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RESEARCH ARTICLE :

Impact of new insecticides on parasitization efficiency of *Trichogramma chilonis* Ishii

SHAHANAZ AND MANDLA RAJASHEKHAR

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SUMMARY : Laboratory experiments were carried out to study the effect of new insecticides *viz.*, indoxacarb, thiodicarb and spinosad on *Trichogramma chilonis* Ishii and its parasitism. The effect of these insecticides on 1, 3, 5 and 7 day old eggs of *Corcyra cephalonica* (Stainton) parasitized by *T. chilonis* was also studied. Thiodicarb (0.075%) prove safe to the parasitized egg as well as to the Adult parasitoid. However, the emergence of adults from treated parasitized eggs was significantly lower than the untreated control. Spinosad had detrimental effect on all age groups of parasitized eggs.

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

Author for correspondence :
SHAHANAZ
College of Horticulture, Mojerla, S.K.L.T.S. Horticultural University, HYDERABAD (TELANGANA) INDIA
Email: Shahanaz.ento@gmail.com

See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

Integrated Pest Management (IPM) programmes are being implemented world wide for mitigating the losses caused by insect pests. In this context, effective integration of bioagents with selective insecticides proved to be a promising way of addressing the problem. Assessment of the potential effects that pesticides on the natural enemy fauna is therefore an important issue in IPM programmes designed with special reference to cotton. Among the various natural enemies present in cotton ecosystem, the egg parasitoid *Trichogramma chilonis* Ishii is of good importance (Varma *et al.,* 1984). With this background, the present study was undertaken to know the effect of commonly used insecticides at recommended doses on the emergence and parasitism of *T.chilonis* so that the safer options can be advocated for their effective integration in formulating an economical, effective and eco-friendly pest management strategy in cotton.

RESOURCES AND METHODS

Mass culture of *T. chilonis* was maintained on the eggs of *Corcyra cephalonica* (Stainton) under laboratory conditions at 25±5°C and 75-80 per cent relative humidity. The experiment was conducted at AICRP on Biological control of crop pests and weeds, Rajendranagar, Hyderabad. Four commercially used insecticides *viz.*, indoxacarb 0.0145 per cent (Avaunt 14.5 SL), thiodicarb 0.075 per cent (Larvin 75 WP), Spinosad 0.015 per cent (Tracer 45 SC) and endosulfan 0.075 per cent (Endocel 35 EC) were evaluated. Two sets

experiments were conducted to examine their effect of these test insecticides on egg parasitoid, *T. chilonis.*

In the first experiment one hundred freshly laid eggs of *C.cephalonica* were glued on to a piece of card (10 x 2cm). The cards were sprayed with recommended concentrations of test insecticides with the help of atomizer. An untreated check was maintained as control by spraying the eggs with distilled water. After fan drying of spray fluid, cards were placed in vials. Each card was exposed to 20 adults of *T.chilonis* for 24 hours in small glass vials. The parasitization capability was recorded by recording the host eggs attaining balck colour from third day onwards. Similarly, the adult emergence was recorded by observing the number of Trichogramma adults emerging from the parasitized eggs after 7th day of exposure. The experiment was replicated five times and the data were analyzed statistically under CRD with angular transformation.

In the second experiment, already parasitized trichocards were taken for experimentation and the effect of insecticides was studied on 1, 3, 5 and 7 day old eggs of *C. cephalonica* already parasitized by *T. chilonis*. In each treatment, cards having 100 eggs were exposed to parasitoids prior to spraying and then were sprayed at 1, 3, 5 and 7 days after parasitism with the help of atomizer. An untreated check was maintained as control by spraying the eggs with distilled water. The experiment was replicated five times. Observations were recorded on number of adults emerged in each case. The data were analyzed statistically under Completely Randomized Design.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Effect of insecticides on parasitization efficiency of *T. chilonis* :

Data obtained in the present investigation have been depicted in Table 1. It is evident from the results that highest parasitism (97.6%) was observed in the untreated eggs. Among the treated eggs maximum parasitism was observed in spinosad 0.015 per cent (82%) followed by thiodicarb 0.075 per cent (78%). Whereas, poor parasitism was observed in indoxacarb 0.075 per cent (22 %) followed by endosulfan 0.07 per cent (31.6%). Percentage of parasitism in spinosad and thiodicarb were significantly higher than that of indoxacarb and endosulfan. These findings are in conformity with Paul *et al.* (1979) against *T. brasiliense* who reported low rates of parasitism and adult emergence in endosulfan, which is attributed to quick knock down effect of this compound. Similar observations reported by Varma *et*

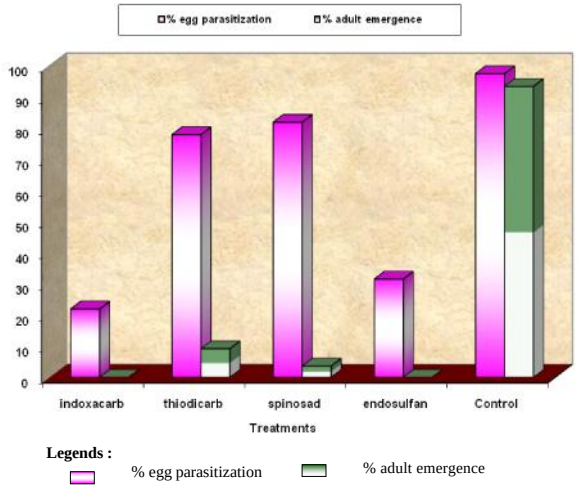

Fig 1: Effect of selected insecticides on parasitization efficiency and adult emergence of *T. chilonis*

