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Effect of Fenvalerate on the Virulence of Nuclear Polyhedrosis Virus to *Heliothis armigera* Larvae*

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The Nuclear Polyhedrosis Virus (NPV) has been found to be effective in the control of *Heliothis armigera* (Rabindra and Jayaraj, 1988a). The virus has also been applied in combination with chemical insecticides like fenvalerate for the control of the pest (Sathiah, 1987). In order to study the effect of fenvalerate on the infectivity of the NPV, a laboratory bioassay was conducted.

The NPV was propagated in fourth instar larvae of *H. armigera* and semipurified by differential centrifugation. Counts were made with a new improved double ruled Neubauer haemocytometer and a quantity of 10^9 POB (Polyhedral Occlusion Bodies) was suspended in 20 ml of a 50 ppm emulsion of fenvalerate (Sumicidin 20 EC) in distilled water for 6 h. The control virus was suspended in distilled water for 6 h. The POB was kept in suspension by periodical shaking of the tubes. After 6 h, the POB was pelletted by centrifugation and the pellet washed repeatedly (10 times) in distilled water and pelletted. The final pellet was suspended in a known quantity of distilled water and after assessing the strength of the virus, a bioassay was done using the standard leaf-dip method described by Rabindra and Jayaraj (1988b). The experiment was repeated with a lower dose of 2.5 ppm fenvalerate emulsion in distilled water. Data on the mortality in different treatments were recorded at regular intervals.

The dosage and time-mortality responses were subjected to probit analysis (Finney,

Table 1. Probit analysis of dosage-mortality response of second instar larvae of *H. armigera* to NPV exposed to 50 ppm fenvalerate

χ	No. of insects used	χ^2 (n-2)@	Slope "b"	LC_{50} (x.10^4 POB/ml)	Fiducial limits (x.10^4 POB/ml)
Fenvalerate-treated	120	7 - 26	1.006	1.7028	1.9582 - 3.0256
Untreated	120	2 - 91	0.711	4.4556	1.7414 -11.4000

@ All lines significantly a good fit (P<0.05)

Table 2. Probit analysis of dosage-mortality response of second instar larvae of *H. armigera* to NPV exposed to 2.5 ppm fenvalerate

χ	No. of insects used	χ^2 (n-2)@	Slope "b"	LC_{50}	Fiducial limits (x.10^4 POB/ml)
Fenvalerate-treated	180	1.01	0.449	0.34	0.11 - 1.00
Untreated	180	3.48	0.947	3.70	2.20 - 6.50

@ All lines significantly a good fit (P<0.05)

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Table 3. Time-mortality response of second instar larvae of *H. armigera* to fenvalerate 2.5 ppm - treated(T) and untreated (U) NPV

Dose POB/ml	Treatment	χ^2 (n-2)@	slope "b"	LC_{50} (h)	Fiducial limits
0.5×10^4	T	2.62	6.7	124.22	118.53 -130.19
	U	0.35	3.66	188.32	168.47 -210.51
0.5×10^5	T	2.77	8.04	100.51	96.36 -104.84
	U	1.70	6.64	132.61	126.28 -139.26
0.5×10^6	T	6.04	15.51	83.03	81.49 - 84.59
	U	4.61	18.42	83.87	82.15 - 85.64

@ All lines significantly a good fit ($P<0.05$)

1964).

Comparison of the LC_{50} values showed that the LC_{50} was much lower in 50 ppm fenvalerate-treated virus than in the untreated virus (Table 1). In the second experiment with reduced dose of fenvalerate also, a similar phenomenon was observed. The LC_{50} of the fenvalerate-treated NPV was significantly lower than that of untreated NPV (Table 2). Probit analysis of time-mortality responses for selected doses showed that fenvalerate treated-NPV recorded significantly lower LT_{50} values than the untreated NPV at the two lower doses (Table 3) corroborating the results of the dosage- mortality studies. The precise mechanisms of this pheonomenon is not known. Small quantities of fenvalerate adsorbed to the polyhedral coat could have predisposed the gut cells to the virus thereby promoting the action of the virus. Detailed studies on the effect of fenvalerate on the different components of POB as well as the virion at the ultrastructural and molecular level would throw more light on the possible mechanisms involved.

Field studies had shown that a combination of NPV with fenvalerate 50 ppm gave the maximum control of the pest as well as grain yield (Sathiah, 1987). The present finding indicates that NPV of *H. armigera* can be combined with fenvalerate as a tank mix formulation without loss of virulence of the virus.

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