

Dr. Nisha. M.S
Assistant Professor,
AICRP on nematodes,
RARS(SZ), Vellayani

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Summary

Research area of interest on biological control of plant parasitic nematodes started from my PhD work as part of National Agricultural Technology Programme on “Mass production and field evaluation of bioagents for the eco-friendly management of nematodes associated with vegetables” in which I have standardized the application of biofortified farmyard manure using nematode egg parasitic fungi, *Pochonia chlamydosporia* and *Purpureocillium lilacinum* for the management of root-knot nematode in coleus, *Solenostemon rotundifolius*. Ten nematode management technologies in rice, banana, brinjal, bittergourd, pepper, cardamom, kacholam and polyhouse cucumber evolved from trials of All India Coordinated Project on Nematodes in Agriculture is published in Package of Practices Recommendations of Kerala Agricultural University for the benefit of farming community. Four native isolates of bacteria having antihelminthic property were isolated and identified.

Research Highlights

- Integrated nematode management strategies involving solarization, seed/nursery treatment with bio-control agents, bio-fumigation using crop residues of cauliflower, mulching using green leaves of glyricidia and soil incorporation of bioagent fortified organic manure were evolved for managing nematodes in okra, cowpea, bitter gourd, polyhouse cucumber, pepper, cardamom, ginger and banana.
 - Package of Practices Recommendations were evolved for management of nematodes infecting rice, banana, brinjal, bittergourd, pepper, cardamom, kacholam and polyhouse cucumber
 - Native bacteria, *Lysinibacillus capsici* strain NSK-KAU (accession number-MT509533) and *Bacillus paramycoides* strain NSK-KAU (accession number-MT-510176) antagonistic to reniform nematode were isolated from soils of Kerala.
 - Two indigenous isolates of bacteria having antagonistic potential against root-knot nematodes viz. *Bacillus thuringiensis* strain a57 and *Stenotrophomonas maltophilia* strain W2-7 were identified.
 - Two new green molecules, fluopyram and fluoensulfone were found effective against root-knot nematode in polyhouse cucumber.
 - Indigenous entomopathogenic nematode, *Metarahabditis rainai* effective against termite was isolated from Kerala and it was reported first time from India.
 - Identified egg parastoid of black bug, *Telenomus oryzae* from rice fields of Kuttanad
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Experience

Joined Department of Agriculture Development and Farmers' welfare as Agricultural Officer in 2005
Joined Kerala Agricultural University as Assistant Professor (Agrl.Entomology) in the year 2009

Education

- Graduated in Agricultural Science from Kerala Agricultural University (1999)
 - Post Graduation in Agrl. Entomology from Kerala Agricultural University (2001)
 - Ph.D in Agrl Entomology from Kerala Agricultural University (2005)
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Area of Specialization

Biological control of plant parasitic nematodes

Research Projects

Ongoing

1. All India Coordinated Project on Nematodes in Agriculture funded by Indian Council of Agricultural Research

Completed

1. Isolation and characterization of biocide molecules from potential plant sources. Funded by Rashtriya Krishi Vikas Yojana, Government of Kerala, India
 2. Development of substitutes for banned pesticides or alternative technologies for the management of nematodes in vegetables and banana. Funded by Rashtriya Krishi Vikas Yojana, Government of Kerala, India
 3. Exploitation of bionematicide from potential plants of westernghats. Funded by Western Ghat Development Program, Government of Kerala.
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Publications

Journal Articles

1. Varghese, P.V. and Nisha,M.S.2022. Eco friendly management of root-knot nematode, *Meloidogyne incognita* in cabbage using *Tithonia diversifolia*.*Indian J.nematol*.52 (1):7-15
2. Divya, T. S., Nisha, M. S., Anitha, N. and Paul, A. 2021, Integrated management of root-knot nematode, *Meloidogyne incognita* (Kofoid and White) Chitwood in cow pea. . In: *Indian J. Nematol*. 51 (1): 74-80
3. Sooraj, S. Nisha, M. S. and Kesavakumar, H. 2021. *In vitro* potency evaluation of *Metarhabditiis rainai* against termite, *Odontoteremes obesus* (Rambur). *Indian J.Nematol*. 50 (1): 65-67
4. Nisha,M.S., Sajeena, A. Jijin, R., Shahiba,A.M. and Anusree,S.S. 2021. Management of *Fusarium oxysporum* using *Quisqualis indica* L. and *Mikania micrantha* Kunth. *Green Farming*12 (3&4): 153-158
5. Remya,S and Nisha,M.S. 2021. Seed extracts of *Samadera indica* Gaetrn. for

the management of pumpkin caterpillar (*Diaphania indica* Saund.) *Green Farming* 12(3&4):175-180

