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Laboratory Efficacy of *Ha*NPV Against *Helicoverpa armigera* (Hubner) Infesting, Chickpea

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Abstract A close perusal of larval mortality showed that all the treatments caused the mortality in 3rd instar larvae of *H. armigera.* The highest larval mortality was obtained in the treatment of *Ha*NPV @ 0.875 ml/l (95.52%), which was at par with the treatment of *Ha*NPV 0.750 ml/l (90.00%). It was also recorded that in all the treatments, higher larval mortality was recorded on 3rd to 5th day after treatment.

Keywords Lab-efficacy, *Ha*NPV, *Helicoverpa armigera,* Chickpea.

Introduction

Among the food crops, pulses are an important gruop which occupies a unique position in the world of agriculture by virtue of their high protein content. In pulses, chickpea (*Cicer arietinum* Linnaeus) is one of the important crop grown in *rabi* season. It is commonly known as "Bengal gram" of "Gram" which is mainly grown in the Indian subcontinent, Western Asia and in many tropical countries. The production of cereals has increased mainfold in the recent part but that of pulses has remained more or less static. Insect pests are probably the main factor limiting the grain legume yields. More than 150 species of insects are known to attack pulse crops in India and of these, about 25 causes serious damage to monsoon and winter pulse crops. Out of them, the gram pod borer, *Helicoverpa armigera* (Hubner) (Lepidoptera : Noctuidae) is a most cosmopolitan and polyphagous pest which attacks numerous crops of agricultural importance. The indiscriminate use of pesticides for the last 40 years has almost eliminated natural enemies from many crop eco-systems, created complications of environment pollution, pest resurgence and insecticide resistance. This scenario has led to consider the potential of biological control as a component of pest management.

Materials and Methods

Rearing techniques of test insect on natural diet

The culture of *H. armigera* was maintained in the laboratory for experimental purpose by making initial larval collection of *H. armigera* from chickpea field.The field - collected larvae were reared individually on chickpea pods in plastic vials under laboratory conditions. Fresh food was changed every day in morning. The larvae being pre-pupated were transferred into plastic vial containing sieved moist soil to facilitate the pupation. They were reared until the adult emergence. The newly emerged adults were transferred to a wooden cage measuring 30 cm × 30 cm × 30

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cm for oviposition. Five per cent honey solution was provided as food for moths. The freshly laid eggs were collected daily and reared till hatching in petridish (15 cm diameter). The newly hatched larvae were used for the further study purpose.

Methodology

Local strain of *Ha*NPV, which was commercially produced in the Biocontrol Research Laboratory, J.A.U. Junagadh was used for this laboratory experiment. The immature pods of chickpea grown in pots was collected and sprayed with respective treatments in the laboratory. In each treatment, six hours starved 10 larvae of the third instar were transferred into petri dishes containing the treated immature pods and then the treatments were replicated thrice. The larvae were allowed to feed on the treated food for 24 h and then they were provided with fresh untreated immature pods on next day.

Observation recorded

Larval mortality was recorded from 1, 2, 3, 5 and 7 days after application. The percentage of larval mortality was recorded using the formula

$$\text{Corrected per cent mortality} = 100 \times 1 - (Ta \times Cb/Tb \times Ca)$$

Where, Ta = Number of insects observed after treatment, Tb= Number of insects observed before treatment, Ca = No. of insects observed after treatment in control, Cb = No. of insects observed before treatment in control.

Results and Discussion

A close peusal of larval mortality data (Table 1) at one day after the treatment indicated that the highest (13.01%) mortality was obtained in the treatment of *Na*NPV @ 0.875 ml/l and it was at par with *Ha*NPV @ 0.750 ml/l, *Ha*NPV @ 0.625 ml/l and *Ha*NPV @ 0.500 ml/l, which recorded 10.00% larval mortality in all doses. The mortality was recorded low (2.50%) in the treatments of *Na*NPV @ 0.375 ml/l and *Ha*NPV @ 0.250 ml/l. The mortality was increased at second day after the treatment. The data showed that the highest mortality was obtained in the treatment of *Ha*NPV @ 0.875 ml/l (23.17%) and it was at par with *Ha*NPK 0.750 ml/l and *Ha*NPV @ 0.625 ml/l, which recorded 20.00% mortality in both the treatments. The lowest mortality (10.00%) was recorded in the treatments of *Na*NPV @ 0.375 ml/l and *Ha*NPV @ 0.250 ml/l.

