



## **Dr. D. L. N. Rao**

Emeritus Scientist

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Dr. D.L.N. Rao graduated from the University of Delhi in 1973 and took his M.Sc and Ph.D degrees in Microbiology in 1975 and 1979 from the Indian Agricultural Research Institute, New Delhi. He joined the Agricultural Research Service in 1978 at the Central Soil Salinity Research Institute, Karnal and worked as Scientist and Senior scientist until 1998. He was a Commonwealth Post-doctoral Fellow in Microbial Ecology at the University of Kent at Canterbury, U.K. during 1986-87. During 1995-1996 he was a DFID Visiting Research Fellow at Wye College, University of London and University of Sussex, U.K. In 1998 he moved to the Indian Institute of Soil Science, Bhopal and worked as Project Coordinator of the All India Coordinated Research Project on Biological Nitrogen Fixation (1998-2004) and All India Network Project on Soil Biodiversity-Biofertilizers (2004-2016). He officiated as Director, IISS, Bhopal during 2003 and as Head, Division of Soil Biology, IISS, Bhopal during 2005-06. After superannuation he is working as Emeritus Scientist (1917-) on soil organic matter formation and improvement of soil health by novel microbial inoculants and Consortium Leader of Indo-UK Nitrogen Fixation Centre (IUNFC). Dr. Rao has made original and well recognized contributions in the area of organic matter and nitrogen transformations in salt affected soils, blue green algae influence on soil ecology and biochemistry, symbiotic nitrogen fixation in annual and perennial legumes, plant growth promoting rhizobacteria, genetic diversity of soybean rhizobia and soil genomics for soil health assessment. He has been guiding and executing researches at 20 centres all over India on various aspects of Biological Nitrogen Fixation, Biofertilizers and Soil Biology. His research projects have been funded by ICAR, DBT, ACIAR, DFID and ACU. Dr. Rao has travelled extensively and lectured worldwide and in addition to his research interests, he takes keen interest in the History and Philosophy of Science, and Science Policy.

**Research Areas:** Biological Nitrogen Fixation, Soil Microbiology, Microbial Diversity, Biofertilizers.

**Number of Publications** 150; Total citations 1511 ; h index 18  
<http://scholar.google.co.in/citations?hl=en&user=rq3m0YQAAAAJ>

### **Honors and Awards**

- 12<sup>th</sup> Internl. Cong. of Soil Science Commemoration award and Gold medal, Indian Society of Soil Science, New Delhi, 2000
- Silver Jubilee Excellence Award, Biofertilizer Research, Gold medal, FAI, New Delhi, 2002
- Fellow, Indian Society of Soil Science, New Delhi, 2003

- Fellow, National Academy of Agricultural Sciences, New Delhi, 2004
- Dr. R. V. Tamhane Indian Society of Soil Science, New Delhi Memorial lecture Award, 2007
- Editor, Journal of the Indian Society of Soil Science, 1998-2006
- Editor, Indian Journal of Microbiology, 2006.-2011
- Active reviewer of several national journals and international journals; scientific organizations.
- Vice President, Indian Soc. Agric. Resource Management, Coimbatore, 2003-04
- Invited Speaker at many national and international symposia on Soil Biology, BNF, Biofertilizers, INM. Also chaired several scientific sessions: 1989-onwards
- Organizing Secretary, 6<sup>th</sup> Agricultural Science Congress NAAS, Bhopal, 2003.
- Member, Bureau of Indian Standards (Soil Quality) 1996-continuing
- Member, DBT National Facility for *Rhizobium* germplasm collections, IARI, Delhi, 1994-96.
- Member, ICAR Task Force on Organic Farming, 2005.
- Advisor, Deptt. of Biotechnology, Barkatuallah University, Bhopal, 2005.
- Advisor, UGC Program, Deptt. of Microbiology, Barkatuallah University, Bhopal, 2002-03
- Member, Research Advisory Committee, National Bureau of Agriculturally Important Microorganisms, Mau (2011-14, 2014-)
- Member-Secretary, Research Advisory Committee, IISS, Bhopal, 2005-07
- Member, Institute Management Committee, Indian Institute of Soil Science, Bhopal: 2005-08, 2015-
- Member, Institute Management Committee, NRC on Weed Sciences, Jabalpur, 2001-07.
- Member, Institute Management Committee: Indian Institute of Pulses Research, Kanpur, 2006-09
- Member, Institute Management Committee, NBAIM, Mau, 2007-10
- Member, Institute Management Committee, NRC on Seed Spices, Ajmer, 2008-11
- Member-Secretary, Quinquennial Review Team, IISS, Bhopal, 2012
- Member, Rajasthan Soil Health Task Force, 2012.
- Consortium Leader India-UK Nitrogen Fixation Centre (Newton-Bhabha Fund) 2016-present
- Member-Secretary, Quinquennial Review Team, National Bureau of Agriculturally Important Microorganisms, Mau (2017-18)

## Recent Publications

- 1) Rawat, A.K., Rao, D.L.N., Sahu, R.K. (2013) Effect of soybean inoculation with *Bradyrhizobium* and wheat inoculation with *Azotobacter* on their productivity and N turnover in a Vertisol. **Archives of Agronomy and Soil Science** 59: 1559-1571
- 2) Ansari, P. G., and Rao, D. L. N. (2014) Soybean Rhizobia in Indian Soils: Populations, Host Specificity and Competitiveness. **Proceedings of the National Academy of Sciences, India Section B: Biological Sciences** 84: 457-464.
- 3) Ansari, P. G. and Rao, D. L. N. (2014) Differentiating Indigenous Soybean *Bradyrhizobium* and *Rhizobium* spp. of Indian Soils. **Indian Journal of Microbiology** 54: 190-195.
- 4) Ansari, P. G., Rao, D. L. N., Pal, K.K. (2014) Diversity and Phylogeny of Soybean Rhizobia in Central India **Annals of Microbiology** 64: 1553-1565.
- 5) Radha T.K., and Rao, D.L.N. (2014) Plant Growth Promoting Bacteria from Cow Dung based Biodynamic Preparations. **Indian Journal of Microbiology** 54: 413-418.

