

## EFFICACY OF NUCLEAR POLYHEDROSIS VIRUS AGAINST *Spodoptera litura* ON GROUNDNUT IN DIFFERENT LOCATIONS OF TAMIL NADU

N. DHANDAPANI and P.C. SUNDARA BABU

Department of Agricultural Entomology  
Agricultural College and Research Institute  
Tamil Nadu Agricultural University  
Coimbatore 641 003  
India

### ABSTRACT

Field trials conducted against *Spodoptera litura* (Fb.) with nuclear polyhedrosis virus (NPV) on groundnut (*Arachis hypogaea* L.) in eight different locations of Tamil Nadu revealed that two rounds of application of NPV at 250 Larval equivalent (LE)/ha with the adjuvant crude sugar at 2.5 kg/ha at ten days interval was significantly superior than untreated check in reducing the larval population and increasing the pod yield, irrespective of the locations tested.

**KEY WORDS :** *Spodoptera litura*, Groundnut, NPV, Tamil Nadu

In India, groundnut is grown in about 67 lakh ha (Anon., 1989). An estimated annual loss of Rs.150 crores in groundnut due to pests has been reported (Amin, 1983). *Spodoptera litura* (Fb.) is a serious pest on groundnut which causes complete defoliation of the crop. Chemical pesticides are not always effective and improper use had created several complications. Among the alternate methods, biological control is ecologically sound and effective. In India, a nuclear polyhedrosis virus (NPV) was reported to infect this larva (Ramakrishnan and Tiwari, 1969). The field efficacy in smaller plot size was reported (Krishnaiah *et al.*, 1984). In the present study, efforts were made to utilise NPV with bigger plots in different locations of Tamil Nadu.

### MATERIALS AND METHODS

The nuclear polyhedrosis virus maintained in the Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore was propagated in late fourth instar larvae of *S. litura*. The virus-killed larvae were collected in glass distilled water and polyhedra allowed to sediment for several days. The virus sediment was then removed by passing through several layers of muslin and finally purified by differential centrifugation in a R4 Remi-centrifuge. The counting of polyhedral occlusion bodies was done with an improved Neubauer haemocytometer (Weber, England).

Eight field experiments were conducted in 45-day-old groundnut cv. TMV 7 in different

Villages of South Arcot district of Tamil Nadu, during 1990-1991. In each experiment, 0.4 ha area was marked with five replications in a randomised block design. The spraying of NPV at 250 LE/ha with the adjuvant, crude sugar 2.5 kg/ha was given in the evening hours with a back pack hydraulic sprayer (Aspee, Bombay) with a hollow cone nozzle using Ca. 500 l of spray fluid/ha. Two sprayings were given at ten days interval starting the first round on 45 days after sowing (DAS) when there was a high incidence of *S. litura* early instar larvae. An untreated check plot was also maintained for comparison.

Observations on larval population were recorded in randomly selected 20 tagged plants in

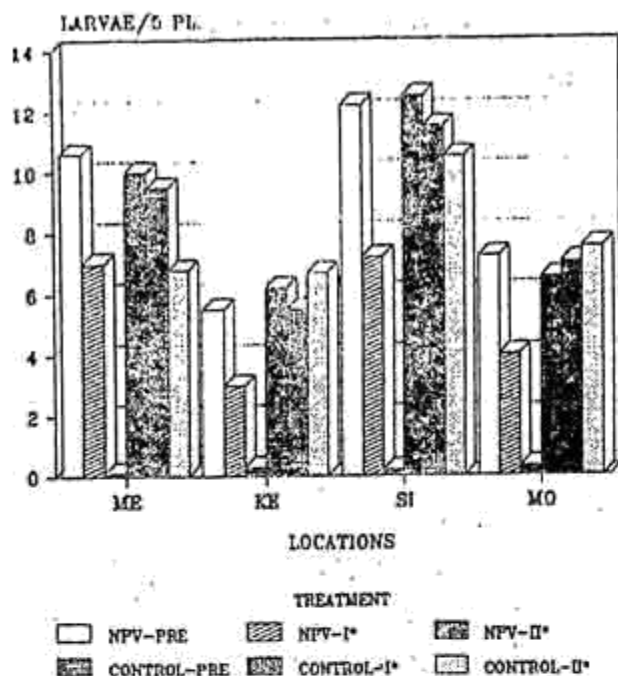
**Table 1.** Effect of NPV against *Spodoptera litura* on groundnut in different locations - 't' value.

