

**Dr. S. Murugesan**  
**Scientist 'G' and Group Co-ordinator (Research)**

Dr. S. Murugesan is a senior scientist in IFGTB with core specialization of Phytopesticide, Chemical ecology, Phytoceuticals and Instrumentation methods and chemical analysis.

**Current activities and research interests**

**Natural products – Phytoceuticals and phytopesticides.**

- Secondary metabolites from *Aegle marmelos* for biopesticides
- Pharmacological evaluation of *Aegle marmelos* for phytomedicine
- Tree borne oil seeds for biopesticide formulation with active ingredients.
- Seed oil extracts for insect/pest management
- Essential oil of *Lantana camara* for biopesticide.
- Biotransformation of secondary metabolites from Frankia into casuarinas for nodulation.
- A novel approach to synergise growth and pest management in fast growing industrially important tree species
- Bioprospecting of forest resources as natural biocolourant for textile industry and as food additives and cosmetics.
- Tree fodder as alternate protein source
- Registration & commercialization of the most effective bio-pesticide formulation.

**Products developed**

**Biopesticides** :Vilvekam, Hy-Act, Tree-PAL<sup>H</sup>, Ento-fight *Nasa*, Crawl clean

**Biobooster** : Treerich biobooster

**Phytomedicine** : R-500.

**Mobile app'** : Tree pests of India.

**Formal education**

B.Sc (Zoology), Madurai Kamaraj University (1981)

M.Sc (Zoology), Madurai Kamaraj University (1984)

M.Phil (Zoology) Madras University (1986)

Ph.D, (Entomology) Madras University (1990)

**Experience**

Dr. S. Murugesan has been working on insect-plant interaction especially role of plant secondary metabolites of host plants and their defence properties against insect pests since 1990. He was involved in the biological control of Forest Insect pests of arid and semi arid tree species, and Insecticidal performance of natural products against seed insect pests of forestry tree species.

He has experience in the areas of plant defence chemicals especially on methods for extraction, purification and characterization of numerous defensive chemicals belonging to various categories (terpenoids, alkaloids, glycosides, phenols, tannins, etc.) which could cause behavioral and physiological impacts on pests.

He was in Bioactive Natural Product Laboratory, Michigan State University, USA as Post Doctoral Fellow during 1998 to 1999.

Three Ph.D were awarded from FRI University with his supervision and two students are pursuing their Ph.D. He supervised more than twenty students for M.Sc. dissertation work and evaluated number of Ph.D, M.Phil and M.Sc., thesis.

### Organisational details

Institute of Forest Genetics and Tree Breeding  
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### Publications

