Bioefficacy of some plant products against brinjal fruit borer, *Leucinodes orbonalis* Guenee (Lepidoptera : Pyrallidae)

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ABSTRACT

Ten plant products were evaluated against *Leucinodes orbonalis*. They were: *Azadirachta indica* A. Juss. leaf extract @ 5.0 %, *Calotropis gigantea*. R. Br. leaf extract @ 5.0 %, *Lantana camera* Linn. leaf extract @ 5.0 %, neem cake extract @ 5.0 %, neem oil @ 2.0 %, Nimbecidine® @ 2 ml /lit, *Pongamia glabra* Linn. leaf extract @ 5.0 %, *Prosopis juliflora* Linn. leaf extract @ 5.0 %, *Vitex negundo* L. leaf extract @ 5.0 %, and garlic (*Allium sativum* Linn.) extract @ 5.0 %. The standard check, carbaryl (Sevin 50 WP) @ 0.1% and an untreated check were included. The plant products, neem oil, Nimbecidine, neem cake extract and C. *gigantea* were able to reduce the shoot damage by more than 50 percent during *Kharif;* Consistent effect was observed only for neem oil (57.29 %) and Nimbecidine (52.67 %) in *Rabi* crop. The plant products were moderately effective compared to the standard check, carbaryl. The plant products were moderately effective against fruit damage too. Among the plant products, neem oil was the best treatment both in *Kharif* (60.20 %) and *Rabi* (59.91 %) followed by Nimbecidine (57.42 %). Neem cake extract (51.97 %) and *C. gigantea* (51.34 %) were also quite effective in *Kharif* crop reducing fruit damage by more than 50 percent. Botanicals are moderate in their efficacy in reducing the fruit borer damage in brinjal.

key words: Brinjal, fruit borer, *Leucinodes orbonalis*, botanicals

INTRODUCTION

Vegetables are an important constituent of human diet. Brinjal is an important dietary vegetable crop. Under sustainable farming brinjal provides regular daily income to meet the day-to-day expenditure like wages for the labour, service charges for the machinery *etc*. Brinjal crop is scourged by a wide range of insect pests. Of them, the shoot and fruit borer, *Leucinodes orbonalis* Guenee.(Lepidoptera : Pyrallidae), is the most destructive one. It inflicts damage to both shoots and fruits (Srinivasan, 2008). The infested fruit fetches low price and become unmarketable. According to Kiritani (1979) ecofriendly, less costly measures such as, cropping system approach, botanicals (Prakash *et al.,* 2008) are more advantageous over insecticides, as they fit well in IPM. In the present study impact of leaves of *Azadirachta indica* A. Juss., *Calotropis gigantea*. R. Br., *Lantana camera* Linn., *Pongamia glabra* Linn., *Prosopis juliflora* Linn., and *Vitex negundo* L. and rhizome of garlic (*Allium sativum* Linn.) were evaluated against brinjal shoot and fruit borer *L. orbonalis.*

MATERIALS AND METHODS

In the present investigation ten botanicals were evaluated, at Agricultural College and Research Institute (TNAU) Killikulam- for their efficacy against the brinjal fruit borer, (*L. orbonalis*). The standard check, carbaryl (Sevin 50 WP @ 0.1%) and an untreated check were included. The brinjal variety was KKM 1. The treatments were applied as foliar spray.

Preparation of extracts

Leaves of *A. indica, C. gigantea, L.camera, P. glabra, P. juliflora* and *V. negundo* and rhizome of garlic (*A. sativum*) were collected and shade - dried and were ground with a domestic grinder. Known quantity of well powdered leaf material was soaked in one-third of water and kept overnight. Stirring was done frequently. Then the material was filtered through a clean muslin cloth and the clear filtrate was mixed with the remaining two-third portion of water. Neem cake extract was also prepared in the same way.