Location	Calculated 't' value		
	Pre-treatment	I Round -7 DAT*	II Round -7 DAT
<b>1990</b>			
Melpakkam (ME)	0.96	8.85	9.02
Keelmaampattu (KE)	2.00	7.90	8.55
Sitherippattu (SI)	2.01	8.80	9.50
Molasur (MO)	1.05	7.88	9.10
<b>1991</b>			
Omanthoor (OM)	2.01	8.82	9.00
Nallathoor (NA)	0.94	8.42	9.55
Neikkuppi (NE)	2.04	8.40	8.90
Perumalpattai (PE)	0.95	9.80	10.06

\*DAT - Days After Treatment

t<sub>20</sub> (P = 0.05) = 2.086

t<sub>20</sub> (P = 0.01) = 2.845



PRE-PRE TREATMENT: \*-I/II SPRAY (7DAT);

ME - MELPAKKAM  
KE - KEELMAMPATTU  
SI - SITHERIPAATTU  
MO - MOLASUR

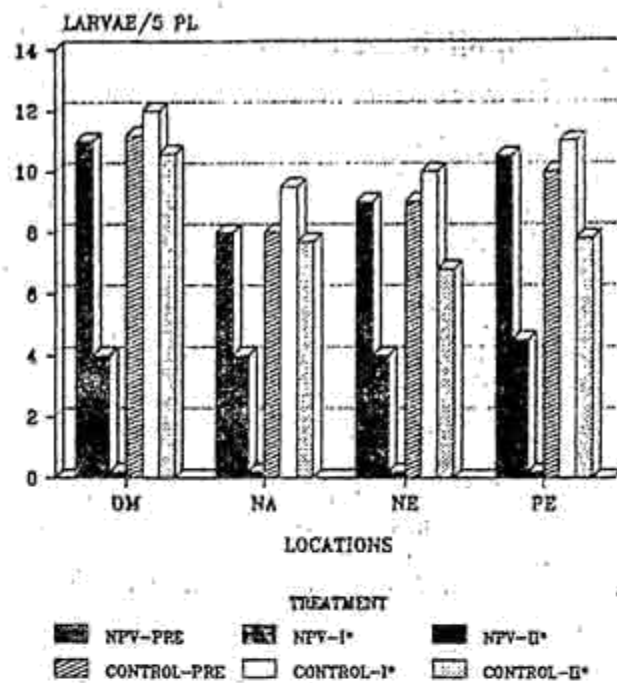
Fig.1. Effect of NPV against *Spodoptera litura* on groundnut in different locations of Tamil Nadu - 1990

each replication prior and 7 days after each spraying and compared with untreated check by 't' test. After harvest, the pod yield was recorded in different replications, pooled and mean yield was compared locationwise.

## RESULTS AND DISCUSSION

The pre-treatment count taken 45 DAS on larval population showed that the variations in different treatments were not significant, irrespective of the locations in 1990 and 1991 (Fig. 1, 2). But the observations taken on seven days after first and second sprayings indicated that NPV applied plots were significantly superior in reducing the larval numbers compared to untreated check (Table 1). There was a steady reduction in the larval population after each application of the virus. The mean pod yield was significantly higher in all the locations in the virus treated plots than in untreated control (Fig. 3).

Utilisation of NPV against *S. litura* on different crops like banana (Santharam *et al.*, 1978).



PRE-PRE TREATMENT: \*-I/II SPRAY (7DAT);

DM - OMANTHOOR  
NA - NALLATHOOR  
NE - NEIKKUPPI  
PE - PERUMALPETTAI

Fig.2. Effect of NPV against *Spodoptera litura* on groundnut in different locations of Tamil Nadu - 1991

Cauliflower (Chaudhari and Ramakrishnan, 1980) and chillies (Dhandapani and Jayaraj, 1989) has been reported. Krishnaiah *et al.* (1984) and Sachithanandam *et al.* (1989) reported the use of NPV on groundnut. Addition of adjuvant, crude sugar could enhance the effectiveness of NPV, by acting as phagostimulant for increased acquisition of the virus (Dhandapani *et al.*, 1987). Due to the fact that the incubation period for the virus was four to six days (Jacob and subramanian, 1972), the larval population reduction was comparatively less within seven days after first application.

Differences in chemical pesticide susceptibility of *S. litura* larvae collected from three locations of Tamil Nadu, was reported by Balasubramanian *et al.* (1988). Whereas in the present investigation there was no differences in susceptibility of *S. litura* larvae to NPV in various locations. Even though some of the insecticides like chlorpyrifos (Santharam and Balasubramanian, 1980), chlorpyrifos and fenitrothion (Jayaraj *et al.*, 1980), fenprothrin (Dhandapani and Jayaraj, 1989) could check this pest, in view of the high

