

Effect of ethofenprox, cartap hydrochloride and endosulfan on the incidence of two major parasitoids *Aprostocetus purpureus* Cameron (Hymenoptera : Eulophidae) and *Tachardiaephagus tachardiae* Howard (Hymenoptera: Encyrtidae) on lac crop

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ABSTRACT

Studies on the effect of three insecticides viz., ethofenprox, cartap hydrochloride and endosulfan on the survival of lac insects and the incidence of its parasitoids viz., *A. purpureus* and *T. tachardiae* on rainy season *rangeeni* lac crop growing on *Butea monosperma* revealed that incidence of these parasitoids was not affected by these insecticides.

The insect parasitoids in lac ecosystem constitute third trophic level and are of considerable importance from commercial point of view. Belonging to mainly chalcid group, most of these species inflict damage to lac crop (5-10%) without easily identifiable symptoms. Besides, dispersal from existing crop in the field, broodlac (lac seed) is one of the major sources of incidence for these parasitoids. In order to prevent the crop from attack of insect predators and parasitoids, the broodlac sticks are kept inside 60 mesh nylon net bag at the time of crop inoculation, enabling trapping of all species of parasitoids and predators but allowing only lac crawlers to come out for settlement on new shoot (Malhotra, 1983). However, if standing crop is infested, there are no control measures and sometimes the whole crop is lost due to parasitization. Of the eight major parasitoids (Varshney, 1976), *Aprostocetus purpureus* Cameron and *Tachardiaephagus tachardiae* Howard are most prevalent and cause extensive damage to lac crop (Srivastava and Mehra, 1980; Srivastava *et al.*, 1976). Endosulfan, dichlorvos, cartap hydrochloride and ethofenprox are selective insecticides recommended for the management of lepidopteran predators, *Eublemma amabilis* Moore and *Pseudohypatopa pulvereana* Meyrick and the neuropteran, *Chrysopa* spp (Malhotra and Katiyar, 1975; Malhotra and Katiyar 1979; Mishra *et al.*, 1995; Mishra *et al.*, 1996; Jaiswal *et al.*, 2004). During the course of experiments to assess the performance of ethofenprox (10 EC), cartap

hydrochloride (50 SP) and endosulfan (35 EC), for management of insect predators of lac insect, observations were also carried out on the incidence of parasitoids of lac insect to assess whether the insecticides have any effect on their incidence.

MATERIALS AND METHODS

The experiment was carried out during rainy season lac crop of *rangeeni* strain growing on trees of *Butea monosperma*. There were nine treatments, each replicated thrice and a control. Five concentrations of ethofenprox (0.005, 0.01, 0.02, 0.03 and 0.04%), three concentrations of cartap hydrochloride (0.05, 0.075, 0.1%) and recommended dose of endosulfan (0.05%) were applied on lac insect culture with the help of a rocking sprayer at 30th day stage of lac crop. Lac encrusted twigs of 30 cm length were collected randomly as samples from each tree at 20th and 40th day after insecticide application and kept inside 60 mesh synthetic net bags. Observation on mortality of lac insect, and emergence of different species of parasitoids from samples was taken. Several species of parasitoids emerged out of the lac encrustation but the population of *A. purpureus* and *T. tachardiae* was greater in comparison to others and were taken into consideration. Analysis of variance was carried out to test the null hypothesis amongst various treatments and control where no insecticidal application was given.

RESULTS AND DISCUSSION

The results presented in table 1 reveal that there was no significant difference in mortality of lac insect between control (check) and various treatments as also amongst different dosages of ethofenprox. Similarly, mortality of lac insect with endosulfan and cartap hydrochloride also does not differ significantly indicating the safety of tested dose of all the insecticides on 20th and 40th day of treatment. The incidence of *A. purpureus* varied between 1.8-4.8 with different dosages of ethofenprox, 1.8-6.8 with cartap hydrochloride, 5.8 with endosulfan and 2.8 only in control at 20th day after insecticide application. However these figures do not differ significantly in comparison to control and also within the treatments. Similarly at 40th day of treatment also there was no difference in the population. of *A. purpureus*.

The mean population of *T. tachardiae* at 20th day of treatment with different concentration of ethofenprox and cartap hydrochloride varied from 1.5-5.3 and 1.5-6.3 per 30 cm lac encrustation respectively. While the corresponding figure with endosulfan and in control was 6.0 and 3.0 respectively. There was no significant difference in the population between control and different treatment as well as amongst different treatments at 20th and 40th day of application. Hence these three insecticides do not affect the population density of *A. purpureus*

and *T. tachardiae*, the two major parasitoids of lac insect. For management of *E. amabilis* under field condition 0.02% ethofenprox and 0.05% cartap hydrochloride are suitable doses without any adverse effect on lac insect (Jaiswal *et al.*, 2004; Bhattacharya *et al.*, 2005), but these are ineffective on the parasitoid population.

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Table 1. Effect of insecticides on survival of lac insects and incidence of its parasitoids in rainy season *rangeeni* lac crop on *Butea monosperma* (values per 30 cm length of encrustation)

Insecticide	Conc. (%)	20 days after application			40 days after application		
		Mean % mortality of lac insect	Mean no. of <i>A. purpureus</i>	Mean no. of <i>T. tachardiae</i>	Mean % mortality of lac insect	Mean no. of <i>A. purpureus</i>	Mean no. of <i>T. tachardiae</i>
Ethofenprox	0.005	3.5	2.5	2.0	4.8	0.8	5.5
	0.01	4.5	1.8	5.3	8.0	0.0	6.0
	0.02	6.3	3.8	3.3	3.5	2.5	9.3
	0.03	8.0	4.8	4.0	12.0	0.0	2.5
	0.04	12.0	4.0	1.5	5.2	2.8	2.0
Cartap hydrochloride	0.05	11.0	1.8	1.5	9.7	12.0	5.3
	0.075	13.2	3.0	3.0	8.8	4.5	16.5
	0.10	11.4	6.8	6.3	7.7	6.8	24.5
Endosulfan	0.05	16.3	5.8	6.0	11.8	1.8	1.5
Control	-	7.20	2.8	3.0	11.5	2.8	3.3
		NS	NS	NS	NS	NS	NS

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