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Toxicity evaluation of newer insecticides against *Trichogramma chilonis* Ishii under laboratory conditions

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Abstract
The laboratory studies were conducted on the evaluation of relative safety of newer insecticides to *Trichogramma chilonis* Ishii, reared on UV irradiated and unirradiated eggs of *Corcyra cephalonica.* The results revealed that the maximum (>59%) and minimum (<21.0%) Parasitization was obtained in the treatment of azadirachtin 1500 ppm and a combination product of lambda cyhalothrin 9.5% + thiamethoxam 12.6% ZC, respectively.
The results indicated that azadirachtin 1500 ppm, chlorantraniliprole18.5 SC, spiromesifen 22.9 SL and imidacloprid 17.8 SL were relatively safer compounds in terms of their toxicity to *T. chilonis*. Hence these insecticides can be safely included in biointensive IPM programmes for managing insect pests in agro-ecosystems.

Keywords: *Trichogramma chilonis,* newer insecticides, per cent Parasitization

Introduction
Biological control which entails the use of natural enemies like predators, parasitoids and disease-causing microorganisms, has been one of the most effective and eco-friendly methods of combating ravages of crop pests (De Bach, 1964 and Van Lenteren *et al.* 2003) [2, 11]. Utilization of natural enemies in pest management had resulted in significant control of more than 150 species of harmful insect pests and several species of invasive weeds, globally including India (Van Lenteren *et al.* 2003) [11]. Among various bioagents used for biological control of insect pests, *Trichogramma chilonis* Ishii (Hymenoptera: Trichogrammatidae) is widely used as an egg parasitoid of many Lepidopteran insect pests, worldwide (Singh and Jalali 1994; Koul and Brar 2008; Liu *et al.* 2014) [9, 5, 6]. In India, about 26 species of *Trichogrammatids* are recorded of which *Trichogramma chilonis* (Ishii), *T. japonicum* (Ashmead) and *T. achaeae* (Nagraja and Nagarkatti) are most promising in controlling harmful insect pests of economically important crops (Yousuf and Shafee, 1987; Singh and Jalali, 1994) [12, 9].

Material and Methods
Fresh eggs (UV irradiated and unirradiated) of rice moth *Corcyra cephalonica* Stainton (Lepidoptera: Pyralidae), Culture of *T. chilonis* Insecticides for treatments, Ethanol for disinfection and or sterilization of glass wares, Sodium hypochlorite for sterilization, glassware and laboratory equipments were used.
To evaluate toxicity of newer insecticides on per cent parasitization of UV irradiated and unirradiated eggs U.V. irradiated and unirradiated fresh eggs of *C. cephalonica*were glued to the egg cards separately, @50 eggs per card strip. The cards were then cut into small strips of 5.0x 2.0cm size and dipped individually in test insecticides for 5 seconds. For control, water was used instead of insecticides. The treated egg cards were then shade dried. The card strips containing U.V. exposed and unexposed eggs were kept separately in glass vials of about 15.0 x 2.5 cm size at the rate of one card strip per vial for each treatment and replication. Each treatment was then labelled properly with details such as name of the treatment, concentration of insecticides, date and time of application, etc. The treated egg-cards were exposed to adults of *T. chilonis* (@ 5:1 host: parasitoid ratio) for 24 h for parasitization. Three replications were kept for each treatment and experiment was conducted at 27+1 ºC temperature and 65+5% Relative humidity in the laboratory. The egg-cards were examined for parasitization after 5 days of parasitoid release and the number of parasitized eggs were counted under stereo zoom microscope and per cent parasitization was worked out using following formula:

Same findings were reported by Singh *et al*. (2012) [3] Thippeswamy, (2001) [5] and Singh *et al.* (2006) [4] Hosamani *et al.* (2008) [1] and Jindal *et al.* (2009) [2].

$$\% \text{ parasitization} = \frac{\text{Number of eggs parasitised}}{\text{Total number of eggs exposed}} \text{ x } 100$$

The per cent reduction in parasitism (RP) was determined for each insecticide by the following equation (Hassan *et al.* 2000) [4].

RP (%) = (1-f/t) x100

Where,

F: Average number of parasitized eggs in the insecticide treatment

T: Average number of parasitized eggs in the control treatment

Results and discussion

Per cent parasitisation of UV irradiated and unirradiated eggs of *Corcyra cephalonica* by *Trichogramma chilonis*

In UV irradiated eggs, among the various insecticides tested, the treatment of imidacloprid recorded maximum parasitism (69.33%) as compared to control (97.33%), whereas chlorantraniliprole with 62.67 per cent parasitism was found as the next relatively safer compound to *T. chilonis* and was at par with the treatment of azadirachtin (59.33%) which in turn was also at par with spiromesifen (56.00%) followed by a group of insecticides *viz*., buprofezin (36.67%), acephate (35.33%) and diafenthiuron (33.33%) all being at par with each other. However least Parasitization was observed in a treatment of lambda cyhalothrin+ thiamethoxam (21.33%). Whereas, in unirradiated eggs, azadirachtin recorded maximum Parasitization (75.33%) and lambda cyhalothrin + thiamethoxam recorded least Parasitization (10.00%) which was found extremely toxic to the parasitoid. Similar results were recorded by Carvalho *et al.* (2005) [1] reported less than 3.5 per cent reduction in parasitism rates by *T. pretiosum* due to imidacloprid, Fand *et al.* (2009) [3] also reported 59.00 and 69.33 per cent Parasitization of *H. armigera* eggs by *T. chilonis* after the treatment of imidacloprid on irradiated and unirradiated eggs, respectively. Narendra *et al.* (2013) [7] recorded 38.67 and 33.80 per cent Parasitization, respectively by *T. chilonis* under the influence of Neem oil. Singhamuni *et al.* (2015) [10] reported 51.5 per cent level of parasitization by *T. chilonis* when exposed to Neem, Prema (2016) [8] reported NSKE 5% as the safest compound with a parasitization rate of 92.6 per cent by *T. chilonis*. Thus, these results are strongly in agreement with our findings.