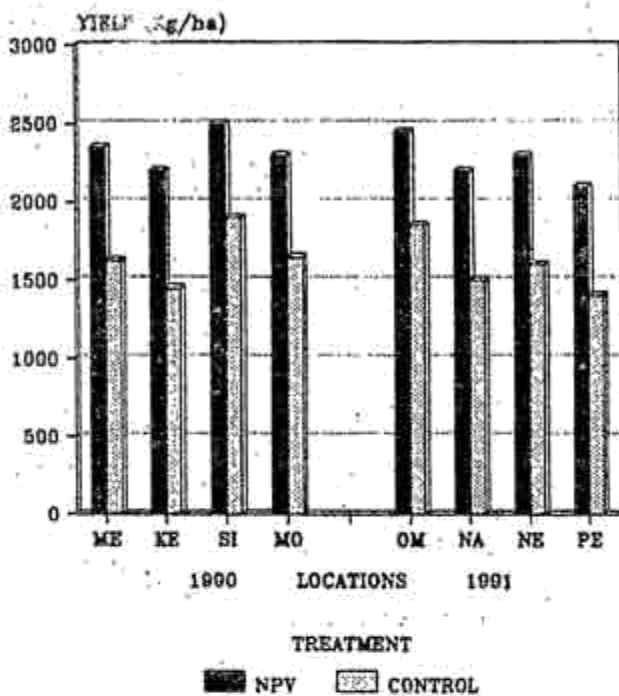


Fig.3. Effect of NPV against *Spodoptera litura* on pod yield of groundnut in different locations of Tamil Nadu

cost of chemical pesticides and increasing awareness of pesticide residue problems, the use of NPV will be ideal. Further, groundnut is grown extensively as rainfed crop with minimum investment. The risk of crop failure and poor economic returns limits the insecticide applications. Long term benefits can be achieved through the use of NPV, since most of the dead larvae remain on the plant with their integument ruptured releasing NPV laden haemolymph or persist in soil. This may lead to fresh infection among healthy individuals of subsequent broods or in next crop and may ultimately result in the epizootic spread of the disease.

#### ACKNOWLEDGEMENT

The financial support by Department of Biotechnology, Government of India, New Delhi, is gratefully acknowledged.

#### REFERENCES

- AMIN, P.W. (1983). Major field pests of groundnut in India and associated crop losses. Proceedings of All India Workshop on crop losses due to insects, ICRISAT, India, 52 p.
- ANONYMOUS, (1989) District-wise area and Production of groundnut (1987-'88) - Agricultural Situation in India. Directorate of Economics and Statistics, Ministry of Agriculture, India, 531 p.
- BALASUBRAMANIAN, G., CHELLIAH, S. and BALASUBRAMANIAN, M. (1988). Differences in pesticides susceptibility of *Spodoptera litura* Fb. collected from three locations in Tamil Nadu. *Indian J. Pl. Prot.*, 16: 67-69.
- CHAUDHARI, S. and RAMAKRISHNAN, N. (1980). Field efficacy of baculovirus and its combination with sub-lethal dose of DDT and endosulfan on cauliflower against tobacco caterpillar *Spodoptera litura* Fb.). *Indian J. Entomol.*, 42: 592-596.
- DHANDAPANI, N. and JAYARAJ, S. 1989. Efficacy of nuclear polyhedrosis virus formulation for the control of *Spodoptera litura* (Fb.) on chillies. *J. Biol. Control* 3: 47-49.
- DHANDAPANI, N., JAYARAJ, S. and RABINDRA, R.J. (1987). Efficacy of ULV application of nuclear polyhedrosis virus with certain adjuvants for the control of *Heliothis armigera* (Hbn.) on cotton *J. Biol. Control* 1: 111-117.
- JACOB, A. and SUBRAMANIAN, T.R. (1972) Effect of larval age and dosage of virus on the susceptibility of *Spodoptera litura* F. to a nuclear polyhedrosis virus. *Agric. Res. J. Kerala* 10: 176- 177.
- JAYARAJ, S., SANTHARAM, G., NARAYANAN, K., SOUNDARARAJAN, K. and BALAGURUNATHAN, R. (1980). Effectiveness of NPV against field populations of tobacco caterpillar, *Spodoptera litura* on cotton. *Andhra Agric. J.*, 27: 26-29.
- KRISHNAIAH, K., RAMAKRISHNAN, N. and REDDY P.C. (1984) Further trials on control *Spodoptera litura* (F.b.) by NPV on black gram and groundnut. *Indian J. Pl. Plot.*, 12: 81-83.
- RAMAKRISHNAN, N. and TIWARI, L.D. (1969) Polyhedrosis of *Prodenia litura* F. (Noctuidae: Lepidoptera). *Indian J. Entomol.*, 31: 191-192.
- SACHIDANANDAM, S., RABINDRA, R.J. and JAYARAJ, S. (1989) Pot culture studies on efficacy of NPV formulations against tobacco cutworm, *Spodoptera litura* (Fb.) larvae on groundnut. *J. Biol. Control* 3: 44-46.
- SANTHARAM, G. and BALASUBRAMANIAN, M. (1980) Note on the control of *Spodoptera litura* Fb. (Lepidoptera: Noctuidae) on tobacco with a nuclear polyhedrosis virus and diflubenzuron. *Indian J. Agric. Sci.*, 50: 726-727.
- SANTHARAM, G., REGUPATHY, A., EASWARA MOORTHY, S. and JAYARAJ, S. (1978) Effectiveness of nuclear polyhedrosis virus against field population of *Spodoptera litura* F. on banana. *Indian J. Agric. Sci.*, 48: 676-678.

(Received : March 1992 Revised: January 1994)