1. **Murugesan, S.** (1988). Some Biochemical Correlates in Relation to the Quantitative Food Utilization and Reproduction in Two Species of Meloids (Insecta: Coleoptera: Meloidae), *Proc. Indian natn. Sci. Acad.*, **B54 ( 2 & 3 )** : 155-160.
2. Ananthkrishnan, T.N., Senrayan, R., Annadurai, R.S. and S. **Murugesan** (1990). Antibiotic effects of resorcinol, gallic acid and phloroglucinol on *Heliothis armigera* Hubner (Insecta : Noctuidae). *Proc. Indian Acad. Sci.*, 99 (1): 39-52.
3. Annadurai, R.S., **Murugesan, S.** and R. Senrayan (1990). Age- correlated tissue preferences of *Heliothis armigera* (Hubner) and *Spodoptera litura* (F) with special reference to phenolic substances. *Proc. Indian Acad. Sci.*, 99 (4): 317-325.
4. Senrayan, R., **Murugesan, S.**, Annadurai, R.S. and T.N. Ananthkrishnan (1992). Host nutrition and fitness of *Trichogramma chilonis* Ishii (Trichogrammatidae: Hymenoptera).pp. 69-82. **In** : *Emerging Trends in Biological Control of Phytophagous Insects*. Etd. T.N. Ananthkrishnan. Published by Oxford & IBH Publishing Co. Pvt. Ltd. 1992.
5. Annadurai, R.S., **Murugesan, S.**, Senrayan, R., Gurusubramanian, G. and T.N. Ananthkrishnan (1992). Trophic interactions in *Heliothis armigera* Hubner and its natural enemy systems: A chemical ecological approach (Notuidae: Lepidoptera). pp. 83- 101. **In** : *Emerging Trends in Biological Control of Phytophagous Insects*. Etd. T.N. Ananthkrishnan. Published by Oxford & IBH Publishing Co. Pvt. Ltd. 1992.
6. **Murugesan, S.**, Gurusubramanian, G. and A. Babu (1994). Effect of cytozyme on various growth rates of sunflower in relation to resistance to insect pests. *Annals of Arid Zone*, **33 (1)**: 69-72.
7. Ahmed, S.I., Sundararaj, R. and **S. Murugesan** (1994). Recent trends and perspectives of neem- as a source of biopesticide. *Neem Newsletter of International Neem Network*, **1 (2)**: 17-20.
8. **Murugesan, S.**, Sundararaj, R., Ahmed, S.I. and S. Kumar (1995). New record of *Myllocerus laetivirens* Marshall (Curculionidae: Coleoptera) as a pest of neem (*Azadirachta indica*) and rohida (*Tecomella undulata*). *Neem Newsletter of International Neem Network*, **(2)**: 33.
9. **Murugesan, S.** and J. Prasanth Jacob (1995). Antifeedant and growth disruption activity of azadirachtin on *Heliothis armigera* (Hubner), *Spodoptera litura* (F) and *Atractomorpha crenulata* (F). *Neem Newsletter of International Neem Network*, **2 (2)**: 32-35.
10. **Murugesan, S.**, Mohan, V. and R. Sundararaj (1995). Insect- VAM interactions: Colonization of aphid, *Aphis nerii* Boy (Homoptera: Aphididae) distinction between host and non-host trees. *Phytophaga*, **7**: 121-126.
11. **Murugesan, S.** and R. Sundararaj (1995). The future prospects and task of biological control of forest insect pests. *AFRI Newsletter*, 3 (1): 19.
12. Sundararaj, R. and **Murugesan, S.** (1995). Phytochemicals in integrated pest management. *AFRI Newsletter*, 3 (1): 17-18.
13. Mohan, V., **Murugesan, S.** and R. Sundararaj (1995). Mycorrhizae in control of plant diseases and soil-borne nematodes. *AFRI Newsletter*, 3 (1): 14-15.
14. Sundararaj, R., **Murugesan, S.** and R.N. Mishra (1995). Biopesticidal potential of neem against insect pests of arid zone. *Neem Newsletter of International Neem Network*, **2 (3)**: 8-10.
15. Sundararaj, R., **Murugesan, S.** and Sangeetha Sharma (1995). Evaluation of neem (*Azadirachta indica* A. Juss) seed kernel extracts from different solvents on the babul defoliator *Taragama siva* Lefbvre (Lasiocampidae: Lepidoptera) and the rohida defoliator *Patialus tecomella* Pajni (Curculionidae: Coleoptera). *Annals of Forestry*, **3(2)**: 193-195.