- 6) Aparna K., Rao, DLN and Manna MC. (2014) Microbial Inoculation of Chickpea (*Cicer arietinum* L.) Enhances Rhizosphere Effects on Soil Biological Quality. **Agrochimica** 58: 114-125.
- 7) Aparna, K., M.A.Pasha, D.L.N. Rao, P.U.Krishnaraj (2014) Organic Amendments as Ecosystem Engineers: Microbial, Biochemical and Genomic Evidence of Soil Health Improvement in a Tropical Arid Zone Field Site. **Ecological Engineering** 71, 268-277.
- 8) Kumar R., Dwivedi V., Nayyar N., Verma H., Singh AK., Rani P., Rao DLN. and Rup Lal (2014) *Parapedobacter indicus* sp. nov., isolated from Hexachlorocyclohexane (HCH) contaminated soil. **International Journal of Systematic and Evolutionary Microbiology** (2014), 64, 000–000 DOI 10.1099/ij.s.0.069104-0
- 9) Malhotra J., Aparna K., Dua A., Sangwan N., Trimurtulu N., Rao, DLN and Rup Lal (2015) Microbial and Genetic Ecology of Tropical Vertisols Under Intensive Chemical Farming. **Environmental Monitoring and Assessment** 187: DOI: 10.1007/s10661-014- 4081-2
- 10) Sahu RK, Rawat AK. and Rao D.L.N. (2015) Traditional rainwater management system ('Haveli') in Vertisols of central India improves carbon sequestration and biological soil fertility. **Agriculture, Ecosystems and Environment** 200: 94-101.
- 11) Aparna K., Rao, DLN and Balachandar D (2016) Microbial Populations, Activity and Gene Abundance in Tropical Vertisols under Intensive Chemical Farming. **Pedosphere** 26: 725–732.
- 12) Aparna K. and Rao, DLN (2016) Split-Agar Assay of Antifungal Soil Microbial Metabolites. **Biocatalysis and Agricultural Biotechnology** 6: 184-188.
- 13) Kumar V, Rawat, AK and Rao DLN (2017) Population Ecology of Soybean-Rhizobia in Diverse Crop Rotations in Central India. **Agriculture Ecosystems and Environment** 240: 261-268.
- 14) Kumar V, Rawat, AK and Rao DLN (2017) Symbiotic Efficiency of Slow and Fast-growing Soybean Rhizobia of Central India. **National Academy of Science Letters** (accepted)
- 15) Radha TK, Rao DLN and Sreeramulu KR (2017) Actinobacteria of Arid and Semi-arid Soils: Antagonism to Fungal Pathogens and Plant Growth Promoting Potential. **J Pure Appl. Microbiol.** 11: 1045-1052

#### Review Article/Book Chapters

- 1) Rao, D.L.N. (2013) Soil Biological Health and its Management. In: *Soil Health Management: Productivity-Sustainability-Resource Management*, Ed. H.L.S.Tandon, FDCO, New Delhi., pp 55-83.
- 2) Rao D.L.N. (2014) Recent Advances in Biological Nitrogen Fixation in Agricultural Systems. **Proc. Ind. Natnl. Sci. Acad** 80 Spl. Sec: 359-378.
- 3) Rao, D. L. N. (2015) Brave New Soil Science. **J. Indian. Soc. Soil Science** 63: S118-133.
- 4) Trimurtulu N. and Rao D. L. N. (2015) Efficacy of Carrier-based and Liquid Microbial Inoculants on Field Crops in Tropical Soils. In: Eds. K.Ramasamy and K.Kumar, New India Publishing Agency, New Delhi, pp 419-447.
- 5) Rao, D. L. N., Balachandar, D., and Thakuria, D. (2015) Soil Biotechnology and Sustainable Agricultural Intensification. **Indian Journal of Fertilisers** 11: 87-105.

- 6) Rao, DLN and Balachandar D (2017) Nitrogen inputs from Biological Nitrogen Fixation in Indian Agriculture. In: The Indian Nitrogen Assessment. *Sources of Reactive Nitrogen, Environmental and Climate Effects, Management Options, and Policies*. YP Abrol et al (ed), pp 117-132, Elsevier.
- 7) Rao D.L.N. (2017) Microbial and Biochemical Origins of Soil Organic Matter: Insights from History and Recent Ecological and Bio-molecular Advances. In: S.K.Sanyal (Ed.) Souvenir 82nd Annual Convention and National Seminar of Indian Society of Soil Science, Kolkata, Dec11-14, 2017, pp. 77-89. DOI 10.13140/RG.2.2.26676.96644
- 8) Rao D.L.N., Mohanty S.R., Acharya C. and Atoliya N. (2018) Rhizobial Taxonomy-Current Status. IUNFC Newsletter 3: 1-4.

### **Project Reports**

- 1) Rao, D.L.N. (2014) Soil Biodiversity- Biofertilizers Research Progress (2012-14). All India Network Project on Soil Biodiversity-Biofertilizers, IISS, Bhopal, pp 81.
- 2) Rao, D.L.N. (2016) Soil Biodiversity-Biofertilizers Research Progress 2012-2014, AINP on Soil Biodiversity-Biofertilizers, ICAR-Indian Institute of Soil Science, Bhopal, pp 90.