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Academic qualifications

Ph.D. Biochemistry, 3.70/4.00, University Merit & CSIR JR and SR Fellowships. (1985-90)

M.Sc. Biochemistry, 3.87/4.00, National and University Merit Scholarships (1977-79)

B.Sc. Biological Sciences, 73.2%, placed in University merit list and awarded silver medal. (1977).

Field of Research

Microbial Biochemistry, Enzymology, Plant biochemistry and Molecular Biology

Awards and Honors:

1984 Rafi Ahmed Kidwai Memorial Award

1986-89 CSIR Junior and Senior Research Fellowship.

1985 Haryana Agricultural University Merit Fellowship.

1996-97 Post-doctoral Commonwealth Fellowship, U.K.

2008 Sirohi Award for the best paper.

Research highlights

- Evaluation of guar for quality characters *viz.* protein, gum, lipid composition, mineral elements and anti-nutritional factors. The study helped breeders to release guar varieties with improved quality traits.
- The wheat germplasm was evaluated for various quality characters *viz.* protein, essential amino acids, gluten content, carbohydrate and starch.

its strength and its strength and extensibility

- Wheat gluten proteins and genes of for strength and extensibility have been characterized,
- Legume-*Rhizobium* symbioses have been studied extensively with special emphasis on the effect of *nod* regulators on initiation of nodulation and nodule efficiency. The role of flavonoids in nodule initiation and nodule functioning was established. The flavonoids not only regulate nodulation but enhance growth and metabolism of rhizobia. Naringenin, a *nod* regulator also enhanced intercellular colonization of wheat root by *Azorhizobium caulinodans*.
- Biochemical and molecular studies on abiotic and biotic stresses have been carried out in various crop plants. Role of proline accumulation and its biosynthesis in water and salt stress tolerance in *Brassica* has been established. Stress induced generation of reactive oxygen species (ROS) and their metabolism in roots and leaves of wheat, rice and *Brassica*, *Pennisetum* indicated the involvement of antioxidant system in stress tolerance. The studies on inorganic metabolism established that water stress affected loss of NR activity involved different mechanisms depending upon the rapidity, intensity and duration of stress. However, the loss at the incipient of stress is largely due

to redox mediated inactivation of the enzyme. The flood-tolerance has been related to metabolic adaptability to sustain higher fermentative respiration in sorghum.

- Protein biosynthesis using S³⁵ labeling and autoradiography indicated the presence of stress related protein in *Brassica*.
- Isolated, purified and immobilized microbial enzymes having applications in fruit and food processing industries.

Research Projects

- Role of plant flavonoids on legume- rhizobia sybiosis funded by ICAR
- “Production and immobilization of microbial enzymes for fruit processing industry” funded by Haryana State Council of Science and Technology, Chandigarh
- Metabolic and molecular aspects of biotic and abiotic stress in plant in relation to resistance/tolerance’ (State Non Plan project)
- Immobilization of biocatalysts for food processing industr State funded project in 11th five year plan.

List of publication of Dr. (Mrs) Veena Jain since 1990

1. Mondal Koushik, Malhotra Sarla P., **Jain Veena** and Singh Randhir (2009). Partial purification and characterization of pectinmethylesterase from ripening guava (*Psidium guajava* L.) fruits. *Acta Physiol. Plant.* 31: 81-87.
2. **Jain Veena and Jain Sunita** (2008). Sodicity induced changes in lipid peroxidation in *Brassica juncea* (L.) cultivars differing in stress tolerance. *International J Agriculture, Environment and Biotechnology*, 1&2: 7-8
3. **Jain Veena** and Dhawan K (2008). Major cell wall degrading enzymes in two contrasting cultivars of *Brassica juncea* infected with *Alternaria Brassicae*. *Cruciferae Newsletter* 27:20-21.
4. Phutela A, Dhawan K, **Jain Veena** and Nainawatee HS (2007). Drought related changes in protein biosynthesis of leaf in *Brassica juncea* cultivars. *Cruciferae Newsletter* 26: 45-46.
5. Yadav Satish, Jain Sunita, **Jain Veena** and Jain R K (2007). Genetic analysis of CMS, restorer and open pollinated genotypes of Indian pearl millet (*Pennisetum glaucum* (L) R. Br.) using ISSR Markers *Indian J. Biotechnol.* 6: 340-348.
6. **Jain Veena**, Singla Naveen, Jain Sunita and Sawhney S.K. (2007). Nitrogen metabolism in the leaves of *Pennisetum glaucum* (L) as affected by water stress. *Indian J. Plant Physiol.* 12: 101-107.
7. **Jain Veena** and Jain Sunita (2007). Effect of flooding and nitrate on enzymes of nitrate assimilation in sorghum (*Sorghum bicolor* L.) cultivars. 33: 157-160.

