

STUDY ON ANTIFEEDANT EFFECT OF METHANOLIC EXTRACTS ON DIAMONDBACK MOTH (*Plutella xylostella*)

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Abstract: Efficacy of methanolic extract of *Lantana camara* (L.), *Eupatorium adenophorum* (Spreng), *Artemisia brevifolia* (Wall), *Melia azedarach* (L.), *Polygonum sp.*, *Vitex nigundo* (L.), *Rumex nepalensis*, and *Ageratum conyzoides* were studied at 1.25, 2.5 and 5.0% concentrations against Diamondback moth. Maximum antifeedant activity was recorded in higher concentration (5.0%) of all the plants. Out of all the plants tested *Lantana camara*, *Rumex nepalensis* and *Artemisia breviflora* completely inhibited the feeding by caterpillars at 5% concentration. Moderate to high reduction in feeding was observed at lower concentrations (2.5 and 1.25%) of other extracts except for *Polygonum sp.*

Keywords: Plant extracts, Pest, Larva, Antifeedant.

INTRODUCTION

Cabbage is a vegetable grown by farmers as an off season as well as a main season crop in all the states of India. This crop is attacked by a large number of pests viz. tobacco caterpillar, diamondback moth, cabbage leaf Webber, aphids, painted bug, and flea beetle (Rao and Lal, 2005). Of these, aphids and diamondback moth have been reported to cause significant losses to the crop and more than 50% losses in yield have been reported due to the attack of only diamondback moth (Krishnamoorthy, 2004). Proper management schedule is required to develop strategies for the control of this pest because most of the pesticides are ineffective owing to development of insect resistance and objectionable pesticide residues (Sharma and Singh, 1993). Several plant parts and their extracts are known to possess pesticidal properties (Djomaha et al, 2016)).

MATERIAL AND METHODS

Collection and Extraction of Plant Material

The aerial parts of eight plant species viz. *Lantana camara* (L.), *Eupatorium adenophorum* (Spreng), *Artemisia brevifolia* (Wall), *Melia azedarach* (L.), *Polygonum sp.*, *Vitex nigundo* (L.), *Rumex nepalensis*, and *Ageratum conyzoides* were collected from different agro climatic zones of Himachal Pradesh. The samples were air dried in shade for a week at room

temperature and dried in oven at 40⁰ C for 24 hours. Finally the dried plant material was extracted in methanol by simple distillation process.

Rearing of Test Insect

Rearing of Mass culture of test insect Diamondback moth (*P. xylostella*) was done under laboratory conditions.

ANTIFEEDANT ACTIVITY

Antifeedant properties of eight selected plant extracts were studied against third instar larvae of *P. xylostella*. Small circular discs were cut from fresh and washed leaves of cabbage. These Discs were dried in air and then dipped in different concentrations of the Methanolic extract for one minute. The treated and dried discs were placed in petri dish having moist filter paper at the bottom. Third instar larvae (pre starved for 6 hours) were released in each Petri dish (n=10). The treatments were replicated thrice and set was also maintained devoid of larvae in order to record the reduction in leaf area due to the shrinkage and loss of moisture. An untreated check was also maintained by releasing larvae on solvent treated discs. After 24 hours, the larvae were removed from the Petri dish and leaf area consumed was measured.

RESULTS AND DISCUSSION

An examination of data (Table1) revealed that Methanolic extract of the eight plants exhibited significant antifeedant activity against *P. xylostella* at different concentrations. Moderate to high antifeedant activity was observed in different plant extracts. *Lantana camara* exhibited significantly higher antifeedant activity followed by *Rumex nepalensis*. Extract of *Polygonum sp.* proved to have least antifeedant activity whereas *Lantana camara*, *Rumex nepalensis* and *Artemesia bravifolia* completely inhibited the feeding by caterpillars at 5% concentrations. Other plant extracts except *Polygonum sp.* also proved very effective in inhibiting feeding and were able to check feedings to the tune of more than 90%. However, at lower concentrations (2.5 and 1.25%) moderate to high reduction in feeding was observed.

Table 1. Antifeedant activities of methanolic extracts against *P. xylostella*

Plant	Per cent reduction in feeding			
	5.0	2.5	1.25	Mean
<i>M. azedarach</i>	98.8 (86.4)	74.5 (59.8)	44.8 (42.0)	72.7 (62.7)
<i>A. conyzoides</i>	99.6 (87.6)	74.0 (59.4)	41.2 (40.0)	71.6 (62.3)
<i>V. nigundo</i>	93.7(76.0)	80.2 (63.7)	48.3 (44.0)	74.1 (61.2)
<i>R. nepalensis</i>	100.0(90.0)	79.2 (66.0)	47.5 (43.6)	75.6 (66.5)

<i>A. brevifolia</i>	100.0(90.0)	78.2 (60.9)	44.6 (41.9)	73.6 (64.3)
<i>E. adenophorum</i>	98.0 (83.5)	75.3 (63.2)	42.7 (40.8)	72.0 (62.5)
<i>L. camara</i>	100.0 (90.0)	85.0 (67.6)	53.7 (47.1)	79.5 (68.2)
<i>Polygonum sp.</i>	85.5 (67.9)	65.5 (54.0)	34.1 (35.6)	61.7 (52.5)
Mean	98.9 (83.9)	76.2 (61.8)	44.6 (41.9)	-

Figures in parenthesis are the angular transformed values

CD (P=0.05)	Plant	= 1.4
	Concentration	= 1.3
	Plant × Concentration	= 2.8

From the present study, it is quite obvious that some plant extracts are effective for checking the feeding by the most destructive stage of *P. xylostella*. Further isolation of active components from these plants will prove to be an eco- friendly and sustainable component in the management of Diamondback moth.

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