Bioassay and Statistical Analysis

Healthy and damaged shoots by *L. orbonalis* were recorded on ten randomly selected plants and per cent damage was worked out. After each observation, the damaged shoots were removed. In case of fruit infestation, number and weight of healthy and damaged fruits were recorded and per cent fruit damage was calculated. The

Table 1. Efficacy of plant products against shoot damage by *L. orbonalis*

Treatments	Reduction in damage over control (%)	
	Kharif	*Rabi*
A. indica Leaf extract (5.0 %)	38.72 (38.48)^{g}	36.38 (37.18)^{h}
C. gigantea leaf extract (5.0 %)	50.23 (45.13) ^{d}	47.53 (43.59)^{e}
L. camera leaf extract (5.0 %)	45.61(42.48) ^{e}	43.87 (41.48)^{f}
Neem cake extract (5.0 %)	50.83 (45.48)^{d}	48.74 (44.29)^{d}
Neem oil (2.0 %)	59.87 (50.70) ^{b}	57.29 (49.21)^{b}
Nimbecidine (2 ml l^{-1})	56.12 (48.52) ^{c}	52.67 (46.53)^{c}
P. glabra leaf extract (5.0 %)	41.24 (39.95)^{f}	42.90 (40.92)^{f}
P. juliflora leaf extract (5.0 %)	34.87 (36.18) ^{h}	31.96 (34.40)^{I}
V. negundo leaf extract (5.0 %)	37.58 (37.81)^{g}	38.09 (38.11)^{g}
A. sativum extract (5.0 %)	39.25 (38.79) ^{g}	36.09 (36.92)^{h}
Carbaryl 50 WP (0.1 %)	75.45 (60.32)^{a}	74.25 (59.44)^{a}
Mean	48.16 (43.98)	46.34 (42.92)
Significance	0.01	0.01
CD (p=0.05%)	1.01	0.64

Figures in parentheses are angular transformed values. In a column means followed by a common letter are not significantly different at 5% level (LSD).

Table 2 . Efficacy of plant products against fruit damage by *L. orbonalis*

Treatments	Reduction in damage over control (%)		
	Kharif	Rabi	Mean
A. indica Leaf extract (5.0 %)	39.20(38.76)^{Af}	36.92(37.41) ^{Bf}	38.26(38.08) ^{g}
C. gigantea leaf extract (5.0 %)	51.34(45.77)^{Ad}	49.90(44.94) ^{Ad}	50.62(45.36) ^{d}
L. camera leaf extract (5.0 %)	46.36(42.91)^{Be}	49.30(44.60) ^{Ad}	47.83(43.76) ^{e}
Neem cake extract (5.0 %)	51.97(46.13)^{Ad}	49.64(44.79) ^{Bd}	50.81(45.46) ^{d}
Neem oil (2.0 %)	60.20(50.89)^{Ab}	59.91(50.72) ^{Ab}	60.06(50.80) ^{b}
Nimbecidine (2 ml l^{-1})	57.42(49.27)^{Ac}	55.34(48.07) ^{Ac}	56.38(48.67) ^{c}
P. glabra leaf extract (5.0 %)	40.35(39.44)^{Af}	41.36(40.03) ^{Ae}	40.86(39.74) ^{f}
P. juliflora leaf extract (5.0 %)	28.28(32.12)^{Bg}	33.28(35.23) ^{Ag}	30.78(33.68) ^{h}
V. negundo leaf extract (5.0 %)	39.90(39.17)^{Af}	37.22(37.59)^{Bf}	38.56(38.38) ^{g}
A. sativum extract (5.0 %)	39.53(38.96)^{Af}	36.47(37.15) ^{Bf}	38.00(38.05) ^{g}
Carbaryl 50 WP (0.1 %)	72.67(58.48)^{Aa}	72.09(58.11) ^{Aa}	72.38(58.30) ^{a}
Mean	47.93(43.81)^{A}	47.40(43.51) ^{A}	47.69(43.66)

Figures in parentheses are angular transformed values; In a column/row means followed by a common letter are not significantly different at 5% level by LSD; NS- Non-significant

fruits were harvested and the yield was recorded. The data gathered were transformed into angular or square-root values for statistical scrutiny, wherever necessary (Gomez and Gomez, 1984). The experiments were subjected to statistical scrutiny following the method of Panse and Sukhatme (1989) and Gomez and Gomez (1984) and the means were compared with Least Significant Difference (L.S.D.).

