

## DEPARTMENT OF MATHEMATICS AND STATISTICS

**Dr. Lajpat Rai**  
**Professor**



**Official Address** Department of Mathematics and Statistics,  
CCS Haryana Agricultural University,  
Hisar.

**Home Address:** 614 ,Sector 15 A Hisar, Haryana

**Phone/Mobile:** 01662-289201(O) 01662 -244292(R)  
09354321946 (M)

**E-mail:** laj@hau.ernet.in

**Academic Qualifications:** Ph.D. (Statistics)

**Professional Experience:** 36 years Research/Teaching Experience

### **Academic Interests:**

- 1) Developing suitable methodology for the yield estimation of cotton and fruits crops.
- 2) Determination of field plot techniques for different crops.
- 3) Estimation and Forecasting of yields of major crops in Haryana.
- 4) Statistical consultation.
- 5) Application of design of experiments in bio-assays.

### **Research Highlights:**

Suitable designs for parallel line assays which leaves important contrasts of interest unconfounded with block effects have been constructed. The proposed designs are partially efficiency balanced designs with atmost three efficiency classes and thus have simple analysis.

A systematic method of constructing incomplete block designs for parallel line assays from semi-regular group divisible designs has been proposed. These designs need a smaller number of experimental units as compared to known designs in literature.

Expressions for the estimates of intersection and blank contrasts have been obtained for asymmetrical slope ratio assays. Designs have also been proposed which estimate intersection and blank contrast free from block effects and are available in smaller block sizes and falls in the category of supplemental block designs.

Conditions for the orthogonal estimation of important contrast have been obtained in case of multiple parallel line assays and many series of multiple asymmetrical parallel line assays have been constructed

The efficiency of different sampling designs has been compared in cotton crop and two stage sampling design in which primary stage unit (villages) selected by probability proportional to previous year data under cotton has been found to be more efficient. Twenty four villages in Hisar district and sixteen villages in Sirsa district were selected by pps. Seven farmers at random with in each selected villages were selected as SSU for conducting crop cutting experiments on 6 x 5 sq. metre plot.

For grape crop two stage strategy in which PSU orchards selected by SRS and SSU wines selected by SRS was found to be more efficient.

For developing suitable models on the time series data the work was persued on the secondary data of area, production and productivity of paddy, american and desi cotton, wheat, bajra, sugarcane, barley, gram and rapeseed and mustard in Haryana.

Statistical models were developed for wheat crop using weekly weather data viz. minimum and maximum temperature, rainfall, R.H. (morning and evening), bright sun shine hours and average productivity of wheat crop at Hisar using 20 years (1981-2000) data. Yield forecasted using partial crop season data in 5<sup>th</sup> and 8<sup>th</sup> standard meteorological week was in the range of 3 to 7% of the actual yield.

Models are being developed to give advance estimate of yield of cotton on the basis of yield of first pick in conjunction with the no. of unpick bolls in mid October well before the harvest.

#### **National/International Exposure:**

- Summer School of 21 days on “Forecasting Technique in Agriculture” (July 9-29, 2003) at I.A.S.R.I., New Delhi.
- Three months training programme under ICAR-AHRD Fellowship on ‘Statistical models for crop forecasting and early warning system’ has been undertaken at Department of

Crop Science, University of Saskatchewan Saskatoon, Canada (13<sup>th</sup> Sept. to 12<sup>th</sup> Dec. 1998) under Professor E.A. Ripley. Different empirical and simulation models were studied to estimate wheat yield under different conditions of the environment and management.

- The paper entitled, “Some supplemented designs for symmetrical parallel line Bio-Assays” was presented at the Eighth International Conference of the Forum for Interdisciplinary Mathematics, Dec. 19-21, 2001 at University of Wollongong, Wollongong, Australia.

#### **Awards & Honours:**

National scholarship for getting 1<sup>st</sup> position in B.Sc.  
I.A.S.R.I., Junior Research Fellowship in M.Sc.  
ICAR Senior Research Fellowship in Ph.D.  
Fellow, Food and Agricultural organization (FAO, Rome)  
Awarded certificate of merit for scoring highest OGPA in Ph.D. for the academic year 1984.

#### **Professional Affiliations**

Life member of Indian Society of Agricultural Statistics, New Delhi.  
Life member of Society of Statistics, computer and Application, New Delhi.  
Member of Society of Applied Statistics and computer Science, CCS HAU, Hisar.

#### **Books/Manuals/Important publications:**

- i. Manual on Design of Experiments (1998)
- ii. A Compendium on “Design and analysis of field experiments”(2000) Academy of Agricultural Research Education and Management, CCSHAU, Hisar
- iii. Applied Statistical Methods(2003). Published by Dhanpat Rai and Co. Pvt. Ltd., New Delhi.
- iv. A Compendium on “Design and analysis of agricultural Experiments” (2005). Academy of Agricultural Research Education and Management, CCSHAU, Hisar.
- v. Manual on “Design and analysis of Agricultural data” (2006). Deptt. of Math.& Stat., CCSHAU, Hisar.
- vi. Research Bulletin “Statistical models for pre-harvest forecasting of cotton yield”(2007). .
- vii. Manual on Business Statistics(2008). .
- viii. Manual on Statistical Methods in Bioinformatics(2008). .
- ix. Manual on Statistical Methods for Social Science(2009). .
- x. Manual on Non-parametric Methods(2009).

### Important Publications:

Economic analysis of nitrogen use in rainfed conditions of M.P. *Fertilizer News*, **23**: 21-24(1978).

Estimation of epistatic components for seed size. *Genet. Ther.* **34**: 117-124(1982).

Design for parallel line assays. *Sankhya*, **48B**: 40-43(1986).

Incomplete block designs for multiple parallel line assays. Abst. *Journal of the Indian Society of agricultural Statistics*. **39**: 260(1987).

Incomplete block designs for parallel line assays. *Journal of Statistical Planning and Inference* **20**: 121-128(1988).

Supplemented designs for parallel line bioassays *Sankhya*. **51B**: 339-347 (1989).

Research and teaching coordination linkage between ICAR Institutes and Agricultural Universities. Ninth National Conference of Agricultural Research Statisticians (Contributed Papers and Proceedings: 128-131(1989).

Incomplete block designs for asymmetrical slope ratio assays. *Statistica*. **49**: 210-218. (1990)

Design patterns of incomplete block designs for parallel line assays. Proceedings of the Spring School and International Conference on Combinatorics and Graph Theory. Hefei 6-27 April, 1992: 71-81. Published by World Scientific Publishing Co. Pvt. Ltd. Singapore, New Jersey, London, Hong Kong.

Relative Efficiency of incomplete block designs in Soyabean [*Glycine max* (L.)]. *Forage Res.* **22**(1) 51-54(1996).

Augmented Row-Column Designs, Recent Advances in Information Theory, Statistics and Computer Application. 248-251(1998)..

Some supplemented Row-column Design. Paper presented in 1<sup>st</sup> Annual Conference of Society of Statistics Computer and application. Abstract published 20-21(1998).

Incomplete block designs for Multiple parallel lines Assays, Recent Advances in Information Theory, Statistics and Computer Applications pp: 237-241(1998)..

Pre-harvest of cotton yield based on plant Biometrical characters. Published in proceeding of "Remote Sensing and GIS for rural development with special reference to Haryana. 203-208. (2005).