6. Remya, S. and Nisha, M.S. 2021. Efficacy of seed extracts of *Samadera indica* Gaetrn. for the management of epilachna beetle, *Henosepilachna septima* (Dieke) *Pest Manag. Hort. Ecosystems* 27 (2) :162-168
7. Swathi Karthika, K. S., Nisha, M. S. and Anitha, N. 2020, Indigenous bacterial antagonists against reniform nematode, *Rotylenchulus reniformis* Linford and Oliveira in vegetable cowpea. *Indian J. Nematol.* 50 (2) 101-106
8. Vishnu, J. S. and Nisha, M.S. 2020, Management of root-knot nematode in tomato using antagonistic bacteria *Stenotrophomonas maltophilia* Strain W 2-7. In: *Indian J. Nematol.* 50 (2):71-78
9. Nimisha, A. M. and Nisha, M. S. 2019, Community analysis of nematodes associated with different varieties of banana in Kerala, India. In: *Indian J. Nematol.* 49(2): 165-172
10. Remya, S. and Nisha, M.S. 2020. Molecular approaches for the improvement of natural enemies. *J. Ent. Zool. Studies*: 8(2):175-179
11. Sooraj, S., Nisha, M.S and Anitha, N. 2019. Biocontrol potential of entomopathogenic nematodes *Steinernema* and *Metarhabditis* against tobacco caterpillar, *Spodoptera litura* (Fabricius). *J. Ent. Zool. Studies* 7(5): 656-660
12. Nisha, M.S., Anusree, S. Sand Sooraj, S. 2019. Efficacy of *Andrographis paniculata* (Burm.f.) Nees against root-knot nematode in pepper, *Piper nigrum* L. *J. Ent. Zool. Studies*: 7(4):42-48
13. Senson A., Paul, A., Anitha, N., Amritha, V.S., Nisha, M.S. and Viswanathan A. 2019. Dissipation and risk assessment of thiamethoxam 12.6% + lambda cyhalothrin 9.5% zc in Tomato. *International Journal of Agriculture Sciences* 11(14) 8797-8799.
14. Ausree, S.S., Nisha, M.S and Sheela, M.S. 2018. Evaluation of *Quisqualis indica* and *Samadera indica* as botanical pesticides against *Spodoptera litura* in Polyhouse. *Indian J. Entomol.* 81 (1): 428-43
15. Nisha, M.S. and Nimisha, A.M. 2017. Impact of mulching of green leaves for the management of nematodes associated with banana, *Madras Agric. J.* 104(4-6):184-187
16. Nisha, M.S., Remya, V.S. and Remya, P.S. 2017. Management of root-knot nematode, *Meloidogyne incognita* (Kofoid & White) Chitwood in bitter melon using bioagents and organic amendment. *Current Nematol.* 28(2) : 187-193.
17. Nisha, M.S. and Sheela, M.S. 2017. Effect of fungal egg parasite, *Paecilomyces lilacinus* (Thom.) Samson on *Meloidogyne incognita* in brinjal. *Indian J. Nematol.* 46(2):157-159 .
18. Nisha, M. S and Sheela, M.S. 2015. Crucifer vegetable wastes and green leaves as biofumigants for the management of nematodes in banana. *International Journal of Agriculture, Environment & Biotechnology* 8: 33-39.
19. Anusree, S.S., Nisha, M.S. and Sheela, M.S. 2016. Insecticidal activity of *Quisqualis indica* L. flower extract on *Spodoptera litura* Fabricius. *International Journal of Applied and Pure Science and Agriculture.* 5: 98-103
20. Nisha, M. S and Sheela, M.S. 2015. Screening of coleus cultivars for their resistance to root-knot nematode, *Meloidogyne incognita* (Kofoid & White) Chitwood and yield under conditions of Kerala. *Entomon* 40 (1) : 23-30.
21. Rajmohana, K. and Nisha, M.S. 2013. *Telenomus oryzae*, a new egg parasitoid of the rice black bug from India *Halters* 4 : 79-86
22. Narayana, R., Nisha, M.S. and Sheela, M.S. 2013. Record of Root-knot nematode, *Meloidogyne incognita* infesting cabbage in Kerala. *Indian J. Nematol.* 42: 181
23. Nisha, M.S., Narayana, R. and Sheela, M.S. 2013. Occurrence of Root-knot Nematode, *Meloidogyne incognita* on carrot in Kerala. *Indian J. Nematol.* 42: 183-184
24. Nisha, M.S and Sheela, M.S. 2012. Rhizome treatment-An Economically feasible nematode management strategy for kacholam. *Indian J. Nematol.* 42 (2):125-128
25. Nisha, M.S and Sheela, M.S. 2006. Biomangement of *Meloidogyne incognita* on coleus, *Solenostemon rotundifolius* by integrating solarization, *Paecilomyces lilacinus*, *Bacillus macerans* and neem cake. *Indian J. Nematol.* 36:136-138.