Table 1. Laboratory efficacy of *Ha*NPV against *H. armigera* infesting chickpea. Data in parentheses are original values, while outsides are angular transformed values (0.25 was added in all transformed values).

Sl. No.	Treatments	Dose/ litre water (ml/liter)	Corrected per cent mortality of *H. armigera* after application 1 day	2 day	3 day	5 day	7 day
			9.09	18.43	28.78	33.21	35.21
1	*Ha*NPV	0.250	(2.50)	(10.00)	(23.17)	(30.00)	(33.25)
			9.09	18.43	28.78	39.23	45.00
2	*Ha*NPV	0.375	(2.50)	(10.00)	(23.17)	(40.00)	(50.00)
			18.43	23.85	39.23	45.00	50.76
3	*Ha*NPV	0.500	(10.00)	(16.35)	(40.00)	(50.00)	(60.00)
			18.43	26.56	46.92	59.00	68.85
4	*Ha*NPV	0.625	(10.00)	(20.00)	(53.35)	(73.48)	(86.98)
			18.43	26.56	52.77	61.21	72.56
5	*Ha*NPV	0.750	(10.00)	(20.00)	(63.40)	(76.82)	(90.00)
			21.14	28.78	54.78	68.85	77.79
6	*Ha*NPV	0.875	(13.01)	(23.17)	(66.74)	(86.98)	(95.52)
	SEm ±		1.10	1.42	1.89	1.69	1.87
	CD at 5%		3.40	4.40	5.84	5.21	5.77
	CV%		12.14	10.41	7.84	5.73	5.57

On third day after feeding, the larvae with treated immature pods, the highest (66.74%) mortality was obtained in the treatment of *Ha*NPV @ 0.875ml/l and it was at par with *Ha*NPV 0.750 ml/l (63.40%), which was followed by the treatments of *Ha*NPV @ 0.625 ml/l (53.35%) and *Ha*NPV @ 0.500 ml/l (40.00%). The lowest mortality (23.17%) was recorded in both the lower doses of *Ha*NPV @ 0.375 ml/l and *Ha*NPV @ 0.250 ml/l. On fifth day after feeding, the highest mortality was obtained in the treatment of *Ha*NPV @ 0.875 ml/l (86.98%), which was followed by the treatments of *Ha*NPV 0.750 ml/l (76.82%), *Ha*NPV @ 0.625 ml/l (73.48%), *Ha*NPV @ 0.500 ml/l (50.00%) and *Ha*NPV @ 0.375 ml/l (40.00%). The lowest mortality was verified in the treatments of H*a*NPV @ 0.250 ml/l (30.00%). The highest (95.52%) larval mortality was obtained in the treatment of *Ha*NPV @0.875 ml/l at seventh day after feeding and it was at par with the treatment of *Ha*NPV 0.750 ml/l (90.00%). The treatments of *Ha*NPV @ 0.625 ml (86.98%), *Ha*NPV @ 0.500 ml/l (60.00%) and *Ha*NPV @ 0.375 ml/l (50.00%) were found next better treatments against this pest. The lowest mor-

tality was noted in the treatment of *Ha*NPV @ 0.250 ml/l (33.25%).

Above results showed that the total larval mortality in all the treatments was increased with increase in day intervals after the treatment of *Ha*NPV. The results also indicated that the larval mortality was found to be attributed to the doses of *Ha*NPV. The higher dose of *Ha*NPV @ 0.875 ml/l caused highest mortality followed by the doses of *Ha*NPV 0.750 ml/l, *Ha*NPV @ 0.625 ml/l, *Ha*NPV @ 0.500 ml/l, *Ha*NPV @ 0.375 ml/l and *Ha*NPV @ 0.250 ml/l. The present results concur to the findings of Gundannavar et al. [1] who reported that *Ha*NPV @ 106 POB/ml inflicted mortality to the extent of 50-100% within 5 to 8 days of treatment. More or less similar trend was also noticed in this study. Slight variation in this study due to species and strain variation and different varieties of chickpea used in this study. Mahesh et al. [2] who elucidated that the larval mortality of *H. armigera* was increased with increase in viral concentration. More or less similar research findings were earlier reported [3-6]. Thus, this result is in conformity with findings of earlier researchers.

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