8. Ram S, Bhatia Vinamrata, **Jain Veena** and Mishra B (2006). Characterizations of low molecular weight glutenin subunit gene representing Glu-B3 locus of Indian wheat variety NP-4. *J. Plant Biochem. Biotechnol.* 15:79-85..
9. Singh Akhlesh, **Jain Veena** and Sawhney SK (2006) Reactivation of nitrate reductase by potassium ferricyanide in water-stressed seedlings of wheat and *Pennisetum glaucum* (L) depends on intensity of stress. *Physiol and Mol Biol. Plants* 12 (2): 139-143.
10. Mukesh, Jain Sunita and **Jain Veena** (2006) Effect of NaCl stress on osmotic adjustment, ionic homeostasis and yield attributes in salt sensitive and salt tolerant cultivars of *Brassica juncea* L. *Physiol and Molecular Biol. Plant* 12: 75-79.
11. **Jain Veena** (2006). Effect of lead on protein mobilization in chickpea seeds during germination. *Ecol Env and Conservation* 12: 57-61.
12. Gupta K, **Jain Veena** and Shelly Bhardwaj (2005). Effect of Cr(VI) on growth and lipid components in developing seeds of *Brassica juncea* L. *Indian Journal of Plant Physiol.* 10(3): 241-247.
13. Gupta K, **Jain Veena**, Solanki IS and Tulika (2005). Effect of aqueous extracts of root and stubble of oat (*Avena sativa*) on seedling growth and protein utilization in mungbean (*Vigna radiata* L.) *Allelopathy Journal* 16(2) 279-288.
14. **Jain Veena** and Gupta Kaushalya (2005). Interactive effect of phosphorus and irrigation on biochemical constituents of fenugreek (*Trigonella foenum*). *Ecol Env and Conservation* 11: 157-160.
15. **Jain Veena** and Gupta Kaushalya (2004). Food and Nutritional analysis. *Encyclopadia of Analytical Sciences* 2nd edition, Elsevier publications, UK. 202-211.
16. Phutela Archana, **Jain Veena**, Dhawan Kamal and Nainawatee HS (2004). Water stress related changes in proteins in leaves of *B. juncea* cultivars differing in drought tolerance. *Cruciferae Newsletter* 25:51-52.
17. Singla N, **Jain Veena**, Jain S and Sawhney SK (2004). An activity of glycolytic enzymes in leaves and roots of contrasting cultivars of sorghum during flooding. *Biologia Plantarum* 47 (4): 555-560.
18. Phutela A, **Jain Veena**, Dhawan K and Nainawatee HS (2003). Proline metabolism and growth of *Brassica juncea* seedlings under water deficit stress *J Agricultural Biochemistry.* 16: 29-32 .
19. **Jain Veena** and Gupta Kaushalya (2003). The flavonoid naringenin enhances intercellular colonization of rice roots by *Azorhizobium caulinodans*. *Biol and Fertl Soils* 38:119-123
20. Gupta K, **Jain Veena**, Kumar N and Deep Vikas (2003). Cadmium sensitivity to different genotypes of wheat. *Ecol Env and Conservation* 9:181-185.
21. Gupta K, **Jain Veena**, Jain S, Dhawan K and Talwar G (2003). Food Analysis. *Encyclopedia of Food Science and Nutrition*, Academic Press. Pp 206-215.
22. Gupta K, Talwar G, **Jain Veena**, Dhawan K and Jain S (2003). Salad Crops (Root Crops). *Encyclopedia of Food Science and Nutrition*, Academic Press. Pp 5060-5073.

