analysis continued to provide facilities for data processing and Computer programming to the Scientists, research workers and students from various Institutes under I.C.A.R., Agri. Universities and Colleges, Directorate of Economics and Statistics, Min. of Agriculture and Deptt. of Agriculture, U. P. State.

10.2 Computer Utilization :

About 4061 production jobs and 1509 testing jobs were processed on B-4700 and IBM 1620 computer systems during the quarter under report.

10.3 Programming facilities :

Guidance and help in data processing and computer programming was extended to 34 Ph.D., 29 M.Sc. students and 15 research scholars working on different projects. Two new computer programs were developed during the quarter.

10.4 Visit to computer centre :

- (i) Two trainees of Junior Certificate Course in Statistics of C.S.O. New Delhi visited the computer centre. The activities of computer centre were explained to them.
- (ii) Four trainees of J. C. Course in Statistics of C.S.O. visited the centre. They were imparted one day training in "Data Processing".
- (iii) A batch of M. Stat. students from I.S.I. Calcutta visited the Centre. The working of the computer systems and the activities of the division were explained to them.

10.5 M.T. Unit :

The Mechanical Tabulation Unit of the Division continued to give facilities for data preparation and processing of the cards on unit record machines for Scientists and Research Scholars from IASRI and other Institutes. About 2.5 lakhs cards were punched and 571 jobs were processed on unit record machines.

11. PAPERS PRESENTED AT INTER-ORGANISATIONAL SEMINARS, CONFERENCES, WORK-SHOPS, ETC.

The title and authorship of papers presented and the particulars of the workshops, seminars at which these were presented, are given below :

11.1 The Seminar on "Agricultural Development in Madhya Pradesh" held at Pachmarhi, M.P. from 12th to 18th May, 1983.

NARAIN, PREM, KHOSLA, R.K. and PANDEY, R.K.—Agricultural Statistics.

11.2 National Seminar on Higher Technology for the Production of Sugar and Sugarcane held at Bangalore during 26th to 28th May, 1983.

BHARGAVA, P.N. and BATRA, P.K.—Statistical Model for fertilizer use.

11.3 Workshop on Training on estimation procedure and tabulation programme for statisticians of Animal Husbandry Departments of States/ U.T., Under centrally sponsored scheme for sample surveys for estimation of milk, eggs, wool and meat held at IASRI from 7th to 9th June, 1983.

NARAIN, PREM—Technical Address (relating to sample surveys on estimation of production of milk, eggs, wool & meat).

KHATRI, R.S.—Tabulation programme for estimation of number of animals and milk production.

11.4 Seminar on Probability and Statistical Inference held at University of Poona, Pune from 23rd June to 25th June, 1983.

RANA, P.S.—A Discrete time queueing problem with S-heterogeneous groups of Channals.

**12. CONFERENCE/SEMINAR/SYMPOSIUM/WORKSHOP, ETC.,
ATTENDED BY THE SCIENTISTS**

Date	Name of Conference/Seminar/ Symposium, etc.	Name of the Scientist with Designation
9 May to 3 June	Workshop on Modern Statistical Computing at Computer Centre, Deptt. of Statistics in Collaboration with Statistical Institute of Asia and Pacific, Tokyo.	Sh. S. N. Mathur, Scientist (S-2)
12-13, May	"The National Seminar on Design and Management of Rural Godowns", held at India International Centre, New Delhi.	Sh. R. K. Khosla, Scientist (S-2)
25-29, May	The Annual Workshop of the All India Coordinated Agronomic Research Project held at Trichur.	Sh. P. N. Bhargava, Scientist (S-3) Sh. P. N. Soni, Scientist (S-2)
26-28, May	The Symposium on Role of Modern Instrumentation and Control Technology in Sugarcane and Sugar Production, (jointly organised by Maharashtra Sugar, Central Electronic Engineering Research Institute, Pilani and Southern India Sugar and Sugar Technologists Association) held at Bangalore.	Dr. S. S. Pillai,* Jt. Director (C. C.)
7-9, June	Workshop on Training on estimation procedure and tabulation programme for statisticians of Animal Husbandry Departments of States/U.T., Under Centrally sponsored scheme for sample surveys for estimation of milk, eggs wool and meat organised by the Ministry of Agriculture, held at IASRI, New Delhi.	Dr. Prem Narain, Director, Sh. R. S. Khatri, Scientist (S-1) Sh. K. B. Singh, Scientist (S-1)
23-25, June	Seminar on probability and statistical inference held at University of Poona, Pune.	Sh. P.S. Rana, Scientist (S-1)

* Chairman of the Session "Application of Computer technology for Sugarcane production" on 26th May, 1983.

13. LIBRARY

13.1 During the period under report 112 books on various subject field of the institute were added to the Library.

13.2 Following reprints written by the scientists of our institute and published in scientific journals were procured for free distribution by the library among the scientist working in the same field on exchange basis.

<i>Author</i>	<i>Title</i>	<i>Source</i>
Agrawal, Ranjana	Joint effect of weather variables on rice yield.	<i>Mausam</i> , 34(2), 189-194, 1983.
Agrawal, V. and Dey, A.	Orthogonal resolution IV designs for some asymmetrical factorials.	<i>Technometrics</i> , 25(2) May, 1983
Nigam, A. K. and Puri, P.D.	On partially efficiency balanced designs-II	<i>Communication in Statistics</i> , 11(24), 2817—30, 1982.
Narain, Prem	Stochastic problems and methods in population genetics.	<i>Current Science</i> , 52(4) 1983
Narain, Prem, et. al	Use of auxilliary traits in combined selection for poultry improvement.	<i>Ind. Jr. Poultry Sci.</i> 18, 37-47, 1983.
Raut, K. C.	Loss in milk production due to mortality of milch stock in rural areas.	<i>Ind. Jr. Ani. Sci.</i> 53(2), 135-38, Feb. 1983.

13.3 The reprographic unit of the library has attended 70 jobs covering 1780 pages sent by the scientific, technical and administrative officers of the Institute.

13.4 During the period under report approx. 7200 persons visited the library for consultation purposes.

13.5 The Issue and Return work at the library counter has involved transaction of approx. 8300 publications.

14. 'LAB TO LAND' PROGRAMME

Under the ICAR Lab-to-Land programme the Institute carried out the following activities in village Nilothi of Delhi during the quarter under report :-

14.1 Demonstration on the use of balanced cattle feed :

Demonstrations on the use of balanced cattle feed (HAFED) were carried out in 75 households belonging mostly to the category of landless agricultural labourers adopted under the programme. As reported earlier, the milk yield increased by 2-3 kgs. per animal per day by feeding 2 kg. of feed. It was also found that the use of HAFED feed checked the downward trend in the milk yield towards the end of lactation and thus increased the lactation period of the animals.

