

Profile of Scientist



1. Name of Scientist : **DR. RAJESH KUMAR**

2. Personal Bio-data :

(a) Position/Designation : **Principal Scientist (Agricultural Statistics)
and In-Charge Agriculture Knowledge Management Unit,
ICAR-IISR, Lucknow**

(b) Contact Details :

(i) ICAR Email ID : **Rajesh.Kumar12@icar.gov.in**

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(iii) Mobile No. : **9450465532**

(c) Joining date in :

(i) ICAR : **07-03-1986**

(ii) IISR : **07-03-1986**

(d) Discipline and Speciation : **Agricultural Statistics (Zonal planning of sugarcane and sugar, Genotype x Environment in sugarcane and Survey Sampling)**

(e) **Training / advance exposure in the area of work :**

- Attended International Workshop on Linear Mixed Models in Practice : An AS-REML – Oriented Approach on 13-15 October, 2016 at ICAR-Central Institute of Fisheries Education (Deemed University), Panch Marg, Versova, Mumbai.
- Attend training program on : Science Governance & Management *Sponsored by* : Department of Science & Technology, Govt. of India during 29.02.2016 to 04.03.2016 at Administrative Staff College of India (ASCI), Bella Vista Campus, Hyderabad.
- Attended training programme of analysis of experimental data at ICAR - National Academy of Agricultural Research Management (NAARM), Hyderabad during august 17-22, 2015.
- Attended advance course in Geographical Information Systems, Remote Sensing, Photogrammetry and Cartography at Indian Institute of Sugarcane Research, Lucknow during April 18-23, 2005 conducted by PCI Software Private Limited, Kolkata.

- Attended summer school on Application of remote sensing and GIS in Agricultural Statistics at Indian Agricultural Statistics Research Institute, New Delhi during August 6-26, 2003.
- Attended 21 days training course on System Analysis and crop Growth Simulation in Agriculture at Unit for Applications of System Simulation, Indian Agricultural Research Institute, New Delhi during March 30 - April 19, 2003.
- Attended summer school on "Advances in Statistical Designs for Agricultural Research" during June 24, to July 14, 1998 at Indian Agricultural Statistics Research Institute, New Delhi.
- Attended three days training on "Windows 98 and MS Office" at Indian Institute of Sugarcane Research, Lucknow conducted by NIIT, New Delhi during July 27-29, 2000.
- Attended two days workshop on "Statistics in Fertiliser Trials" at Department of Agronomy, Punjab Agricultural University, Ludhiana during Nov. 4-5, 1996
- Attended course on " Optimality and Robustness of Designs " from April 25, 1995 to April 29, 1995 at Indian Agricultural Statistics Research Institute, New Delhi.
- Attended training course on " Use of Computers in Agricultural Research " from Dec. 11, 1995 to Dec. 27, 1995 at Indian Agricultural Statistics Research Institute, New Delhi.
- Attended 24th foundation course on Agricultural Research Management from Nov. 22, 1986 to April 18, 1987 at National Academy of Agricultural Research Management, Hyderabad,

3. Contribution to the scientific advancement :

Delineation of Sugar Recovery and Sugarcane Productivity zones in India

- Delineated sugar recovery zones of India for the purpose of better planning of sugarcane research and development activities.
- Critical climatic and soil parameters affecting production and productivity of sugarcane under different soils and climate were identified.
- Appropriate models were developed to study the relationship between cane yield and different weather parameters. Relationships were also established with cane yield and different types of soils.
- Sugarcane planning *vis-à-vis* soils and climate was done for sustainable sugarcane and sugar productivity in India.

All India Coordinated Research Project on Sugarcane

- Proposed different indices for selection of high yielding and stable sugarcane genotypes.
- Compared different methods to study Genotype x Environment interaction in sugarcane.
- An improved method of assigning high yielding stable sugarcane genotypes was proposed.

