

Profile of Scientist



1. **Name of the Scientist:** Dr. Sangeeta Srivastava

2. **Personal Biodata:**

a) **Position/Designation:** Principal Scientist, Division of Crop Improvement

b) **Contact Details:**

- i. ICAR Email ID Sangeeta.Srivastava@icar.gov.in
- ii. Personal Email ID sangeeta_iisr@yahoo.co.in , sangeeta.iisr@gmail.com
- iii. Mobile No.: 9415001735

c) **Joining Date:**

- i. ICAR: 05th December, 1989
- ii. IISR: 10 November, 1990

d) **Discipline and Specialization:** Genetics and Cytogenetics

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

International:

- DBT-CREST Associate - Visiting Scientist in miRNA Laboratory at Oklahoma State University, Stillwater, USA as, **2013** for six months.
- Government of Federal Republic of Germany sponsored International Training Course on Development Oriented Biotechnology, conducted by INWENT at Zschortau near Leipzig, Germany in **2003** for two weeks.
- Government of Germany sponsored Biotechnology Refresher Course and 4th IAPTC at Dhaka University, Dhaka, Bangladesh, **2001** for 4 days.
- DSE Scholarship of Government of Germany for Advance Professional Training in Biotechnology at DSE, Zschortau and University of Hannover in Germany in **1997** for 4 months.

National:

- *National Workshop on Bioinformatics in Agriculture* at ICAR-NAARM, Hyderabad for 2 days, **2019**.
- *Implementation of E Office* at ICAR-IISR, Lucknow for 2 days, **2019**.
- *Competency Enhancement Programme for Effective Implementation of Training Functions by HRD Nodal Officers* of ICAR at ICAR-NAARM, Hyderabad for 3 days, **2017**.
- *18th Indo-US Flow Cytometry Workshop* on Flow Application in Plant Research at Biotech Park, Lucknow for 1 day, **2017**.
- *Workshop on Competency Development of Human Resource Development Nodal Officers of ICAR* at ICAR-NAARM, Hyderabad for 3 days, **2016**.
- *Next Generation Sequencing Workshop* at CSIR-CDRI, Lucknow for 4 days, **2015**.
- *Pre RMP- MDP on leadership development* at ICAR-NAARM, Hyderabad for 12 days, **2015**.

- Short Term Training on *Fish Genomic and Proteomic Data Analysis with High Throughput Computing* at ICAR-NBFGR, Lucknow, for one week, **2015**.
- Workshop on Application of RNAi in crop improvement, at NRCPB, New Delhi for 1 day, **2015**.
- DST, Govt. of India Sponsored Programme on *Project Management: Methodology & Evaluation for Women Scientists* at ASCI, Hyderabad for one week, **2012**.
- *Workshop cum Training on Computational Techniques in Discovery of Agronomically important Crop Genes* organized by the National Agricultural Bioinformatics Grid (NABG-NAIP) at NBPGR, New Delhi, **2012** for one week.
- *Biosafety Capacity Building Programme* at CSA, Hyderabad, **2011** for one week.
- *Database Management System & Internet Resources in Biotechnology* at Biotech Park, Lucknow, **2004** for 3 days.
- *Techniques in Plant Genetic Engineering and Molecular Breeding* by NATP–Team of Excellence for human resource development at NRCPB, New Delhi, **2003** for three weeks.
- *Molecular Markers: Tools for Genetic Variability analysis* at NBFGR, Lucknow, **2002** for two weeks.
- Training programme on *Vigilance Awareness* for 4 days at IISR, Lucknow from January 18 -21, **2002**
- *IPR and WTO Awareness training programme* at IISR, Lucknow for 3 days from September 5 to 7, **2001**.

f) Contribution to the scientific advancement:

