

**RESEARCH ARTICLE :**

Effect of different insecticides on adult emergence of *Trichogramma japonicum* (Ashmead)

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SUMMARY : The present investigations were undertaken on laboratory studies of *Trichogramma japonicum* (Ashmead) during the year 2013-2014 in the Bio-control laboratory, Department of Agricultural Entomology, College of Agriculture, Dapoli (Maharashtra). The results of effect of different insecticides on adult emergence of *T. japonicum* revealed that insecticides viz., oxydemeton methyl and cypermethrin can be safely used in the field after release of *T. japonicum*. However, insecticides viz., dimethoate, indoxacarb and emamectin benzoate can wisely used in the field 4-5 days after release of *T. japonicum*, while use of malathion and dichlorvos should strictly be avoided.

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KEY WORDS:

Adult emergence,
Oxydemeton methyl,
Cypermethrin,
Dimethoate,
Malathion,
Trichogramma japonicum

BACKGROUND AND OBJECTIVES

Several parasitoids and predators of different crop pests have been successfully used in pest management. After the era of indiscriminate use of synthetic pesticides, inundative release of bio-control agents as a mean of pest management subsequent to their mass production on a commercial scale has become very popular. Among the several parasitoids successfully used in the pest management strategies, *Trichogrammatids* are one of the most important groups of bio agents with renowned interest for the suppression of lepidopterous pests all over in India. *Trichogrammatids* are one of the important parasitoids amenable for mass production, which can be accomplished by

mass culturing its factitious host, either *Corcyra cephalonica* (Stainton) or *Sitotroga cerealella* (Olivier). Due to its amenability to mass production, this group of parasitoids has the distinction of being maximum produced and released in the world. Eggs of minute endoparasitoids are released in crops or forest in large numbers (upto several millions/ha) as per the presence of pest eggs.

Trichogramma wasps, minute in size from the friendly insect fauna, are used as biological control agent against lepidopterous insects in integrated pest management of crops and vegetables (Nagarkatti and Nagaraja, 1977). It is a very aggressive parasitoid and has the ability to increase in number. *Trichogramma* are being used to control lepidopterous pests of cotton, cabbage,

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apple and tomato etc. (Smith, 1996). It is the widely used natural enemy of pests owing to its rearing abilities in insectaries and ravenous parasitising tendency on eggs of variety of target hosts.

Several insecticides that are widely used to suppress various pests can disrupt the effectiveness of these beneficial agents. Thus, assessment on the safety of insecticides to natural enemies was essential. Detailed knowledge of the effects of different pesticides on the natural enemies will help to determine the type of spray and the timing of sprays, thus, avoiding contact with their most susceptible stages.

RESOURCES AND METHODS

To study the sensitivity of *T. japonicum* to insecticides:

Design	:	C.R.D
Treatments	:	8
Repetitions	:	3

The treatment details and the treatment concentrations are as below:

Sr. No.	Treatments	Concentration (%)
1.	Cypermethrin 25EC	0.0075
2.	Dimethoate 30 EC	0.05
3.	Oxydemeton methyl 25 EC	0.02
4.	Indoxacarb 15.8 SC	0.01
5.	Emamectin benzoate 5 SG	0.002
6.	Malathion 50 EC	0.05
7.	DDVP 50 EC	0.05
8.	Control	-

Effect on adult emergence:

Required number of white card paper strips (4 x 3.5 cm) with U.V. sterilized 100 *Corcyra* eggs glued with the help of diluted gum were prepared and mass exposed to *T. japonicum* females for 24 h. After four days when the eggs changed their colour to black, the strips along with the parasitised eggs were sprayed with respective insecticide solution. In control, the card strips were sprayed with water only. They were then air dried and individually kept in plastic vial (7.5 x 7 cm). Observations were recorded on per cent adult emerged from each treatment. Based on reduction in adult emergence as compared to control, the insecticides were categorized into four categories.

Sr. No.	Particulars	Reduction in adult emergence over control (%)	Score
1.	Harmless	<30	1
2.	Slightly harmful	30 to 79	2
3.	Moderately harmful	80 to 99	3
4.	Harmful	>99	4

(Baladandi *et al.*, 2005)

OBSERVATIONS AND ANALYSIS

The findings of the present study as well as relevant discussion have been summarized under following heads:

Sensitivity of *T. japonicum* to insecticides for adult emergence:

The data revealed that significantly highest per cent adult emergence was recorded in control (98.47 %) followed by oxydemeton methyl and cypermethrin with per cent adult emergence of 95.26 and 92.07, respectively and were at par. Further reduction in adult emergence was recorded in dimethoate and emamectin benzoate with (84.85%) and (80.54%), respectively and were at par followed by indoxacarb with per cent adult emergence of 70.79. No adult emergence was recorded in malathion (0.00%) and DDVP (0.00%). DDVP and malathion, both were more toxic insecticides for adult emergence and caused cent per cent mortality of the developing *T. japonicum* adults within the eggs.

