



## TMC MM 3.3: Development, validation, utilization and / or commercialization of bio-pesticides and bio-inoculants

### Introduction:

The earlier project in the X plan under TMC focused mainly on the management of bollworms through the use of pesticide - and temperature-tolerant strains of *Trichogramma* and use of insect pathogens. Since the bollworms have got relegated to the secondary status due to large-scale adoption of Bt cotton, and in its wake, other pests have gained significance, it is necessary to reorient the activities. Entomophages are expected to be conserved effectively under low pressure of pesticides in Bt cotton, but the microbials have remained unexplored to the extent desired. Preliminary studies have given us leads to the high level specificities existing in different classes of microbes. Therefore, it would be essential to take these specific microbes to the level of CIB registration and commercial exploitation to make tangible impact.

### Objectives:

1. To explore potent microbials and their screening against major pests of Bt-cotton
2. To evaluate induced systemic resistance of potential antagonists
3. To generate data for microbes with potential and need for

registration

4. To commercialize new bio-pesticide strains

### Salient findings:

Two new parasitoids *Promuscidea unfasciativentris* Girault (Chalcidodea: Aphelinidae) and *Aenasius bambawalea* (Chalcidodea: Encyrtidae) were found parasitizing *Phenacoccus solenopsis* on cotton and *Parthenium* from Maharashtra and Delhi, respectively. Their parasitization on cotton as well as on weeds ranged from 20-70%. *Fusarium pallidoroseum* was isolated from mealy bug (*Phenacoccus solenopsis*) cadavers collected from Haryana and Maharashtra. Evaluation of *F. pallidoroseum* against adult mealy bug exhibited 0.0 to 30.0 per cent adult mealy bug mortality. Bioassay studies conducted with 13 isolates of *Verticillium lecanii* (at 10<sup>7</sup> spores/ml) against the nymphal stage of cotton mealy bug indicated that all isolates caused nymphal mortality ranging from 6.67 to 58.33 per cent. Isolate VI-5 recorded a maximum of 100% mortality followed by VI 1 (95 per cent) at Coimbatore. Village level trial conducted in Haryana with commercial formulations of *V. lecanii* indicated 45.8 to 55.1 per cent

reduction in mealy bug population. Compatibility of *V. lecanii* with seven insecticides indicated more than 80 per cent inhibition in case of quinalphos, profenophos, carbaryl and chloropyrifos. Imidacloprid followed by thiodicarb and acephate appeared to be compatible. Screening of 26 native entomopathogenic fungi against mealy bug under laboratory condition indicated that all the isolates were able to cause nymph and adult mortality (range 20-100 per cent). Bacterial symbionts of EPN (*Photorhabdus/Xenorhabdus*) were found pathogenic to mealy bug colonized on potato sprouts. Out of 6 *Trichoderma* isolates collected from Tamil Nadu, Iso1 was found most effective in inhibiting the growth of the major soilborne pathogens viz., *Rhizoctonia solani* (65.55 per cent inhibition), *Fusarium oxysporum* pv. *vasinfectum* (70.00% inhibition) and *Macrophomina phaseolina* (68.88% inhibition). Preliminary screening of ten isolates of *Streptomyces* spp against *R. solani*, *F. oxysporum* pv. *vasinfectum* and *M. phaseolina* indicated that the isolate Iso 2 was highly inhibitory (>50%) in reducing the growth of all the pathogens.