16. Sundararaj , R., **Murugesan, S.** and S.I. Ahmed (1995). Different impact of NSKP extracts on nutrition and reproduction of *Taragama siva* Lefbvre (Lasiocampidae: Lepidoptera). *Entomon*, **20 (3)**: 257-261.
17. Ahmed, S.I. and S. Murugesan, (1995). *Achaea janata* Linn (Noctuidae: Lepidoptera), A new pest record on neem – its management through Nuclear Polyhedrosis Virus. *The Indian Forester*, **121 (1)**: 63.
18. Sundararaj , R. and **Murugesan, S.** (1995). Evaluation of neem (*Azadirachta indica* A. Juss) seed kernel powder against the rohida defoliator weevil, *Patialus tecomella* Pajni. *Journal of Applied Zoological Research*, **6(2)**: 141:142.
19. Sundararaj, R., **Murugesan, S.** and R.N. Mishra (1996). Field Evaluation of Neem Seed Oil Against the Babul Whitefly *Acaudaleyrodes rachipora* (Singh) (Aleyrodidae: Homoptera) on *Acacia senegal* Seedlings. *Annals of Arid Zone*, **35 (4)**: 369-372.
20. Sundararaj, R., **Murugesan, S.** and R.N. Mishra (1996). Biopesticides Research in arid zone Forestry of India. *Applied Zoological Research Association of India (AZAR)*. pp. 28.
21. **Murugesan, S.** Sundararaj, R. and S. Kumar (1996). Role of flower colour of arid and semi- arid tree species and its effect on insect colonization. *Indian Journal of Environment and Toxicology*. **6 (2)**: 89-91.
22. **Murugesan, S.** and S. Kumar (1996). New record and damage of flower thrips in the introduced tree species of arid and semi- arid regions. *The Indian Forester*, **122 (9)**: 854- 855.
23. **Murugesan, S.**, Kumar .S. and R. Sundararaj (1996). Sensillar dynamics in thrips – flower interactions of arid and semi- arid tree species. *Annals of Arid Zone*, **35 (4)**: 361-368.
24. Sundararaj , R. and **S. Murugesan.** (1996). Occurrence of *Acaudaleyrodes rachipora* (singh) (Aleyrodidae: Homoptera) as a pest of some importance forest trees in Jodhpur (India). *Indian Journal of Forestry*, **19 (3)**: 247-248.
25. **Murugesan, S.**, Sundararaj, R.. and S. Kumar. (1996). Moringa defoliator on neem. *The Hindu*, 15<sup>th</sup> August.
26. Sundararaj, R., **Murugesan, S.**, and R.N. Mishra (1996). An ideal tree for arid region. *The Hindu*, 7<sup>th</sup> November.
27. **Murugesan, S.** Meeta Gaur, Sundararaj, R. and S. Kumar (1996). Population trends of the oleander aphid *Aphis nerii* on host and non-host trees and their nutrient composition. pp. 423- 426. In : Impact of diseases and insect pests in Tropical Forests. Proceedings of IUFRO Symposium, 23-26<sup>th</sup> November, 1993, Peechi, India.
28. **Murugesan, S.**, Sundararaj, R.. and R.N. Mishra (1997). Varieties of bajra for the maintenance of *Corcyra cephalonica* (stainton) cultivars towards the detrimental effect of the predatory habit of *Tribolium castaneum* (Herbst.). *The Indian Forester*, **123 (2)**: 175- 179.
29. Sundararaj , R. and **S. Murugesan.** (1997). Record of *Thosea bipartite*(Limacodidae: Lepidoptera) on *Azadirachta indica* (Neem) from Jodhpur, India. *The Indian Forester*, **123 (3)**: 261.
30. Kumar, S., **Murugesan, S.** and R. Sundararaj (1997). Some Biochemical Correlates in Relation to Thrips flower Interactions of Arid and Semi-arid tree species. *Indian J. Ent.*, **59 (3)**: 290-294.
31. **Murugesan, S.**, Kumar .S. and R. Sundararaj (1997). Blister beetles as a threat to medicinal/ ornamental plants of arid and semi- arid regions. *The Indian Forester*, **123 (4)**: 341-344.
32. Pankajam, S., Sunitha, B., **Murugesan, S.** and S. Durairaj (1998). First record of seed chalcid, *Bruchophagous sp.*, (Hymenoptera: Eurytomidae) as a pest of *Albizia lebbek*. *The Indian Forester*, **124 (8)**: 667-668.
33. **Murugesan, S.**, Pankajam, S., Balu, A., Durairaj, S. and B. Sunitha (1998).Evaluation and Utilization of Biopesticidal Properties of Oscimum , Sesbania and Parthenium on *Caryedon serratus*, A Seed pest of *Acacia nilotica* and *Tamarindus indica*. *Pestology*, Vol. XXII **(7)**: 45-50.
34. **Murugesan,S.**, Balu, A., Durairaj, S., Pankajam, S. and B. Sunitha (1998). Insecticidal Performance of a Neem Product in Control of Two Major Seed Pests of Forestry Tree Species. *Entomon*, **23 (3)**: 197-201.
35. Sundararaj, R., **Murugesan, S.** and R.N. Mishra (1998). Biopesticidal potential of neem (*Azadirachta indica* A. Juss.) against forest insect pests of arid and semi-arid region. Published in: *NEEM A wonder tree*. B.N. Gupta and K.K. Sharma (eds.), Indian Council of Forestry Research and Education, Dehra Dun. pp. 154-159.
36. **Murugesan, S.**, Prasanth Jacob, J. and A. Balu (1999). Comparative toxicity of some insectifides against *caryedon serratus*, A seed pest of forestry tree species. Published in : *Recent trends in insect pest control to enhance forest productivity*. P.K. Shukla and K.C. Joshi (eds.), Tropical Forest Research Institute, Jabalpur. pp 17-20.

