

Efficacy of some Euphorbiaceae plant extracts against cabbage diamondback moth, *Plutella xylostella* L.

Increasing use of synthetic pesticides in agriculture has led to various problems and in order to overcome these, there has also been a steady effort to develop environment friendly practices to prevent further degradation of the environment as well as human health. With this view point there has been a considerable effort to explore plants for their insecticidal property. Hence, the search for new and potent botanicals would be appropriate in the current agricultural scenario. Several anti herbivore property of extracts of Euphorbiaceae plants such as insecticidal, larvicidal, insect growth inhibitor and ovicidal action have been demonstrated previously. Therefore, an attempt was made for assessing the insecticidal properties of some plants.

The culture of cabbage diamondback moth (DBM), *P. xylostella* was maintained on mustard seedlings. Four species of *Euphorbia* plant parts were shade dried and ground to powder. The powder was then defatted by soxhlet extraction with petroleum ether (40-60°). The defatted marc was re-extracted in ethyl alcohol. The extract obtained was concentrated in a flash evaporator and diluted in distilled water to obtain 2.5, 5.0, 7.5, 10.0 and 20.0 per cent solutions by weight by volume. Different plant extracts were assayed against *P. xylostella* using standard leaf dip method (Kumar *et al.*, 2000). Clean mustard leaves cut into suitable sizes with stalks intact were dipped in respective concentrations of the extract for 15 seconds and air dried in shade and transferred to Petri plate. Ten freshly hatched second instar larvae of DBM were released on to these treated leaf bits. Each such leaf represented one replication and three replications were maintained. The treated leaves were replaced with untreated leaves at every 72 h after treatment. Observations on the larval mortality were made at 24 h intervals. Larvae were

observed for their death either due to toxic effect or IGR effect or both. Some of the larvae were dead while moulting. Observations were made periodically and the total per cent mortality data (due to toxicity and IGR effect) were corrected using Abbott's formula.

Euphorbia nivulia leaf extract exhibited both toxic and insect growth regulatory (IGR) effects on DBM. At 96 h after treatment, the mortality was observed only in 10 and 20 per cent concentration with a maximum of 10 per cent mortality. At adult emergence, the highest mortality was observed at 2.5 per cent concentration (57.7 % mortality) followed by 10, 20 and 5 per cent concentrations. The mortality was observed to increase from 96 h after treatment till adult emergence in all the concentrations. A change in mortality pattern with time was observed such that the initial mortality was largely due to toxic effect while at the time of adult emergence the IGR effect was more compared to toxic effects (Table 1).

E. pulcherrima plants exhibited limited toxic effect and higher IGR activity. At 96 h post treatment, the maximum mortality was observed in 20 per cent concentration (43.3 %). Similar trend was observed for cumulative mortality till adult emergence with a total maximum mortality of 92.85 per cent at 20 per cent (Table 1). The results indicate both quick and long lasting activity of the chemicals contained in the leaves. The plant was proven to have insecticidal activity against rice weevil (Jacobson, 1975).

E. antiquorum stem part showed both IGR and toxic effects on DBM. At 96 h after treatment the maximum mortality was observed in 10 per cent concentration (16.6 %) and the

Table 1. Efficacy of various alcoholic extracts of *Euphorbia* plant against *Plutella xylostella*

Plant name	Plant part used	Concentration	(%) Total	corrected mortality (%)	Type of mortality
			96 h after treatment	Till adult emergence	
<i>Euphorbia nivulia</i>	Leaf	2.50	0.0	57.70	Both toxic and IGR effect
		5.00	0.0	23.10	
		10.00	10.0	50.01	
		20.00	6.66	42.39	
<i>Euphorbia pulcherrima</i>	Leaf	2.50	30.0	71.43	Major IGR effect
		5.00	36.66	71.43	
		10.00	13.33	75.00	
		20.00	43.33	92.85	
<i>Euphorbia antiquorum</i>	Stem	2.50	6.66	53.84	Both toxic and IGR effect
		5.00	3.33	65.38	
		10.00	16.66	92.30	
		20.00	10	92.30	
<i>Euphorbia tirucalli</i>	Stem	2.50	16.66	85.18	Both toxic and IGR effect
		5.00	6.66	55.55	
		10.00	10	59.25	
		20.00	6.66	59.25	

mortality in other concentrations did not show a trend (Table 1). By adult emergence a graded mortality was observed such that the highest mortality of 92.3 per cent was observed in 20 per cent concentration and was followed by 10, 5 and 2.5 per cent concentrations.

E. tirucalli stem extract showed both toxic and IGR effects on the test insect. A maximum of 16.6 per cent mortality was observed in 2.5 per cent concentration at 96 h after treatment and the general trend with respect to different concentrations was random. Similar pattern continued even at adult emergence

with highest mortality being observed in 2.5 per cent concentration (85.18 % mortality), followed by 20, 10 and 5 per cent concentrations. Both toxic and IGR effects increased at the same rate till adult emergence. *E. tirucalli* and *E. antiquorum* were previously known to have larvicidal property against mosquitoes in their latex (McIndoo, 1983).

All the plants tested demonstrated some degree of activity against the test insect where as *E. pulcherrima* and *E. antiquorum* demonstrated a high degree of activity against the test insect at 20 per cent concentration. These species can be conveniently considered as useful plants for local exploitation.

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