- Developed an inventory of miRNA *vis-à-vis* target gene interactions for chickpea and sugarcane under various stress conditions especially red rot
- Developed molecular diagnostic tools to detect incipient infection of red rot and smut diseases of sugarcane, and for detection of sugarcane grassy shoot (SCGS) phytoplasma in host plant sugarcane and its transmitting insect vector. Also developed highly sensitive multiplex PCR assay for fungal and phytoplasma diseases
- Part of the team that developed CoLk 07201(*Ikshu-1*), an early maturing, high yielding and red rot resistant sugarcane variety identified for release in north western zone
- As a team, developed 25,190 EST libraries from different sugarcane tissues *viz.* root, stem, leaves and leaf whorls and 1069 EST libraries specific to red rot disease of sugarcane, which have been used to develop highly polymorphic EST-SSR markers for marker assisted selection especially for red rot.
- Developed >3000 efficient and new functional markers ‘Conserved intron scanning primer’ (CISP) in sugarcane for genotyping, genetic diversity, fingerprinting and gene identification studies.
- Developed 351 novel EST-SSR markers from two Indian sugarcane cultivars, which are highly polymorphic and cross-transferable to *Saccharum* complex, allied genera and cereals, thereby enriching the microsatellite marker resources in sugarcane, allied genera and other cereal crops.
- Developed a new molecular marker system *viz.* Single Strand Conformational polymorphism of SSR markers (SSCP-SSR) that has helped to enhance the polymorphism in the genotypes showing low molecular diversity by converting monomorphic primers into polymorphic ones and has been used successfully for genetic diversity analysis of *Saccharum* species and cultivar level germplasm and for genetic fidelity analysis of micro propagated plants in sugarcane.

- Developed new putative RGAs for red rot disease in sugarcane for candidate gene identification and polymorphism studies.
- Deciphered adaptability of sugarcane progeny clones with red rot tolerance and optimum sugar content, to sub-tropical conditions *vis-à-vis* chromosome variations in clonal population.
- A model concept of '*Decretion Factor*' has been developed to compare and quantify the effect of heavy metals on sugarcane in terms of changes in mitotic cell division *vis-à-vis* the mitotic index.
- A '*Numerical Aberration Factor*' has been suggested to ascertain the extent of somatic chromosome variation in mosaic genotypes of the genetically complex crop sugarcane.
- Deciphered genetic divergence, among various *Saccharum* species clones for economic attributes and, biochemical & molecular markers and, among different species accessions, land races and cultivars of *Beta* germplasm collection for high temperature tolerance to help broaden the genetic base of the two sugar crops
- Differentiated species genomes in sugarcane using FISH technique for the first time in India that has made possible to distinguish the chromosomes of wild species *Saccharum spontaneum* carrying the genes for abiotic and biotic stress tolerance.
- Established axioms of classical genome analysis in two sugar crops *i.e.* *Saccharum* and *Beta*, and two medicinal plants *viz.* *Hyoscyamus* and *Papaver*, through pattern of band associations and, significance of chiasmate association pattern to help predict the prospective fertility of the derived tetraploids at the level of diploid progenitor itself.
- Established evolutionary direction in chromosome change in terms of chromosome number (*i.e.* ploidy elevation) *in vivo* through nuclear DNA content variation, heterochromatic C-band pattern and rDNA gene family; and *in vitro* through ploidal *vis-à-vis* hormonal dependence of chromosome variations in callus cultures over a passage of time and culture.