RESULTS

The results of the investigation with ten plant products against shoot and fruit borer, *L. orbonalis* are presented in Tables 1-3. Variability in reduction of shoot damage was evident in *Rabi* and *Kharif*. The plant products were much less effective compared to the standard check carbaryl. Among the plant products, neem oil, Nimbecidine, neem cake extract and *C. gigantea* only were able to reduce the shoot damage by more than 50 per cent during *Kharif*. In *Rabi* crop, consistent effect was observed only for neem oil (57.29 per cent) and Nimbecidine (52.67 per cent) (Table 1). Treatments were statistically significant at 5 % level.

The data presented in table 2 revealed apparent differences in fruit damage among the treatments but not between the seasons; significant interaction was also observed ($P < 0.05$). The plant products were much less effective against fruit damage too. Neem oil was the best treatment both in *Kharif* (60.20 per cent) and *Rabi* (59.91 per cent) followed by nimbecidine (57.42 per cent). Neem cake extract (51.97 per cent) and *C. gigantea* (51.34 percent) were also quite effective in *Kharif* crop reducing fruit damage more than 50 per cent. Overall means had the similar trend of *Kharif*.

The plant products were able to increase the fruit yield significantly over untreated check; but the yield increase was more than 2 t ha^{-1} only in neem oil treated plots (Table 3). Neem oil recorded a fruit yield of 14.38 and 11.48 t ha^{-1} in *Kharif* and *Rabi* crops respectively. Nimbecidine was the next best treatment with 13.99 and 11.03 t ha^{-1} in *Kharif* and *Rabi* crops respectively; while it was 12.26 and 9.21 t ha^{-1} in *Kharif* and *Rabi* crops respectively in control plot.

DISCUSSION

Usually the management of insect pests in brinjal has been insecticide oriented. However, the obvious limitations and hazards associated with the insecticide applications restrict their use in pest management programmes. Evidently, the safer plant products proved useful in developing sound pest management strategies (Gupta and Singh, 2002).

Neem oil and nimbecidine were moderately effective against *L. orbonalis* in both the seasons and gave higher yields than the standard check. Several earlier workers have also demonstrated the effectiveness of neem oil (Udaiyan and Ramarathinam, 1994; Shanmugaraj, 1995),

Table 3. Effect of plant products on fruit yield (t ha^{-1}) at two different seasons

Treatments	Yield		Mean
	Kharif	*Rabi*	
A. indica Leaf extract (5.0 %)	13.05^{g}	9.80^{fg}	11.43
C. gigantea leaf extract (5.0 %)	13.79^{d}	10.64^{d}	12.22
L. camera leaf extract (5.0 %)	13.54^{e}	10.24^{e}	11.89
Neem cake extract (5.0 %)	13.89^{cd}	10.79^{d}	12.34
Neem oil (2.0 %)	14.38^{b}	11.48^{b}	12.93
Nimbecidine (2 ml l^{-1})	13.99^{c}	11.03^{c}	12.51
P. glabra leaf extract (5.0 %)	13.25^{f}	9.85^{fg}	11.55
P. juliflora leaf extract (5.0 %)	12.51^{i}	9.56^{g}	11.04
V. negundo leaf extract (5.0 %)	12.85^{h}	9.75^{fg}	11.30
A. sativum extract (5.0 %)	12.95^{gh}	9.95^{f}	11.45
Carbaryl 50 WP (0.1 %)	16.89^{a}	14.63^{a}	15.76
Untreated check	12.26^{j}	9.21^{h}	10.74
Mean	13.61	10.58	12.10
Significance	0.01	0.01	-
CD (P=0.05%)	0.19	0.29	-

In a column, means followed by a common letter are not significantly different at 5% level (LSD).

nimbecidine (Udaiyan and Ramarathinam, 1994) against *L. orbonalis* and nimbecidine (Murugesan and Murugesh, 2008) against Hadda beetle (*Henosepilachna vigintioo ctopunctata)***.** The present studies with plant products revealed that some of the plant products were moderately effective in bringing down the damage by *L. orbonalis*, besides increasing the yield, though not as effective as that of the standard check carbaryl.

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