37. Kumar, S., **Murugesan, S.** and R. Sundararaj (1999). Evaluation of Forestry Thrips and their Damaging Profiles. Published in: *Management of Arid Ecosystem*. A.S. Paroda *et al.* (eds.), Arid Zone Research Association of India and Scientific Publishers, Jodhpur, pp. 401-404.
38. Gaur, M., Sundararaj, R. and **S. Murugesan** (1999). Host Range and Distribution of the Babul Whitefly *Acaudaleyrodes rachipora* (Singh) (Aleyrodidae: Homoptera) in Indian Arid Zone. Published in: *Management of Arid Ecosystem*. A.S. Paroda *et al.* (eds.), Arid Zone Research Association of India and Scientific Publishers, Jodhpur, pp. 397-400.
39. **Murugesan,S.**, Balu, A., Prasanth Jacob, J., Pankajam, S. and B. Sunitha (1999). Insecticidal action of Neem and Vitex against forestry seed pest. *Sylva Plus*, **VII (2)**: 1-2.
40. **Murugesan, S.**, Ramsewak, R.S., Mattson, W.J., and M.G. Nair (2000). Potential Pest Managing Constituents from *Dirca palustris*. Paper presented in the Entomocongress 2000, perspectives for the new millennium (An **international meet**), **organized by Association for Advancement of Entomology**, pp.16.
41. Ramsewak, R.S., Nair, M.G., **Murugesan, S.**, Mattson, W.J. and J. Zasada (2001). Insecticidal Fatty Acids and Triglycerides from *Dirca palustris*. *J. Agric. Food Chem.*, **49**: 5852-5856.
42. **Murugesan, S.** , Ramsewak, R.S., Mattson, W.J., Nair, M.G., Mohan, V. and C. Narayanan (2002). Antifeedant and antifungal compounds from *Dirca palustris*. Published in the proceedings on “Vistas of Entomological Research for the New Millennium”, eds. K.P. Sanjayan, V. Mahalingam, and M.C. Muralirangan, pp-65-71.
43. Prasanth Jacob, J., Balu, A., **Murugesan, S.**, Deeparaj, B and G. Srinivasan, (2002). Variation in Defoliator Incidence on Teak Clones. Published in the proceedings on “Vistas of Entomological Research for the New Millennium”, eds. K.P. Sanjayan, V. Mahalingam, and M.C. Muralirangan, pp-164-172.
44. **Murugesan, S.** (2001). Antibiotic effects of *Dirca palustris* seed extracts and fatty acids on teak pests. *Pestology* Vol. XXV No. **11** : 16-19.
45. **Murugesan, S.** (2001). Biochemical estimation of seeds. Published in :*Recent Techniques and Participatory Approaches in Quality Seed Production*. K. Vanangamudi *et al.* (eds.), Tamil Nadu Agricultural University, Coimbatore. pp. 509-512.
46. **Murugesan, S.**, Ramarethinam, S., Marimuthu, S., Prasanth Jacob, J. and A. Balu (2000). Insecticidal Action of Neem and Vitex in Comparison with Synthetic Pesticides on *Caryedon serratus*, A Seed Pest of *Acacia nilotica* and *Tamarindus indica*. *Pestology* Vol. XXIV No. **12** : 3-8.
47. **Murugesan, S.**, Prasanth Jacob, J. and A. Balu (2000). Evaluation of some Insecticides against *Caryedon serratus*, A seed pest of forestry tree species. *Pestology* Vol. XXIV No. **10** : 65-70.
48. **Murugesan, S.** and A. Balu (2000). New Record of Blister Beetle on Neem- Chameli : Its Interaction with Flavonoid Pigments. *The Indian Forester*, **126**: 1243-1245.
49. **Murugesan, S.** and D.R. Sekar (2002). *Mappia foetida* – a potential medicinal/ phytopesticidal plant. In: *Agri Gold Swarna sedyam*, p.54.
50. **Murugesan, S.**, Sunitha, B. and Balu, A. (2002). Pesticidal potency of *Acacia nilotica* leaf extracts. *My Forest*, **38 (3)**: 277-281.
51. Balu, A., Ranjeet Singh., Sasidharan, K.R., Prasanth Jacob, J., Rajarishi, R., Mahalakshmi, R., **Murugesan, S.** and B. Deeparaj (2002). Emerging insect pest of important tree species. Proceeding of National Workshop on Agroforestry – Prospects and Challenges (eds) M. George and C. Buvanewaran, IFGTB, Coimbatore.
52. **Murugesan, S.**, Sunitha, B. and Balu, A. (2002). Pesticidal potency of *Acacia nilotica* leaf extracts. *My Forest*, **38 (3)**:277-281.
53. **Murugesan, S.**, Mohan, V., Sunitha, B. and A.Balu (2002). Antifungal activity of *Acacia nilotica* (Babul) plant extracts against some fungal isolates. *My Forest*, **38(4)**:351-355.
54. **Murugesan, S.**, Ramsewak, R.S., Mattson, W.J., Nair, M.G., Mohan, V. and Narayanan, C. (2003). Antifeedant and antifungal compounds from *Dirca palustris*. *The Indian Froester*, **129 (3)**: 364-370.
55. Zhang, Y., **Murugesan, S.** and M.G. Nair (2003). Triterpenoids and lignans from *Picrorhiza kurroa* Seeds. Published in the proceedings of 44<sup>th</sup> Annual meeting of the American Society of Pharmacognosy: *The Changing face of Natural Products Chemistry*: Chapel Hill, North Caoline, July 12-16, 2003.
56. Zhang, Y., **Murugesan, S.** and M.G. Nair (2004). Novel Lipid-Peroxidation and Cyclooxygenase-Inhibitory Tannins from *Picrorhiza kurroa* Seeds. *Chemistry and Biodiversity*, **1**: 426-441.
57. **Murugesan,S.** (2004). Induced defence research and potential application of induced defences in forestry. *Indian Forester*, **130 (11)**: 1227-1234.
58. **Murugesan, S.** (2004). Biopesticidal effects of different tissues of *Acacia nilotica* (Babul) extracts on *Tectona grandis* (teak) pests. *Ad. Plant Sci.*, **17(1)**:203-206.