Basic research in Statistics (Survey Sampling)

- Methods have been proposed to obtain sample size under various situations when coefficient of variation or its estimate is known.
- Regression and ratio estimators in sampling on two occasions have been considered and their efficiencies were compared and suggestions were made for its adoption in different situations.
- A new strategy for sampling with varying probabilities was proposed. In majority of cases, it was found better than the Midzuno-Sen scheme.
- Proposed two general classes of ratio and product type estimators to estimate population parameters and attempted to make classes unbiased.
- Impact of stratification in systematic sampling was studied and it was found that the merit of stratified sampling in producing a gain in precision of estimates for the whole population is lost when systematic sampling is very efficient .

Crop Protection

- Devised method to estimate cane yield loss in genotypes of sugarcane affected with smut at different levels of disease incidence.
- Non-linear model was developed to estimate cane yield loss in plant crop inflicted by sugarcane smut.
- Progressive decline in cane yield and quality of sugarcane up to second ratoon was studied in three varieties affected with sugarcane mosaic virus.
- Appropriate model was developed to establish relationship between primary infection foci of smut and its disease incidence in plant and ratoon crop for deciding eradication of clumps in order to manage the disease.
- Studied the statistical distribution of internode and stalk borers in sugarcane.

- Prepared model for estimating intensity of internode borer to obviate cumbersome process of recording intensity by cutting and splitting of canes.
- Weather based forewarning models were developed for top borer and pyrilla as well as red rot and smut diseases of sugarcane.

Crop Improvement

- Cluster analysis (Hierarchical procedures and Non-hierarchical procedures) techniques were used to evaluate inter-specific hybrids of sugarcane for yield, quality, adoption and other metric traits. K-means cluster analysis was found appropriate method for grouping of sugarcane genotypes.
- Multivariate analysis (cluster analysis, principal component analysis and D^2 analysis) was used to study the genetic diversity in *Beta vulgaris* ssp. *maritima* under subtropical (North India) climate.
- Cluster analysis was employed to study the divergence of genotypes for jaggery quality in sugarcane for their future use in breeding to evolve varieties with better jaggery quality.

Crop Production

- Developed models for early prediction of sugar.
- On-farm comparison of ring-pit and conventional method of planting for yield and quality of sugarcane in northwest India was done.

Agricultural Engineering

- Statistically analyzed different methods of new fertilizer dispensing system and found the best one in over all performance when compared with the traditionally used fertilizer application system attached as a sub-unit of the sugarcane planter in the development of new fertilizer dispensing system.
- Compared fiber and sugar in cane obtained from new approach with overall average in development of a efficient cost effective motorized cane preparator for accurate determination of fiber and sugar in cane.
- Studied in assessing comparative hardness of sugarcane varieties at nodes and internodes during crop cycle.

Plant Physiology & Biochemistry

- Identified important physiological parameters affecting the sugarcane yield at different crop growth stages.
- Non-hierarchical cluster analysis procedure was used to study the variability in physiological characters amongst the clones of sugarcane germplasm.
- Associated in improving sprouting of stubble buds in sugarcane under sub-optimal-temperatures.

Information Technology

- Develop Cane Des: A web based expert system for disorder diagnosis in sugarcane useful in AICRP(S) trials of crop protection.
- A Web based IISR information system has been developed at ARIS Cell. In this system information related to research and administrative matters can be stored at central repository and made it accessible to users through network nodes. The system works in Client / Server architecture, in which a Web Server is being used to host all the information in the form of HTML pages, database, Word, PDF, Excel files. ASP and HTML. It is accessible on Institute LAN using any popular web browsers like Internet Explorer, Netscape Navigator, etc.

4. Future Planning of research (in bullets) :

- **Mixed effect model in varital testing programme of sugarcane**
- **Mechanism for evaluating the efficiency of programmes in large scale data analysis**

5. Publication (best five) :

Kumar, Rajesh & Misra, S.R, 2002, Sugar recovery zones of India - Delineation and critical analysis. Sugar Tech, 4(1&2), 38-44 (An International Journal of Sugar Crops and Related Industries).

