

## Profile of the Scientist



1. **Name of the scientist** : **Dr. Sanjeev Kumar**  
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2. **Personal bio-data**

- a) **Designation** : Principal Scientist (Agricultural Biotechnology)  
b) **Date of joining ICAR** : 05/11/1998 (as ARS Scientist at IIVR, Varanasi)  
c) **Date of joining IISR** : 13/08/2013 (as Senior Scientist)  
d) **Discipline and specialization** : Agricultural Biotechnology  
Plant tissue culture studies, transgenic development, molecular marker studies

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

- Attended Subject Matter Training Course “Fish genomic and proteomic data analysis with high throughput computing” at NBFGR, Lucknow during Nov. 19-24, 2015
- Attended Subject Matter Training Course “Bioinformatics Approaches in Genomics, Transcriptomics and Proteomics” at NBFGR, Lucknow during Nov. 12-22, 2013
- Attended 21 days winter school on “Plant Genetic Engineering and Molecular Breeding” at NRC on Plant Biotechnology, IARI, New Delhi during Sept. 25-Oct 15, 2003
- Attended one week Orientation Course on “Biosafety Considerations for evaluation of Transgenic Crops” at NBPGR, New Delhi during Nov. 20-28, 2002

f) **Contribution to the scientific advancement :**

**Marker-trait associations for sucrose and yield contributing traits in sugarcane:**

Linkage disequilibrium (LD)-based marker-trait associations were identified for sucrose and yield contributing traits using a panel of 108 sugarcane genotypes from sub-tropical India and 989 SSR marker loci. Significant associations were identified for four markers with cane diameter, seven markers each with cane length and number of millable canes (NMCs), eleven markers with number of nodes, six with sucrose per cent, and five markers with average cane weight. The identified MTAs could be exploited to fine-tune marker-assisted breeding programmes.

**Identification of putative candidate genes for red rot resistance in sugarcane:**

This study utilized a panel of 119 sugarcane genotypes fingerprinted for 944 SSR alleles. Mixed linear model detected four MTAs; and EST sequences diagnostic of three could be mapped on to sorghum genome. Several genes encoding important plant defense related proteins were localized to the vicinity of these MTAs. These positional candidate genes possibly contribute to red rot resistance.

**Genetic transformation in tomato and eggplant:** Transgenic lines of tomato (carrying *CryIAc* and *DREB1A*) and eggplant (carrying *CryIAb* and *CryIAc*) were developed and the transgene integration/expression was confirmed using PCR, Southern blot and ELISA. These lines are in the process of confined field trials.

**Development of DNA marker for sex identification in *T. Dioica*:** For the first time, an RAPD markers *OPC07<sub>567</sub>* (associated with femaleness) was identified. This marker can reliably identify the sex of the plantlets well before flowering.

**Embryo culture studies in *T. Dioica*:** Owing to problems in seed germination in *T. dioica*, embryo culture was resorted to raise the only sexual progeny on record and the inheritance of leaf and stem characters were studied.

### 3. On-going projects associated with :

- DBT-Accredited Test Laboratory (ATL) for Genetic Fidelity Testing and Virus Indexing; (2015-2018), DBT, New Delhi, Rs. 69.29 Lakh (Coordinator & PI-Genetic Fidelity).
- RNA Seq for SNP mining and linkage mapping in sugarcane; (2014-2017): Mentor (DBT, New Delhi, Rs. 50.28 lakh)