3. Future Planning of research (in bullets):

- Small RNA transcriptome analysis of sugarcane

4. Publications (Since 2005)

Total Citations = >1200; h-Index = 19; i10-Index = 35

1. Singh P., Singh S.N., Tiwari A.K., Pathak S.K., Singh A.K., **Srivastava Sangeeta** and Mohan N. (2019) Integration of sugarcane production technologies for enhanced cane and sugar productivity targeting to increase farmers' income: strategies and prospects. **3Biotech** 9(48): DOI: 10.1007/s13205-019-1568-0
2. **Srivastava Sangeeta**, Gupta P. S., Lal S. and Sinha O.K. (2017) PCR-RFLP based identification of endophytic fungi of sugarcane (*Saccharum* spp. hybrid). **J. Env. Biol.** **38** (1): 21-26.
3. **Srivastava Sangeeta**, Pathak A. D., Kumar R. and Joshi B. B. (2017) Genetic diversity of sugar beet genotypes evaluated by microsatellites DNA markers. **J. Env. Biol.** **38** (5-6): 777-783.
4. Shrivastava A. K. and **Srivastava Sangeeta** (2016) Diversity of the germplasm of *Saccharum* species and related genera available for use in directed breeding programmes for sugarcane improvement. **Current Science** **111** (3): 475-482.

5. Pathak A. D., Arun K. Srivastava, A.K. Shrivastava, R. Kumar, R.K. Rai and **Sangeeta Srivastava** (2016) Adaptation behaviour of sugarcane varieties against high temperature stress in subtropical India. **Research in Environmental and Life Sciences**. 9(5): 521-525
6. **Srivastava Sangeeta**, Y. Zheng, H. Kudapa, G. Jagadeeswaran, V. Hivrale, R. Varshneya, R. Sunkar (2015) Highthroughput sequencing of small RNA component of leaves and inflorescence revealed conserved and novel miRNAs as well as phasiRNA loci in chickpea. **Plant Science** <http://dx.doi.org/10.1016/j.plantsci.2015.03.002>
7. Pathak A.D., Kapur R., Solomon S., Kumar R., **Srivastava S.** and Singh P.R. (2014). Sugar beet: A historical perspective in Indian context. **Sugar Tech** 16(2): 125–132.
8. Singh, R.K., Jena, S.N., Khan, M.S., Yadav, S., Banarjee, N., Raghuvanshi, S., Bhardwaj, V., Dattamajuder, S.K., Kapur, R., Solomon, S., Swapna, M., **Srivastava Sangeeta**, Tyagi, A.K. (2013) Development, cross-species/genera transferability of novel EST-SSR markers and their utility in revealing population structure and genetic diversity in sugarcane. **Gene** 524: 309–329
9. Jain, R. and **Srivastava Sangeeta** (2012). Nutrient composition of spent wash and its impact on sugarcane growth and biochemical attributes. **Physiology and Molecular Biology of Plants**, 18: 95-99.
