

Laboratory evaluation of commercial neem formulations *vis-à-vis* insecticides against egg parasitoid, *Trichogramma japonicum* Ashmead (Hymenoptera: Trichogrammatidae)

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ABSTRACT: Laboratory experiments were carried out to study the effect of neem formulations *vis-à-vis* insecticides on *Trichogramma japonicum* Ashmead, based on rate of parasitization and emergence of adults from parasitised eggs. The results revealed that Econeem and Neem Azal T/S (0.1-1.0%) were safer compared to insecticides, particularly quinalphos and chlorpyrifos which had adverse effects on parasitization. Some neem formulations like Nimbecidine (0.25-4.0%), Neemgold (2.0-4.0%) and Rakshak (1.0%) also had adverse effects on parasitism.

KEY WORDS: Egg parasitoid, insecticides, neem formulations, *Trichogramma japonicum*

Trichogramma japonicum is a potential egg parasitoid of rice yellow stem borer, *Scirpophaga incertulas* as well as leaf folder, *Cnaphalocrocis medinalis* (Arasumallaiah *et al.*, 1984; Chen and Chui, 1985). It is the only natural enemy being used for inundative field releases in rice ecosystem (Bentur *et al.*, 1994). Since use of insecticides continues to be a major tool for the farmers to check the insect pests of rice, it is essential to know the effect of insecticides on egg parasitization by *T. japonicum* for the integration of these two

components in rice IPM. Hence, efforts were made to study the effect of commercial neem formulations *vis-à-vis* insecticides on parasitization due to *T. japonicum* under laboratory conditions.

MATERIALS AND METHODS

Nine neem formulations *viz.*, Nimbecidine, Neemgold, Rakshak, Neem Azal T/S, Econeem, Fortune Aza, NG-4, Achook and Neemax at 3 doses each were evaluated and compared with

recommended doses of commonly used insecticides *viz.*, quinalphos (0.05%), chlorpyrifos (0.05%), monocrotophos (0.04%) and untreated control. Two sets of experiments were conducted to examine their effect on egg parasitoid, *Trichogramma japonicum* reared on *Corcyra cephalonica* eggs, under laboratory conditions at Directorate of Rice Research during 1996.

In the first experiment, freshly laid eggs of *C. cephalonica* (0-24 h old) were glued on paper cards (2.5 x 2.5 cm) @ approximately 200 eggs/card. The egg cards were then sterilized by exposing to ultraviolet rays. The sterilized egg cards were placed in test tubes @ one card per tube and in each tube 10 pairs of adults *T. japonicum* were released for parasitization of the eggs. A streak of honey on the inner walls of the tube served as diet for the *Trichogramma* adults. After twenty four hours, the egg cards were placed on petri dish (15 cm diam.) and sprayed with insecticides or neem formulations using Potter's tower (1 ml/spray). Egg cards used as control were sprayed with water. In all, there were 31 treatments replicated 5 times.

In the second experiment, the procedure followed was same as above except that the sterilized egg cards were sprayed through Potter's tower prior to keeping in test tubes for exposure for parasitization by *T. japonicum*. In this experiment, there were 28 treatments replicated thrice.

In both the experiments, the treated egg cards were allowed to remain in tube for

7-10 day and observations were then recorded on rate of parasitization by *Trichogramma* based on percentage of host eggs attaining black colour and rate of emergence based on number of *Trichogramma* adults emerging from the parasitized eggs. The data were subjected to Duncans Multiple Range Test (DMRT) after transforming to arcsine values.

RESULTS AND DISCUSSION

It is evident from the results (Table 1) that highest parasitism was observed in monocrotophos 0.04 per cent (80.6%), followed by Fortune Aza 0.1 per cent (79.9%) and Neem Azal T/S 0.3 per cent (79.2%). The parasitism ranged from 54.69 to 76.3 per cent in other treatments except NG 4 at 4.0 per cent (47.9%), Neemgold at 2.0 (46.1%) and 4.0 per cent (42.9%) and the three concentrations of Nimbecidine 0.25 to 4.0 per cent (6.0-39.5%) which showed less than 50% parasitism. The control showed cent per cent parasitism and was superior to all treatments. The data on parasite emergence revealed that the treatments of Econeem (1.0%), Neemax (2.0 and 4.0%) and Rakshak (0.1%) showed 87.8-100 per cent emergence of the parasitoid and were on par with that of control (100%). Adult emergence in other treatments ranged from 55.6 to 96.3 per cent whereas parasitoids failed to emerge in chlorpyrifos treatment.

