Impact of microbes and botanical on natural enemies of chickpea pod borer, *Helicoverpa armigera* (Hubner)

**GM Golvankar, VS Desai, SK Mehendale, KV Naik and SD Desai**

**Abstract**

The present study was conducted to find out the impact of microbes and botanical on natural enemies of chickpea pod borer, *Helicoverpa armigera* (Hubner). There were total two sprays taken. The activity of Hymenopteran natural enemies started from 4th meteorological week and remained up to 11th meteorological week. The peak activity was in the 7th meteorological week. The activity of Coleopteran natural enemies was started from 4th meteorological week and remained up to 11th meteorological week. During this period lady beetles, *Coccinella septempunctata* and *Cheilomenas sexmaculata* were observed in the experimental plot. The peak activity was in 10th and 11th meteorological week. The spider population during 4th to 11th meteorological week was in the range of 0.50 to 3.75 per five plants. The peak activity was in 10th and 11th meteorological week.

**Keywords:** *Helicoverpa armigera*, microbes, botanical, chickpea, pod borer, etc.

**Introduction**

India is a premier pulse growing country. Gram pod borer, *Helicoverpa armigera* (Hubner) is the serious pest of Indian agriculture. This pest is highly polyphagous and has been reported to damage more than 182 species of host plants. Availability of many alternative hosts and extensive cultivation of this crop in various agro-climatic zones is one of the key reasons for its incidence on the crop (Shivanna et al. 2012) [7]. The caterpillar not only defoliates the tender leaves but also makes holes in the pods and feed upon the developing grains. While feeding on the developing seeds the anterior body portion of the caterpillar remains inside the pod and rest half or so hanging outside. When seeds of one pod are finished, it moves to the next. Unless the pest is controlled in the initial stages of infestation it takes the heavy toll of the crop. A single larva has potential to damage up to 30 pods in its lifetime, thereby causing heavy losses to the crop (Sharma, 1978) [6]. The pod damage ranges from 3.3 to 72.8 per cent (Ahmad and Lingappa, 1998) [1]. Worldwide losses due to *H. armigera* have been estimated over US $ 300 million annually (Kaur et al. 2007) [2].

The management of this noxious pest is primarily based on synthetic insecticides. Preference of insecticides due to their easy availability and applicability and their excessive and indiscriminate use has resulted in the development of insecticidal resistance in the pest and environmental pollution. Recently, *H. armigera* is reported to have developed resistance to many commonly used insecticides (Phokela et al. 1990) [4]. Biopesticides are inherently less harmful than conventional pesticides. These are quickly biodegradable in addition to etiology that they can self-propagate and have long lasting control effect as opposed to chemical which can create residual problem in addition to resistance development in pest and pest resurgence. Therefore now a days biopesticides play an important role in pest management. Thus it is the need to evaluate the biopesticides and its impact on pest population as well as on their natural enemies. Hence the present investigation was carried out to know the impact effect of microbes and botanical on natural enemies of chickpea pod borer, *Helicoverpa armigera* (Hubner).

**Materials and Methods**

The experiment was conducted at ASPEE Agricultural Research and Development Foundation Farm Village- Met, Tal-Wada, Dist-Thane during rabi 2012-2013 and laid out in split plot design with two replication using of chickpea cv. Gujarat-1 with a plot size 1.8 x 1.5 m².
The spraying of biopesticides viz., (T₁) Btk 1.5 g l⁻¹, (T₂) HaNPV 500 LE ha⁻¹, (T₃) Beauveria bassiana 5 g l⁻¹, (T₄) Metaerrhizium anisopliae 5 g l⁻¹, (T₅) Azadirachtin 50000 ppm (0.8 ml l⁻¹) and (T₆) only water spray was done after initiation of the pest. Another application was done 15 days after first spray. Whereas, border crops viz., (S₁) maize, (S₂) marigold, (S₃) sorghum and (S₄) no border (sole chickpea) were planted around the chickpea plot at the time of sowing of chickpea. The natural enemies attracted towards chickpea crops were recorded from 4 to 11th meteorological week i.e. up to harvest of the crop. The natural enemies were recorded by necked eyes and by collecting with the help of insect collection net. Similarly, the infected larvae, pupae from each plot having border crop were collected from the plant and kept in plastic vials in the laboratory for observing the emergence of the natural enemy. The recorded natural enemies were counted plot wise. The unidentified natural enemies were got identified from the Department of Agril. Entomology, College of Agriculture, Dapoli. The data on number of natural enemies were subjected to \(\sqrt{n + 1}\) transformation and analysed statistically.

