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Efficacy of synthetic and botanical insecticide against whitefly (*Bemicia tabaci*) and shoot and fruit borer (*Leucinodes orbonalis*) on brinjal (*Solanum melongena* L.).

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ABSTRACT

Field experiment was conducted at Adisaptagram Block Seed Farm, Government of West Bengal, Hooghly, West Bengal during 2006-07 and 2007-08 to evaluate the efficacy of different doses of NSKE against whitefly (Bemicia tabaci) and shoot and fruit borer (Leucinodes orbonalis) on brinjal (Solanum melongena L.) on different spray schedule. 5% a.i/ha of NSKE was found to be the most effective treatments in minimizing the pests population and also recorded maximum yield of brinjal in all the entire period of study.

Keywords: Brinjal, NSKE, shoot and fruit borer and white fly.

Brinjal is generally grown in almost all the states in the country because of high nutritive value. It is used as a staple vegetable in our diet since ancient times and can be compared with tomato. The major brinjal producing states are West Bengal, Orissa and Bihar. In West Bengal, it is grown all the year round in a vast area covering most of the districts. Brinjal is a hardy crop and thrives best in warm and moist climate, which also favour multiplication of many insect pests. Generally, brinjal suffer maximum pest damage due to plant canopy and succulency. There is a greater possibility of carry over of insect pests from one season to other as it grown throughout the year. Whitefly [*Bemicia tabaci,* (Gennadius) (Aleyrodidae: Hemiptera)] and shoot and fruit borer [*Leucinodes orbonalis,* (Pyraustidae: Lepidoptera)] are the two destructive pests of brinjal causing substantial yield loss. Tripathy *et al.* (1997) recorded 4.33 to 6.54 per cent shoot damage and 52.3 per cent fruit damage irrespective of plantings month. The loss caused by this pest was estimated to range from, 70-92 per cent in the fruit yield (Rosaiah, 2001). To avoid the crop loss by these pests, the frequent use of toxic chemical insecticides has been a common practice to the brinjal growers. However, these methods ultimately pose problem due to pollution of environment, health hazards and adverse effect on beneficial organisms. Hence, the present investigation was made to the efficacy of different insecticidal schedules containing both chemical and non chemical insecticides, assessed against pests of brinjal to adopt such control measures.

MATERIALS AND METHODS

The experiment was conducted at Adisaptagram Block Seed Farm, Department of Agriculture, Hooghly, during 2006-07 and 2007-08 to evaluate the effectiveness of various synthetic insecticides and bio-pesticides against important insect pests of brinjal. The farm is situated at 81.5^0N latitude and 23.5^0 E longitudes with an average altitude of 9.75 m above the mean sea level. In this region, winter is very short and mild, while the soil is sandy loam of alluvial type with soil pH of 5.5. Seven treatments including one untreated control were tried in Randomized Block Design with three replications. Brinjal cv. Pusa Kranti was planted by the early September 3×2m plot with 60×20cm spacing in each plot. Fertilizer of the recommended doses and irrigation was provided as and when required following usual agronomical practices. The seven different treatments consisting of, T_1= NSKE @ 50 g/l of water + adjuvant @ 1% kernel wt. T_2= NSKE @ 25 g/l of water + adjuvant @ 1% kernel wt.; T_3 = NSKE @ 12.5 g/l of water + adjuvant @ 1% kernel wt.; T_4 = Monocrotophos @ 1.5 ml/l of water; T_5= Commercial Neem Formulation @ 2 ml/l of water. T_6 = Adjuvant @ 0.5 ml/l of water and T_7 = Untreated control were taken. The spraying was started 20 days after transplanting during late afternoon hours and repeated at an interval of 15 days till profitable yield was obtained. Population of whitefly was recorded from one upper, one middle and one lower leaves from 5 plants in each plot, selected at random. On the other hand, the population of brinjal shoot and fruit borer was taken by indirect method, *i.e.,* by the number of holes, on both shoot and fruit, through counting separately. Total weight of marketable brinjal fruits (fruits not damaged in any respect) obtained after each harvesting was recorded from each replication and treatment. Then the pooled data of pest population and yield of crop of two years were statistically analyzed for presentation and interpretation.

