

OBJECTIVES & SCOPE OF THE STUDY

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3.1 Objectives

Objectives of the proposed study are as follows:

- To rear tea mosquito bugs *Helopeltis theivora* collected from Terai tea plantations in laboratory condition and carry out bioassays for determining lethal concentration (LC) values of some common pesticides belonging to organophosphate and synthetic pyrethroid groups.
- To assess the activity of defence enzymes such as general esterase, glutathione *S*-transferase (GST) and cytochrome P450 (monooxygenases) quantitatively in pesticide selected *H. theivora* population.
- To assess general esterase and cytochrome P450 (monooxygenases) qualitatively in pesticide selected *H. theivora* population.
- To study the reaction pattern of synergists with defence enzymes in *H. theivora* population.
- To develop a user-friendly and quick detection technique of pesticide tolerance level based on defence enzyme titer and activity for *H. theivora* populations.
- To study aspects of the lifecycle, such as fecundity and developmental period of the common spider predator and its predation efficacy against *H. theivora*.

3.2 Scope of the study

A thorough study of the scientific literature published mostly on the management practices and damage potential confirmed the status of *Helopeltis theivora* as a major pest of tea plantations in India. The bug is one of the common and most destructive sucking pests that feed primarily on tender leaves and shoot of tea grown in Terai and the Dooars region in the northern part of the Indian state of West Bengal. The extent and severity of infestation even in other parts of India are such, that the bug is declared as a pest of national importance (Roy et al., 2015). Currently, the management of the pest is mostly based on synthetic chemicals. Such chemical driven pest management systems are reported to be responsible for the development of resistance in the pest besides other drawbacks (Gurusubramanian et al., 2008). The level of tolerance in *H. theivora* population on being detected at field level warrants a

choicest selection of pesticides and their concentrations for effective management of the pest. A research investigation in this direction is imperative if the chemical control has to be practiced sustainably.

Review of literature revealed paucity of research towards conscious deployment of natural enemies as a part of the biological control for management of *H. theivora* and other tea pests. The tea agroecosystem of NE India treasures a bountiful of pests' natural enemies including spiders, but seldom attention has been paid for tapping their immense potential as biocontrol agents for pest management.

To bridge these identified research gaps, an important step in the direction of the sustainable management of *Helopeltis theivora*, objectives of the present research study (as mentioned in the preceding section) were set and delineated. The study intends to generate:-

- i) Baseline information on the levels of pesticide tolerance based on lethal concentration values in tea mosquito bug *H. theivora* population from tea plantations of Terai.
- ii) An enzyme-based, quick assay technique for determining the level of pesticide tolerance in *H. theivora* populations will prove to be another helpful and handy tool in deciding upon the kind, dosage and formulation of pesticide for effective management of the pest.
- iii) Knowledge of biology and predation potential of common spider predator, *Oxyopes javanus* against *H. theivora* that will greatly help in evaluating the efficacy of the natural enemy in biologically controlling the pest under Integrated Pest Management.