Table 1: Effect of newer insecticides on per cent parasitisation of U.V. irradiated and unirradiated eggs of *C. cephalonica* by *T. chilonis*

S.N	Treatment	Conc. (%)	Parasitism of *C. cephalonica* (%)		Reduction in Parasitism (%)	
			UV irradiated	UV Unirradiated	UV irradiated	UV Unirradiated
1.	Chlorantraniliprole 18.5% SC	0.005	62.67 (52.44)	51.33 (45.77)	35.61	46.90
2.	imidacloprid 17.8% SL	0.005	69.33 (56.41)	52.00 (46.15)	28.76	46.21
3.	acephate 75% SC	0.05	35.33 (36.45)	35.33 (36.45)	63.70	63.45
4.	diafenthiuron 50% WP	0.06	33.33 (35.22)	27.33 (31.43)	65.75	71.73
5.	buprofezin 25% SC	0.005	36.67 (37.24)	45.33 (42.32)	62.33	53.11
6.	Spiromesifen 22.9% SC	0.006	56.00 (48.50)	44.67 (47.93)	42.46	53.79
7.	Azadirachtin 1500Ppm	0.005	59.33 (50.42)	75.33 (60.37)	39.04	38.62
8.	Lambdacyhalothrin 9.5% + thiamethoxam 12.6% ZC	0.002	21.33 (27.47)	10.00 (18.38)	78.08	77.93
9.	Control	Water Spray	97.33 (80.73)	96.67 (79.60)	0.00	0.00
10.	F test		Sig.	Sig.		
11.	SE (diff.)		3.15	2.59		
12.	CD (%)		6.62	5.44		

Figures in parentheses are arc sin transformed values

References

1. Carvalho GA, Rezende DT, Moura AP, Moscardini VF, Lasmar O, Souza JR. Selectivity of flubendiamide, a new insecticide used to control tomato pests in Brazil to *Trichogramma pretiosum* Riley (*Hymenoptera*: *Trichogrammatidae*). IOBC Egg Parasitoid News Letter. 2005; 17: 27.
2. DeBach P. (Ed.). Biological Control of Insect Pests and Weeds. New York. Reinhold Publishing Carporation, 1964.
3. Fand BB, Satpute NS, Dadmal SM, Bag RP, Sarode SV. Effect of some newer insecticides and biopesticides on parasitization and survival of *Trichogramma chilonis* Ishii. Indian Journal of Entomology. 2009; 71(2):105-109.
4. Hassan SA, Halsall N, Gray AP, Kuehner C, Moll M, Bakker FM. A laboratory method to evaluate the side effects of plant protection products on *Trichogramma cacoeciae* Marchal (Hym: *Trichogrammatidae*). In: Guidelines to evaluate side effects of plant protection products to non-target arthropods (eds. M.P. Candolfi, S. Blümel, R. Forster, F.M. Bakker, C. Grimm, S.A. Hassan). IOBC/WPRS, Reinheim, Germany, 2000, 107-119.
5. Koul R, Brar KS. Evaluation of different doses of *Trichogramma* species for the management of leaf folder and stem borer on Basmati rice. J Biol. Control. 2008; 22:131-135.
6. Liu YM, Hou D, Babendreier Zhang F, Song K. Evaluation for potential *Trichogramma* (Hymenoptera: Trichogrammatidae) strains for control of the striped stem borer (Lepidoptera: Crambidae) in the Greater Mekong Subregion. J Econ Entomol. 2014; 107(3):955-63.
7. Narendra G, Kohkar S, Ram P. Effect of insecticides on some biological parameters of *Trichogrammachilonis* Ishii (*Hymenoptera*: *Trichogrammatidae*). J Biol. Control. 2013; 27(1):48-52.
8. Prema MS. Evaluating the Biosafety of Newer and Conventional Insecticides against Parasitoids, Predators and Pollinators Prevailing in Agricultural Ecosystem: To achieve Agricultural Sustainability in Future. Res. J Recent Sci. 2016; 5(8):11-15.

9. Singh SP, Jalali SK. Trichogrammatids (Eds. Singh, S. P. and S. K. Jalali) Project Directorate of Biological Control, Banglore, 1994.
10. Singhamuni SAA, Jayasuriya MIUF, Hemachandra KS, Sirisena UGAI. Evaluation of the potential of *Trichogramma chilonis* Ishii as a bio control agent for *Trichoplusiani*, cabbage semilooper. Tropical Ag. Res. 2015; 26(2):223-236.
11. Van Lenteren, JC, Babendreier D, Bigler F, Burgio G, Hokkanen HMT, Kuske S *et al*. Environmental risk assessment of exotic natural enemies used in inundative biological control. Biocontrol. 2003; 48:3-38.
12. Yousuf M, Shafee SA. Taxonomy of Indian Trichogrammatidae (Hymenoptera: Chalcidoidea). Indian Journal of Systematic Entomology. 1987; 4(2):55-200.