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RESULTS AND DISCUSSION

The data presented in the table 1, revealed that all the treatment schedules were significantly superior over control throughout the entire period of study. T_1 was found most effective treatment in controlling the whitefly population throughout the crop life as it supported 3.50 mean whitefly population which was succeeded by T_2 (4.07), T_4 (4.65), T_3 (4.81), T_6 (5.44), T_5 (5.85) and T_7 (8.00) respectively. Similarly, the percent decrease of population over control was found maximum in T_1 (5.25) and minimum in T_5 (26.87). The findings of Srinivasan and Babu (2001) confirm the result of the investigation against whitefly and also suggested that frequent sprays of neem derivatives were needed to regulate the pest below economic threshold level and can be best suited as a component of IPM for the management of *B. tabaci.* Naitam and Mali (2001) also evaluated that azadiractin @ 0.5 g a. i./ha + monocrotophos @ 126 g a. i./ha was most effective (59.25%) in reducing the population of whitefly on brinjal.

Table 1 : Efficacy of insecticide treatments against whitefly and shoot and fruit borer on brinjal

Treatments	Dose applied	Whitefly		Shoot and fruit borer		Fruit yield (t/ha)	Yield increase/ decrease over control (%)
		Mean population	% decrease over control	Mean population	% decrease over control		
T_1	NSKE @ 5 g a.i. /ha	3.50	56.25	0.29	25.64	19.33	9.10
T_2	NSKE @ 2.5 g a.i. /ha	4.07	49.12	0.32	17.95	21.33	17.63
T_3	NSKE @ 1.25 g a.i. /ha	4.81	39.87	0.30	23.07	18.50	5.03
T_4	Monocrotophos @ 126g a.i. /ha	4.65	41.87	0.35	10.26	18.07	2.77
T_5	Commercial neem @ 0.2g a.i. /ha	5.85	26.87	0.37	5.13	18.18	3.35
T_6	Adjuvant @ 0.05g a.i. /ha	5.44	32.00	0.35	10.26	16.97	-3.53
T_7	Untreated control	8.00	-	0.39	-	17.57	-
SEm (±)	-	**0.27**	-	**0.11**	-	-	-
LSD (0.05)	-	**0.66**	-	**0.28**	-	-	-

The shoot and fruit borer is one of the most damaging pests of brinjal which has international importance and has become resistant to all most all the chemical pesticides. However, the result of neem application is quite promising. Perusal of data shown in table 1 revealed that the incidence pattern of shoot and fruit borer on brinjal under different treatment schedules were statistically significant over control in reducing damage caused by of brinjal fruit and shoot borer throughout the crop life. Out of seven treatment schedules, T_1 was most effective as it recorded lowest mean relative incidence of pest (0.29) which was closely followed by T_3 (0.30), T_2 (0.32), T_4 (0.35), T_6 (0.35), T_5 (0.37) and T_7 (0.39) respectively. As a result, T_1 gave maximum percentage of decrease of infestation (25.64%) over control and T_3 (23.07), T_2 (17.95), T_6 (10.26) and T_5 (5.13) respectively. The overall performance of all the NSKE treatments is better than all other treatments in respect to yield and pest control. The findings of Raja *et al.* (1999), Singh (2003) and Jena *et al* (2005) also confirm the result of present investigation.

The yield of brinjal is found maximum in T_2 (21.33), followed by T_1 (19.33), T3 (18.50) T_5 (18.18), T_4 (18.07), T_7 (17.57) and T_6 (16.97) respectively. Therefore, T_2 (17.63) gave highest percentage increase over control. However, T_6 was unable to obtain higher yield than control in respect to both yield t/ha as well as percentage increase over control.

It can be concluded from the above experiment that neem tree can be utilized effectively as pest control measure as all parts of it (specially the seeds) possess insecticidal activity and its alkaloids can be extracted with water. It mainly acts as repellent and feeding deterrent agent along with some ovicidal and growth regulating activities. The experiment showed that the chemical insecticide failed to provide much effective result as desired, in addition causing the problem of resurgence, resistance, residual toxicity on products and environmental hazards. Neem thus can be used as an important component in IPM programmes to manage the incidence of whitefly and shoot and fruit borer on brinjal.

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