59. Prasanth Jacob, J., **Murugesan, S** , Balu, A. and B. Sunitha . (2004). Organic pest control methods against some insect pests of forest trees. *My Forest*, **40 (3)**: 209-216. Yanjun, Z. Dewitt, D.L., **Murugesan, S**. Nair, M.G (2005). Cyclooxygenase- 2 enzyme inhibitory triterpenoids from Picorhiza kurroa seeds. *Life Sciences*, **77**: 3222-3230.
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61. Sudhimumar, A.V., Mathew, M.J., Sunish, E., **Murugesan, S** and Sebastian, P.A., (2005). Preliminary studies on the spider fauna in Mannavan shoal forest, Kerala, India (Araneae) *European Arachnology 2005, Acta zoologica bulgarica*, Suppl. **(1)**:319-327.
62. Sebastian, P. A., M. J. Mathew, A.V. Sudhikumar, E. Sunish and **S. Murugesan** (2005) Diversity of spiders in Mangalavanam, an ecosensitive mangrove forest in Cochin, Kerala, India. Paper presented in 22<sup>nd</sup> *European Colloquium of Arachnology*. Pp. 50.
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64. **Murugesan, S. (2005)**. Plant Natural Products in forest insect pest management. *Pestology*, **29 (11)**: 35-36.
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66. **Murugesan, S.**, Mathew, M.J. and A.V. Sudhikumar (2006). A new species of green lynx spider of the genus, *Peucetia ananthakrishnae* (Thorell) (Araneae: Oxyopidae ) from Tamil Nadu, India. *Entomon*, **31 (4)**: 287-292.
67. Mathew, M.J., Sebastian, P.A. and **Murugesan, S** (2007). Araneofauna of the protected areas in Western Ghats of central Kerala. Paper presented in 17<sup>th</sup> International Congress of Arachnology, 5-10 August, 2007, Sao Pedro, Sao Paulo, Brazil pp.172.
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69. **S.Murugesan** (2007). Methods in mass production of some selected herbivorous Insects Through modified artificial diets. *Indian journal of forestry* Vol.30 No.2:171-174.
70. Sebastian, P.A. Mathew, M.J., **S. Murugesan** and J. Joseph (2008). Diversity and ecology of spiders in vegetable ecosystems of central Kerala, India. Paper accepted for 24<sup>th</sup> *European Congress of Arachnology & to be presented on 25 to 29<sup>th</sup> August, 2008*.
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88. Senthilkumar, N., **S. Murugesan** and K. B. Vijayalakshmi. 2012. GC-MS-MS analysis of *Trichilia connaroides* (Wight & Arn.) Benth (Meliaceae): A tree of ethnobotanical records, *Asian Journal of Plant Science and Research*, 2(2): 193-197 – 8 citations
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### Books