23. **Jain Veena**, Sheoran IS and Nainawatee HS (2002). Effect of rhizospheric application of naringenin and nitrate on enzymes of ammonia assimilation and carbohydrate metabolism in pea (*Pisum sativum* L.)- *Rhizobium leguminosarum* biovar *viciae* symbiosis. **J. Plant Biol.** 29: 265-270.
24. **Jain Veena** and Nainawatee HS (2002). Flavonoids: Signals to legume nodulation and soil microorganisms. **J. Plant Biochem. Biotechnol.** 11: 1-10
25. Phutela Archana, **Jain Veena**, Dhawan Kamal and Nainawatee HS (2002). Water stress induced changes in growth characteristics and proline content in seedlings of *B. juncea* cultivars differing in drought tolerance. **Cruciferae Newsletter** 24: 49-50.
26. Jain S, Pruthi V, Jain Veena, and Chawla HKL (2002). Changes in phenylalanine ammonia lyase, tyrosine ammonia lyase and lipoxygenase activities in the leaves *Brassica juncea* L. infected with *Albugo candida*. **Plant Physiol. Mol. Biol.** 8: 261-266.
27. **Jain Veena** and Nainawatee HS (2000). Cobalt reduces nitrate inhibition of nodulation in mungbean (*Vigna radiata*). **Biol Fert Soils** 31: 522-524.
28. Phutela Archana, **Jain Veena**, Dhawan Kamal and Nainawatee HS (2000). Proline metabolism under water stress in the leaves and roots of *Brassica juncea* cultivars differing in drought tolerance. **J. Plant Biochem. Biotechnol.** 9:35-39.
29. **Jain Veena** and Nainawatee HS (1999). Flavonoids influence growth and metabolism of *Rhizobium meliloti*. **Folia Microbiol.** 44: 311-316.
30. **Jain Veena** and Nainawatee HS (1999). Naringenin application alters functions and metabolism of pea nodules. **Indian J. Exptl. Biol.** 37: 995-1000.
31. Webster G, **Jain V**, Davey MR, Gough C, Vasse J, Denarie J and Cocking EC (1998). The flavonoid naringenin stimulates the intercellular colonization of wheat roots by *Azorhizobium caulinodans*. **Plant Cell Environment** 21: 373-383.
32. Ahlawat A, **Jain V** and Nainawatee HS (1998). Effect of low temperature and rhizospheric application of naringenin on pea - *Rhizobium leguminosarum* symbiosis. **J. Plant Biochem. Biotechnol.** 7: 35-38.
33. Jain Sunita and **Jain Veena** (1998). Nodulation in Cereals. A New Outlook. **Indian J. Exptl. Biol.** 36: 1065-1068.
34. O'Callaghan, K, **Jain V**, Davey, M and Cocking EC (1998). Flavonoids enhancement of sorghum root development. Proceedings of 16th North American Conference on Symbiotic Nitrogen Fixation held at Mexico from Feb 1-6, 1998.
35. Bandyopadhyay AK, **Jain Veena** and Nainawatee HS (1996). Nitrate alters the flavonoid profile and nodulation in pea (*Pisum sativum* L.). **Biol. Fertl. Soils** 21: 189-192.
36. Maheshwari A, **Jain V**, Nainawatee HS and Singh R (1995). Effect of rhizospheric application of syringaldehyde and nitrate on enzymes of ammonia assimilation and ureide biogenesis in Bradyrhizobium-mungbean symbiosis. **Indian J. Exptl. Biol.** 33: 972-976.

37. Jain Veena, Garg N and Nainawatee HS (1993). Effect of nitrate on Bradyrhizobium -mungbean (*Vigna radiata*) symbiosis in presence of syringaldehyde. **J. Plant Biochem. Biotechnol.** 2: 25-27.
38. **Jain V**, Garg N and Nainawatee HS (1992). Effect of nod regulators on the ammonia assimilation enzymes of *Rhizobium* sp. *Vigna* and *Rhizobium meliloti*. **Natl. Acad. Sci. Letter** 15: 345-349.
39. **Jain V**, Garg N and Nainawatee HS (1992). Influence of flavonoids on nodulation and carbon partitioning in pea -*Rhizobium* symbiosis. **J. Plant Biochem. Biotechnol.** 1: 23-26.
40. **Jain Veena**, Garg N and Nainawatee HS (1991). Production of Tsr factor by *Rhizobium meliloti*. **Folia Microbiol.** 36: 164-168.
41. **Jain Veena**, Garg N and Nainawatee HS (1991). Effect of nod regulator on growth and carbohydrate metabolism and acetylene reduction activity of *Rhizobium* sp. *Vigna*. **Natl. Acad. Sci. Letter** 14: 121-124.
42. **Jain V**, Garg N and Nainawatee HS (1991). Influence of rhizosphere application of syringaldehyde on rhizobia-mungbean (*Vigna radiata*) symbiosis. **Biochem. Physiol Pflanzen.** 187: 331-336.
43. **Jain V**, Garg N and Nainawatee HS (1990). Naringenin enhanced efficiency of *Rhizobium meliloti* - alfalfa symbiosis. **World J. Microbiol. Biotechnol.** 6: 434-436.

Practical Manuals

44. Malhotra S, **Jain Veena**, Single HR, Jain S, Saharan MR and Singh DS (2006). Practical Manual on Experiments in Biochemistry.
45. **Jain Veena**, Malhotra S and Saharan MR (2006) A Practical Manual in Biochemistry for Home Science Undergraduates.

Book Chapters

46. **Jain Veena** and Dhawan Kamal (2007). Estimation of nucleic acids. in: Research Methods in Plant Sciences : Allelopathy Vol 5 *Plant Physiology* (Ed Narwal SS, Politycka B and Goswami C.L). Scientific Publishers (India), Jodhpur. Pp 205-210.
47. Nainawatee H.S., **Jain V** and Singh R (1997). Current status of biological nitrogen fixation: Microbiology, Biochemistry & Molecular Biology. In: **Biotechnological Approaches in Soil Microorganisms for Sustainable Production**. (Eds. Dadarwal KR & Sindhu SS.), Scientific Publishers Jodhpur. Pp1-38. **Biol.** 33: 972-976.
48. Nainawatee HS and **Jain Veena** (1995). Plant recombinant DNA technology. In: **Current Advances in Plant Breeding**. (Eds. Kapoor RL & Saini ML) CBS Publishers and Distributors, New Delhi p 324-331.
49. **Jain Veena** and Nainawatee HS (1994). Structure, function and regulation of nod genes. In: **Biology and Application of Nitrogen Fixing Organisms**. (Eds. Prasad AB & Vaishampayan A) p173-188. Scientific Publishers, Jodhpur, India.