14.2 Introduction of new crops in the cropping pattern :

- (i) *Moong* : The cultivation of summer moong was introduced in the cropping pattern of 41 farmers after the harvest of wheat crop in April, 1983. Besides the seed of PS-16 variety of moong, other inputs like fertilizers and bacterial culture were also supplied to the farmers for demonstration of moong cultivation in 38.75 acres. The performance of the crop was found to be very good. The yield results will be reported latter.
- (ii) *Maize* : The farmers were educated about the cultivation practices of maize. Demonstrations on cultivation of hybrid maize (Ganga Safed-2) were laid out in the fields of 17 farmers. Arrangements were also made for the supply of inputs for the purpose. The crop was making good progress.
- (iii) *Arhar* : Demonstration on the cultivation of short duration variety of arhar were laid out in the fields of 8 farmers. They were supplied seeds of UPAS-120 variety alongwith fertilizers for the purpose.

14.3 Organisation of field day :

A field day was organised on 15.6.83. The farmers were invited to see the demonstration plots of moong and maize. They showed interest in the cultivation of these crops.

14.4 Observance of the National Agricultural Inputs Fortnight :

Observed the National Agricultural Inputs Fortnight on 14.6.83 and 15.6.83 in village Nilothi for achieving higher production during kharif 1983.

under this programme the package of practices to be followed for kharif crops were brought to the notice of the farmers. Special stress was given for cultivation of pulses. They were also advised to procure seeds and fertilizers from the N. S. C. and Block Development Stores well in time.

14.5 Creation of self-employment opportunities and vocational training of village youths and women :

Organised a meeting of the adopted households and officials of Delhi Administration in village Nilothi for processing the applications submitted earlier for vocational training programmes and grant of loans as mentioned below :

Name of vocational training/programme/ purpose of loan	No. of applicants processed
1. Motor Driving	22
2. Tailoring for ladies	28
3. Food & Nutrition programmes	8
4. Loan for purchase of auto-riksha	9
5. Loan for purchase of buffaloes	9
6. Loan for setting up to general shop	1
7. Loan for setting up tailoring shop	1
8. Loan for purchase of buffaloe cart	1
9. Setting up gobar gas plant on subsidy basis	5

Efforts are being made to hold the training class of tailoring for women in the village itself.

14.6 Programme for land shaping and levelling :

During the course of survey of households it was found that about 50 acres of land (belonging to as many farmers) was undulating and could not be irrigated properly leading to poor yield levels. The farmers having this type of land could not take the advantage of modern agricultural technology for improving their agricultural production. Hence, steps are being taken to get the undulating fields levelled.

14.7 Visit of the Zonal Coordinator (Zone-1) to village Nilothi :-

The Zonal Coordinator (LLP)-zone-1 visited village Nilothi on 16.6.83 and met the adopted farmers. He was satisfied with the progress of work mentioned above. During the visit of the Zonal Coordinator, the farmers were advised to use Tolkan, Areton or Desanex for eradication of Phalaris Minor weed from wheat fields. They were also advised to treat wheat seed with Bavistin against loose smut.

15. MISCELLANEOUS

15.1 Personnel Information :

15.1.1 The Scientists of IASRI were deputed to attend training/study tour/meeting and to deliver lectures, etc. during April-June, 1983;

(1) Dr. Prem Narain,
Director

- (i) Attended "A Date with Mathematicians-1983" organised by the Delhi Chapter of the Mathematical Association of India on 14th April, 1983 at University of Delhi and presided over prof. J. N. Mitra Memorial Lecture entitled "On Random Motions" by Prof. K.R. Parthasarathy of Delhi Centre of Indian Statistical Institute, New Delhi.
- (ii) Attended as Secretary, the Executive Council meeting of the Indian Society of Agricultural Statistics at New Delhi on 21st April, 1983.
- (iii) Attended the Executive Committee meeting of the Indian Association of Social Science Institutions held at New Delhi on 21st and 22nd May, 1983.
- (iv) Attended joint meeting of the Study Groups on "Perspective of Agricultural Development in the Seventh Plan" set up by the Planning Commission held on 6th June, 1983.

- (v) Attended the meeting on "Sampling Methods sectional Committee, TDC-33" held at Indian Standards Institution, New Delhi on 8th June, 1983.
- (vi) Delivered a Guest Lecture entitled "Statistical Aspects of genotype x environmental interactions in plant breeding" on 25th June, 1983 on the occasion of the Valedictory Function of the Summer Institute on "Advances in breeding Methodology in crop improvement" organised by the Department of plant Breeding, H.A.U., Hissar.
- (2) Dr. R.K. Pandey,
Scientist (S-3)
- (i) Delivered a lecture on activities of the Division of Econometric Analysis to the trainees of Junior Certificate Course in Statistics from Central Statistical Organisation, New Delhi on 17th June, 1983.
- (ii) Delivered a lecture and discussed the ungoing projects of the Division of Econometric Analysis to the students of M. Stat. Class, ISI, New Delhi on 29th June, 1983.
- (3) Dr. K. G. Anja
Scientist (S-2)
- (4) Sh. S. R. Bapat,
Scientist (S-2)
- } Attended training programme on "Man power Forecasting"-organised by Institute of Applied Manpower Research, New Delhi from 4th to 11th May, 1983.
- (5) Sh. P. C. Mehrotra,
Scientists (S-2)
- Delivered a lecture on planning and conduct of large scale sample surveys with special reference to

- (i) Sample surveys for methodological investigations into high yielding varieties programme.
- (ii) Sample surveys for estimating yield of cotton to 2 trainees (one from Bureau of Eco. & Stat., Sikkim and one from Bureau of Eco. & Stat., Meghalaya) deputed by the C.S.O. Junior Certificate Course-Specialisation in Agril. Statistics.
- (6) Dr. Shivtar Singh,
Scientist (S-2) Delivered a lecture "On rearing of calves" to J. C. C. trainees from C. S. O. at IASRI, on 15th June, 83.
- (7) Smt. Ranjana Agrawal,
Scientist (S-2) Delivered the lectures on activities of the Division of Crop Forecasting Methodology to—
- (i) CSO trainees, New Delhi on 6th June, 1983.
- (ii) ISI, New Delhi Students on 28th June, 1983.
- (8) Sh. B. C. Saxena,
Scientist (S-1) Delivered a lecture (on Impact study) to J.C.C. trainees from CSO at IASRI, New Delhi on 15th June, 1983.
- (9) Sh. Ram Kumar,
Scientist (S-1) Explained the use of computer in Agricultural Research to—
- (i) CSO trainees of Sr. Certificate Course on 18th June, 1983.
- (ii) Students of M. Stat.] of ISI, Calcutta on 28th June, 1983.

