

## RESPONSE OF *Trichogramma toidea bactrae* TO NEWER INSECTICIDES FOR PER CENT MORTALITY UNDER LABORATORY CONDITION

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### ABSTRACT

The study conducted on reduction in adult emergence (per cent mortality) during developmental stages (1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> days) under laboratory condition on *Trichogramma toidea bactrae*. It is a potent egg parasitoid of lepidopteran pests, reared on UV irradiated and Unirradiated eggs of *Corcyra cephalonica*. Eight newer insecticides with different mode of action were selected for present investigation. The results revealed that the treatment of azadirachtin 1500 ppm caused least mortality of *T. toidea bactrae* immature stages developing inside the parasitized *C. cephalonica* eggs. The insecticides viz., Chlorantraniliprole 18.5% SC and flonicamid 50% WG were recorded less than 30% mortality of *T. toidea bactrae* thus, found safer as compared to other insecticides. Whereas, profenofos 40% + cypermethrin 4% EC was most toxic to adult emergence, thus recorded 'harmful' to *T. toidea bactrae*. Hence, some insecticides from the above are safely included in bio intensive pest management (IPM).

(Key words): Per cent mortality, Reduction in adult emergence, *Trichogramma toidea bactrae*

### INTRODUCTION

*Trichogramma spp.* are used widely in IPM on many important pests of crops. Integrated Pest Management (IPM) is an effective and environmentally approach to pest management that relies on a combination of chemical and biological control methods. *Trichogramma* wasps are highly susceptible to most broadspectrum insecticides. This is the reason that various attempts to suppress pest population by biological control measures have often failed because of deleterious effects of chemical on the beneficial insects (Borgemeister *et al.*, 1993). The integration of biological and chemical control tactics requires a thorough understanding of effects on biological control agents. A step-wise assessment, moving from the laboratory to the field, with proper consideration of both direct and sub lethal effects is recommended in the screening of pesticides against biological control agents (Croft, 1990). It should be noted here that, all the pesticides and insecticides are not equally harmful to the biocontrol agents, there are some safer compound to different bioagent. (Fand *et al.*, 2009).

### MATERIALS AND METHODS

The present investigation was carried out in the Biocontrol laboratory, Entomology Section, College of Agriculture, Nagpur, Maharashtra during June-Dec. of 2019.

The rearing of the host insect and parasitoid was done under controlled room temperature and relative humidity conditions ranging between  $24 \pm 2^{\circ}\text{C}$  and  $60 \pm 5\%$ . To obtain the eggs of *Corcyra cephalonica* through the experimental period rearing of rice moth was done in the laboratory. The culture was maintained on sorghum based artificial diet with following ingredients for one tray (15 X 30 cm.) UV irradiated and unirradiated eggs of *C. cephalonica* were used for counting the per cent mortality (reduction in adult emergence) experiment. The treatments were given by the following method UV irradiated and unirradiated eggs of *Corcyra cephalonica* were glued to the egg cards separately (@ 100 eggs card<sup>-1</sup> strip) and were cut into strips of 5.0x 2.0 cm size. These cards were exposed to the adults of *Trichogramma-matoidea bactrae* (@ 5:1 host parasitoid ratio) for 24 hrs. To obtain adequate parasitization after parasitoid release, the card strips were dipped in insecticide solution, as per the treatments, for 5 seconds on 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> day of parasitoid release. For control, water was used instead of insecticides. The cards were shade dried and kept in BOD for 24 hrs. Each treatment was repeated three times and the observations were recorded daily starting at 24 hrs after parasitoid release and were continued upto parasitoid emergence to record per cent mortality based on per cent emergence. The per cent reduction in adult emergence were considered as the per cent mortality due to application of insecticide during different developmental stages of *Trichogramma-matoidea bactrae*. On the bases of per cent

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**Table 1. Response of *Trichogrammatoidea bactrae* to newer insecticides for per cent mortality under laboratory condition**