Kumar, Rajesh, R.L. Yadav, Rajendra, Gupta and D.V., Yadav, 2008, Planning of sugarcane crop vis-à-vis soils and climate for sustainable sugar productivity in India. International Sugar Journal and Sugarcane International merged , 26(6), 15-23, U.K

Singh, S.N., Singh, A.K. Singh, J.P.S. Malik, **Kumar, Rajesh**, Sunderpal and M.L. Sharma, 2012, Cultural- practice packages and trash management effects on sugarcane ratoons under sub-tropical climatic conditions of India. Journal of Agricultural Science, 150, 237-247, UK.

Srivastava, A.K., Srivastava, D.C., Sinha, O.K. & **Kumar, Rajesh**, 2010, Accumulated thermal time, a key factor in affecting generation initiation and duration of top borer, *Scirpophaga excerptalis Walker* of sugarcane for its model-based chemical control. Meteorological Applications, 17:32-39. UK

Kushwaha, K .S. & **Kumar, Rajesh**, 2001, On the use of Jack-Knife in systematic sampling strategy. Biometrical Journal, 43(1), 93-101, (Germany).

6. Awards and Fellowship :

- Elected Fellow of Royal Statistical Society in 2000, Royal Statistical Society , London
- Awarded the Status of Chartered Statistician in 2003, Royal Statistical Society , London
- Awarded as Best Poster paper entitled “Development of diagnostic expert system in sugarcane using object oriented knowledge representation technique” in 2014, Paper presented in Poster Session of 5th IAPSIT International Sugar Conference (IS-2014) held at Nanning, China during 25-28 Nov, 2014.
- Awarded best oral presentation by University of Agricultural Sciences , Banglore in 2015. Paper “Growth of sugar production in different states of sub-tropical and tropical India” was awarded best oral presentation in the National Seminar on Recent Advances and Challenges in Sugarcane Research organized by by University of Agricultural Sciences , Banglore at Hotel Le Ruchi, Mysore.
- Gold Medal in Professional Statistician’s Certificate Course in 1983, Indian Agricultural Statistics Research Institute, New Delhi.
- V.V.R. Memorial Prize in Professional Statistician’s Certificate Course in 1983. Indian Agricultural Statistics Research Institute, New Delhi
- Commendation letter for outstanding performance in Summer School on “Advances in Statistical Designs for Agricultural Research” in 1998 Indian Agricultural Statistics Research Institute, New Delhi.

- **Team Leader/ Member Secretary / Member** of the monitoring team of AICRP(S) trials conducted at different centers in Zones for more than 12 occasions to conducted monitoring and assessment of performance of AICRP(S) trials conducted in regular and voluntary centers of different zones of AICRP(S).
- **Elected Member** of Executive Council of Indian Society of Agricultural Statistics in 2007-2008 and 2015-2015, Indian Society of Agricultural Statistics, Indian Agricultural Statistics Research Institute, New Delhi
- **President**, Bhartia Krishi Anusandhan Samiti, Lucknow Unit for the period 2006 to 2016 to look after the administrative and financial matters of the Society and publication of journal.
- **Secretary**, Association of Sugarcane Technologists of India, ICAR-Indian Institute of Sugarcane Research, Lucknow for eight years (2004 to 2012).
- Elected Associate Editor of Journal of Research in Environment and Life Sciences for the period 2016-2018.
- Nominated **members of Editorial Board** for the period 2012-2016 of Indian Journal of Sugarcane Technology, Indian Institute of Sugarcane Research, Lucknow.
- **Editor** of Bhartiya Krishi Anusandhan Patrika published by Bhartiya Krishi Anusandhan Samiti, Karnal, Haryana for 2006 to 2016.
- Member of International **Board of consulting Editors** for 2007-2008 of Sugar Tech - An International Journal of Sugar Crops and Related Industries

7. **Other relevant activities of scientist :**

Chairman of Security and Vigilance Committee of ICAR-IISR, Lucknow to keep watch on institute property, law and order and annual contact for security work on job.