15.2 Monitoring Cell :

A meeting of the Monitoring Cell was held on 19th April, 1983 to review the progress of the research projects.

The research project files were sent to the ARIC (ICAR) after getting these completed from the scientists.

The Cell prepared the report on the progress of all the on-going research projects of the institute and distributed among the scientists.

15.3 Joint Staff Council :

The first meeting of the re-constituted Joint Staff Council was held on 15th April, 1983 under the Chairmanship of Director, IASRI. About 25 agenda items were discussed.

15.4 Meetings of Heads of Divisions and Sr. Scientists :

(i) HDs and Sr. Scientists	on	11.5.1983
(ii) Sr. Officers	on	11.5.1983
(iii) HDs. and Sr. Scientists	on	27.6.1983

15.5 Grievance Cell

A meeting of the Grievance Cell was held on 26.4 1983.

15.6 Benevolent Fund :

The annual Benevolent Fund Day was observed on 30th June, 1983 at IASRI. A sum of Rs. 429/- (Rupees four hundred and twenty nine only) was contributed by the Officers/staff of the Institute on that day.

15.7 IASRI Representatives at the meetings of Scientific Panel of ICAR :

Name of the Officer	Name of the Scientific Panel & Date
1. Dr. M. P. Jha	"Plant Pathology", held on 5th to 7th April, 1983.
2. Miss C. R. Leelavathi	"Agricultural Engineering", held on 18th & 19th April, 1983.
3. Sh. J.C. Malhotra	"Animal Breeding", held on 5th & 6th May, 1983.
4. Sh. U.G. Nadkarni	"Animal Nutrition and Physiology", held on 6th & 7th May, 1983.
5. Sh. P. N. Bhargava	"Soil Science", held on 18th & 19th May, 1983.
6. Dr. O.P. Kathuria	"Fisheries", held from 16th to 17th May, 1983.
7. Dr. K.C. Raut	"Dairy and livestock products technology", held from 30th & 31st May, 1983.

15.8 Other Information :

15.8.1 Dr. Prem Narain, Director was nominated as a member of the Executive committee and the council of the Maharashtra Association for the cultivation of Science, Pune for the period 1983-1986 *vide* their letter No. 7/1/83-Admn. dated 13th April, 1983.

He was elected as a member of executive committee of Editorial Board of Indian Society of Animal Genetics and Breeding for the term 1983-84.

Dr. Narain was also elected as a member of the Executive Committee of the Society of Mathematical Sciences, University of Delhi *vide* their letter No. MF/SMS/83 dated 23rd June, 1983.

15.8.2 Dr. S.K. Raheja, Scientist (S-3) gave a Radio Talk on "Role of Statistics in L.L.P." which was recorded by AIR, correspondent on 6th April, 1983 at Jammu.

He was appointed Chairman of Security Committee constituted by Director, IASRI.

He attended the Zonal Advisory Committee (LLP), Zone-I meeting at Jammu on 6th April, 1983.

Dr. Raheja was also nominated convenor of Symposium "Hill Development & Programme in Agriculture and allied fields" to be held at the next Annual Conference of J.S.A.S. at Simla.

15.8.3 Dr. J.P. Jain attended the 4th Meeting of the Panel on Sampling of Wool and Wool Products, TDC 33/p-3 of Indian Standards Institution in Manak Bhavan, New Delhi on 7th June, 1983.

15.8.4 Sh. K.B. Singh, Scientist (S-1) participated in a meeting with DDG (AS), ICAR for Critical appraisal to him regarding "Survey of animal draught power in various agro-climatic zones of the country, semi economic features and current husbandry practices."

15.8.5 The following Scientists were deputed by the Institute for attending XII Orientation Course on Agricultural Research Management, conducted by National Academy of Agricultural Research Management, Rajendra Nagar, Hyderabad (A.P.) from 20th April, 1983 to 19th May, 1983.

1. Sh. K.P.S. Nirman, Scientist (S-1)
2. Sh. B.L. Kaul ,, (S-1)
3. Sh. Chandrahas ,, (S-1)
4. Sh. Mahesh Kumar ,, (S-1)
5. Sh. M.S. Batra ,, (S-1)

16. कृषि अनुसंधान में समूह विश्लेषण

आँकड़ों के मिश्रित पिण्डों में ही ढाँचे की खोज के लिए गुच्छ विश्लेषण अनेक असमान तकनीकों सम्पादित करता है। एक विशिष्ट उदाहरण में, एक के पास आँकड़े की इकाइयों [वस्तुओं, किस्मों, मिट्टी का प्रतिदर्श, आदि] का प्रतिदर्श है, जो कि प्रत्येक चयनित चरों के अंकों द्वारा वर्णित हैं। या तो आँकड़े इकाइयों या चरों को गुच्छों में इस प्रकार समूहित करना उद्देश्य है कि एक गुच्छ के तत्वों में आपस में "स्वाभाविक साहचर्य" की उच्चतम श्रेणी हो जबकि झुण्ड आपस में एक दूसरे से "अपेक्षाकृत भिन्न" हो। समस्या को सदृश करना तथा परिणामों को प्राप्त करना मुख्यतः इस बात पर निर्भर करता है कि अन्वेषक "स्वाभाविक साहचर्य" तथा "अपेक्षाकृत भिन्न" शैलियों को किस प्रकार परिचालन अर्थ देने का चयन करता है।