The results also revealed that the treatment of egg cards before exposure for parasitization, resulted in parasitism levels of 73.6 to 78.1 per cent in Econeem

(0.5%), Neem Azal (0.1 and 0.3%), Achook (1%) and Fortune Aza (0.5%) treatments, which were on par. The remaining treatments showed parasitism range of 0.8 to 68.2 per cent with chlorpyrifos showing the lowest level. However, cent per cent parasitism was recorded in control. Adult parasitoid

Table 1. Effect of Neem formulations *vis-à-vis* insecticides on parasitization of *T. japonicum*

Treatment	Concentration (%)	Parasitization		Parasitizing ability	
		Parasitism (%)	Adult emergence (%)	Parasitism (%)	Adult emergence (%)
Nimicidine	0.25	27.5h	60.3d	38.9hi	55.6i
Nimicidine	1.00	39.5g	55.7de	21.0kl	46.5je
Nimicidine	4.00	6.0i	16.0g	24.6jkl	32.9k
Neemgold	1.00	60.9e	85.3 abc	66.5bcde	65.5g
Neemgold	2.00	46.1fg	41.3ef	30.9ijk	33.0k
Neemgold	4.00	42.9fg	28.1f	7.2mn	57.8hi
Rakshak	0.10	80.6bc	97.8a	49.8g	87.7d
Rakshak	0.30	75.4c	88.5abc	53.6f	59.1h
Rakshak	1.00	76.1c	86.6abc	24.4jkl	30.3k
Neem Azal T/S	0.10	72.7d	85.2abc	77.4bc	75.9f
Neem Azal T/S	0.30	79.2bc	76.4bc	75.9bc	94.5bc
Neem Azal T/S	1.00	60.6e	52.0e	66.1bcde	86.8de
Econeem	0.10	71.0d	83.8bc	68.2b	100.0a
Econeem	0.50	59.4e	77.0bc	78.1b	100.0a
Econeem	1.00	75.4c	100.0a	57.5ef	100.0a
Fortune Aza	0.10	79.9bc	49.4de	28.1ijkl	61.8h
Fortune Aza	0.50	65.9e	73.2bc	73.6bcd	100.0a
Fortune Aza	1.00	74.4cd	48.9de	53.5fg	92.0c
NG 4	1.00	66.1e	43.3e	-	-
NG 4	2.00	67.2de	51.9de	-	-
NG4	4.00	47.9f	24.5g	-	-
Achook	1.00	64.4e	84.7abc	75.1bcd	94.5bc
Achook	2.00	60.0e	55.2de	47.5e	70.1fg
Achook	4.00	56.9e	73.8bc	47.5e	100.0a
Neemax	1.00	58.0e	72.2c	25.3jkl	73.2f
Neemax	2.00	76.3c	87.8a	33.4ij	96.3b
Neemax	4.00	64.8e	100.0a	38.3h	83.4e
Quinalphos	0.05	66.7d	21.2g	18.6lm	57.4hi
Chlorpyrifos	0.05	64.6e	0.0h	0.8n	0.0l
Monochrotophos	0.04	86.7b	79.8bc	63.2def	100.0a
Control	-	100a	100.0a	100.0a	100.0a
SEM ±	-	2.80	5.50	4.50	1.20

Figures followed by common letters are not significantly different at P=0.05

emergence from the parasitized eggs was cent per cent in Econeem (all concentrations), Fortune Aza (0.5%), Achook (4.0%) and monochrotophos (0.04%) which was on par with that of control. The adult emergence ranged from 55.6 to 96.3 per cent in other treatments except Nimbecidine (1.0 and 4.0%), Neemgold (2.0%) and Rakshak (1.0%) which showed 30.3 to 46.5 per cent emergence, whereas chlorpyriphos (0.05%) treatment showed no emergence.

The toxic effect of these two insecticides compared to relatively safer nature of Neem Azal T/S and Fortune Aza neem formulations has been reported earlier (PDBC, 1997). In the present study, monocrotophos (0.04%) was found to be safe and compatible with that of neem formulation which again confirms the earlier findings. Singh and Jalali (1994) reported inhibition of parasitism due to *T. chilonis* by some neem products. In the present study also the parasitism was lower in case of Nimbecidine (all concentrations), Neemgold and Rakshak (at higher concentrations). However, Econeem and Neem Azal T/S (0.1 to 1.0%) were safe as indicated by higher parasitism as well as adults emergence levels of *T. japonicum*. There were no clear trends regarding the effect of concentration of neem formulation on parasitization due to *T. japonicum*.

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