26. Sheela, M. S., Jiji, T., Nisha, M. S and Joseph Rajkumar. 2005. A new record of *M. graminicola* on rice, *Oryza sativa* in Kerala. *Indian J. Nematol.* 35:218.
27. Nisha, M.S. and Sheela, M.S. 2003. Preliminary study on the effect of bioagents and organic amendments for the management of root-knot nematode associated with Kacholam, *Kaempferia galanga* Linn. *Pest Mgmt. Hort. Ecosyst.* 9:165 to 168.
28. Nisha, M. S. and Sheela, M.S. 2002. Effect of green leaf mulching for the management of root-knot nematode in Kacholam. *Indian J. Nematol.* 32: 211-212.
29. Nisha, M. S. and Sheela, M.S. 2002. *Emilia sonchifolia*: A new host of *Meloidogyne incognita*. *Indian J. Nematol.* 32:193.
30. Santhakumari.P, Kavitha,K and Nisha,M.S. 2002. Occurrence of collar rot in coral hibiscus, *J.Mycol. Plant Pathol.*258

Paper published in Proceedings of Symposia/workshops

1. Nisha, M.S., Sheela, M.S., Jiji, T. and Sivaprasad, P. 2001. Comparative efficacy of different nematode management strategies in Kacholam. In: *Proceedings of the National Congress on Centenary of Nematology in India- Appraisal and Future Plans*; 5-7 December, 2001; New Delhi, IARI, p.172.
2. Sheela, M. S., Mohandas, C., Rajkumar, A. and Nisha. M.S. 2002. Potential of entomopathogenic nematodes for the management of lepidopteran pests In: *XIIth Swadeshi Science Congress*; 5-7 November, 2002; CTCRI, Thiruvananthapuram, p. 21.
3. Sheela, M.S., Jiji. T. and Nisha. M.S. 2002. Evaluation of different control strategies for the management of nematodes associated with vegetables (brinjal). In: Prem Nath (Eds) *Proceedings of International Conference on Vegetables*; 11-14 November, 2002; Bangalore, IIHR and Indian Society of vegetable Science Foundation, p. 268.
4. Sheela, M.S., Nisha, M.S and Mohandas, C. 2002. Impact of trap cropping and crop rotation for the management of root-knot nematodes in vegetables. In: Prem Nath (Eds) *Proceedings of International Conference on Vegetables*, 11-14 November, 2002; Bangalore, IIHR and Indian Society of vegetable Science Foundation, p. 245.
5. Nisha, M.S. and Sheela, M.S. 2004. Rhizome treatment - a low cost technology for the management of nematodes in Kacholam, an important medicinal plant. In: *National Symposium on Paradigms Nematological Research for Biodynamic Farming*; 17-19. November, 2004; GKVK, University of Agricultural Sciences, Bangalore,p.62-63
6. Sheela, M.S., Nisha, M.S and Mohandas, C. 2004. Eco-friendly management of nematodes associated with Chinese potato (coleus), *Solenostemon rotundifolius* (Poir) Morton. In: *National Symposium on Paradigms in Nematological Research for Biodynamic Farming*; 17-19 November, 2004; Bangalore, University of Agricultural Sciences, GKVK, pp 63-64.
7. Sheela, M.S. and Nisha, M.S. 2004. Impact of biological control agents for the management of root-knot nematode in brinjal. In: *National Symposium on Paradigms in Nematological Research for Biodynamic Farming*; 17-19 November, 2004; Banagalore, University of Agricultural Sciences, GKVK, p. 63-64.
8. Sheela, M.S., Mohandas, C., Nisha, M.S. and Manu. C.R. 2005 Potential of *Rhabditis* spp. for the management of pests of bittergourd, *Momordica charantia* L. In: Ignacimuthu. S.J. and Jayaraj.S. (Eds) *National Symposium on Green Pesticides for Insect Pest Management*, Narosa Publishing House Pvt. Ltd., New Delhi, pp. 200-202.
9. Nisha, M.S and Sheela, M.S. 2007. Integrated management of root-knot nematode in coleus, *Solenostemon rotundifolius*. In: *Proceedings of National Symposium on Nematology in 21st century: Emerging Paradigms* ; 22-23 November, 2007; Jorhat, Nematological Society of India and Assam Agricultural University, p. 86-87.
10. Sheela, M.S. and Nisha, M.S. 2008. Biointensive management of root-knot nematode in coleus (Chinese potato). In: *Proceedings of Fifth International Congress on Nematology*; 13-18 July, 2008; Australia, Brisbane, p. 46.
11. Sheela, M.S., Ajith, K. and Nisha, M.S. 2008. Impact of green leaf application on the management of plant parasitic nematodes and its effect on the population of predatory and saprophytic nematodes and micro flora in soil. In: *Proceedings of Fifth International Congress on Nematology*; 13-18 July, 2008; Australia, Brisbane, p. 37-38.

