

PhD Thesis Abstract

Bio-control based management of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee

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ABSTRACT

Brinjal shoot and fruit borer, *Leucinodes orbonalis* is the most serious pest of brinjal. As currently the farmers rely exclusively on the application of pesticides to control *L. orbonalis* the level of contamination exceeded the Maximum Residue Limit (MRL) in brinjal fruits in India. By considering these impacts of insecticides the present study was conducted to formulate bio-intensive pest management (BIPM) against *L. orbonalis*. The survey conducted at Coimbatore and Erode districts confirmed the availability of pupal parasitoid of *L. orbonalis*, *Trathala flovo-orbitalis* in the fields. The study on seasonal incidence of *L. orbonalis* at Thondamuthur, Coimbatore during the year 2014 revealed that the maximum ($r = -0.78^*$) and minimum ($r = -0.43$) temperature negatively correlate with the damage intensity of *L. orbonalis* whereas Relative Humidity (RH) ($r = 0.17$) and rainfall ($r = 0.41$) positively correlate with the damage intensity. Further it was found that the maximum temperature played a major role in adult emergence and fluctuating the population of moth. The biology of *L. orbonalis* revealed that there was 5 larval instars in the lifecycle of *L. orbonalis* and the weather parameters existed in Rabi, 2013 ($27 \pm 5^\circ\text{C}$) promoted the fecundity, incubation period and hatchability of eggs of *L. orbonalis* as well as developmental period and growth of all life stages of *L. orbonalis*. Screening of 35 brinjal germplasm showed that the germplasm with lower shoot thickness, short fruit pedicel and calyx with higher trichome density on lower surface of leaves were less susceptible against the infestation of *L. orbonalis* hence; priority should be given to these biophysical characteristics while developing host plant resistance varieties in breeding programmes. The pheromone trap efficiency studies revealed that Wota-T trap installed at crop canopy level with 3 mg lure concentration replaced at every 21 days were found effective in trapping the maximum number of *L. orbonalis* moths. Research on egg parasitoids of *L. orbonalis* insufficient. Hence different *Trichogramma* species of egg parasitoids were tested for their efficacy against *L. orbonalis* under laboratory condition. Among the nine different species of *Trichogramma*, *T. pretiosum* and *T. embryophagum* performed well in laboratory and field conditions in reducing population of *L. orbonalis* with maximum yield in brinjal at field conditions. Further it was found that *T. pretiosum* (92%) and *T. embryophagum* (90%) had higher parasitization against the eggs of *L. orbonalis* whereas *T. chilonis*, *T. dendrolimi* and *T. evanescens* had no efficacy against *L. orbonalis*. Moreover, it was noted that the parasitoids preferred freshly laid eggs of *L. orbonalis* for parasitization and the selection of eggs for parasitization was reduced with the aging of host eggs. In addition, parasitoids showed various emergence rates and maximum emergence rate was observed in *T. embryophagum* (90.2%) and *T. pretiosum* (87.5%). Almost all *Trichogramma* sp. tested in this study were eco-friendly and protected the other natural enemies prevailed in brinjal cultivation. Results of pathogenicity test of three entomopathogenic fungi @ 2×10^9 conidia per ml and Bt k showed maximum mortality by *Verticillium lecanii* against all larval instars of *L. orbonalis*. Among the plant product insecticides and FORS, NSKE 5% had higher efficacy in functioning as ovicide, larvicide and adulticide against the *L. orbonalis*. Acetamiprid 20% SP performed well among newer molecular insecticides tested against the eggs of *L. orbonalis*. It was noticed that almost all insecticides reduced the shoot infestation substantially in 14 days after 2nd spray. Chlorantraniliprole 18.5% SC was found to be the most effective insecticides in reducing shoot and fruit infestation in brinjal cultivation by *L. orbonalis*. Bio-Intensive Pest Management (BIPM) module with the management practices viz., installation of pheromone traps, seasonal release of *Trichogramma pretiosum* and *T. embryophagum*, spraying of *Verticillium lecanii*, NSKE 5%, Acetamiprid 20% SP and Chlorantraniliprole 18.5%, evaluated against *L. orbonalis* on brinjal recorded a lesser shoot infestation of *L. orbonalis* as compared to farmer's practice. BIPM was found to be superior to farmer's practice in all aspects in the brinjal field experiment.