### 4. Publication list (last 5 years): Total citations: 380; H-index: 12; RG Score: 23.59

#### Research articles:

- Siraree A, Banerjee N, **Kumar S**, Khan MS, Singh PK, Kumar S, Sharma S, Singh RK and Singh J. 2017. Identification of marker-trait associations for morphological descriptors and yield component traits in sugarcane. *Physiol. Mol. Biol. Plants* 23(1): 185-191 (IF. 0.88; NAAS 6.88).
- Singh RK, Banerjee N, Khan MS, Yadav S, **Kumar S**, Duttamajumder SK, Lal RJ, Patel JD, Guo H, Zhand D and Paterson AH. 2016. Identification of putative candidate genes for red rot resistance in sugarcane (*Saccharum* species hybrid) using LD-based association mapping. *Molecular Genetics and Genomics* 291: 1363-1377 (IF. 2.98; NAAS 8.98)
- Banerjee N, Siraree A, Yadav S, **Kumar S**, Singh J, Kumar S, Pandey DK and Singh RK. 2015. Marker-trait associations for sucrose and yield contributing traits in sugarcane (*Saccharum* spp. Hybrid). *Euphytica* 205: 185-201 (IF. 1.62; NAAS 7.62).
- Singh H, **Kumar S** and Singh BD. 2015. *In vitro* conservation of pointed gourd (*Trichosanthes dioica*) germplasm through slow-growth shoot cultures: Effect of flurprimidol and triiodobenzoic acid. *Scientia Horticulturae* 182: 41-46 (IF. 1.62; NAAS 7.62).
- Singh RK, Rai N, Lima JM, Singh M, Singh SN and **Kumar S**. 2015. Genetic and molecular characterization of *Tomato leaf curl virus* (ToLCV) resistance in tomato. *Journal of Horticultural Science and Biotechnology* 90(5): 503-510 (IF. 0.54; NAAS J243; 6.54).
- Rai GK, Rai NP, Rathaur S, **Kumar S** and Singh M. 2013. Over-expression of *rd29A::AtDREB1A/CBF3* in drought stress exposed tomato plants alleviates oxidative stress by regulating key enzymatic and non-enzymatic antioxidants. *Plant Physiol. Biochem.* 69: 90-100 (IF. 2.72, NAAS 8.72).
- Rai NP, Rai GK, **Kumar S**, Kumari N and Singh M. 2013. Shoot and fruit borer resistant transgenic eggplant (*Solanum melongena* L.) expressing *CryIAa3* gene: Development and bioassay. *Crop Protection* 53: 37-45 (IF. 1.83; NAAS 7.83).
- Kumar S**, Singh BD and Sinha DP. 2012. RAPD markers for identification of sex in pointed gourd (*Trichosanthes dioica* Roxb.). *Indian J. Biotechnol.* 11: 251-256 (NAAS 6.3).
- Rai GK, Rai NP, **Kumar S**, Yadav A, Rathaur S, Singh M. 2012. Effects of explant age, germination medium, pre-culture parameters, inoculation medium, pH, washing medium and selection regime on *Agrobacterium*-mediated transformation of tomato. *In Vitro Cellular Developmental Biology-Plant* 48(5): 565-578 (IF. 1.0; NAAS 7.0).

### Scientific reviews

Swapna M and **Kumar S.** (2017). MicroRNAs and their regulatory role in sugarcane. *Frontiers in Plant Science* 8: 1-7 (Article 997) (IF. 4.3; NAAS 10.3).

**Kumar S** and Singh BD. 2012. Pointed Gourd: Botany and Horticulture. *Horticultural Reviews* 39: 203-238.

### Books

BD Singh and **Sanjeev Kumar.** 2007. Molecular Biology, Genetic Engineering and Biophysics. Kalyani Publications, New Delhi, p. 275 (ISBN: 978-81-272-4128-5).

BK Prasad, BD Singh and **Sanjeev Kumar.** 2011. Objective Biotechnology. Kalyani Publications, New Delhi, p. 557 (ISBN: 978-81-272-6937-1).

Dibendu Dutta, **Sanjeev Kumar,** Major Singh and SP Das. 2010. Biotechnology in Crop Improvement: Concept and Manual. Kushal Publications and Distributors, Varanasi, p. 136 (ISBN: 978-81-860-9926-3).

HP Singh, Mathura Rai, Sudhakar Pandey and **Sanjeev Kumar.** 2009. Vegetable Varieties of India. Studium Press (India) Pvt. Ltd., New Delhi, p. 325 (ISBN: 978-81-907-5776-8).

## 5. Other relevant activities of the scientist :

### Awards:

- Recipient of “**Dwarika Nath Memorial Gold Medal-2008 for Best Ph.D. Thesis**” in the field of Vegetable Science awarded from Indian Society of Vegetable Science.
- Received “**SARC Gold Medal for outstanding contribution in the field of Vegetable Biotechnology**” awarded during 14-16 Sept. 2011 at *National Symposium on Advances in Biotechnology Research in Agri-horticultural Crops for Sustaining Productivity, Quality Improvement and Food Security*, SVBPUA&T, Meerut
- Recipient of “**Best Poster Presentation Award**” for the poster entitled “Drought tolerant transgenic tomato (*Solanum lycopersicum* L.) lines expressing rd29A: *AtDREB1A/CBF3* transcription factor: Development and physico-chemical analysis” presented in the National Symposium on Abiotic and Biotic Stress Management in Vegetable Crops, 12-14 April, 2013, IIVR, Varanasi.
- Recipient of “**Best Poster Presentation Award**” for the poster entitled “Association mapping for yield contributing traits in sugarcane” presented in the International Conclave on Sugar Crops, 15-17 Feb., 2014, IISR, Lucknow.

### Life member:

- Society for Plant Biochemistry and Biotechnology, NRCPB, New Delhi
- UP Academy of Agricultural Sciences, UPCAR, Lucknow
- Indian Society of Vegetable Science, IIVR, Varanasi
- Biotech Research Society of India, NIIST, Trivandrum

**Reviewer:** Scientia Horticulturae, Physiology and Molecular Biology of Plants