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Control of Pigeonpea Pod Borer, *Helicoverpa armigera* (Hbn.) with Nuclear Polyhedrois Virus

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The pigeonpea pod borer, *Helicoverpa* (=*Heliothis*) *armigera* (Hbn.) in recent years has been identified as a pest which acquired resistance to many of the commonly used insecticides (Dhingra *et al.,* 1988). The unabated population explosion of this pest since 1986 in Andhra Pradesh confirmed the understanding that even synthetic pyrethroids are quite ineffective against this pest. Studies made by Santharam *et al.* (1981), Jayaraj *et al.* (1989) and Sithanantham (1987) indicate that nuclear polyhedrois virus (NPV) can be used to contain this pest at field level. Hence, studies were conducted at the Regional Agricultural Research Station, Lam in collaboration with the Central Biological Control Station, Hyderabad on the utility of NPV against the pigeonpea pod borer.

A field trial with six treatments (Table 1) replicated four times, was taken up on pigeonpea (CV. LRG 30) during Kharif 1989-90 season with an objective of evaluating the efficacy of NPV of *Heliothis,* either alone or in combination with endosulfan and acephate. An individual plot size of 27 m^2 was maintained and the recommended agronomic practices were adopted. The treatments were applied thrice at 10 days interval starting the first round at flower initiation of the crop which synchronised with the maximum activity of the pest. The treatments were applied with a high volume sprayer using 250 litres of spray fluid per hectare. Data on the larval population were collected on 10 randomly-selected plants as post counts after each application to verify the effectiveness of the treatments. The damage to pods was recorded by counting the total and bored pods. Grain yields were recorded at harvest.

To verify further the efficacy of the *Heliothis* NPV on the pod borer, a second field experiment with six treatments (Table 2) was conducted on Rabi pigeonpea (Cv.ICPL 270). The treatments were given on 30.12.90

Table 1. Efficacy of NPV in the control of *H.armigera* on pigeonpea (Cv. LRG30) during kharif 1989-90 on pigeonpea*

Treatment	Larvae/10 plants	Pod damage (%)	Yield kg/ha
NPV (500 LE/ha) + Teepol (0.1%)	11.7^b	19.7^b	944^d
NPV + Teepol + Crude sugar (0.5%)	8.7^b	10.0^a	1241^{bc}
NPV + Teepol + Crude sugar + endosulfan (0.07%)	4.7^a	12.5^a	1389^b
Endosulfan (0.07%)	16.7^c	21.8^b	1129^c
Maximum Protection check**	3.3^a	9.9^a	1537^a
Untreated check	26.7^d	45.7^c	398^e

* Mean values of three post counts recorded after each application of treatments. Means followed by common letters are not significantly different at 0.05 level by LSD

** Maximum protection check comprised of sprays with endosulfan (0.07%) chlorpyriphos (0.05%) quinalphos and deltamethrin (0.002%) at weekly intervals one after the other

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Table 2. Relative impact of selected treatments of NPV and insecticides in the control of *H. armigera* on pigeonpea (Cv ICPL 270) during Rabi 1989-90*

Treatment	% reduction in larval numbers days after spray			% diseased larvae on day		
	4	6	8	1	2	3
NPV (500 LE/ha) + Teepol (0.1%)+Crude sugar	5.9[a]	25.9bc	74.1[d]	11.6[b]	60.2[b]	65.9[b]
NPV + Teepol +endosulpan 0.1% + Crude sugar (0.5%)	6.5[a]	28.3[bc]	72.2[d]	21.8[c]	70.3[ac]	85.0[c]
NPV + Teepol + Crude sugar + acephate (0.1%)	16.9[c]	39.5[d]	70.1[d]	32.5[d]	82.2[a]	82.0[c]
Endosulfan (0.07%)	16.5[c]	20.6[b]	23.1[b]	0.0[a]	3.8[a]	6.9[a]
Acephate 0.1%	15.8[c]	31.7[cd]	35.5[c]	1.3[a]	4.1[a]	7.1[a]
Untreated check	10.5[b]	7.2[a]	11.6[a]	0.0[a]	1.5[a]	4.6[a]

* Means followed by common letters are not significantly different at 0.5 level by LSD

and repeated on 2.1.90 synchronising with the larval activity. Three post counts on the decrease in larval number in comparison with pre-counts, on 10 randomly selected plants were recorded on alternate days after fourth day of first application. The infectivity level of NPV was quantified by collecting larvae present on 10 randomly - selected plants and rearing them in individual glass tubes under laboratory conditions. The data were scrutinised statistically.

The data showed that the mean larval number per 10 plants were as low as 3.3 in maximum protection check which received sprays of endosulfan, chlorpyriphos, quinalphos and deltamethrin (one followed by the other) at weekly intervals from flower initiation stage (Table 1). The incidence of *H.armigera* in terms of larval number was also significantly low in NPV + Teepol + crude sugar + endosulfan treated plots (4.7/10 plants) followed by other NPV treatments. However, similar trend could not be observed in respect of pod damage and grain yields. The pod damage in NPV + additives or NPV + additives + endosulfan - treated plots were on par with maximum protection check. The grain yields were significantly high (15.4 q/ha) in maximum protection followed by NPV + additives + endosulfan (13.9 q/ha) and NPV + additives (12.4 q/ha). It was interesting to note that the efficacy of endosulfan was significantly low in all respects when compared to NPV + additives. This is a clear deviation from earlier understanding that NPV is less effective when compared with conventional insecticidal treatments (Anon., 1988).

The observations made on Rabi pigeonpea also revealed (Table 2) the lower efficacy of endosulfan and acephate when compared to NPV + additives. The larval population was reduced to an extent of 74.1 per cent in NPV - treated plots whereas, the decrease was only to a tune of 23.1 per cent in endosulfan and 35.5 per cent in acephate. The infectivity was significantly more when NPV was applied along with either endosulfan or acephate. These results are in agreement with the conclusion of Srinivas (1987), Rabindra and Jayaraj (1987) and Rabindra *et al.* (1985). The studies clearly indicate the efficacy of *Heliothis* NPV against *H. armigera* on pigeonpea when applied with endosulfan or acephate in situations where these insecticides alone fail to reduce the pest and increase the yields.

KEY WORDS : *Helicoverpa armigera* control, NPV, Pigeonpea

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