10. **Srivastava S.**, Pathak A.D., Gupta P.S., Shrivastava A.K. and Srivastava A.K. (2012) H₂O₂-scavenging enzymes impart tolerance to high temperature induced oxidative stress in sugarcane **J. Environ. Biol.** 34: 657-661
11. Khan, M. S., Yadav S., **Srivastava S.**, Swapna M., Chandra A. and Singh R K. (2011) Development and Utilization of CISP Marker in sugarcane. **Australian Journal of Botany** 59: 38-45.
12. **Srivastava S.**, Singh V. and Gupta P.S. (2011) Ribosomal DNA sequence based characterization of *Trichoderma* strains antagonistic to *Colletotrichum falcatum* causing red rot disease of sugarcane. **Sugar Tech**: 13(3):245–249.
13. **Srivastava S.**, Gupta P.S., Singh P.K., Singh J. and Jain R. (2011) Genetic diversity analysis of *Saccharum spontaneum* germplasm using SSR-SSCP and RAPD markers. **Ind. J. Agric. Sci.** 81 (10): 914–20.
14. **Srivastava S.**, Pathak A.D. and Gupta P.S. (2011) Molecular Characterization Based on RAPD Markers of High and Low Sugar Intergeneric Hybrids of *Saccharum* and *Erianthus*. **Tropical Agr. (Trinid.)** 88(4): 186-192.
15. **Srivastava S.** and Jain R. (2011) *In-Situ* Monitoring of Chromium Cytotoxicity in Sugarcane. **J. Environ. Biol.** 32: 759-763.
16. Singh, R. K. , Khan M. S., Yadav S., Singh M. R., Madhok H. L., **Srivastava S.** and Singh J. (2011) *Agrobacterium*-mediated genetic transformation of subtropical sugarcane variety with *CryIAb* gene. **Nat. Acad. Sci. Lett.**, 34 (3&4): 103-111.
17. Gupta V., Raghuvanshi S., Gupta A. , Saini N., Gaur A. , Khan M. S., Gupta R. S., Singh J., Duttamajumder S. K., **Srivastava Sangeeta**, Suman A., Khurana J. P., Kapur R. and Tyagi A. K. (2010) The water-deficit stress- and red-rot-related genes in sugarcane. **Functional Integrative Genomics** 10 (2): 207-214.
18. **Srivastava Sangeeta** and Jain R. (2010) Effect of distillery spent wash on cytomorphological behaviour of sugarcane seedlings. **J. Environ. Biol.** 31: 809-812.
19. Jain R., **Srivastava Sangeeta**, Shrivastava A.K., Solomon S. and Chandra A. (2010) Impact of excess zinc on growth parameters, cell division, nutrient accumulation, photosynthetic pigments and oxidative stress of sugarcane (*Saccharum* spp.). **Acta Physiol. Plantarum** 32: 979-986.
20. Gupta P.S., **Srivastava Sangeeta**, M.K. Srivastava and Abhilash Gupta (2010) Genetic diversity and fingerprinting of flax cultivars of India using RAPD-PCR markers. **Guangxi Agricultural Sciences** 41: 201-206.