Results and Discussion
Impact of microbials and botanical on number of natural enemies at different meteorological weeks
Data on number of natural enemies per five plants at different meteorological weeks was recorded like Hymenoptera, Coleoptera and Spiders.

Impact of microbials and botanical on Hymenopteran natural enemies at different meteorological weeks
The data presented in Table 1 and indicated that the impact of microbials and botanical on Hymenopteran natural enemies at 4th to 11th meteorological weeks were found statistically non-significant. The numbers of Hymenopteran natural enemies were recorded from five plants during 4th to 11th meteorological weeks in rabi season of 2012-13. Campoletis chlorideae Uchida and Xanthopimpla punctata (Hymenoptera) were recorded from the experimental plots. The activity of Hymenopteran natural enemies started from 4th meteorological week and remained up to 11th meteorological week. The peak activity was in the 7th meteorological week. The activity of Hymenopteran natural enemies from different sub plot treatments of microbials and botanical was in the range of 0.13 to 5.25 per five plants. All the sub plots recorded good activity of natural enemies up to 8th meteorological week. The peak activity was in 7th meteorological week.
The present findings confirm the results of Suganthy et al. (2000) [9]. They reported that all the IPM strategies were found to be safe to Campoletis chlorideae Uchida (Ichenomonidae: Hymenoptera) a larval parasitoid of H. armigera in chickpea.

Impact of microbials and botanical on Coleopteran natural enemies at different meteorological weeks
The activity of Coleopteran natural enemies was started from 4th meteorological week and remained up to 11th meteorological week. During this period lady beetles, Coccinella septempunctata and Chelomenas sexmaculata were observed in the experimental plot. The peak activity was in 10th and 11th meteorological week.
The data presented in Table 2 and indicated that the impact of microbials and botanical on Coleopteran natural enemies at 4th to 11th meteorological weeks were found statistically non-significant. The number of Coleopteran natural enemies recorded from 4th to 11th meteorological week was in the range of 1.38 to 7.00. The peak activity of natural enemies was in the 10th and 11th meteorological week. The results of the sub plot treatments of microbials and botanical was non-significant showing all the treatments recorded equal number of Coleopteran natural enemies Latif et al. (2009) [10] reported that, spiders and lady bird beetles were non significantly affected by application of flubendiamide and nimbicidine for controlling brinjal shoot and fruit borer in the field. Flubendiamide and nimbicidine were comparatively safe for natural enemies and might be fit well into the integrated pest management (IPM) programs for brinjal.

Impact of border crops, microbials and botanical on Spiders at different meteorological weeks
The data presented in Table 3 and indicated that the impact of microbials and botanical on Spiders population at 4th to 11th meteorological weeks were found statistically non-significant. The effect of sub plot treatments of microbials and botanical on spider population revealed that the population was in the range of 0.50 to 3.75 and the peak activity was in 10th and 11th meteorological week. Data on spider population during different meteorological week was non-significant showing the equal population in all the sub plots.
The present findings confirm the results of Ravi et al., (2008) [8]. They reported relatively higher number of predatory mirids (Macrolophus spp.) and spiders (Argiope spp. and Thomisus spp.) in microbials and neem applied plots compared to the insecticide treated plots.
The number of birds like cattle egret, house sparrows and pigeons were observed during experimental period. These birds were commonly observed at morning, noon and evening hours. The border crop was served as bird perch for them. They were picking the H. armigera larva from the plot and feeding them by sitting on these border crops.

### Table 1: Impact of microbials and botanical spray on number of Hymenopteran natural enemies at different meteorological weeks

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Number of Hymenopteran natural enemies per meteorological week</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>4th</td>
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<tr>
<td>Sub plot: Spray level</td>
<td></td>
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<tr>
<td>T₁: Bacillus thuringiensis var. kurstaki 1.5 g l⁻¹</td>
<td>2.50 (1.83)*</td>
</tr>
<tr>
<td>T₂: HaNPV 500 LE ha⁻¹</td>
<td>1.88 (1.65)</td>
</tr>
<tr>
<td>T₃: Beauveria bassiana 5 g l⁻¹</td>
<td>2.75 (1.80)</td>
</tr>
<tr>
<td>T₄: Metarrhizium anisopliae 5 g l⁻¹</td>
<td>3.25 (1.39)</td>
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2. References

and coleopterans’ natural enemies, spiders, were relatively safer to microbials and botanical insecticide tested in this experiment

Conclusion

Table 2: Impact of microbes and botanical spray on number of Coleopteran natural enemies at different meteorological weeks

Table 3: Impact of microbes and botanical spray on number of Spiders at different meteorological weeks

*Figures in parentheses are $\sqrt{n+1}$ transformed values.

References