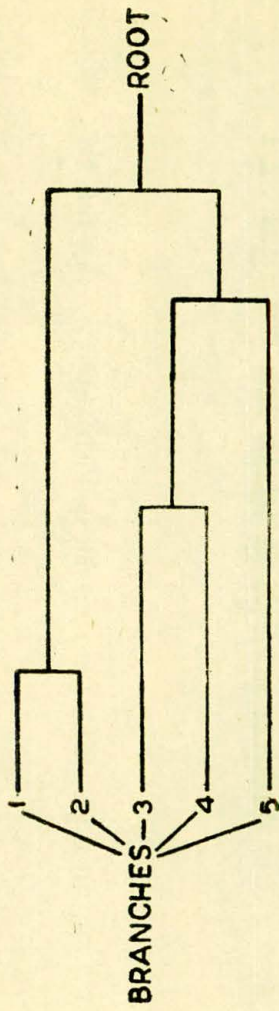
समूह विश्लेषण के परिणाम प्रत्यक्ष रूप से वर्गीकरण योजनाओं के विकास में योगदान कर सकते हैं। वास्तव में, जीव-विज्ञान तथा वनस्पति विज्ञान में गुच्छ विश्लेषण के मुख्य उपयोगों में से एक "वर्गीकरण विज्ञान" का निर्माण करना है। अन्य परिस्थितियों में, गुच्छ विश्लेषण द्वारा आँकड़े के बहुत बड़े ढाँचे को अपेक्षाकृत सुसम्बद्ध सीमा तक घटाना सम्भव हो सकता है। यदि दशमलव-प्रणाली द्वारा प्रस्तावित समूहीकरण को परिचालन प्रयोग के लिए अपना लिया जाय तो यह नवीन प्रेक्षणों के वर्गीकरण के लिए "आधार" बन सकता है। अधिक सैद्धान्तिक ढंग में गुच्छ विश्लेषण का उपयोग प्रेरक सामान्यीकरणों को विकसित करने में किया जा सकता है। सही अर्थ में, परिणामों का एक समुच्चय केवल उस ही प्रतिदर्श पर लागू होता है जिस पर वे आधारित हैं लेकिन उचित संशोधन द्वारा उन्हें अन्य प्रतिदर्शों की विशेषताओं के समुचित निर्माण के लिए तथा अन्त में मूल जनसंख्या के लिए विस्तृत किया जा सकता है।

जबकि ऐसे ही प्रेक्षणों को एक-साथ समूहित किया गया है, प्रत्येक व्यक्ति का क्लास लेवल को अपनाने की ओर झुकाव है और पूर्ण प्रकिया चीजों को नाम दे सकती हैं। गुच्छ विश्लेषण का यह पहलू जीव-विज्ञान में अधिकतर प्रमुख है जिसमें प्रत्येक वैज्ञानिक नाम का क्लास नाम एक अंग है।

संकरण प्रयोजन के लिए विभिन्न जीव-प्ररूपों की पहचान के लिए अपसरण विश्लेषण अनुष्ठित किया गया है। इसमें विभिन्न तकनीकों द्वारा जीन-प्ररूपों का गुच्छ विश्लेषण लाभदायक है जो कि अपने आप विभिन्न झुण्ड उत्पन्न करता है।

गुच्छ विश्लेषण के विभिन्न तरीकों को दो विस्तृत प्रकार में समुहित किया जा सकता है : [i] श्रेणी बद्ध [ii] गैर-श्रेणीबद्ध ।

श्रेणीबद्ध तरीके ऐसे पेड़ के निर्माण के लिए "अन्तर-मैट्रिक्स" [असमरूप मैट्रिक्स] पर परिचालित हैं जो कि तत्वों के बीच विशेष रूप से उल्लेखित सम्बन्धों का चित्रण करता है जैसा निम्न चित्र में है ।



श्रेणी बद्ध समूहीकरण के लिये अंजोर का पेड़

बायीं ओर की शाखायें प्रत्येक, एक तत्व का प्रतिनिधित्व करती है जबकि जड़, तत्वों के सम्पूर्ण संग्रह का प्रतिनिधित्व करती है । पेड़ की शाखाओं से जड़ की ओर नीचे आना तत्वों के झुण्ड में बढ़ते हुए समूहन का चित्रण करता है । 'm' तत्वों के आंकड़ों के एक सम्मुख्य के लिए, श्रेणीबद्ध तरीका 'm' समूहित वर्गीकरण को प्रदान करता है जो कि प्रत्येक एक सदस्य के 'm' झुण्ड से लेकर 'm' सदस्यों के एक झुण्ड तक की सीमा में है ।

"अन्तर-मैट्रिक्स" को अनेक प्रकार से परिभाषित किया जा सकता है । आगे, विभिन्न प्रकार के प्रस्ताव हैं जिनके द्वारा झुण्डों को बनाया जा सकता है । अन्वेषक अपनी समस्या के आधार पर तथा समय व संगणक में स्थान की उपलब्धता के आधार पर इन में से कोई एक तरीके का चयन कर सकता है ।

गैर-श्रेणीबद्ध तरीकों में आंकड़ों की इकाइयों को 'K' झुण्डों के एकमात्र वर्गीकरण में बांट दिया जाता है जहाँ 'K' या तो पूर्ववत् रखा गया है या झुण्ड बनाने के तरीके के एक भाग के रूप में निर्धारित किया गया है । गैर-श्रेणीबद्ध झुण्ड बनाने के अधिकतर तरीकों में मुख्य उद्देश्य आंकड़े इकाइयों के कुछ आरम्भिक विभाजन का चयन करना तथा फिर झुण्ड सदस्यता के बाद एक अच्छा विभाजन प्राप्त करना है ।

गैर-श्रेणीबद्ध तरीकों की तुलना में अधिक बृहत् समस्याओं में प्रयोग किया जा सकता है । क्योंकि अन्तर (असमरूपता) मैट्रिक्स के गणन व इकट्ठे करने की आवश्यकता नहीं होती ।

[1] प्रमुख फसलों के क्षेत्र, उत्पादन और उत्पादकों के आकर्मों के लिए प्रतिद्वेष

गया है ।

मर्यादा और बानकी पर किये गये सर्वेक्षण शामिल है । इनका विवेचन निम्नलिखित किया गया है ।
 सांख्यिकीय अन्वेषणान संस्थान द्वारा पुरोगामी कार्य किए गये हैं । इनमें फसलों, पशुधन, लिए समुचित प्रतिद्वेष सर्वेक्षण तकनीकों के विकास में लगभग 3 दशकों से भारतीय ऊँच उद्योगी शामिल हैं । मिश्र-मिश्र क्षेत्रों में ऊँच प्रतिद्वेष (Statistics) एकत्रित करने के साधन उपलब्धता, विशेष रूप से आकलन प्राप्त करने के लिए प्रतिद्वेष सर्वेक्षण का की जाये फसल, बानकी, बागवानी, मर्यादा, पशु उत्पादकों से संबंधित क्षेत्र, उत्पादन, उत्पादकों, भारतीय अर्थव्यवस्था के प्रमुख आधार-रचनात्मक क्षेत्र क्षेत्र में, विभिन्न क्षेत्र वस्तुओं