21. Srivastava H.M. and **Srivastava Sangeeta** (2009) *Beta* genetic resource activities in India (1999-2005) – a review. In: Frase L., Maggioni L. and Lipman E. (eds.) Report of a working group on *Beta* and the World *Beta* network. Third joint meeting, 8-11 March 2006, Puerto de la Cruz, Tenerife, Spain. Bioversity International, Rome, Italy. Pp. 94-103.
22. Jain R., **Srivastava Sangeeta** and A.K. Shrivastava (2009) Changes in growth, cell division and metabolism of sugarcane in response to nickel. **Trop. Agric.** (Trinidad) 86: (4) 128-133.
23. **Srivastava Sangeeta** and Gupta P.S. (2008) Inter simple sequence repeat profile as a genetic marker system in sugarcane. **SugarTech** 10: 48-52.
24. Rao G.P., **Srivastava Sangeeta**, Gupta P.S., Sharma S. R., Singh A., Singh S., Singh M. and Marcone C. (2008) Detection of sugarcane grassy shoot phytoplasma-infecting sugarcane in India and its phylogenetic relationship to closely related phytoplasmas. **SugarTech** 10: 74-80.
25. Yadav R.L., Singh V., Srivastava S.N., Lal R.J., **Srivastava Sangeeta**, Awasthi S.K. and Joshi B.B. (2008) Use of *Trichoderma harzianum* for the management of red rot disease of sugarcane. Sugarcane International now merged with **International Sugar Journal (U.K.)** 26(4): 28-33.
26. Jain R., Shrivastava A.K, Solomon S. and **Srivastava Sangeeta** (2008) Influence of excess copper on sugarcane metabolism and nutrient composition. **Indian J. Plant Physiol.** 13: 84-87.
27. **Srivastava Sangeeta**, Gupta P.S., Saxena V.K. and Srivastava H. M. (2007) Genetic diversity analysis in sugar beet (*Beta vulgaris* L.) using isozymes, RAPD and ISSR markers. **Cytologia** 72 (3): 265-274.
28. Rao G.P., **Srivastava Sangeeta**, Singh M. and Marcone C. (2007) Phylogenetic relationships of sugarcane grassy shoot phytoplasma with closely related agents. **Bulletin of Insectology** 60 (2): 347-348.
29. Jain R., Singh J., **Srivastava Sangeeta** and Shrivastava A.K. (2007) Changes in photosynthetic pigments, lipid peroxidation, proline and activity of antioxidant enzymes of sugarcane in response to low temperature stress. **Trop. Agric.** (Trinidad) 84: 111-116
30. **Srivastava Sangeeta**, Singh V., Gupta P.S., Sinha O.K. and Baitha A. (2006) Nested-PCR assay for detection of sugarcane grassy shoot phytoplasma in the leafhopper vector *Deltocephalus vulgaris* Dash & Viraktamath: a first report. **Plant Pathology** (U.K.) 55: 25-28.
31. **Srivastava Sangeeta** and Gupta P.S. (2006) Assessment of small-scale methods for quick extraction of genomic DNA from leaf tissue of sugarcane. **Cytologia (Japan)** 71: 181-188.
32. **Srivastava Sangeeta**, Jain R., Gupta P.S. and Singh Jyotsna (2006) Genetic stability of *in vitro* raised sugarcane plantlets by RAPD markers. **Plant Cell Biotechnol. and Mol. Biology** 7(1&2): 93-96.
33. **Srivastava Sangeeta** and Gupta P.S. (2006) Genetic relationship of sugarcane genotypes used as parents in breeding programmes. **Nucleus** 49 (3): 155-163.
34. Jain R. and **Srivastava Sangeeta** (2006) Effect of cadmium on growth, mineral composition and enzyme activity of sugarcane. **Indian J. of Plant Physiology** 11 (3 N.S.): 306-309.
35. **Srivastava Sangeeta**, Gupta P.S. and B.L. Srivastava (2005). Genetic Relationship and clustering of some sugarcane genotypes based on Esterase, Peroxidase and Amylase Isozyme polymorphism. **Cytologia (Japan)** 70: 355–363.
36. **Srivastava Sangeeta**, Jain R., Gupta P.S. and Singh J. (2005) Analysis of genetic fidelity in micro propagated plants of sugarcane using SSR-SSCP assay. **Ind. J. Genetics** 65: 327-328.
37. **Srivastava Sangeeta**, Gupta P.S. and B.L. Srivastava (2005). Molecular genetic diversity of sugarcane genotypes of subtropical India: SSCP-PCR analysis of simple sequence repeats. **Proc. ISSCT** 25: 602-606
38. Jain R., **Srivastava Sangeeta**, Singh J. and Gupta P.S. (2005) Assessment of genetic purity of micropropagated plants of sugarcane by isozyme and RAPD analysis. **Sugar Tech** 7 (2&3): 15-19.