From the data the categories allotted to different insecticides based on per cent reduction in adult emergence over control were as below.

1	=	Harmless (<30 % reduction)	:	Cypermethrin, dimethoate, oxydemeton methyl, indoxacarb, emamectin benzoate.
2	=	Slightly harmful (30 to 79% reduction)	:	No insecticide
3	=	Moderately harmful (80 to 99% reduction)	:	No insecticide
4	=	Harmful (>99% reduction)	:	Malathion and DDVP

Oznipar and Kornosor (1998) studied the effect of four different insecticides recommended for the control of corn pests on the adult emergence of *T. evanescens* (Hymenoptera, Trichogrammatidae) from the parasitised host eggs of *O. nubilalis* (Lepidoptera, Pyralidae) at field conditions. In the plots, which were sprayed with monocrotophos, cyfluthrin, thiodicarb and cypermethrin,

Table 1: Effect of different insecticidal treatments on adult emergence of *T. japonicum*

Sr. No.	Treatment	Concentration (%)	Mean per cent adult emergence	Per cent reduction in adult emergence over control	Score
1.	Cypermethrin 25 EC	0.0075	92.07 (74.96)	6.49	1
2.	Dimethoate 30 EC	0.05	84.85 (67.51)	13.83	1
3.	Oxydemeton methyl 25EC	0.02	95.26 (78.15)	3.25	1
4.	Indoxacarb 15.8 SC	0.01	70.79 (59.48)	28.11	1
5.	Emamectin benzoate 5 SG	0.002	80.54 (64.65)	18.20	1
6.	Malathion 50 EC	0.05	0.00 (0.00)	100	4
7.	DDVP 50 EC	0.05	0.00 (0.00)	100	4
8.	Water	-	98.47 (84.42)	0.00	1
	S.E. ±		4.85	-	-
	C.D. (P=0.05)		14.54	-	-

Note: Figures in the parentheses are arcsine values

the adult emergence from the parasitised host eggs was 58.71, 49.98, 48.89 and 47.93 per cent, respectively. The adverse effect of all insecticides was considerably higher than the untreated plot. According to them, monocrotophos was considered to be relatively safe to *T. evanescens*. The effect of the remaining insecticides was similar.

Samantha *et al.* (2006) evaluated the residues of different insecticides in/on brinjal and their effect on *T. chilonis* and *T. japonicum*. They noticed that alpha cypermethrin was safest towards both the species. Considering the retention period of the toxicant, they recommended to release both the parasitoids in the cropping ecosystem after 3 to 5 days of alpha cypermethrin, 4 to 6 days of methomyl and 6 to 7 days of quinalphos spray, respectively depending upon the treatment doses.

Kaur *et al.* (2009) screened some insecticides against egg parasitoid *T. brasiliensis*. They found that seven insecticides were extremely toxic to adults, while four slightly toxic and two chemicals were harmless. At pupal stage abamectin and imidacloprid were slightly toxic with > 50 per cent emergence but extremely toxic to emerged adults after 24 hours *i.e.* < 10 per cent survival. Endosulfan, monocrotophos and cypermethrin were slightly toxic for adult and pupa with maximum survival in cypermethrin.

Hussain *et al.* (2010) tested the effect of ten insecticides (emamectin benzoate 1.9EC-40 ppm, indoxacarb 150SC-260 ppm, lufenuron 50EC-1000 ppm, bifenthrin 10EC-250 ppm, spinosad 240SC-200 ppm, carbosulfan 20EC-500 ppm, chlorpyrifos 40EC-3200 ppm, triflumuron 20SC-400 ppm, imidacloprid 200SL-500 ppm

and abamectin 1.8EC-40 ppm) on pre-imaginal development and adult survival of egg parasitoid, *T. chilonis*. The results revealed that all insecticides except emamectin benzoate, lufenuron, triflumuron and imidacloprid had a significant adverse effect on the emergence of *T. chilonis* when exposed to all immature stages of development (egg, larvae, pre-pupae, early pupae and pupae) in the host eggs of *S. cerealella*. At adult *Trichogramma* exposure to insecticides, imidacloprid, abamectin, triflumuron, emamectin benzoate, indoxacarb and lufenuron had 70.02, 32.19, 27.62, 25.98, 21.45 and 18.48 per cent survival, respectively after 4 hours but after 24 hours none of the insecticides was safer for *T. chilonis* adult.

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