Sr. No.	Treatments	Dose ml, gl <sup>-1</sup>	Mortality of <i>T. toideabactrae</i> (%)											
			1 <sup>st</sup> day				3 <sup>rd</sup> day				5 <sup>th</sup> day			
			UV Irradiated	UV Unirradiated	UV Irradiated	UV Unirradiated	UV Irradiated	UV Unirradiated	UV Irradiated	UV Unirradiated	UV Irradiated	UV Unirradiated	UV Irradiated	UV Unirradiated
1	Chlorantraniliprole 18.5% SC	0.3	18.80 (25.55)	18.96 (25.77)	19.12 (25.91)	21.36 (27.49)	11.71 (20.00)	11.19 (19.46)	39.36 (38.82)	36.90 (37.41)	39.11 (38.70)	38.19 (38.12)	31.70 (34.27)	51.33 (45.74)
2	Imidacloprid 17.8% SL	0.2	29.01 (32.58)	32.32 (34.63)	28.74 (32.39)	30.97 (33.77)	23.42 (28.93)	11.03 (19.37)	29.01 (32.58)	32.32 (34.63)	28.74 (32.39)	30.97 (33.77)	23.42 (28.93)	11.03 (19.37)
3	Diafenthiuron 50% WP	0.8	21.87 (27.83)	24.76 (29.80)	21.23 (27.35)	25.34 (30.20)	17.85 (24.95)	7.04 (15.34)	21.87 (27.83)	24.76 (29.80)	21.23 (27.35)	25.34 (30.20)	17.85 (24.95)	7.04 (15.34)
4	Flonicamid 50 % WG	0.3	17.61 (24.80)	16.64 (24.04)	20.46 (26.85)	18.79 (25.62)	12.96 (21.05)	18.86 (25.70)	17.61 (24.80)	16.64 (24.04)	20.46 (26.85)	18.79 (25.62)	12.96 (21.05)	18.86 (25.70)
5	Azadirachtin (1500 PPM)	3.0	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)
6	Profenofos 40% + Cypermethrin 4% EC	2.0	81.43 (64.45)	83.03 (65.65)	80.33 (63.65)	84.03 (66.42)	78.92 (62.65)	94.45 (76.31)	81.43 (64.45)	83.03 (65.65)	80.33 (63.65)	84.03 (66.42)	78.92 (62.65)	94.45 (76.31)
7	Lambda cyhalothrin 9.5% + Thiamethoxam 12.6 % zc	0.5	83.45 (65.96)	83.50 (66.03)	83.06 (65.65)	81.99 (64.82)	79.58 (63.08)	87.52 (69.30)	83.45 (65.96)	83.50 (66.03)	83.06 (65.65)	81.99 (64.82)	79.58 (63.08)	87.52 (69.30)
8	Chlorantraniliprole 9.3 % + Lambda cyhalothrin 4.6 % zc	0.5	8.98 (17.36)	9.70 (18.15)	9.47 (17.85)	10.50 (18.91)	6.43 (14.65)	5.86 (13.94)	8.98 (17.36)	9.70 (18.15)	9.47 (17.85)	10.50 (18.91)	6.43 (14.65)	5.86 (13.94)
9	Control (Water spray)	-	1.26	1.05	1.25	0.97	1.78	1.11	1.26	1.05	1.25	0.97	1.78	1.11
10	S E (m)		3.68	3.07	3.64	2.84	5.17	3.24	3.68	3.07	3.64	2.84	5.17	3.24
11	CD at 5%													

(Figures in parenthesis are arc sin value)

mortality / per cent reduction in parasitization / adult emergence, insecticides were classified in different categories as suggested by IOBC/WPRS (Sterk *et al.*, 1999).

## RESULTS AND DISCUSSION

### Per cent reduction in adult emergence (% mortality) after 1<sup>st</sup>, 3<sup>rd</sup> 5<sup>th</sup> days of parasitization

The results obtained on per cent reduction in adult emergence of *Trichogramma toidea bactra* due to application of insecticides after 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> day of parasitization in UV irradiated and unirradiated eggs are allocated in Table 1.

