International Journal of Agricultural Sciences
Volume 8 |Issue 1| January, 2012 | 188-190

RESEARCH PAPER

Field evaluation of HaNPV isolates against *Helicoverpa armigera* (Hubner) under tomato crop ecosystem

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Abstract **:** Field evaluation of virulent isolates of *Helicoverpa armigera* (Hubner) nuclear polyhedrosis virus (HaNPV)isolates was carried out under field condition on tomato at Regional Agricultural Research Station, UAS Campus, Bijapur. Under field condition, at 7 and 14 days after spray, the pooled larval reduction during both spray was highest with Combatore and Gulbarga isolates (47.86 and 46.78 % at 7 days and 68.71 and 68.50% at 14 days, respectively). Coimbatore and Gulbarga isolates recorded lower fruit damage of 9.52 and 9.56 per cent, respectively. Both Gulbarga (190.42 q/ha) and Coimbatore (193.78 q/ha) isolates recorded statistically at par yield with RPP.

Key Words **:** HaNPV, *Helicoverpa armigera,* Tomato

View Point Article **:** Kambrekar, D.N. (2012). Field evaluation of HaNPV isolates against *Helicoverpa armigera* (Hubner) under tomato crop ecosystem. *Internat. J. agric. Sci.*, **8**(1): 188-190.

Article History **: Received :** *07.07.2011;* **Revised :** *03.10.2011;* **Accepted :** *19.11.2011*

INTRODUCTION

Four viruses were reported from *Helicoverpa* species comprising three inclusion viruses and one non-inclusion virus (Teakle and Bryne, 1989). In India, occurrence of NPV in *H. armigera* was first reported during 1968 (Patel *et al.*, 1968) from Gujarat and later Rabindra and Subramanian (1974) described the symptoms of disease, susceptibility of different instars of *H. armigera* and host pathogen relationship. Of the several insect viruses tested against *H. armigera,* the nuclear polyhedrosis virus (NPV) holds great promise in the management of *H. armigera* on a number of crops due to its high efficacy and safety to the natural enemies (Rabindra and Jayaraj, 1990).

Tomato is a profitable vegetable, cultivated widely in Karnataka both under rainfed and irrigated conditions. Among the various insect pests responsible for lowering the yield of tomato crop, fruit borer, *H. armigera* is highly destructive pest causing serious damage. The spray of persistent insecticides over the foliage and fruiting bodies so far was the only practical method to manage this pest. Recently, bio-pesticides have widely been exploited to combat the pest under field condition. The present study was undertaken to explore the possibilities of HaNPV isolates against *H. armigera* under tomato field condition.

MATERIALS AND METHODS

The experiment was laid out in a CRBD with eight treatments comprising of six HaNPV isolates collected from different place replicated thrice with 4m x 4m plot size having 0.60m and 0.45 m row to row and plant to plant distance, respectively. Recommended package of practices were followed to raise the crop except plant protection. However, there was a treatment with recommended package of practices which received chemical insecticides.

The crop was sprayed at two intervals 15 days apart and observations on larval reduction were recorded at an interval of 7 and 14 days after each spray. Further, the fruit damage was recorded at each picking and the average per cent fruit damage was calculated. The data was subject to arc sin transformation before analysis. The yield was recorded at each picking and total yield per hectare was calculated.

RESULTS AND DISCUSSION

The results of the experiment revealed that before spraying, the larval count was uniform in all the treatments and was statistically non-significant (Table 1). At seven days after first spray, there was a significant difference between the treatments. The larval mortality was between 13.46 to

66.19 per cent among the treatments. Among the treatments, though highest mortality was recorded by RPP, the plots sprayed with Coimbatore and Gulbarga isolates recorded significantly higher mortality of 41.50 and 41.11 per cent, respectively, followed by Dharwad isolates (30.56%) which were statistically at par with each other. The isolates from private firms recorded statistically lower mortality with around 25 per cent. At 14 days after the first spray, the trend in the larval reduction remained same. Both the virulent isolates confirmed their virulence by recording higher mortality compared to other isolates under study and were statistically at par with RPP. The larval mortality ranged between 15.28 to 77.18 per cent, respectively.

The second spray was administered 15 days after the first spray. At seven days after the second spray, the per cent larval reduction ranged between 7.67 to 76.67. There was a statistical significance among the treatments. The isolates obtained from Coimbatore and Gulbarga recorded larval mortality at well above 50 per cent. The next best isolate in the order of virulence was Dharwad which has registered 39.38 per cent larval mortality. At 14 days after the second spray, both the virulent isolates confirmed their efficacy and were statistically superior over other isolates in controlling the larval population (Table 2).

