Name of the Project	**Development of Nano-biopesticides for application in forestry and agriculture:**
Principal Investigator	Dr. N. Senthilkumar, Scientist- G
Co-Principal Investigator	Smt. R. Sumathi, CTO
Objectives	1. Isolation and taxonomic confirmation of endophytic fungi from selected tropical tree species. 2. Screening and evaluation of endophytic fungi of entomopathogenic significance. 3. Characterization of chitosan encapsulated (nano-encapsulation) endophytic fungi of entomopathogenic significance. 4. Development and evaluation of nano-biopesticides against insect pests of forestry and agricultural importance.

Significant achievements

The healthy leave samples of *Tectona grandis, Ailanthus excelsa, Gmelina arborea* and *Pterocarpus santalinus* were collected from the trees free from insect and disease infestation different agroclimatic zones of Tamilnadu Viz., Thondamuthur, Siruvani, Annur, Valparai, Coimbatore, Palladam, Trichy, Tanjore, Thovarankuruchi and Karaikudi and surrounding areas. Leaves of *Tectona grandis* (26 trees)*, Ailanthus excelsa* (38 trees)*, Pterocarpus santalinus* (33 trees) and *Gmelina arborea* (58 trees) were collected. 112 entophytic fungi were isolated from the leaves of *T. grandis, A. excelsa, G. arborea and P. santalinus.* The isolated and identified entophytic fungi were evaluated for their entomopathogenic significance against *Eligma narcissus* and *Spodoptera litura* and found that *Cladosporium* spp, *Aspergillus* spp. *Curvilaria* spp, *Trichoderma* spp, and *Botryodiplodia* spp were very effective. 13 endophytic fungi observed to have entomopathogenic significance. The sequences of the 14 entomopathogenic endophytic fungi isolated from teak, Gmelina, ailanthus and red sanders were identified and deposited in NCBI GenBank MW882241to MW882247 and OL801347 to OL801353.

Optimized the technique for the synthesis of chitosan nano particle needed for the nano encapsulation of the selected entomopathogenic endophytic fungi Thirteen entomopathogenic endophytic fungi were used for encapsulation with synthesized chitosan nanoparticles. Synthesized chitosan nanoparticles of endophytic fungus were confirmed by-UV spectroscopy and subjected to nano characterization such as SEM and Particle Size Analysis (PSA) with Zeta potential and they follow nano particle as per reference. The X-Ray diffraction (XRD) pattern of nano chitosan and nano chitosan encapsulated fungal endophyte powders showed the presence of crystallographic structures and characteristic diffraction peaks. It was also confirmed for encapsulation and nano formation using FTIR analysis.

Evaluated larvicidal activity of nanochitosan encapsulated entomopathogenic fungal endophytes viz. *Aspergillus terrus*, *Aspergillus flavus, Rhizopus oryzae, Trichoderma reesei, Aspergillus sp. Trichoderma virens, Cladosporium sp*. *Colletotrichum sp*. *Curvilaria sp*. *Aspergillus sp*. *Lecanicillium lecanii*, *Aspergillus terrus*, *Trichoderma sp*. *Fusarium sp*, *Acremonium borodinense* and *Trichoderma harzianum* at various concentration viz. 500ppm, 1000, 1500, 2000 and 2500ppm against the larvae of *Eligma narcissus* under nursery conditions. Significant mortality rate was observed as compared with control. *Acremonium borodinense, Cladosporium sp*. and *Colletotrichum sp*. The nano encapsulated entomopathogenic endophytic fungi were observed to have significant biopesticidal efficacy against targeted insect with no toxicity against beneficiary organism and honey bees and found promising for the development of nano biopesticide.

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