1. **Murugesan, S.** and N. Senthilkumar. 2009. Instrumentation methods and chemical analysis. ICFRE/IFGTB/TM-1 – English. pp. 104
2. Senthilkumar, N., **S. Murugesan** and N. Krishnakumar. 2009. An illustrated guide on insect pests of important tree species in South India. IFGTB Publications, Coimbatore. pp 132.
3. **Murugesan, S.** and N. Senthilkumar. 2010. Metabolite profiling: Current Techniques IFGTB Publications, Coimbatore. pp 180.
4. Senthilkumar, N., **S. Murugesan**, C. Rajeshkannan and N. Krishnakumar. 2011. Bioprospecting forest resources: An illustrative catalogue of some flora for biopesticides. IFGTB publications, Coimbatore. pp 56.
5. **Murugesan, S.**, and N. Senthilkumar. 2012. Chemical Ecology, Sentinals of plant defences in forest insect plant interactions. LAP Lambert Academic Publishing, Germany. Pp188.
6. **Murugesan, S.**, C. Rajeshkannan and N. Senthilkumar. 2012. *Aegle marmelos* seed oil based biopesticide, An Ecofriendly Strategy for the management of teak defoliators. LAP Lambert Academic Publishing, Germany. Pp124.
7. **Murugesan, S.**, N. Senthilkumar and N. Krishna Kumar. 2013. Bioprospecting: Scope, challenges and prospects, IFGTB, Pp164.
8. **Murugesan, S.**, N. Senthilkumar and N. Krishna Kumar. 2013. Training workshop (manual) on Bioprospecting: Role of state forest departments. IFGTB, Pp 142.
9. Senthilkumar, N., and **S. Murugesan**. 2014. Orthoptera (Grasshoppers) of Nilgiris Biosphere Reserve: A systematic information. IFGTB, Coimbatore. Pp56. ISBN:978-93-82387-09-1.
10. **Murugesan, S.**, N. Senthilkumar and R.S. Prashanth. 2016. Forest resources in India: Opportunities in Bioprospecting. IFGTB publications. Pp243.
11. **Murugesan, S.**, N. Senthilkumar 2016. Training manual on “Instrumentation methods and phytochemical analysis” IFGTB publications, pp 84.