12. Sheela, M.S., Nisha. M.S. and Jiji. T. 2010. Bio efficiency of *Bacillus macerans* for the management of root-knot nematode *M. incognita* in vegetables. In: *Proceedings of International Conference on Bio 2010*; 2- 4 June, 2010; Bangalore, India, p. 12-13.
13. Nisha,M.S and Sheela,M.S.2011. Reaction of coleus cultivars against root-knot nematode, *Meloidogyne incognita* and its impact on quality. In: *National symposium - Nematodes: A challenge under changing climate and agricultural practices*, 16-18 November,2011; KJJM Animation centre Kovalam, Thiruvananthapuram, p.84
14. Narayana, R., Sreeja. C.A., Nisha, M.S. and Dhanya. M.K. 2011. Management of nematodes infecting cardamom (*Elettaria cardamomum* maton.) using biodynamic preparation. . In: *National symposium- Nematodes: A challenge under changing climate and agricultural practices*, 16-18 November,2011; KJJM Animation centre Kovalam, Thiruvananthapuram, p.82
15. Sheela, M.S., Nisha. M.S. and Narayana, R. 2011. Ecological manipulations for nematode management. In: *National symposium; Nematodes: A challenge under changing climate and agricultural practices*, 16-18 November,2011; KJJM Animation centre Kovalam, Thiruvananthapuram, p.38
16. Narayana, R., Nisha, M.S. and Dhanya. M.K. 2012. Effect of organic inputs and biocontrol agents on the microflora and nematodes in rhizosphere of cardamom. In: *Proceedings of 24th Kerala Science Congress*: 29-31 January 2012, RRII, Kottayam, pp. 46-47
17. Narayana, R., Nisha, M.S., Sheela, M.S. and Angela Cyriac. 2012. Community analysis of nematodes associated with rhizosphere of cardamom, black pepper and beetel vine grown in Cardamom reserve hills of Idukki district. In: *First National biodiversity congress*, 27-30 December 2012; Kanakakkunnu palace, Thiruvananthapuram, p.60
18. Nisha, M.S. and Sheela, M.S. 2013. Efficacy of bioagents as rhizome treatment in the management of root-knot nematode in Kacholam. In: *Proceedings of 25th Kerala Science Congress*; 29 January – 1 February, Thiruvananthapuram, p.21-22
19. Narayana , R., Nisha, M.S. and Sheela, M.S. 2013. Biorational Methods for the management of nematodes associated with Kacholam, *Kaempferia galanga* L. In: *Proceedings of the 8th National seminar on medicinal plants, I– 2 March 2013, Rajiv Gandhi Centre for Biotechnology, Jagathy 2013*; p.80-83
20. Narayana, R., Nisha, M.S. and Sheela, M.S. 2013. Nematodes associated with medicinal plants in Kerala. In: *Proceedings of the 8th National seminar on medicinal plants I– 2 March 2013, Rajiv Gandhi Centre for Biotechnology, Jagathy 2013*; p.76-79
21. Nisha, M. S and Sheela, M.S. 2014. Bio rational management strategy against pests of coleus. In: *Proceedings of 26th Kerala Science Congress*; 28-31 January. 2014, Pookode, Wayanad, p.96
22. Nisha, M. S and Sheela, M.S. 2016. Effect of different inoculums levels of *Meloidogyne incognita* (Kofoid & White) Chitwood on growth and biochemical parameters of coleus, *Solenostemon rotundifolius* (Poir) Morton. *Proceedings of 26th Swadeshi Science Congress*, 7-9 November 2016, CMFRI, Kochi P.31-32
23. Nisha, M. S., Nimisha, A. M. and Sheela, M.S. 2016, Impact of green leaf mulching on the management of Plant parasitic nematodes in banana. In: *Proceedings of 5th International Conference on Sustainable Utilization of Tropical Plant Biomass: Bioproducts, Biocatalysts and Biorefinery*, 17-18 November 2016,Coimbatore P.134-139
24. Annie.P.Varghese, Nisha.M.S and Sheela.M.S, 2016. Nematicidal activity of different weed plant extracts against root-knot nematode, *Proceedings of 28th Kerala Science Congress*, 28-30 January 2016, University of Calicut, Malappuram.P.291-295
25. Anusree, S. S., Nisha, M. S. and Sheela, M.S. 2016. Effect of *Quisqualis indica* flower extracts against tobacco caterpillar, *Spodoptera litura* under protected cultivation, *proceedings of 26th Swadeshi Science Congress*, 7-9 November, Central Marine Research Institute, Kochi, p.5.
26. Nisha, M.S., Sheela,M.S., Sreeshma,M.K. and Jijin,R.2016. Antifungal activity of Mikenia leaf extract against pathogenic fungi infecting ginger. *National conference on advance in biological and environmental sciences (NCABES-2016)* Gandhigram rural Institute, Gandhigram, Tamil Nadu P. 20

