A report on National Seminar

Recent Advances in Applied Statistics and its Application in Forestry

Three days National Seminar on '**Recent Advances in Applied Statistics and its Application in Forestry**' was inaugurated on April 15, 2013 by Prof. Kedar Nath Singh Yadav, Hon'ble Vice Chancellor, Rani Durgawati Viswavidhalay, Jabalpur at Tropical Forest Research Institute, Jabalpur (TFRI) in the presence of Dr. U. Prakasham, Director, TFRI, Dr. Ram Prakash, Director, SFRI, Jabalpur, senior forest officers, Experts from IASRI, New Delhi, ICFRE, Dehradun, Kerla Forest Research Institute, Lucknow University, Allahabad University, YS Parmar University of Horticulture and Forestry, Solan, Jawahar Lal Krishi Viswa Vidhyalaya, Sikkim Manipal Institute of Medical Sciences, Sikkim, Burdawan University, WB, National Institute of Technology, Patna, APS University, Rewa, Indian Institute of Forest Management, Bhopal, Bidhan Chand Krishi Vishwa Vidyalaya, WB, former scientists of TFRI and officers from NSSO, Jabalpur etc. Dr. Girish Chandra, organizing secretary briefed about the aims and significance of the seminar.

Dr. U. Prakasham in his introductory remarks emphasized about the vision of Indian Council of Forestry Research and Education (ICFRE), Dehradun and its institutes/centers. On this occasion, he paid such tribute to founder of Statistics in India, Prof. P. C. Mahalanobis and his contribution in the fields of statistical development and economic planning, his model of development planning, the large scale sample survey techniques etc. He also emphasized about International year of Statistics-2013 and National Statistics day (June 29 every year) in the context of the present scenario. He was also delighted to thank Hon'ble Director General, ICFRE, Dr. V. K. Bahuguna, for his kind support and guidance to organize this seminar and the support received from Ministry of Statistics and Program Implementation, Government of India,

CSIR, MPCST, Bhopal, Union Bank of India, SPSS and Systat, experts from different organizations and all the committee members of the seminar. Dr. Ram Prakash and Dr. C. P. Rai also recorded their views on the relevance of Statistics with forestry research by explaining its indispensability for design of experiments, sampling techniques, multivariate analysis, time series analysis etc.

Prof. K. N. Yadav delivered his key note address and focused on the importance of applied statistics in facing the problems on development of different streams of science through collection of relevant data and drawing valid and reliable conclusion of specified objective under economically optimized way. In forestry research statistically designed experiments with models are important in field experiments in order to gain a better understanding of trees, stand, and forest responses and minimized the biasness and experimental errors. Recently developed software like SAS, SPSS, Systat, R, Minitab etc. are the new advancement in analyzing the collected data in the most efficient way. He was happy that TFRI is carrying out the pilot studies/field research through projects funded by external agencies and ICFRE and catering the overall research needs of forests of four central Indian states, viz., Chhattisgarh, Madhya Pradesh, Maharashtra and Orissa, in particular, and specific issues of forests and forestry sector confronting India, in general.

There were many invited speakers for special lectures, and contributed papers under the four important themes viz. (a) Role of Applied Statistics in Scientific Research (b) Design of Experiments in Forestry Research (c) Sampling techniques and Time Series in Forest Survey and (d) Applied Mathematics and Forest Biometrics. Besides these a colloquium on “Statistical

Modelling and Forecasting" and a half day workshop on "Importance of Statistical software in Survey Data Analysis" were the parts of the seminar. Session wise summary is given below:

Invited Paper Session I (Role of Applied Statistics in Scientific Research)

Chairperson: Dr. S. A. Ansari

In this session, total two papers were presented. Dr. M. Sivaram briefed about the non availability of proper statistical system to track the timber market trends in developing countries. The newly developed Timber Market Intelligence System by KFRI, Peechi, computer based decision support system tool to gather, store, search, retrieve and analyze timber price trends, is successful for the same. Selected models for forecasting future timber price trends were integrated in the system. It is useful for monitoring timber prices as was demonstrated through a case study of timber market of Kerala State, India. Dr. Krishan Lal, discussed about mixture experiment, an experiment in which the response is assumed to depend on the relative proportions of the ingredients present in the mixture and not on the amount of mixture. He suggested a methodology for the optimization in mixture experiment with process variable with minimum variability when the number of replication is two or more.

Contributory Paper Session I (Role of Applied Statistics in Scientific Research)

Chairperson: Dr. S. A. Ansari

There were 7 papers presented in this session and discussed on the role of women contribution in generating livelihood through forest development activities a cause and effect relationship based on an intensive survey of 20 JFM villages, selected from different forest ranges of Betul,

Jhabua, Sheopur and Mandla districts of MP, the statistically significant impact of mother's lifestyle characteristics on her neonate weight using statistical (or probabilistic) modeling, trends

in production, import- export and consumption of **particle** board and plywood in India using ARIMA model, methodology for tangible and intangible benefits, role of statistics for the development of genetic concepts to accomplish better understanding of genome and its function in different organisms and statistical methods used in phytopathological research.