योग की है ।

बनाने वाले और निर्णय लेने वाले व्यक्तियों के लिए शिक्षा करने हेतु व्यवहारिक उप-समय है जिसे संसदि प्रवर्तकों के निहित होने की संभावना होती है । ये सीमाएँ योजना प्राप्त परिणाम व्यक्त हैं और आकर्मों की मानक रूटि से सीमाओं का निर्धारण घटे मूल्यों और अक्षर पुरस्तरण सहित परिणाम उपलब्ध करता है । प्रतिद्वेष सर्वेक्षणों से समसिद्ध की प्रत्येक दृष्टिकोण की आवश्यकता होती है, के मुकाबले प्रतिद्वेष सर्वेक्षण मुद्रकल से ही कोई बल देने की आवश्यकता होती है । अध्ययन के अधीन पूर्णतया निसे उद्योगपरक एवं विवेचनीय आंकड़े प्राप्त करने में प्रतिद्वेष सर्वेक्षणों के सहित्व पर

17. क्षेत्र एवं पशु पालन में प्रतिद्वेष सर्वेक्षण

अनुवादिका : क० उषा कश्यप निरीक्षक : श्री महाराज स्वल्प एवं श्री फणीन्द्रपाल सिंह

रही है ।

करते हुए श्रुतिवद्ध समूह विवेक्षण के लिए संगणक केंद्र में एक प्रयोग विकसित किया जा रहा है एक बहुरि अन्वेषण प्रयोग विकसित किया गया है । दक्ष तरीके में से एक प्रयोग आंकड़े एकत्रियों के गैर-श्रुतिवद्ध समूह विवेक्षण के लिए संगणक केंद्र के वैशालिकों

के लिए विभिन्न तरीके प्राप्त हैं ।

गैर-श्रुतिवद्ध तरीकों द्वारा बनाए गए श्रुतिवद्ध गैर-अतिव्यक्ति होते हैं । आरम्भिक विभाजन

बदलती हुई अर्थव्यवस्था और क्रिष के तीव्र विकास के परिप्लव में फसलों की खेती की लागत का आकलन एक महत्वपूर्ण पहलू है जो अकेले ही किसानों के लिए आर्थिक लाभ सुनिश्चित करने के लिए वास्तविक आधार उपलब्ध कराता है। संस्करण नं 1952-53 में महाराष्ट्र के अकीला जिले में कपास और मूंग-धान की लागत का आकलन करने के लिए माहिदशी प्रतिवेदन संपन्न किया।

अपनाई जा सकती है।

उत्पादन का आकलन करने के लिए ये तकनीक अब तक अनेक राज्यों द्वारा प्रयोग की गई हैं। इन फसलों के लिए प्रतिवेदन में भी मिश्रित आ जाती है। इन फसलों के लिए प्रतिवेदन प्रतिवेदन तकनीक का विकास किया गया क्योंकि एक ही क्षेत्र में उत्पादन के लिए पंचवें और छठे दशक के दौरान इस तकनीक फसल है। इन वस्तुओं के निर्माण से देश में काफी विदेशी मुद्रा कमायी जा सकती है और अन्य महत्वपूर्ण विज्ञानिक क्षेत्रों की महत्वपूर्ण

अपनायी गया है।

में ही नहीं अपितु पश्चिम और अफ्रीका जैसे अन्य देशों में भी व्यापक रूप से के लिए इस तकनीक की मानकीकृत किया गया और अब इसे समस्त भारत में सुनिश्चित सांख्यिकीय पद्धति का विकास किया गया। विभिन्न क्षेत्रों की फसलों का आकलन करने के लिए यार्डबुक रूप से खेती में फसल कटाई प्रयोगों की तकनीकों का विकास किया जाएँ, जिसके परिणाम स्वरूप फसल उत्पादन का महत्त्व की गई कि फसल प्रतिवेदन में सुधार लाने के लिए उपयुक्त प्रतिवेदन की अपूर्ण विवरणों का विकास में आयी और इस बात की आवश्यकता 1943 में बंगाल के अकाल के बाद शीघ्र और खोजान उत्पादन के आकलनों

करने के लिए प्रतिवेदन संपन्न।

पशुओं की संख्या, पशुधन उत्पादकों और वारे वाली फसलों के उत्पादन का आकलन

संपन्न।

[6] संयुक्त एवं अन्तर्देशीय मछली पालन और वन संसाधन एवं उत्पादों पर

[5] फलों एवं सब्जियों के प्रतिवेदन संपन्न।

[4] गहन जल क्रिष कायकम, उच्च प्रदावार वाली क्रिष कायकम और सूखे एवं बाढ़ के कारण फसल की हुई हानि का सूच्यंकन एवं प्रभावों का अध्ययन।

[3] विभिन्न महत्वपूर्ण फसलों की खेती की लागत पर पद्धतिबद्ध संपन्न।

[2] बाह्यभागी फसलों के उत्पादन का आकलन लगाने हेतु प्रतिवेदन संपन्न।

सन् 1955-56 से 1962-63 के दौरान उ० प्र०, विहार, पंजाब, महाराष्ट्र, आन्ध्र प्रदेश, कर्नाटक में गन्ने की खेती की लागत का आकलन करने के लिए भी इसी प्रकार के सर्वेक्षण किये गये। 1960-61 और 1962-63 के दौरान पंजाब, महाराष्ट्र, गुजरात और कर्नाटक में कपास और सरयावर्तन में भी सर्वेक्षण का कार्य किया गया। इन सर्वेक्षणों से जो आंकड़े कास्ट एकाउन्टिंग विधि से एकत्रित किये गये। इन सर्वेक्षणों की महत्ता इस तर्क पर है कि ये सर्वेक्षण वारसत्विक लागत के अलावा लागत संघटनों की सूचना उपलब्ध करते हैं। जिससे मजूरी और मूल्यों पर एकत्रित आंकड़ों की सहायता से कृषि की लागत के सूचकांकों का पता लगाया जा सकता है और बदले में जिसका उपयोग किसी वर्ष में खेती की लागत का पता लगाने के लिए किया जा सकता है वशर्ते कि लागत के संघटनों में पर्याप्त परिवर्तन न हुए हों। देश में उगाई जाने वाली प्रमुख 45 फसलों में से मुख्यतः चावल, गेहूं और बाजरे की प्रधान फसलों की खेती की लागत का अध्ययन करने के लिए सन् 1970-71 से चलाई जा रही व्यापक योजना हेतु भारत सरकार ने इन तकनीकों को अपनाया है।