39. Singh V., Baitha A. and **Srivastava Sangeeta** (2005) Young and fast growing plants as better feeding material for *Deltocephalus vulgaris*, a leafhopper vector of sugarcane grassy shoot phytoplasma. **Sugar Tech** 7 (2&3): 87-88.

5. Other relevant activities of Scientist:

Awards/ Honours:

- **ICAR Young Scientist Award** for biennium 1997-98 in Crop Improvement, 1999.
- **ISCA Platinum Jubilee Lecture Award** in Plant Sciences Section, 100th Science Congress, 2013.
- **DBT-CREST Award** of the Department of Biotechnology, Govt. of India, 2012.
- **Distinguished Agriculture Scientist award 2019** (Crop Improvement) by UPAAS (Uttar Pradesh Academy of Agricultural Sciences), 2020.
- **IISR Team Research Award**- 2019.
- **NABS-Best Woman Scientist Award** of National Academy of Biological Sciences, 2015.
- **Professor UmaKant Sinha Memorial Lecture Award** of Indian Botanical Society, 2014
- **SAB Award of Excellence** in Plant Genomics of Society for Applied Biotechnology, 2014.
- **Woman Botanist Award and Gold Medal** by the Indian Botanical Society, 2011.
- **Professor Y. S. Murty Award and Gold Medal** of Indian Botanical Society, 2003.
- **SAAR Distinguished Scientist Award**- Crop Sciences 2019 by Society for Agriculture & Allied Research.
- **Outstanding Scientist Award** – 2019 by Society of Tropical Agriculture.
- **Distinguished Scientist Award** in the field of Genetics by Society for Scientific Development in Agriculture & Technology, 2018.
- **LifeTime Achievement Award** in Agricultural Biotechnology by ENR Foundation, 2018.
- **Certificate of Recognition** at the *4th World Congress of Biotechnology*, Raleigh, NC, USA, 2013.
- **Member, National Academy of Sciences (MNASc)** since 2015.
- **Member, Board of Studies** (Bioinformatics) at GKRG P.G. College, Gwalior, 2016-17.
- **Member, ICAR Delegation** to the *3rd Crop Science Congress*, Hamburg, Germany, 2000.
- **Member, Research Board of Advisors**, *The American Biographical Institute*, NC, USA, 2000.
- **Member, International Board of Editors** of *SugarTech* Journal (Springer Verlag), 2007-2017.
- **Editorial board member** of *Plant Cell Biotechnology and Molecular Biology* (NAAS indexed), 2006-2009.
- **Course Director** of ICAR sponsored 21 days' Winter School from Sept. 09 to 29, 2014.
- **Best Poster Award** in the Symposium on Bioenergy - at SBI, Coimbatore, 2014
- **First Prize for best paper** presentation by the Indian Phytopathological Society, 2003.
- **Certificate of Merit & Cash Prize** for best paper by Indian Botanical Society, 1990.
- **CSIR NET** in Life Sciences in 1985.
- **UGC NET** in Life Sciences in 1985.

Fellowships:

- **Fellow, UPAAS** (Uttar Pradesh Academy of Agricultural Sciences) in Crop Sciences, 2015.
- **Fellow, NABS** (National Academy of Biological Sciences), 2015.
- **Fellow, SSRP** (Society for Sugar Research and Promotion), 2014.
- **Fellow, SAB** (Society for Applied Biotechnology), 2014.
- **Fellow, ISGPB** (Indian Society of Genetics and Plant Breeding), 2012.
- **Fellow, Indian Botanical Society** (FBS), 2010.

7. Other relevant activities of Scientist

- **Chief Editor-** Indian Journal of Sugarcane Technology (Indexed in NAAS and UGC approved)
- **Nodal Officer- EFC/SFC** of Commercial Crops
- **Nodal Officer- HRD**
- **Member, Institute Management Committee** (IMC), IISR, Lucknow (2019-2022 and 2009-2012)
- **Chairperson- Human Resource Development Committee** of IISR, Lucknow
- **Chairperson- EFC Plan Committee** of IISR, Lucknow (2020-2025 and 2017-2020)
- **Presiding Officer- ICC** (Internal Complaint Committee) of IISR, Lucknow
- **Internal Expert - IBSC** (Institutional Bio-safety Committee) of IISR, Lucknow
- **Co-guide** of Ph.D. and M.Sc. thesis
- **Project/Dissertation supervisor** of U.G./P.G. students
- **External examiner & paper-setter** for Ph.D., M.Sc., B.Sc. and B. Tech. examinations of various universities
- **Editorial Board member** of Journal of Environmental Biology (Indexed in NAAS)
- **Editorial board member** of Indian Journal of Fundamental and Applied Life Sciences.
- **Advisory Board member** – Agrica Journal (Indexed in NAAS)
- **Reviewer** of research papers for National/ International journals of repute
- **Life member** of ASTI, IBS, ISCA, ISGPB, IMS, NABS, PMB&B, SAB, SSRP, SSRD, UPAAS and Crop Improvement Society of India
- **Member** of IAPSIT and NASI

Post-doctoral Fellowship/ Scholarships abroad:

- **DBT-CREST Fellowship** for USA by the Department of Biotechnology, Govt. of India in 2012.
- **DSE** (*Deutsche Stiftung fur Internationale Entwicklung*) Scholarship, Govt. of Germany for long term advance training in Biotechnology in Germany, 1997.