



RESEARCH NOTE

Effect of botanical extracts against shoot and fruit borer, *Earias vittella* (Fab.) on bhendi under *in vitro* condition

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ABSTRACT: The antifeedant and mortality effects of eight plant extracts *viz.*, neem leaf (5%), *Calotropis* leaf (5%), neem seed kernel (5%), *Datura* leaf (5%), oleander seed (5%), garlic bulb (5%), garlic + chilli extracts (5%) were evaluated against bhendi shoot and fruit borer, *Earias vittella* F. under the laboratory conditions. The results showed that neem leaf extract and neem seed kernel extract exhibited maximum antifeedant activity after 24 hours of treatment. The highest per cent mortality was observed with neem seed kernel extract followed by garlic + chilli extracts, neem leaf extract and oleander seed extract. The data demonstrated that these botanical extracts have potential for the effective management of *E. vittella* on bhendi.

Keywords : Botanical extract, bhendi, *Earias vittella*, shoot and fruit borer

More than hundred insect species have been reported as pests of bhendi (Santosh kumar *et al.*, 2013). There are a few insect pests such as leaf hopper, aphid, white fly, shoot & fruit borer and spider mite, which are importance in bhendi. Among them, shoot and fruit borer, *Earias vittella* Fab. is considered a major pest (Shitole and Patel, 2009) and causes about 50% loss in cotton and bhendi crops (Mahapatro and Gupta 1998) in various parts of India. *E. vittella* alone is reported to cause 13.8 to 41.6 per cent net yield loss in bhendi (Rai *et al.*, 2010). The use of chemical insecticides is not advisable in bhendi crops which might lead to serious problems of residue deposition in fruits. It has now become necessary locally available botanicals extract for the management of *E. vittella*. Therefore some botanicals extracts were tested against shoot and fruit borer on bhendi to find out antifeedant activity and per cent mortality.

The collection and preparation of botanical extracts was done as per the the aqueous method of Pazhanisamy (2015). The laboratory experiment was conducted to evaluate the efficacy of botanical insecticides against mass cultured third instars larvae of *E. vittella*. The experiment was conducted by following the fruit disc no-choice method of Muthu *et al.* (2015). In each plastic petri dish, a wet filter paper was placed to avoid early drying of the test materials. There were 10 number of 3rd instar larvae (pre starved in 12 hours) were introduced into each petri dish containing five discs of bhendi fruit treated with botanical insecticides. Three replications were maintained for each treatment. The

per cent antifeedant activity and per cent mortality were calculated using below given formulae.

$$\text{Antifeedant activity} = \frac{\text{Consumption in Control} - \text{Consumption in treated}}{\text{Consumption in control}} \times 100$$

$$\text{Per cent mortality} = \frac{\text{Observed mortality in treatment}}{\text{Total number of larvae released per treatment}} \times 100$$

Bio-efficacy of plant extracts against *E. vittella* under laboratory conditions revealed that all botanicals extracts caused substantial reductions in *E. vittella* population (Table 1). The higher per cent antifeedant activity was recorded in neem seed kernel extract (NSKE) 5% (61.23%) followed by neem leaf extract (NLE) 5% (59.09%) and oleander seed extract (OSE) 5% (51.15%) compare to control (3.84%) at the 24 HAT after the treatment. The least antifeedant activity was recorded on *Datura* leaf extract 5% (35.65%) followed by *Calotropis* leaf extract 5% (37.18%). The highest per cent mortality was recorded in NSKE 5% (33.33%) on par with garlic + chilli + kerosene extract (GCKE) 5% (26.67%) on par with NLE 5% (26.67%) followed by OSE (16.67%) at after 24 HAT. The similar trends were followed in 48 HAT (Plate 13). At 72 HAT, the highest per cent mortality was NSKE 5%, GCKE 5% and NLE 5% were 76.67%, 63.33% and 56.67% respectively. The least mortality was recorded on *Datura* leaf extract (DLE) 5% (33.33%). Thus it was evident that there was significant difference among the botanical extracts but individually NSKE showed highest mortality followed

Table 1. Bio- efficacy of botanical extract against *E. vittella* under lab condition

Treatment	Per cent antifeedant activity*		Per cent mortality*		
	24 HAT	24 HAT	48 HAT	72 HAT	72 HAT
Neem leaf extract (5%)	59.09 (50.25) ^{ab}	26.67 (30.99) ^a	43.33 (41.16) ^b	56.67 (48.85) ^c	
<i>Calotropis</i> leaf extract (5%)	37.18 (37.55) ^e	13.33 (21.15) ^{bc}	20.00 (26.57) ^{cd}	33.33 (35.84) ^d	
Neem seed kernel extract (5%)	61.23 (51.51) ^a	33.33 (35.22) ^a	56.67 (48.85) ^a	76.67 (61.22) ^a	
<i>Datura</i> leaf extract (5%)	35.65 (36.65) ^e	6.67 (12.39) ^{cd}	16.67 (23.86) ^d	26.67 (30.99) ^e	
Oleander seed extract (5%)	51.15 (45.67) ^{bc}	16.67 (23.86) ^b	33.33 (35.22) ^c	46.67 (43.08) ^c	
Garlic extract (5%)	37.18 (37.55) ^e	13.33 (21.15) ^{bc}	20.00 (26.57) ^{cd}	36.67 (37.23) ^{cd}	
Garlic + Chilli + kerosene extract (5%)	45.73 (42.55) ^{cd}	26.67 (30.99) ^a	46.67 (43.07) ^{ab}	63.33 (52.78) ^b	
control	3.84 (11.27) ^f	0.00 (2.9) ^d	00.00 (0.29) ^c	00.00 (0.29) ^f	
SED	2.202	4.415	4.313	2.260	
CD (p=0.05)	4.723	9.450	9.265	4.849	

*Mean of three replications

Figures in parentheses are arcsine ($x + 0.5$) transformed values, mean in column followed by common letter are not significantly different at the 5 per cent level (DMRT), HAT- Hour after treatment.

by GCKE and NLE.

The results of *in vitro* studies on *E. vittella* revealed that the maximum antifeedant activity was observed in NSKE 5% followed by NLE 5% and OSE 5% when compared to control (3.84%) at the 24 HAT (Table. 14 & Fig. 5). The results are in conformity with Rao *et al.* (2002) who reported higher antifeedant activity with neem seed extract. Similarly, Sharma *et al.* (2009) confirmed that maximum antifeedant activity in neem seed (40.06%).

The maximum per cent mortality was recorded in NSKE@ 5%, GCKE @ 5% and NLE @ 5% were 76.67%, 63.33% and 56.67% at 72 HAT, respectively. These botanical extracts were slow in action and long lasting. The present findings are in accordance with Sumathi and Balasubramanian (2002) who highlighted the effectiveness of NSKE @ 5% in controlling the shoot

and fruit borer on bhendi. Umamageswari *et al.* (2008) reported the neem (*A. indica*) as deterring and repelling agent against *E. vittella* on bhendi. In the present study, OSE @ 5% and GBE @ 5% were moderate by effective against *E. vittella* on bhendi. Similarly, Pratibha and Singh (2006) observed the maximum toxic effect after treatment with neem in all exposure periods followed by garlic bulb extract.

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MS Received : 5 January 2018

MS Accepted : 7 March 2018