तृतीय पंचवर्षीय योजना के दौरान निवेशों और सुविधाओं की उपलब्धता करने के लिए भारत सरकार ने चुने हुए जिलों में गहन कृषि जिला कार्यक्रम आरम्भ किए। संस्थान ने कार्यक्रम की सफलता का मूल्यांकन करने के लिए मार्ग निर्देश एवं मूल्यांकन सर्वेक्षण किये। इन सर्वेक्षणों के द्वारा फार्म उत्पादों, भिन्न भिन्न फसलों के अधीन क्षेत्रों और बोर्डे गई फिसमें, फसल पद्धति जैसे कुछ महत्वपूर्ण घटकों और सहायक निवेशों जैसे उर्वरक एवं सिंचाई इत्यादि और अन्य प्रबन्ध एवं कृषि कार्यों पर बहू मूल्य आंकड़े उपलब्ध हुए। इन सर्वेक्षणों के जरिए, अन्य प्रबन्ध एवं कृषि कार्यों से निर्धारित लक्ष्यों द्वारा प्राप्त वारसत्विक उत्पादन स्तरों पर आलोचनात्मक अध्ययन संभव हो सके हैं जिनसे बांछनीय फार्म एवं संस्थानगत परिवर्तनों इत्यादि के लिये समुचित निर्धारण में काफी सहायता मिली है। इसी प्रकार अनाजों की उच्च पैदावार वाली फिसमें और अन्य फसलों के समावेश से छोटे दशक के मध्य में महसूस किया गया कि इन विभिन्न कृषि विकास कार्यक्रमों का उद्देश्य-पूरक मूल्यांकन किया जाए। संस्थान ने 1969-70 से 1978-79 की अवधि में विषवसनीय आंकड़े एवं उपज दरें एकत्रित करने और यह पता लगाने के लिए उच्च पैदावार वाली फिसमें को कहां तक उपयोग में लाया गया और खेतों की परिस्थितियों के अधीन उ० पै० की खेती के लिए स्वीकृत ऋणकों ने सम्माननीय कृषि कार्यों को कहां तक अपनाया गया है, को ध्यान में रखते हुए 15 राज्यों के 88 जिलों में मूल्यांकन सर्वेक्षण किये गये। इन सर्वेक्षणों से प्राप्त परिणामों ने कार्यक्रम की वारसत्विक उपलब्धियों पर ही प्रकाश नहीं डाला है अपितु राज्य एवं राष्ट्रीय स्तर पर कृषि नियोजन नीति एवं लक्ष्य स्थापित करने के लिए एक वारसत्विक एवं सुदृढ़ आधार प्रदान किया है।

सूखे और बाढ़ के कारण से फसल, पशु और देश की सामान्य अर्थव्यवस्था को लगा-
 तार हानि होती रही है। इन प्राकृतिक विपदाओं के कारण हुई हानियों के मूल्यांकन की
 आवश्यकता न सिर्फ नीति नियोजन को ही मध्दे नजर रखते हुए अपितु प्रभावित व्यक्तियों को
 राहत पहुंचाने की दृष्टि से भी आवश्यक है। दिल्ली में 1979-80 में पड़े अकाल के कारण फसल
 को हुई हानियों का अध्ययन करने के लिए दिल्ली संघ राज्य में मार्गदर्शी अन्वेषण किया
 गया। उ० प्र० के बाढ़ पीड़ित क्षेत्रों में सूखे के कारण फसल को हुई हानि का मूल्यांकन करने
 के लिए अध्ययन प्रगति पर है।

संस्थान के लिए अनुसंधान कार्य का एक महत्वपूर्ण क्षेत्र, उद्यान से प्राप्त होने वाली
 फसलें जिनके कृषि एवं कटाई कार्य खेतों से प्राप्त होने वाली फसलों से भिन्न हैं, के उत्पादन
 आकलन प्राप्त करने हेतु प्रतिचयन तकनीकों को परिष्कृत एवं मानकीकृत करने का है।
 1972-73 के दौरान तमिलनाडु में सभी फलों पर मार्गदर्शी प्रतिदर्श सर्वेक्षण किये गये जिनसे
 राज्य स्तर पर साधारण लागत पर अनुमानों सहित उत्पादन आकलन करने के लिए बहुमूल्य
 आंकड़े उपलब्ध हुए। अन्य महत्वपूर्ण फलों जैसे सेब, अमरुद, आम के लिए भी इसी प्रकार
 के सर्वेक्षण किये गये और पर्याप्त अनुमान सहित उनके उत्पादन के आकलन करने हेतु एक
 पद्धति विकसित की गई। केला, आम और चीकू पर भी इसी प्रकार के सर्वेक्षण का कार्य
 प्रगति पर है।

संज्ञियों पर आंकड़े एकत्रित करने में अनेक समस्याएं पेश आती हैं।
 ये फसलें अल्पकालीन हैं और अनेक बार इनको चुनना पड़ता है, एक वर्ष में उसी सब्जी की
 दो से तीन तक फसल प्राप्त होती है और कभी-कभी तो देखने में आता है कि उसी सब्जी की
 फसल एक तरफ तो उगायी जा रही है दूसरी तरफ उसी फसल को चुना जा रहा है। वर्ष
 1964-66 के दौरान दिल्ली में, 1966-69 के दौरान नासिक [महाराष्ट्र] में और 1973-74 के
 दौरान बंगलौर [कर्नाटक] में संज्ञियों का उत्पादन करने वाली फसलों के अधीन क्षेत्रफल
 का आकलन करने के लिए और खाद, कृषि कार्य और विपणन पर विश्वसनीय आंकड़े एकत्रित
 करने के लिए उपयुक्त प्रतिचयन पद्धति का विकास करने हेतु मार्गदर्शी सर्वेक्षण किये गये।
 विभिन्न प्रतिचयन अभिकल्पनाओं और वैकल्पिक स्तरण पद्धति और चयन विधि जैसे-आकार
 की प्रायिकता समानता, साधारण यादृच्छिक प्रति-चयन तकनीकों का अध्ययन
 किया।

