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Comparative toxicity of different insecticides against *Trichogramma chilonis* Ishii

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ABSTRACT: **Five insecticides including two neem-based insecticides namely Achook and Neemactin, two biopesticides namely Halt and Dipel (both are formulations of *Bacillus thuringiensis*) and endosulfan were evaluated for their relative toxicity to newly emerged adults of *T. chilonis*. Observations revealed that neem based pesticides and biopesticides are harmless while endosulfan is slightly toxic to egg parasitoid.**

KEY WORDS: Biopesticides, egg parasitoid, neem-based insecticides, relative toxicity, *Trichogramma chilonis*

Keeping in view the adverse effects of indiscriminate use of chemical insecticides, which surfaced in the forms of environmental pollution, resurgence of target pests, outbreaks of secondary pests and toxicity to non-target species, agricultural scientists are now advocating the use of safer pesticides like botanicals and biopesticides in pest control. However, information on the effects of these pesticides on biological control agents is scanty. *Trichogramma chilonis* Ishii has been reported a potential egg parasitoid in many lepidopteran pests by different authors (Thakur *et al.*, 1991, 1993; Mishra and Mandal, 1994).

Therefore, in the present investigation, efforts were made to evaluate relative toxicity of neem-based insecticides, biopesticides and chemical insecticide on adults of *Trichogramma chilonis* Ishii.

MATERIALS AND METHODS

Mass culture of *Trichogramma chilonis* was produced in the laboratory on eggs of rice moth, *Corcyra cephalonica* Stainton at room temperature (27±1°C) and relative humidity (70±5%) during August, 1998. Freshly emerged parasitoids were used as test insects. Five commonly used insecticides including two neem based namely Achook and Neemactin, two biopesticides namely Halt and Dipel (both commercial formulations of *Bacillus thuringiensis kurstaki*) and one chemical insecticide endosulfan were tested for their relative toxicity against egg parasitoid *T. chilonis* at the concentrations recommended for field use (Table I). Formulated materials were diluted to get the desired concentration with water. Teepol (0.5ml/l) was also added to it to increase adhesiveness of spray fluid. Filter paper strips

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(8x3cm) and glass tubes (10x4cm) were dipped in freshly prepared solutions of above insecticides separately and dried in air. One filter paper strip impregnated with desired pesticide was put into one glass tube dipped in the same insecticides. The newly emerged adults of parasitoid were exposed by contact to these insecticides impregnated filter paper strips and glass tubes. Cotton swabs soaked in honey (50%) were stuck on the inner walls of glass tubes for adult feeding. Mouths of glass tubes were covered with pieces of fine muslin cloth fastened with rubber bands. Each treatment was replicated five times with 50 adults in each replication. For control, tap water was used in place of insecticide.

Observations were made at 2, 8 and 24hours intervals on the adult mortality. Number of parasitoid found dead at these intervals was counted and per cent mortality was worked out in each pesticide formulation for each replication. Natural mortality factor was eliminated from each treatment by using Abbott' formula (1925). Data so obtained were statistically analysed for significant differences by applying Duncan's New Multiple Range Test (Ducan, 1955) at 5 per cent level of significance after transforming the percentages into angles.

RESULTS AND DISCUSSION

Data obtained in the present investigations have been depicted in Table I. It is evident from the data that all tested insecticides caused significant mortality of adults of *T. chilonis* at one stage or other as compared to that of control. Mortality increased significantly with each time interval. Lowest being after 2 hours and highest after 24 hours of exposure. Lowest mortality (1.21%) after 24 hours exposure was recorded in Achook, a neem product. Highest mortality (61.21%) after 24 hours exposure was recorded in

Table I. Comparative toxicity of commonly used pesticides against *Trichogramma chilonis*

Treatment	Dose	Per cent mortality of adult parasitoid (after exposure)		
		2 h	8 h	24 h
Achook	3 g/l	2.51[a] (9.97)	5.20[a] (17.46)	1.21[a] (25.47)
Neemactin	2 ml/l	3.51[a] (11.54)	11.45[a] (22.79)	48.48[b] (49.31)
Halt	1 g/l	3.01[a] (12.25)	8.85[a] (20.70)	54.54[b] (52.24)
Dipel	1 ml/l	5.52[b] (14.18)	19.27[b] (28.32)	47.27[b] (48.73)
Endosulfan	1.5 ml/l	2.21[a] (9.97)	29.16[b] (34.45)	61.21[b] (55.55)
Control (Tap water)	-	0.5[c] (4.05)	4.00[c] (11.54)	17.50[a] (24.73)

Figures in parenthesis are angular transformed values.
Means bearing same letter in each column are not statistically different from one another (P=0.05).

endosulfan, which is considered comparatively safe among other insecticides. In nutshell, observations showed that neem based insecticides namely Achook and Neemactin have least, chemical insecticide namely endosulfan has highest, while biopesticides namely Halt and Dipel have moderate effects on the mortality of parasitoid. Similar to our observations, Lakshmi *et al.* (1977) revealed that neem based insecticides (Econeem and Neem Azal) are safer to egg parasitoid *Trichogramma japonicum* Ashmead as compared to synthetic insecticides.

According to Hassan (1985) pesticides causing 50 per cent damage to beneficial organisums are classified as harmless. Therefore, in the present study, all tested pesticides except endosulfan and Halt, are harmless to egg parasitoid *T. chilonis* as evident from the Table I. These observations are in close agreement with the findings of Thakur *et al.* (1988) and Masoodi *et al.* (1995), who reported that many of commonly used fungicides for apple scab control are harmless for parasitoids of San Jose scale.

Based on the results of present study, it is concluded that neem based insecticides namely Achook and Neemactin and biopesticides are quite safe to *T. chilonis*, an egg parasitoid of most of lepidopteran pests and can be recommended for use in Integrated Pest Management Programmes.

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