Invited Paper Session II (Design of Experiment in forestry research)

Chairperson: Prof. V. K. Choudhary

Total 5 papers were presented in this session. Dr. Krishan Lal presented on Design Resources Server, which is developed to popularize and disseminate research in design of experiments among experimenters in agricultural sciences, forestry, biological sciences, animal sciences, social sciences and industry in planning and designing their experiments for making precise and valid inferences on the problems of their interest, generally treatment contrasts. Mr. Raman Nautiyal presented experiments in field trials of forest tree species, especially for tree improvement by presence of a large number of varieties to be tested. Two classes of experiments were discussed, one pertaining to the field and one to the laboratory. Dr. Rabin Das presented *invariant* robust first-order *D*-optimal and rotatable designs for correlated lifetime responses having log-normal, exponential, gamma and Weibull distributions. It was shown that robust first-order *D*-optimal designs are always robust rotatable but the converse is *not* true. Prof. R. B. Singh described multi locational experiments for four categories viz. (a) experimental error homogeneous and the interaction absent (b) experimental errors are homogeneous and the interaction present (c) experimental error are heterogeneous and the interactions absent and (d) experimental error heterogeneous and the interaction present. Prof. H. L. Sharma described the need of confounding problems in design of experiments for agricultural and forestry surveys.

Contributory Paper Session II (Role of Applied Statistics in Scientific Research)

Chairperson: Dr. M. Shivaram

Total 4 papers were presented in this session and discussed on situational analysis of HIV-positive women on art in Manipur, plant diversity and helping in ecological monitoring,

estimating the Maternal Mortality Rates that occurred during 2000 to 2011 in Sikkim and quantal-response statistics, particularly probit Analysis in toxicological determinations.

Invited Paper Session III (Statistical Modeling and Forecasting)

Chairperson: Prof. Anoop Chaturvedi

Two papers were presented in this session. Dr. Amrender Kumar showed that the pests and diseases adversely effects of many aspects of forest such as tree growth, survival, yield, quality of wood and non wood products. He successfully showed that complex polynomials through Group Method of Data Handling (GMDH) technique, Ordinal Logistic Model, Fuzzy approach and Artificial Neural Network are reliable forewarnings models. Dr. V. Ramasubramanian presented on Technology Forecasting for prediction of the future characteristics of useful machines, procedures or techniques. Using this technique he showed the case studies in the field of Indian agriculture. He further highlighted on Questionnaire approach, Analytical Hierarchy Process, Cross Impact Analysis, Substitution Modelling and Scientometrics.

Invited Paper Session IV (Sampling Technique and Time Series in Forest Survey)

Chairperson: Mr. Raman Nautiyal

Ttwo papers were presented in this session. Prof. S. K. Pandey expalained the need of controlled sampling in forestry research. Prof. Anoop Chaturvedi presented the ecological and forestry studies with time series data. He introduced different time series models, which can be used for modeling forestry and ecological data. The spectral analysis of time series models and its role in to investigate cyclic behavior of time series data generated in forestry also been discussed.

Contributory Paper Session III (Sampling Technique and Time Series in Forest Survey)

Chairperson: Dr. Krishan Lal

Four papers were presented on estimation of domain total in the presence of nonresponse when the domain size is assumed unknown and the sampling design is two-stage, estimation of finite population mean in systematic sampling, Ratio-cum-product estimators of finite population mean using known parameters of auxiliary variates, statistical analysis of wood based panels in India relates to forestry and their trends and usefulness of statistical software Systat on statistical analysis in this session.

Invited Paper Session V (Applied Mathematics and Forest Biometrics)

Chairperson: Dr. Hukum Chandra

Two papers were presented in this session. Brief view on the application of multivariate analysis techniques viz. Cluster Analysis ,Principal Component Analysis and Factor Analysis in

important forest species namely – Wild Marigold (Tagets minuta L.) were discussed by Prof. V. K. Choudhary. Dr. S. K. Singh successfully used Newton's forward and backward interpolation formula for reading the data inside and outside of given domain.

Contributory Paper Session IV (Applied Mathematics and Forest Biometrics)

Chairperson: Prof. R. B. Singh

Total three papers were presented in this session and discussion were made on inventory of volume and biomass tree allometric equations for South Asia, growth tables for coppice origin plants of important species of RDF areas in different forest types of Madhya Pradesh , linear and non linear regression techniques to predict the growing stock in Yamunanagar, Haryana.

Invited Paper Session VI (Importance of Statistical software in survey data analysis)

Chairperson: Dr. V. Ramasubramanian

In this session, Dr. Hukum Chandra explained about various software used in survey data analysis and their significance in the case of simple and complex sample survey designs. He discussed the impact these design complexities on the sampling variance and summarize survey function in software R to carry out analysis on sample survey data.

Practical on SPSS Software

Chairperson: Dr. Rabin N Das

The usefulness of SPSS software were discussed in this session and demonstrated with the help of many examples.

Plenary Session

Chairperson: Dr. U. Prakasham

In this session the recommendations of all the chirpersons were presented by Dr. N. Roychoudhary.