समुद्री और अन्तरदेशी दो प्रमुख साधन हैं जिनसे मछलियों का उत्पादन होता
 है। 1950-56 के दौरान संस्थान ने समुद्री मछली पालन के संदर्भ में पकड़ी जाने वाली
 मछलियों का आकलन लगाने हेतु समुचित प्रतिचयन पद्धति विकसित करने की दृष्टि से देश
 के तटीय क्षेत्रों का प्रतिदर्श सर्वेक्षण किये। यह पद्धति समुचित संशोधन सहित अब समुद्रीय
 मत्स्यकी अनुसंधान संस्थान और अन्य तटीय राज्यों तथा एशिया अफ्रीका जैसे अन्य देशों

द्वारा समुद्री मछली पकड़ने का आकलन लगाने के लिए अपनायी जा रही है। जहाँ तक अन्तरदेशीय मछली-पालन का संबंध है, विभिन्न अन्तरदेशी संसाधन कहाँ तक फँसे हैं, इन संसाधनों से कितनी मछलियाँ पकड़ी जाती हैं का आकलन लगाने की मुख्य समस्या है। ऐसी पद्धति का विकास करने के निम्न प्रतिदर्श सर्वेक्षणों का कार्य प्रगति पर है।

पशु और पशुधन उत्पाद देश की कृषि अर्थव्यवस्था का एक बहुत ही महत्त्वपूर्ण घटक है। विभिन्न पशु जैसे-गोवंशीय पशु, भेड़, मुर्गियों इत्यादि की संख्या और पशुधन उत्पाद जैसे—दूध, ऊन, मांस, अण्डे, चमड़ा व खाल का आकलन लगाने के लिए विश्वसनीय प्रतिदर्श [Statistics] की आवश्यकता है। इन विभिन्न पहलुओं पर अनेक राज्यों में 1954-55 से संस्थान द्वारा अनेकानेक सर्वेक्षण किये। इन सर्वेक्षणों का नवीनतम स्वरूप, क्षेत्र में किये गये एक सर्वेक्षण के आधार पर महत्त्वपूर्ण पशुधन उत्पाद का आकलन करने के लिए अध्ययन का कार्य हाथ में लेना है। दूध, मीठ, ऊन और अण्डों के उत्पादन का आकलन करने के लिए इन पहलुओं पर 1969-72 में उत्तरी क्षेत्रों और 1971-74 के दौरान दक्षिणी क्षेत्रों में सर्वेक्षण किये गये। चमड़े और खाल के उत्पादन के आकलन हेतु और उपयुक्त प्रतिचयन तकनीकों के विकास के लिए मार्गदर्शी अन्वेषण किये गये।

पशुधन उद्योग का विकास काफी दृढ़ तक समुचित चारे के उत्पादन और उपलब्धता पर निर्भर करता है। फिलहाल इनका काफी कुछ भाग खेत में उगाई जाने वाली फसलों के सहायक उत्पादों के रूप में प्राप्त किया जाता है। मगर अनेक राज्यों में चारे की फसलें समुचित क्षेत्र में उगाई जाती हैं। पशुधन उत्पाद विशेषकर दूध की पर्याप्त विकास दर बनाए रखने के लिए पोषक चारे के उत्पादन की आवश्यकता है। इनमें आज देश में उगाई जाने वाली खाद्य फसलों के समान ही देश के विभिन्न भागों में चारे के उत्पादन की नियमित समीक्षा करने के आवश्यकता है। 1972-73 के दौरान मेरठ जिले में और हरियाणा के करनाल तथा उड़ीसा राज्य के पुरी जिले में उगाए गए चारे का आकलन करने के लिए संस्थान द्वारा प्रतिदर्श सर्वेक्षण किये गये।

18. हिन्दी के प्रगामी प्रयोग में प्रगति

नीस जून, 1983 को समाप्त होने वाली इस विमाही के दौरान हुई हिन्दी की प्रगति का संक्षिप्त विवरण निम्न प्रकार है :

संस्थान में सर्वाधिक उपबन्धों, राजभाषा अधिनियम 1976 के नियमों आदि को कार्यान्वित करने का उत्तरदायित्व सँभालने में प्रशासनिक प्रधान की भूमिका में योगदान करने के लिए हिन्दी अधिकारी का चुनाव हो गया था तथा 16 अप्रैल, 1983 को संस्थान के हिन्दी अधिकारी ने अपना पद भार संभाला। राजभाषा अधिनियम, 1976 के नियम 12 के अधीन केन्द्रीय सरकार के प्रत्येक कार्यालय के प्रशासनिक प्रधान से सम्बद्ध उत्तरदायित्व से अपने निदेशक महोदय को अवगत कराते हुए, संवैधानिक एवं राजभाषा अधिनियम, 1976 के प्रावधानों का अनुपालन करने के लिए समुचित कार्यावाही की गई। संस्थान के कार्यालय में कार्यरत सभी अधिकारियों एवं कर्मचारियों को हिन्दी के प्रयोग से संबंधित समय जानकारी दी गई तथा तत्सम्बन्धी प्रावधानों का अनुपालन करने के लिए सभी से अपील की गई। उपयुक्त परिपत्र द्वारा, भारतीय संविधान के अनुच्छेद 343 में निहित व्यवस्था के अनुसार देवनागरी लिपि एवं भारतीय अंकों के अन्तर्राष्ट्रीय रूप के प्रयोग, राजभाषा अधिनियम 1963 की धारा 3 (3) के तहत हिन्दी और अंग्रेजी दोनों भाषाओं में अतिवाच्यतः जारी किए जाने वाले कागजातों के व्योरे, केन्द्रीय सरकारी कर्मचारियों के लिए सेवानिवृत्तिन प्रशिक्षण, टंकणों एवं आशुलिपिकों के हिन्दी में प्रशिक्षण के प्रावधान, पत्राचार, टिप्पणी आदि में हिन्दी प्रयोग की व्यवस्था, सेवा पुस्तिकाओं में प्रविष्टियों और हिन्दी के प्रगामी प्रयोग की प्रगति सम्बन्धी आवधिक तिमाही रिपोर्टों की अवधि एवं उपयोगिता आदि से अवगत कराया गया।