Table 1: Effect of selected insecticides on parasitization efficiency and adult emergence of *T. chilonis* from the treated egg cards

Treatments	Concentration (%)	Per cent egg parasitization	Per cent adult emergence
Indoxacarb 14.5 SL	0.0145	22.00^{a} (27.95)	0.00^{a} (0.00)
Thiodicarb 75 WP	0.075	78.00^{b} (62.52)	9.19^{c} (17.59)
Spinosad 45 SC	0.015	82.00^{b} (67.84)	3.62^{b} (6.44)
Endosulfan 35 EC	0.07	31.60^{a} (34.18)	0.00^{a} (0.00)
Untreated check	--	97.60^{c} (84.68)	93.49^{d} (75.47)
Mean		62.24 (55.43)	21.26 (19.90)
C.D. (P=0.05)		10.834	6.44

Values followed by a common letter are not significantly different from each other
Values in parentheses are Arcsine transformed values

Table 2: Effect of selected insecticides on adult emergence of *T. chilonis* from treated tricho cards of different age groups

Treatments	Concentration (%)	Per cent adult emergence				Mean
		1 day	3 day	5 day	7 day	
Indoxacarb 14.5 SL	0.0145	7.61^{b} (15.96)	5.76^{b} (13.76)	7.33^{b} (15.33)	9.13^{c} (17.55)	7.47
Thiodicarb 75 WP	0.075	7.18^{b} (15.50)	14.38^{c} (88.15)	12.50^{c} (20.63)	7.22^{b} (15.53)	10.32
Spinosad 45 SC	0.015	0.00^{a} (0.00)	0.00^{a} (0.00)	0.00^{a} (0.00)	0.00^{a} (0.00)	0.00
Endosulfan 35 EC	0.07	14.93^{c} (22.58)	0.00^{a} (0.00)	8.33^{b} (16.71)	7.26^{b} (15.55)	7.63
Untreated check	--	92.07^{d} (73.75)	86.23^{d} (68.94)	88.71^{d} (70.80)	95.55^{d} (77.93)	90.64
Mean		24.36 (25.56)	21.27 (20.97)	23.37 (24.69)	23.83 (25.31)	
C.D. (P=0.05)		2.543	4.63	4.12	1.98	

Values followed by a common letter are not significantly different from each other
Values in parentheses are Arcsine transformed values

al. (1988 and 1991); Malathi *et al.* (1999) and Premchand *et al.* (2001). The per cent emergence of parasitoid was also higher in untreated control (93.49 %) as compared to all other treatments. Among the test insecticides thiodicarb 0.075 per cent showed the maximum per cent adult emergence followed by spinosad 0.015 per cent (3.62%). No adult emergence was recorded with endosulfan and indoxacarb at the test contributions. These findings are in line with the findings of Varma *et al.* (1988) where the adult emergence of *T. achaeae* was zero per cent when host eggs were treated with endosulfan. Even though thiodicarb and spinosad recorded certain egg parasitism levels, but adult emergence was adversely effected supposedly due to the insecticide deposits in the chorion layer of the eggs might have caused the death of *T. chilonis* larvae in early stages within the *C. cephalonica* eggs resulting into ultimate lesser adult emergence even after satisfactory levels of parasitism.

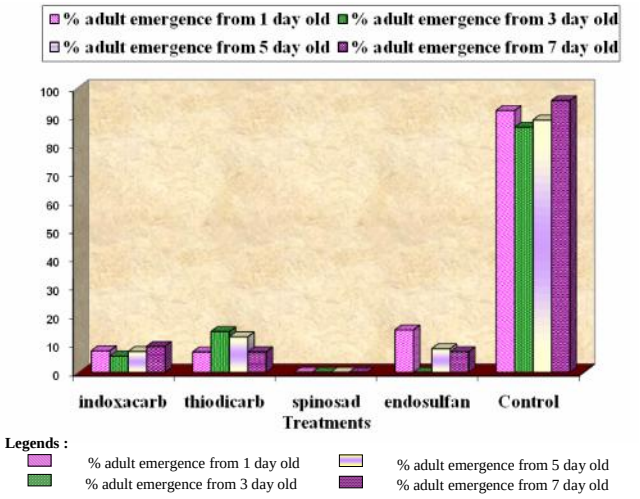

Fig 2: Effect of selected insecticides on adult emergence of *T. chilonis* from treated tricho cards of different age groups

Effect of insecticides on the emergence of parasitoid from the parasitized eggs of *T.chilonis* :

When tricho cards of different ages *viz.*, 1, 3, 5 and 7 day old were treated with test insecticides, the emergence from untreated tricho cards was significantly higher (90.64%) than the tricho cards treated with insecticides (Table 2). Among different age groups effect of spinosad, indoxacarb and endosulfan on adult emergence was very high in 3 day old eggs as compared to 1, 5 and 7 day old parasitized eggs. Spinosad had detrimental effect on all age groups *viz.*, 1, 3, 5 and 7 day old *T. chilonis* parasitized eggs. These results are in line with findings of Suh *et al.* (2000), who reported spinosad had detrimental effect, as preimaginary development progresses the level of complete emergence decreased. Similar observations were reported by Cleary and Scholz (2002) against *T. chilonis* who reported that spinosad and endosulfan were found deleterious when compared to untreated control.

On the basis of overall results, it is concluded that thiodicarb 0.075 per cent was found to be the safest insecticide among the test insecticides followed by other test insecticides *viz.*, spinosad, indoxacarb and endosulfan in terms of both parasitism efficiency and per cent adult emergence of *T. chilonis*.

Authors' affiliations :
MANDLA RAJASHEKHAR, ICAR- Indian Agricultural Research Institute, NEW DELHI, INDIA

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