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Insecticidal activity of neem derivatives against okra fruit borer *Helicoverpa armigera* Hubner

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ABSTRACT

Insecticidal activity of neem oil 0.5, 1.0 and 2.0%, neem cake extract 1.0, 3.0 and 5.0% along with monocrotophos 0.05% was evaluated against fourth instar larvae of *Helicoverpa armigera* under laboratory conditions. Of all the test solutions, neem oil at 2.0% showed maximum larval mortality, followed by neeem cake extract and monocrotophos 0.05%. An increase in the concentration of the test solutions resulted in an increase in the rate of larval mortality.

Key words : *Helicoverpa armigera*, Neem derivatives, Insecticidal, Mortality

INTRODUCTION

With the current thrust on sustainable agriculture and organic farming, the use of botanical products as pesticides has acquired greater significance. Implementation of environmentally friendly agricultural practices is essential to the preservation of the quality of life on earth. This has evoked a search for eco-friendly and indigenous botanical pesticides. Among so many plants investigated, the Indian tree, *Azadirachta indica* A.Juss is a promising source of botanical insecticides (Chandele, 2003). Neem extracts make the ideal insect control for impoverished farmers worldwide by providing a safe, inexpensive and very effective insect control for both ends of the agricultural spectrum. Biopesticides made from neem are biodegradable, non-toxic, eco-friendly and have no residual effect on agriculture produce.This concept has the bearing upon the present investigation that evaluates the bioefficacy of neem derivatives on okra fruit borer, *Helicoverpa armigera* Hubner.

During the last decades, apart from the chemistry of the neem compounds, considerable progress has been achieved regarding their biological activities (Kausik *et al.*, 2002).

The growing accumulation of research works clearly demonstrates that neem derioil was first observed by Patrick *et al*. (1987). Larvicidal effect of neem oil was also earlier reported by Brar *et al*. (1994) and Thara *et al*. (2008) on *Earias vittella*, Shanmugapriyan and Kingsley (2001) and Murugesan and Murugesh (2008) on *Epilachna vigintioctopunctata*, Sahayaraj and Gabriel Paulraj (2001) on *Helicoverpa armigera*, Revathi and Kingsley (2008) on *Pericallia ricini* and Kavitha *et al*. (2008) on *Leucinodes orbonalis*. This consideration was behind the present study in selecting the larval stage to evaluate the effect of neem derivatives on cotton boll worm *Helicoverpa armigera* Hubner. *H. armigera* is a polyphagous pest reported to damage 181 species of host plants belonging to 45 families (Sachan, 1992). Okra, *Abelmoschus esculentus* is one of the main vegetable crop of Erode district, Tamilnadu, India. When the crop is month old, the larvae of *H. armigera* bore into the flowers and fruits, cause severe yield loses and the quality of the fruits also get affected.

MATERIALS AND METHODS

The laboratory culture of *H. armigera* was initiated from the eggs collected from fields at Uppukkadu of Erode district, Tamilnadu. As recommended by Bhatt and Patel (2001), the insects were reared in the laboratory at 28 ± 2° C on a diet of okra. The collected eggs were placed in a well ventilated plastic container and okra fruits were provided to newly hatched larvae. T he laboratory reared fourth instar larvae were used for the present investigation to evaluate the insecticidal efficacy of neem derivatives.

Efficacy of neem oil at 0.5, 1.0 and 2.0%, neem cake extract 1.0, 3.0 and 5.0% along with monocrotophos 0.05% were bioassayed against fourth instar larvae of *H. armigera*. Fresh okra fruits were treated with neem test extracts and monocrotophos at various concentrations. Untreated control was also maintained. Treated fruits were placed in plastic trough and 20 fourth instar larvae were introduced in each trough and covered with muslin cloth. Five replicates were maintained for all concentrations and the number of dead larvae was

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recorded after 48 hours. Percentage of larval mortality was calculated by using formula (1) and corrections for mortality when necessary were done by using Abbot´s (1925) formula:

$$\text{Percentage of molarity} = \frac{\text{Number of dead larvae}}{\text{Number of larvae intruduced}} \times 100$$

RESULTS AND DISCUSSION

Neem derivatives such as neem oil, neem cake extract and the synthetic pesticide monocrotophos exhibited insecticidal effect at all concentrations on the fourth instar larvae of *H. armigera* (Table 1). The results also showed that higher concentrations of neem oil and neem cake extract were required to obtain significant insecticidal effect on the fourth instar larvae. It was observed, that the larval mortality varied from 45.83 to 79.16% in neem oil 0.5 – 2.0% and 29.16 to 70.83% in neem cake extract 1.0 – 5.0% (Table 1). As the concentration of the test solutions increased, the rate of larval mortality was also increased. These results are in agreement with the earlier reports of insecticidal effect on *Epilachna vigintioctopunctata* (Shanmugapriyan and Kingsley 2001 and Anam *et al*., 2006), *Spodoptera littoralis* (Roman Pavela, 2004), *Spodoptera litura* (Subramanian *et al*. 2006), *Sesamia calamistis* (Oigiangbe *et al.,* 2007) and *Earias vittella* (Thara *et al.,* 2008).

In the present investigation it was observed, that neem oil showed maximum insecticidal effect of 79.16% than neem cake extract and monocrotophos (Table 1). This is in accordance with the earlier findings of Sahayaraj and Gabriel Paulraj (2001) on *Helicoverpa armigera* (75.0%), Revathi and Kingsley (2008) on *Pericallia ricini* (79.99%) and Irulandi *et al.* (2008) on *Hypothenemus hampei* (78.67%). Monocrotophos 0.05% exhibited larval mortality of 41.66% (Table 1). This corroborates with the findings of Shanmugapriyan and Kingsley (2001),who observed 47.61% of larval mortality with Monocrotophos 0.025% at 12 hrs on *Epilachna vigintioctopunctata*.

The results under laboratory conditions clearly demonstrate, that both neem oil and neem cake extract had insecticidal effect on *H. armigera.* If these neem derivatives could retain their insecticidal effect in the field trials, then it would become an efficient, non-hazardous and eco-friendly biopesticides for the management of okra fruit borer, *H. armigera*.

Table 1 : Efficacy of neem oil, neem cake extract and monocrotophos on IV instar larvae of *Helicoverpa armigera*

Treatments	Concentration %	Larval mortality %
Neem oil	0.5	45.83 (42.58)c
Neem oil	1.0	66.66 (54.82)b
Neem oil	2.0	79.16 (63.09)a
Neem cake extract	1.0	29.16 (32.58)b
Neem cake extract	3.0	58.33 (49.82)a
Neem cake extract	5.0	70.83 (57.41)a
Monocrotophos	0.05	41.66 (40.17)c
Control		0.00 (0.19)d

Values mean of three replications
Means followed by a common letter are not significantly different at the 5% level by DMRT

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