POPULATION FLUCTUATIONS OF HELICOVERPA ARMIGERA AND CAMPOLETIS CHLORIDEAE AND THEIR RELATIONSHIP ON CHICKPEA

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ABSTRACT

Two peaks of the larval population of gram pod borer, Helicoverpa armigera were noticed first peak during 49th meteorological week(MSW) with a maximum of 1.73 and 2.13 larvae m\(^{-1}\) row length and second peak with 8.93 and 7.93 larvae m\(^{-1}\) row during 8-9\(^{th}\) MSW in 2003-04 and 2004-05, respectively which decreased sharply with maturity of the crop. The temperature and wind speed showed positive relationship with the larval multiplication during both the years. Relative humidity and rainfall exhibited negative effect on larval multiplication of pest during first the year. The Ichneumonids (Campoletis chlorideae) exhibited reciprocal relationship with environmental parameters and suppressed larvae of H. armigera.

Key words: Campoletis chlorideae, Chickpea, Helicoverpa armigera, Population fluctuation, Weather parameters.

Chickpea is the most preferred host of gram pod borer, Helicoverpa armigera (Hübner) (Bilapte, 1983), causing pod damage to the extent of 90 per cent (Sehgal and Ujagir, 1990). The environmental factors including abiotic factors play a considerable role in reducing the pod borer incident. The fluctuation due to these factors may affect the time of application of pest management strategies against this pest in chickpea crop. These investigations were therefore, under taken to determine the population fluctuations of H. armigera in rabi cropping season on chickpea crop.

The field experiments were conducted at the Students Instructional Farm of C.S. Azad University of Agriculture & Technology, Kanpur during rabi 2003-04 and 2004-05 on chickpea (var.KPG-59) raised under normal agronomical practices. The larval population was recorded at five random places in one metre linear row of chickpea. The plants were shaken down on a paper sheet for counting the larval population at each place. The data were collected at weekly intervals. The natural larval parasitisation was observed in the control plots. The first and second instar twenty larvae of H. armigera were collected randomly from chickpea field at each observation, and reared individually in the laboratory to record the number of parasitoids emerging from them. The parasitoid was identified in the department. The data on temperature, relative humidity, rainfall and wind speed were obtained from meteorological observatory of the University to work out their relationship with the intensity of pest and its parasitoid.

The incidence of the H. armigera was started with 0.73 larva m\(^{-1}\) row in the 47th meteorological standard week during 2003-04, which increased to 1.73 larvae m\(^{-1}\) row during 49\(^{th}\) MSW and declined to 0.5 larva m\(^{-1}\)row, which peaked as high as 8.93 larvae m\(^{-1}\) row during 9\(^{th}\) MSW and then again decreased to 0.67 larva m\(^{-1}\) rows during 14\(^{th}\) MSW. A similar trend of larval population was noticed during the second year also with an average of 0.26 larva m\(^{-1}\) row during 47\(^{th}\) MSW which remained at less level up to the end of the 3\(^{rd}\) MSW during January.

The pest became active again from the 4\(^{th}\) MSW which gradually increased up to 8\(^{th}\) MSW (Table 1). The natural parasitisation of the early stage larvae of H. armigera by C. Chlorideae was more during

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49th to 51st MSW which declined with the advancement of season and was low during 5th MSW and vanished. Maximum temperature and wind speed correlated negatively, while Relative humidity (both morning and evening) correlated positively with present parasitisation.

The rate of multiplication of *H. armigera* was maximum of 0.44 larva/day during 8th MSW in 2003-04 and 0.33 larva per day during 7th MSW in 2004-05 and declined subsequently in the first fortnight of March and again increased at the end of March in both the years (Table 1). These observations are in accordance with those of Vishwadhar et al. (2005) who reported that a sudden rise in the temperature (7.5°C) around 7-8 standard week and rainfall during 1-9 standard week along with a considerable adult moth catches (above 15/week) during 5-7 MSW and ultimately leading to rise in the larval population of pest during 10-14 MSW standard weeks. The results of present study also corroborate with Patel and Koshiya (1999) and Patnaik et al. (2005) who observed the peak activity of *H. armigera* at podding stage of the crop. Numbers of workers have reported that the pest infestation on chickpea usually starts from November with the maximum activity at podding stage near the maturity of the crop. Srivastava et al. (1964) and Saini and Jaglon (1998) reported that during 1993-94. The population level of *H. armigera* was quite high 3.8-9.9 larvae m⁻¹ row length during mid November. But subsequently it declined sharply as the temperature decreased and reached lowest level (<1.0 larva m⁻¹ row) after 3rd week of December. A positive correlation of the population with temperature was observed by them, and almost identical trend of larval activity in relation to temperature was noticed in the present findings (Table 2).

<table>
<thead>
<tr>
<th>Months</th>
<th>MSW</th>
<th><em>H. armigera</em> larval population m⁻¹ row</th>
<th>Rate of increase in larval population day⁻¹</th>
<th>% Parasitisation by <em>C. chlorideae</em></th>
<th><em>H. armigera</em> larval population m⁻¹ row</th>
<th>Rate of increase larval population day⁻¹</th>
<th>% parasitisation by <em>C. chlorideae</em></th>
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<tbody>
<tr>
<td>November</td>
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<td>0.0</td>
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<td>0.01</td>
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<td>16.67</td>
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<tr>
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<td>4.73</td>
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</tr>
</tbody>
</table>

**TABLE 1:** Larval population of *Helicoverpa armigera* and extent of parasitisation by *Campoletis chlorideae*.
TABLE 2: Meteorological parameters relationship with the larval population and *parasitoid, C. chlorideae of H. armigera.*

<table>
<thead>
<tr>
<th>Biotic and abiotic factors</th>
<th><em>Rabi season 2003-04</em></th>
<th><em>Rabi season 2004-05</em></th>
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</thead>
<tbody>
<tr>
<td></td>
<td><em>C. chlorideae</em></td>
<td><em>H. armigera</em></td>
</tr>
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<td>Tem. Max.</td>
<td>-0.52*</td>
<td>0.57*</td>
</tr>
<tr>
<td>Tem. Min.</td>
<td>-0.70*</td>
<td>0.62*</td>
</tr>
<tr>
<td>RH (%) morning</td>
<td>0.63*</td>
<td>-0.49*</td>
</tr>
<tr>
<td>RH (%) evening</td>
<td>0.31</td>
<td>-0.37**</td>
</tr>
<tr>
<td>Wind Speed (km/hr)</td>
<td>-0.45*</td>
<td>0.53*</td>
</tr>
<tr>
<td>Evaporation (mm/day)</td>
<td>-0.68*</td>
<td>0.71*</td>
</tr>
<tr>
<td>Rainfall</td>
<td>-0.078</td>
<td>-0.27 NS</td>
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<tr>
<td>Parasitisation</td>
<td>-</td>
<td>-0.37**</td>
</tr>
</tbody>
</table>

Note: Correlation coefficient (r) at * 5 and ** 1 per cent level of significance.

REFERENCES