27. Nisha, M. S., Nimisha, A. M. and Sheela, M.S. 2017, Effect of *Paecilomyces lilacinus* and *Bacillus macerans* for the management of nematodes in banana. In: *Proceedings of National seminar on Biodiversity Conservation and Farming Systems for Wetland Ecology*; 22-23 February, 2017, Regional Agricultural Research station, Kumarakom P.113-114
28. Nisha, M. S., Nimisha, A. M., Narayana, R and Sheela, M. S. 2017. Biofumigation using crop residues of cruciferous vegetable wastes for the management of nematodes in okra. In: *National seminar on Biodiversity Conservation and Farming Systems for Wetland Ecology*; 22-23 February, 2017, Regional Agricultural Research station, Kumarakom, p. 67-68
29. Nisha, M. S., Vishnu, J.S. and Sooraj. S. 2018, Biomangement of *Meloidogyne incognita* (Kofoid & White) Chitwood infecting salad cucumber with fungal egg parasite, *Purpureocillium lilacinum* and neem cake in polyhouse. In: *International symposium on Fungal Biology: Advances, Applications and Conservation*; 19-21 November 2018, MACS's Agharkar Research Institute, Pune P. 96
30. Nisha, M.S. and Anusree, S.S. 2018. Antifungal activity of *Quisqualis indica* and *Mikania micrantha* against *Fusarium solani* in ginger. In: *28th Swadeshi Science Congress*; 7-9 November 2018, CSIR-National Institute for interdisciplinary science and Technology (NIIST), Thiruvananthapuram P.20-21
31. Anusree, S. S. and Nisha, M. S. 2018. Potential of *Samadera indica* as green pesticide against tobacco caterpillar, *Spodoptera litura*. In: *Proceedings of International Conference on biocontrol and Sustainable insect pest management*. ICBS-29-31 Jan 2018, Killikkulam P.599-602
32. Sooraj, S. Nisha, M. S. and Anitha, N. 2019. Pathogenicity of *Rhabditis*, a native entomopathogenic nematode against termite. In: *Proceedings of 31st Kerala Science Congress*, 2-3 February 2019, Fathima Matha National College, Kollam, P.9
33. Nisha, M.S., Anusree, S.S. and Sooraj, S. 2019. Eco-friendly management of root-knot nematode in pepper using *Andrographis paniculata* dry powder, In: *Proceedings of 31st Kerala Science Congress*, 2-3 February 2019, Fathima Matha National College, Kollam, P.6-7
34. Remya, S., Nisha, M. S., Radhakrishnan, K.V. and Biji, M. 2021, Management of pumpkin caterpillar, *Diaphania indica* using seed extracts of *Samadera indica*. In: *Proceedings of National webinar on Integrated Pest Management: a Paradigm shift*; 27-28 August, 2021.
35. Remya, S., Nisha, M. S., Radhakrishnan, K. V. and Biji, M. 2021. Management of epilachna beetle, *Henosepilachna septima* (Dieke) using extracts from seeds of *Samadera indica*. In: *5th National Symposium on Plant Protection in Horticulture (NSPPH-2021) challenges and roadmap ahead*.
36. Nisha, M. S., Remya, S. and Swathi Karthika, K.S. 2021. Bio management of *Meloidogyne incognita* infecting okra by biofumigation and egg parasitic fungus *Purpureocillium lilacinum*. In: *Proceedings of National Webinar on Integrated Pest Management: a Paradigm shift*; 27-28 August, 2021