The investigation revealed that azadirachtin 1500 ppm recorded as least mortality and categorized as “harmless” and on the other hand highest mortality recorded as profenofos 40% + cypermethrin 4% EC and categorized as “harmful” to the bioagent *T. bactrae*. The insecticides VIZ chlorantraniliprole 18.5% SC and flonicamide 50% WG recorded as less than 30% mortality thus, they were found relatively safer as compared to rest of the insecticides. Whereas, the results of present study on the per cent mortality of *T. bactrae* under the influence of insecticidal treatment indicated the relative toxicity of test insecticides in following order azadirachtin 1500 ppm < chlorantraniliprole 18.5% SC < flonicamid 50% WG < diafenthiuron 50% WP < imidacloprid 17.8% SL < chlorantraniliprole 9.3% + lambda cyhalothrin 4.6% ZC < lambda cyhalothrin 9.5% + thiamethoxam 12.6% ZCs < profenofos 40% + cypermethrin 4%. Our results are strongly supported by the finding of earlier researcher Sabry *et al.* (2014), who recorded mortality of 20-30.67 per cent by chlorantraniliprole. Ughade (2003), Fand *et al.* (2009) observed only 25 per cent mortality with 75 per cent adult emergence in the treatment of neem oil.

Hallapa *et al.* (2013) recorded 28.71 per cent adult emergence after 24 - 48 hr. when sprayed with diafenthiuron 50 WP. Costa *et al.* (2014) reported that the effect of lambda cyhalothrin + thiamethoxam on per cent adult emergence less than 60 per cent by *Trichogramma galloi*.

## REFERENCES

- Borgemeister, C., H.M. Poehling, A. Dinter and C. Holler, 1993. Effects of insecticides on life history parameters of the aphid parasitoid *Aphidius rhopalosiphi* (Hymenoptera: Aphidiidae). *Entomophaga*, **38**:245-255.
- Costa, M. A. V.F. Moscardini, P.C. Gontijo, G.A. Carvalho, R. L. Olivaria, H.N. Oliveria, 2014. Sub lethal and trans-generational effects of insecticides in developing *Trichogramma galloi*. *Exotoxicology*. **23**(8) : 1399-1408
- Croft, B. A. 1990. Arthropod biological control agents and pesticides. Wiley, New York (USA) CAB International pp. 723 pp. ref.79.
- Fand, B. B., N.S. Satpute, S.M. Dadmal, R.P. Bag, S.V. Sarode, 2009 Effect of some newer insecticides and biopesticides on parasitization and survival of *Trichogramma chilonis* Ishii. *Indian Entomol.* **71** (2):105-109.
- Halappa, B., J. S. Awaknavar, D. Archana and B. Doddabasappa, 2013. Safety of biopesticides and newer insecticides to egg parasitoid, *Trichogramma chilonis* Ishii (Trichogrammatidae: Hymenoptera) in laboratory. *Insect Environ.* **19**(2), 119 - 120
- Sabry, A. H., Karim Abou-zied Hassan and Atef Abd-El Rahman, 2014. Relative toxicity of some modern insecticides against the pink bollworm, *Pectinophora gossypiella* (saunders) and their residues effects on some natural enemies. *Int. J. Sci. and Tech.* **2**(3): 481– 491.
- Sterk, G., S.A. Hassan, M.F. Baillod, and others. 1999. Results of the seventh joint pesticide testing programme carried out by the IOBC/WPRS Working Group ‘Pesticides and Beneficial Organisms’. *Bio. Control*, **44** : 99–117.
- Ughade, Jayashri, D. 2003. Relative safety of newer insecticides to *Trichogramma chilonis* Ishii. M.Sc. (Agri.) Thesis (Unpub.), submitted to Dr. PDKV, Akola.

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