हिन्दी का अधिकाधिक उपयोग करने से सम्बद्ध इस सुझाव का भी निदेशक महोदय ने अनुमोदन कर दिया कि कुछ सामान्य आदेश तो मूलतः केवल हिन्दी में ही जारी किए जाते रहें तो उन्हें सहर्ष स्वीकारा जाना रहेगा जैसे स्थायीवत्, स्थायीवत्ता, पर्यवीक्षा काल, आवासावटन एवं अर्जित अवकाश संबंधी आदेश यथा सेवा पुस्तिकाओं में प्रविष्टियाँ आदि।

हिन्दी के कार्य में समन्वय स्थापित करने के लिए कृषि तथा सिंचाई मंत्री की स्वीकृति से निदेशक [राजभाषा] को उत्तरदायी बनाया गया था तथा कृषि संबंधी मंत्रालयों, विभागों, भारतीय कृषि अनुसंधान परिषद् और अधीनस्थ संस्थानों के हिन्दी कार्य में समन्वित प्रयास की आवश्यकता की दृष्टि से कुछ निर्णय लिए गए जैसे: भाषा सम्बन्धी कार्यक्रमों के समान नियमन तथा कार्यान्वयन, कार्यान्वयन के लिए कार्यालयों/संगठनों का दौरा, राजभाषा के कार्यक्रमों की नीति तथा कार्यान्वयन सम्बन्धी देखरेख और तकनीकी मार्गदर्शन, निदेशक (राजभाषा) की सहमति से ही महत्वपूर्ण निर्णय आदि कार्यों में निदेशक (राजभाषा) को सहयोग प्रदान करने की संस्थानों से की गई अपील पर हमारे संस्थान के अधिकारियों/कर्मचारियों को सूचित किया गया।

राजभाषा विभाग, गृह मंत्रालय के लोकनायक भवन कार्यालय से अपने संस्थान में हिन्दी के प्रयोग सम्बन्धी सुविधाएं प्रदान करने हेतु उपयोगी साहित्य लाया गया। इस साहित्य में नेमी कार्यालय टिप्पणियाँ, राजभाषा अधिनियम 1963, हिन्दी प्रगति विवरण

1965 से अगले सभी वर्षों की रिपोर्टें, वर्ष 1983-84 का वार्षिक कार्यक्रम तथा राजभाषा भारती अंक 17-18 (अप्रैल-सितम्बर 1982) सम्मिलित है। इस साहित्य की प्रतियां उपलब्ध संख्या के आधार पर विभिन्न अनुभागों, एककों, कक्षों आदि की भेजी गई ताकि वहाँ के कर्मचारी इसका सदुपयोग कर सकें। फालतू प्रतियां पुस्तकालयाध्यक्ष को रिकार्ड एवं उपयोग के लिए भेजी गई और प्रत्येक सैट की एक-एक प्रति हिन्दी अनुभाग में भी रखी गई।

हिन्दी शिक्षण योजना के अन्तर्गत अधिकाधिक संख्या में आशुलिपिकों एवं लिपिकों को हिन्दी आशुलिपि तथा तथा हिन्दी टंकण में प्रशिक्षण देने के लिए मनोनीत करने हेतु संस्थान के प्रभाग प्रधानों, अनुभागाधिकारियों आदि से सम्पर्क स्थापित किया गया और उनकी सहमति से नामों की सूची तैयार की गई।

संस्थान की हिन्दी कार्यान्वयन समिति की अगली बैठक शीघ्रातिशीघ्र करने का निर्णय लिया गया और पिछली बैठक के निर्णयों पर की गई कार्यवाहियों की समीक्षा प्रस्तुत करते हुए अगली बैठक की तिथि एवं बैठक में विचारणीय विषयों की सूची निश्चित की गई।

केन्द्रीय सचिवालय हिन्दी परिषद् द्वारा प्रस्तावित विभिन्न प्रतियोगिताओं के विस्तृत विवरण, कार्यक्रम एवं नियम सभी वैज्ञानिकों, तकनीकी कर्मचारियों, प्रशासनिक अधिकारियों एवं कर्मचारियों में परिचालित किये गए। प्रतियोगिताओं में भाग लेने के इच्छुक वैज्ञानिकों तथा तकनीकी एवं प्रशासनिक कर्मचारियों के नाम 27 जून तक मांगे गए तथा विभिन्न पुरस्कारों के प्रावधानों से अवगत कराते हुए उन्हें प्रोत्साहित किया गया।

PERIODICAL PUBLICATIONS

I.A.S.R.I. STATISTICAL NEWSLETTER

The I.A.S.R.I. Statistical Newsletter is a quarterly publication giving such information about the current activities of the Institute as is likely to provide useful information to research workers in the field of agricultural statistics.

ANNUAL REPORT

The Annual Report issued by the Institute covers all the aspects of its functions and activities and provides useful information to research workers in the field of Agricultural Statistics.

ANNUAL REPORT ON SAMPLE SURVEY METHODOLOGY

The Annual Report of Sample Surveys for Methodological Investigations into High Yielding Varieties Programme (H.Y.V.P.) are being published since 1974-75.

ANNUAL INDEX OF AGRICULTURAL FIELD EXPERIMENTS

The Annual Index gives information on the objectives of agricultural field experiments other than varietal trials conducted during that year on various crops at different experimental research stations and their years of commencement and termination under the scheme of National Index of Agricultural Field Experiments.

NATIONAL INDEX OF AGRICULTURAL FIELD EXPERIMENTS

The results of statistical analysis of the data pertaining to agricultural field experiments (other than varietal trials) conducted at the various research stations all over the country, are published in the forms of compendia series. Three such series in respect of the various States pertaining to the periods 1948-53, 1954-59 and 1960-65 have already been completed and the data for the period 1966-71 have been collected and are under process which would be published in the form of cropwise compendia series.

OTHER PUBLICATIONS

	Price (Rs.)
Sample Survey for Estimation of Milk Production in Punjab (1956-57)-V. G. Panse. Daroga Singh and V. V. R. Murty.	5.50
Sample Survey for Estimation of Milk Production in Eastern Districts of U. P. (1957-59)—V.G. Panse. Daroga Singh and V.V.R. Murty.	4.25
Cost of Milk Production in Madras (1953)—V. G. Panse, V. N. Amble and K. C. Raut.	4.75
Green Manuring of Crops (1965)—V.G.Panse, T.P. Abraham and C. R. Leelavathi	2.50
Cost of Milk Production in West Bengal (1967)—V.G. Panse, V. N. Amble and K. C. Raut.	5.50
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Survey on Mango and Guava in U. P. (1971)—G. R. Seth, B. V. Sukhatme and A. H. Manwani.	3.50
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