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Effect of different insecticides on adult emergence of *Trichogramma chilonis* (Ishii)

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ABSTRACT

The present investigations were undertaken on laboratory studies of *Trichogramma chilonis* (Ishii) 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. chilonis* revealed that insecticides *viz.,* oxydemeton methyl can be safely used in the field after release of *T. chilonis*. However, insecticides *viz.,* cypermethrin, dimethoate, indoxacarb and emamectin benzoate can be wisely used in the field 4-5 days after release of *T. chilonis*, while malathion and dichlorvos should strictly be retrained from their use as they reduce the per cent adult emergence.

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INTRODUCTION

Several parasitoids and predators of different crop pests have been successfully used in pest management. After the era of indiscriminate use of synthetic pesticides, innundative 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, 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.

MATERIAL AND METHODS

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

Design : Complete Randomized Design
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. chilonis* 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)

RESULTS AND DISCUSSION

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

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

The data revealed that significant highest per cent adult emergence was recorded in control (98.22 %) followed by oxydemeton methyl and dimethoate with per cent adult emergence of 97.50 and 94.72, respectively and were at par. Further, reduction in adult emergence was recorded in indoxacarb, emmamectin benzoate and cypermethrin with (86.85), (86.68) and (79.97) per cent, respectively and were at par. Minimum adult emergence was recorded in malathion (13.33 %) and no adult emergence was recorded in DDVP (0.00 %) (Table 1). DDVP was more toxic insecticide for adult emergence and caused cent per cent mortality of the developing *T. chilonis* 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, emmamectin benzoate.
2.	=	Slightly harmful (30 to 79% reduction)	:	No insecticide
3.	=	Moderately harmful (80 to 99 % reduction)	:	Malathion
4.	=	Harmful (> 99% reduction)	:	DDVP

Prem *et al.* (2001) reported mean per cent adult emergence in acephate 0.05 per cent (44.01 %), deltamethrin 0.0028 per cent (3.62 %), endosulfan 0.05 per cent (1.92 %), malathion 0.05 per cent (3.42 %) as compared to control (63.83 %).

Mehendale (2009) studied the safer insecticides

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

Sr. No.	Treatment	Concentration (%)	Mean per cent adult emergence	Per cent reduction in adult emergence over control	Score
1.	Cypermethrin 25 EC	0.0075	79.97 (68.01)	18.58	1
2.	Dimethoate 30 EC	0.05	94.72 (79.59)	3.56	1
3.	Oxydemeton methyl 25EC	0.02	97.50 (82.58)	0.73	1
4.	Indoxacarb 15.8 SC	0.01	86.85 (68.87)	11.57	1
5.	Emamectin benzoate 5 SG	0.002	86.68 (69.08)	11.74	1
6.	Malathion 50 EC	0.05	13.33 (13.20)	86.42	3
7.	DDVP 50 EC	0.05	0.00 (0.00)	100.00	4
8.	Water	-	98.22 (83.76)	0.00	1
	S.E. ±		6.64	-	-
	C.D.(P=0.05)		20.13	-	-

Note: Figures in the parentheses are arcsine values

against *T. chilonis*. He reported that no insecticide was found safe to developing adult *Trichogramma* inside the egg. Insecticides *viz.*, triazophos 40 EC (0.05 %), acetamiprid 20 SP (0.004 %), acephate 75 SP (0.1 %), emamectin benzoate 5 SG (0.001 %), novaluron 10 EC (0.0075 %) and endosulfan 35 EC (0.075 %) were slightly harmful, imidacloprid 17.8 SL (0.005 %) as moderately toxic and fenobucarb 50 EC (0.1 %) as the most toxic one.

Kumar *et al*. (2010) carried out laboratory experiments to compare the toxicity of six insecticides *viz.*, Nuvan, imidachloprid, malathion, monocrotophos, endosulfan and chloropyriphos with respect to adult emergence and per cent parasitisation of *T. chilonis.* The results revealed that imidachloprid-17.8 SL @ 0.5 ml was found to be comparatively safe to the parasitoid with least effect on the adult emergence and parasitisation of *Chilo tumidicostalis* (Ishii). The toxicity of nuvan was higher followed by malathion and least was found in imidachloprid with 54 per cent of adult emergence and 52.57 per cent of parasitisation.

Dileep (2012) revealed that significant highest per cent adult emergence was recorded in control (94.00%). Among the different insecticides tested azadirachtin recorded the maximum per cent adult emergence (83.67%) followed by acephate (57.33%). Insecticides *viz.*, emamectin benzoate, novaluron, triazophos and cypermethrin recorded 38.33, 36.33, 30.00 and 23.33 per cent adult emergence, respectively. Moreover, imidachloprid (8.67%) and lambda cyhalothrin (7.00%) reported the minimum adult emergence and were at par. Spinosad was the most toxic insecticide for adult emergence and caused cent per cent mortality of the developing *Trichogramma* adults within the eggs.

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