Book chapter

1. Nisha, M.S. and Sheela, M.S. . 2017.. Nematodes of vegetables. In: *Pest management in vegetable crops* (Ed.). Samnata, A., Patra, B and Patra, S. Agro India Publications, Allahabad, pp.143-160
2. Sheela, M.S., Jiji, T., Nisha, M.S. and Narayana, R. 2018. Nematode problems in Kerala. In: *Nematode problems of Crops in India* (Ed) R.K. Walia and P.K. Chakrabarty p. 199-217

Booklets

1. Sheela, M.S., Jiji, T., Nisha, M.S. and Narayana, R. 2012. Three decades of nematology in Kerala. P.100
2. Sheela, M.S., Jiji, T., Nisha, M.S. and Narayana, R. 2012. Nematodes of Kerala P.100
3. Nisha, M.S. 2021. Nematode pests of Kerala and their management P. 50

Popular Articles and leaflets

1. Dr.Nisha.M.S, Akhila.P.Subhash, Kiran,A.-Nematode management in Vegetables
2. Dr.Nisha.M.S. Remya,S. Abin,J.S Nematode management in banana
3. Dr.Nisha.M.S - AICRP on nematodes in agriculture- at a glance
4. Dr.Nisha. M.S and Gayathri.P.S- Nematode management in ginger
5. Dr.Nisha.M.S, Remya.S- Pest management with EPN
6. Sheela, M.S., Shobana, G., Kumari Sushama. N.P. Nisha, M.S. and Geetha G. Nath. 2004. Pachchakarikalile susthira nimavira Niyanthranam Jivanukalilude. Kerala Agricultural University, Thrissur.
7. Nisha, M. S, 2020. Nematode pests of Kerala and their management, Popular article in Kerala karshakan September issue,2020 Page no. 20-24
8. Nisha,M.S. 2018. Pachchakarikalile nimavirakale niyanthrikkam, Kerala karshakan September
9. Nisha. M.S and Narayana,R.2019 Nematode management in cool season vegetables
10. Narayana.R, and Nisha,M.S. Nellile Nimavirakalum NiyatrannaMargagalum (Nematodes Infecting rice and its management)
11. Nisha,M.S. Vazhayile Nimavira Niyanthranam (Nematodes infecting banana and its management)

Student Guidance (Major Advisor/ Advisory Committee member)

M. Sc.

Within KAU: Completed : 12 Ongoing : 6

Ph. D

Within KAU: Completed : 1 Ongoing:2

Other Institutional Responsibilities

1. Currently acting as student Advisor/faculty mentor to 10 Undergraduate students.
2. Member in PC group: Crop pests and beneficial Insects
3. Group leader of Group .F- Nematode management in Fruits and Spices of AICRP on nematodes

Membership in Professional Associations

1. Annual membership in Nematological Society of India
2. Life member in Association for advancement of entomology