Fruit damage:

The average fruit damage recorded at each picking reveled that there was a statistical difference among the treatments. Though RPP recorded statistically lower tomato fruit damage, Coimbatore and Gulbarga isolates recorded lower fruit damage of 9.52 and 9.56 per cent, respectively. The other isolates recorded statistically higher fruit damage but were statistically superior over untreated control (Table 3).

Fruit yield:

The healthy fruit yield was recorded at each picking and the average fruit yield is presented in Table 3. The fruit yield ranged from 99.59 to 220.48 q/ha. Though, highest yield was recorded by RPP (220.48q/ha), both Gulbarga (190.42 q/ha) and Coimbatore (193.78 q/ha) isolates recorded statistically at par yield with RPP. Dharwad isolate was the next best isolate to register better yields (161.78q/ha).

The present findings are in agreement with the results of Gopali (1998) who reported the superiority of Gulbarga isolate in reducing the population of *H. armigera* but pigeonpea ecosystem is in accordance with the present findings. Further the studies of Kambrekar *et al.* (2009) are also in accordance with the present studies who reported the virulence of Coimbatore and Gulbarga HaNPV isolates in the

Table 1 : Filed efficacy of different HaNPV isolates against *H. armigera in* tomato (First spray)

Sr. No.	Isolates	Before application (larvae/5 plants)	Per cent larval reduction at	
			7 DAS	14 DAS
1.	Dharwad	10.83a	30.56b	42.38b
2.	Gulbarga	11.17a	41.11b	66.15a
3.	Coimbatore	11.11a	41.50bc	66.54a
4.	PCI, Ltd.	11.45a	25.45c	41.17b
5.	BPM, Ltd.	11.52a	23.55c	45.15b
6.	BPL, Ltd.	11.20a	25.89c	38.60c
7.	RPP	11.89a	66.19a	77.18a
8.	Untreated check	11.26a	13.46d	15.28d

Table 2 : Filed efficacy of different HaNPV isolates against *H. armigera* in tomato (Second spray)

Sr. No.	Isolates	Before application (larvae/5 plants)	Per cent larval reduction at	
			7 DAS	14 DAS
1.	Dharwad	10.83c	39.38c	48.40c
2.	Gulbarga	7.61b	52.44b	70.84b
3.	Coimbatore	7.80b	54.22b	70.88b
4.	PCI, Ltd.	12.26c	37.56c	45.27c
5.	BPM, Ltd.	11.77c	36.66c	47.39c
6.	BPL, Ltd.	12.71c	33.55c	38.28c
7.	RPP	5.10a	76.67a	86.87a
8.	Untreated check	14.33d	7.67d	11.73d

Note: The original values were converted to arc sin transformation before analysis
DAS: Days after spray PCI- Pest Control India Ltd. Bangalore BPM- Bio-Pest Management Ltd. Bangalore
BPL: Bio Pest Laboratories, Bangalore RPP- Recommended package of practices
Means followed by same alphabet in vertical column do not differ significantly by DMRT (P=0.05)

Table 3 : Filed efficacy of different HaNPV isolates against *H. armigera* on yield of tomato

Sr. No.	Isolates	Fruit damage (%)	Fruit yield (q/ha)
1.	Dharwad	12.71c	161.78b
2.	Gulbarga	9.56b	190.42a
3.	Coimbatore	9.52b	193.78a
4.	PCI, Ltd.	15.44c	137.18c
5.	BPM, Ltd.	14.78c	133.72c
6.	BPL, Ltd.	13.78c	124.64c
7.	RPP	6.24a	220.48a
8.	Untreated check	27.29d	99.59d

Note: The original values were converted to arc sin transformation before analysis
PCI- Pest Control India Ltd. Bangalore
BPM- Bio-Pest Management Ltd. Bangalore
BPL: Bio Pest Laboratories, Bangalore
RPP- Recommended package of practices
Means followed by same alphabet in vertical column do not differ significantly by DMRT (P=0.05)

management of *H. armigera* in chickpea under field condition.

The efficacy of HaNPV in chickpea had been on record (Santharam and Balasubramanian, 1982; Supare *et al.,* 1991; Rabindra *et al.,* 1994; Jagadeeshbabu *et al.,* 1995; Kumar *et al.,* 1998). There are many studies that have documented the variation in the virulence of isolates (Jayaraj *et al.,* 1989; Rabindra, 1993). Among the various factors responsible for these variations, selective forces that shape the genomic constituent of individual stains assumes utmost importance which might often favour better performance of the isolates.

Thus, it can be inferred from the present investigations that Gulbarga, Coimbatore and Dharwad isolates can well be utilized in the IPM schedule of *H. armigera* in tomato ecosystem.

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