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Laboratory evaluation of toxicity of commercially used insecticides against egg parasitoid, *Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae)

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ABSTRACT: **The effect of four commercially used insecticides on tomato crop was studied on *Trichogramma chilonis* Ishii and its parasitism under laboratory conditions. The toxic effect of these insecticides on 1, 3, 5 and 7- day old eggs of *Corcyra cephalonica* (Stainton) parasitized by *T. chilonis* was also studied. Acephate (0.05%) proved safer to the parasitized host as well as to the adult parasitoid. However, the emergence of adults from treated parasitized eggs was significantly lower than the untreated control.**

KEY WORDS: Egg parasitoid, insecticides, *Trichogramma chilonis*

Trichogramma chilonis Ishii is a potential egg parasitoid of tomato fruit borer, *Helicoverpa armigera* (Hübner). It is the only natural enemy being used for inundative releases in vegetable ecosystem. Since use of insecticides continues to be a major tool for the farmers to check the insect pests of vegetable crops, it is essential to know the effect of these insecticides on *T. chilonis* for the integration of these two components in vegetable IPM. Hence, the present study was undertaken to know the effect of these insecticides on parasitization due to *T. chilonis* under laboratory conditions.

MATERIAL AND METHODS

Four insecticides, *viz.*, acephate 0.05 per cent (Starthene 75 SP), deltamethrin 0.0028 per cent (Decis 2.8 EC), endosulfan 0.05 per cent (Thiodan 35 EC) and malathion 0.05 per cent (Massthion 50 EC) were evaluated. Two sets of experiments were conducted to examine their effect on egg parasitoid (*T. chilonis*) reared on *C. cephalonica* eggs under laboratory conditions in the Department of Entomology, Himachal Pradesh Krishi Vishvavidyalaya, Palampur.

Two hundred eggs of *C. cephalonica* were mounted on each card (10x2.5 cm) with gum acacia. The cards were sprayed with different insecticides with an atomiser @ 0.5 ml spray fluid per card. The spray fluid was prepared by mixing the insecticides with tap water. Untreated cards were sprayed with tap water only. After drying of spray fluid, each card was exposed in a glass tube to 20 adults of *T. chilonis* for 24 hours. The mortality of adults was observed after 2 and 24 hours of release. The rate of parasitism was

recorded. The experiment was replicated thrice and the data were analysed statistically after angular transformation.

The effect of these insecticides was studied on 1, 3, 5 and 7-day-old eggs of *C. cephalonica* parasitized by *T. chilonis*. In each treatment, 3 cards each having 200 eggs which were exposed to parasitoids prior to spraying, were sprayed at 1, 3, 5 and 7 days after parasitism. The cards for control were sprayed with water only. In all the treatments, 100 parasitized eggs were kept on each card, while the remaining were removed with the help of a camel-hair brush and a needle. The number of parasitoids emerged were counted in each case. The data were analysed statistically. The above experiments were conducted during September-October, 1999 under laboratory conditions in a B.O.D. incubator (Temperature 26±1° C and relative humidity 70±5%).

RESULTS AND DISCUSSION

Effect of insecticides on *T. chilonis* adults and parasitism of host eggs

The data presented in Table-1 revealed that deltamethrin (0.0028%), malathion (0.05%) and endosulfan (0.05%) caused 91.48, 76.79 and 76.66 per cent mortality of adults within 2 hours, respectively, whereas acephate (0.05%) caused only 17.27 per cent mortality. After 24 hours, all the insecticides gave 100 per cent mortality except acephate (50.92%). Maximum parasitism (69.80%) was observed in the untreated eggs. Among the treated eggs, 48.14 per cent parasitism was observed in the case of acephate. Poor parasitism was noticed in all other treatments. The emergence of parasitoid was also higher in control (63.83%) as compared to acephate (44.01%).

Table 1. Effect of insecticides on the mortality, rate of parasitism and emergence of *T. chilonis*

Treatment (Conc.%)	Mean per cent mortality		Mean parasitism (%)	Mean emergence (%)
	2 h	24 h		
Acephate (0.05)	17.24 (24.43)*	50.92 (45.53)	48.14 (43.92)	44.01 (41.54)
Deltamethrin (0.0028)	91.48 (75.77)	100.00 (88.19)	4.54 (12.21)	3.62 (10.89)
Endosulfan (0.05)	76.66 (61.49)	100.00 (88.19)	2.90 (9.48)	1.92 (7.73)
Malathion (0.05)	76.79 (61.46)	100.00 (88.19)	5.13 (12.74)	3.42 (10.36)
Control (untreated)	5.25 (13.02)	28.71 (31.30)	69.80 (56.92)	63.83 (53.11)
CD (P=0.05)	(7.56)	(6.79)	(4.62)	(3.60)

* Figures in parentheses are angular transformed values.

These findings are in line with those of Varma *et al.* (1988,1991) and Mani (1995).

Effect of insecticides on the emergence of parasitoid from the eggs of *C. cephalonica*

When parasitized eggs of different ages were treated with insecticides, there was no effect on the emergence from 1 and 3- day-old parasitized eggs. However, emergence from 5-day-old parasitized eggs was significantly lower than 1 and 3-day-old eggs which in turn was higher than 7-day-old parasitized eggs (Table 2).

The emergence from untreated parasitized eggs was significantly higher (63.56%) than the eggs treated with all the insecticides. The emergence from acephate treated eggs was 36.14 per cent followed by endosulfan (32.43%), deltamethrin (29.81%) and malathion (15.58%). Similar observations were reported by Shukla *et al.* (1988), Hohman (1991) and Rajendran and Hanifa (1997).

It is concluded that acephate (0.05%) is comparatively safer to this parasitoid followed by endosulfan (0.05%). Hence these insecticides can be safely recommended to be used on tomato crop if proper waiting periods are followed.

Table 2. Effect of insecticides on the emergence of *T. chilonis* adults from the parasitized eggs of *C. cephalonica*

Treatment (Conc.%)	Mean per cent emergence from parasitized eggs of different ages				Mean
	1d	3d	5d	7d	
Acephate (0.05)	48.78 (44.29)*	43.59 (40.46)	37.25 (37.22)	14.94 (22.67)	36.14 (36.16)
Deltamethrin (0.0028)	38.33 (38.20)	35.54 (36.52)	25.63 (30.25)	19.75 (26.06)	29.81 (32.76)
Endosulfan (0.05)	45.94 (42.65)	42.82 (40.81)	27.23 (31.41)	13.73 (21.72)	32.43 (34.15)
Malathion (0.05)	24.42 (29.55)	23.45 (28.87)	12.64 (20.63)	2.22 (7.79)	15.58 (21.71)
Control (untreated)	75.86 (61.46)	69.90 (56.98)	57.41 (49.32)	51.09 (45.63)	63.56 (53.35)
Mean for days	46.67 (43.23)	43.06 (40.71)	32.03 (33.76)	20.35 (24.77)	

* Figures in parentheses are angular transformed values.

CD (P=0.05) for treatment = (3.09)

for days = (2.76)

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