### Chapter in Editorial book

1. **Murugesan, S. and N. Senthilkumar. 2010.** Ecological Interactions and impact of biodiversity of Insects in Social Forests. In: Prof. T.N. Ananthkrishnan (ed.) Insect Biodiversity: Functional Dynamics and Ecological Perspectives. Scientific Publishers (India), Jodhpur. Pp.107-125
2. Senthilkumar, N., S. Murugesan, P. Manivachakam, D. Suresh Babu and M. Monisha. 2013. Species richness, climate change and altitudes: A study on diversity of Orthoptera in Nilgiris shola forests and grasslands. 135-142. In (Eds.). Balu *et al.*, Proceedings of the National Seminar on Forest Health Management. 22<sup>nd</sup> & 23<sup>rd</sup> March 2012, IFGTB, Pp 586.
3. Murugesan, S., R. Sumathi, S. Santhi, N. Senthilkumar, C. Rajesh Kannan, P. Manivachakam, and R. Lakshmi Devi. 2013. Impact of biochemical signals of Frankia on *Casuarina equisetifolia*. 527-536. In (Eds.). Balu *et al.*, Proceedings of the National Seminar on Forest Health Management. 22<sup>nd</sup> & 23<sup>rd</sup> March 2012, IFGTB, Pp 586.

### **Training imparted**

1. Imparted training on “Instrumentation methods and chemical analysis” on 27&28<sup>th</sup> July, 2009 at IFGTB, Coimbatore.
2. Imparted training on “Instrumentation methods and chemical analysis” on 9&10<sup>th</sup> September, 2009 at IFGTB, Coimbatore.
3. Imparted training on “Instrumentation methods and chemical analysis” on 27&28<sup>th</sup> September, 2010 at IFGTB, Coimbatore
4. Two days Training workshop on “Bioprospecting-Role of state forest departments need to play” to IFS officials was imparted during 1<sup>st</sup> & 2<sup>nd</sup> August, 2013 sponsored by MoEF, Govt. of India. Total of 25 IFS officers from various states participated in the training programme.
5. Two days Training workshop on “Bioprospecting-Role of state forest departments need to play” to IFS officials was imparted during 23& 24 July, 2015 sponsored by MoEF, Govt. of India. Total of 25 IFS officers from various states participated in the training programme.
6. Two days Training workshop on “Bioprospecting-Role of state forest departments need to play” to IFS officials was imparted during 21-22<sup>nd</sup> July, 2016 sponsored by MoEF, Govt. of India.
7. Imparted Hands on training on “Bioprospecting – Instrumentation methods and phytochemical analysis” during 17-19<sup>th</sup> August, 2016 at IFGTB, Coimbatore.
8. Imparted Hands on training on “Bioprospecting – Instrumentation methods and phytochemical analysis” during 22 – 23<sup>rd</sup> December 2016 at IFGTB, Coimbatore.
9. Imparted Summer Internship training on “Biotechnology, Microbiology and Bioprospecting module” during 15th – 31st May, 2017 at IFGTB, Coimbatore