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Efficacy of Fenvalerate-treated Nuclear Polyhedrosis Virus and Fluvalinate-Virus Combination in the Control of *Helicoverpa armigera* (Hbn.) on chickpea*

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The usefulness of nuclear polyhedrosis virus (NPV) in the management of *Helicoverpa* (=*Heliothis*) *armigera* Hbn. on chickpea (*Cicer arietinum* L.) has been demonstrated through several field experiments (Rabindra and Jayaraj, 1988a ; Rabindra *et al.*, 1989; Rabindra *et al.*, 1992). The virus has been applied along with half the recommended doses of insecticides like endosulfan (Rabindra and Jayaraj, 1988b) and fenvalerate (Sathiah, 1987). Probit analysis of dosage-mortality responses of *H.armigera* larvae to fenvalerate-treated and untreated NPV showed that the activity of the virus was enhanced due to exposure to fenvalerate (Rabindra *et al.*, 1991). This paper reports the results of a field experiment on the field performance of fenvalerate-treated NPV as well as NPV-fluvalinate combinations in the control of *H.armigera* on chickpea.

The nuclear polyhedrosis virus used in the study was obtained fresh from virosed cadavers of *H.armigera* and semi-purified by differential centrifugation using a clinical centrifuge. The strength of polyhedral occlusion bodies (POB) was assessed with the help of a haemocytometer. Approximately 10 larval equivalents (6×10^{10} POB) of NPV were suspended in a 50 ppm fenvalerate emulsion in distilled water for six hours and held at room temperature (27.5 - 30.2°C). Then the virus was pelletted by centrifugation at 5000 rpm for 10 min and the pellet washed repeatedly in distilled water. The washed pellet was suspended in distilled water and counts on POB were made with a haemocytometer.

The efficacy of fenvalerate-treated NPV was compared with untreated virus along with NPV-fluvalinate combinations in the control of *H.armigera* on chickpea (cv.Shoba) in a farmer's field at Kurumbapalayam of Coimbatore district. The treatments were replicated thrice in a randomised block design and the plot size was 20 m^2. The first round of treatment was started in the vegetative stage itself since there was a good incidence of the pest and subsequently four more sprays were given at 6-7 days interval. A hand-held battery-operated spinning disc ULV sprayer was employed using a spray fluid of 12.5 litres per ha. A cloth screen of 5 feet height was held all around the plot to avoid the drift of spray to adjacent plots. Treatments were given in the evening hours (4-6 pm) to reduce the UV-inactivation of virus by sunlight. *H. armigera* larval population was recorded on 10 randomly selected plants in each plot 5-6 days after each spray. Pod damage was assessed on 10 randomly-selected plants before harvest. The plot yield of grain was assessed at harvest. The data were subjected to analysis of variance after suitable transformation and the means were compared with L.S.D.

The data on larval population, pod damage as well as yield indicated clearly that there was no significant differences in efficacy between the fenvalerate-treated and untreated NPV (Table 1). The enhanced activity of fenvalerate-treated NPV seen in laboratory studies (Rabindra *et al.*, 1991) was not observed in the field. The possible reason for this may be that at the field dose which is

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Table 1. Evaluation of field efficacy of fenvalerate-treated NPV and NPV - fluvalinate combination in the control of *H.armigera* on chickpea (cv.Shoba)

Treatment	Larvae/10 plants					% Pod damage	Grain yield kg/ha
	Pretreatment	6th day of spray I	6th day of spray II	5th day of spray III	6th day of spray IV		
Fenvalerate-treated NPV 250 LE/ha	2.7	2.3^{bc}	1.7^{ab}	2.7bc	3.0^{c}	9.6^{bc}	531.3^{a}
Untreated NPV	5.0	1.0^{ab}	2.3b	3.0^{c}	2.7^{bc}	11.8^{c}	501.0^{a}
NPV + fluvalinate 30 g a.i./ha	4.7	0.3^{a}	0.3a	1.7^{ab}	1.0^{a}	7.8^{b}	456.0^{a}
Fluvalinate 30 g a.i./ha	3.7	0.3^{a}	1.3ab	1.3^{a}	1.3^{ab}	7.2^{b}	482.7^{a}
Fluvalinate 60 g a.i./ha	4.3	0.3^{a}	0.7ab	1.0^{a}	1.0^{a}	2.9^{a}	512.7^{a}
NPV + Fluvalinate 60 g a.i./ha	3.7	1.0^{ab}	0.7a	1.3^{a}	1.0^{a}	9.8^{bc}	552.0^{a}
Endosulfan 350g a.i./ha	3.0	2.7^{c}	1.3ab	1.0^{a}	1.0^{a}	11.7^{c}	511.3^{a}
Control	3.3	3.0^{c}	5.0c	4.7^{d}	7.0^{d}	19.9^{d}	289.7^{b}

In vertical columns, means followed by similar letters are not different statistically by L.S.D. (P=0.05)

much higher than what was used in the laboratory study, the activity differences were masked and not evidently seen.

NPV may also be used along with fluvalinate 30 g a.i./ha for the effective control of pests of chickpea. However, the synthetic pyrethroids should be used with caution as *H.armigera* has already developed resistance to these insecticides (Dhingra *et al.*, 1988; McCaffery *et al.*, 1989).

KEY WORDS: Nuclear polyhedrosis virus, fenvalerate, fluvalinate, *Helicoverpa armigera*

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