ECOLOGICAL STUDIES ON CEREAL APHID SCHIZAPHIS GRAMINUM (RONDANI) ON WHEAT PLANTS AND ASSOCIATED NATURAL ENEMIES IN FAYOUM GOVERNORATE

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ABSTRACT

*S. graminum* (Rondani) activity on wheat at Fayoum Governorate was evident from the 1st week of Feb. to mid May with two peaks. The first peak of infestation occurred at the early of April, with 90 and 49 aphids/10 plants during 2000/2001 and 2001/2002 seasons, respectively. Also, five species of predators and three species of parasitoids were recorded in association with this aphid. *C. undecimpunctata* and *C. carnea* were the dominant predators during the activity period from mid Mar. to mid April. On the other hand the parasitoids, *Aphidius* sp. was the most common species, followed by *Aphelinus* sp. and *Diaeretiella rapae*. The major weather factors (max. temp., min. temp. and RH.) showed insignificant effect on population of aphid, predators and parasitoids.

Key words: Wheat, Aphid, Natural enemies.

INTRODUCTION

Aphids cause qualitative and quantitative damage to wheat plantation not only in Egypt but also in many parts of the world, (Rabe *et. al.* 1989, El-Heneidy and Attia 1991, Ali *et. al.* 1999 and Mannaa 2000). The parasitoids and predators attacking cereal aphids are important factors to be considered in an Integrated Pest Management (IPM) program (s). The reported parasitoid species are *Diaeretiella rapae* (M'tntosh), *Aphidius* spp. and *Aphelinus* sp. (Stary, 1976 and Alhag *et al.* 1996). Several publications reported the effect of parasitoids on the population dynamics of cereal aphids abroad (Feng *et al.* 1992 and Pike *et. al.* 1997), while the main predators associated with aphids on wheat plants are *Coccinella undecimpunctata L.*, *Orius albidipennis* Reuter., *Paederus alferii* Koch., *Syrphus* spp and *Chrysopelo carnea* Steph. (Ibrahim and Afifi 1991 and Hesler *et al.* 2000). An overall evaluation of the role of natural enemies in Integrated Pest Management of cereal aphids in Fayoum is unavailable, therefore the present study is an approach to evaluate the role of parasitoids and predators in wheat fields during the seasonal occurrence of aphids.

MATERIAL AND METHODS

The present study was carried out in Dar- El Ramad experimental farm, El-Fayoum Faculty of Agriculture, in half feddan during the two seasons of 2000/2001 and 2001/2002. This area was divided into 4 sections, 400 m² each (66 m. long x 6 m wide) and was cultivated with wheat of Sakh 69 variety during two planting dates, i.e., Nov. 25 and Dec. 14. The normal agricultural practices were applied without using any pesticides. Survey of cereal aphids and the associated natural enemies were made during the two growing seasons, at regular interval of 15 days. Sampling started four weeks after sowing and continued until wheat harvest.
Two sampling methods were applied; a) Sweeping with a net 30 cm. diameter and 60 cm., deep at 100 strokes/sample/kirat; and b) examination of whole plant 10 randomly selected plant / each plant date of sample.

The collected samples were kept, in polyester bags, taken to the laboratory, the aphids and the associated natural enemies were identified, then counted. The relationships between the population densities of aphids, natural enemies and certain weather factors were established. These factors were maximum, minimum temperature and daily relative humidity. Data obtained were statistically analyzed (Sendecor and Cochran 1990).

RESULTS AND DISCUSSION

1) Population fluctuation of cereal aphid, *S. graminum*:

Data presented in tables (1 & 2) and Fig. (1 & 2) showed that the cereal aphid, *S. graminum* had 1-2 peaks during the two seasons 2000/2001 and 2001/2002. The infestation of wheat plants with *S. graminum* appeared in few numbers and reached a 1st peak (34 aphids/10 plants) in March 5. Population slightly decreased, then increased and reached a 2nd peak (90 aphids/10 plants) in April 2 (2000/2001). In 2001/2002 season few numbers of aphids were recorded during the period from early Feb. to late Mar., then population increased to 1st peak (49 aphids/10 plants) in April 4.

2) Natural enemies associated with cereal aphid *S. graminum*

Predators and parasitoids collected from wheat plants which existed in association with cereal aphids are shown in table (3). Five insect predators belonging to five families and four orders; namely *Coccinella undecimpunctata*, *Paederus alfierii*, *Orius albidipennis*, *Syrphus* ssp. and *Chrysopela carnea* were found. The parasitoids belonging to one order and one family, namely *Aphidius* sp, *Aphelinus* sp. and *Diaeretiella rapae* were also recorded. These results are in general agreement with those observed by Mannaa (2000), who recorded the same species of predators.

3) Population fluctuation of predators:

As shown in tables (2 and 3) and Fig. (1), the population density of predators per 100 strokes on wheat plants during the 1st season (2000/2001) began with low numbers (2 individuals.) in Feb 19. Then the numbers increased reaching a peak (64 individuals.) in April 2, and the population of the predators gradually decreased till mid.- May.

The data clearly show that *C. undecimpunctata* and *C. carnea* were found to be dominant species during the period from mid.- March to mid April, with a peak (23 individuals) for *C. undecimpunctata* in March 19 and (13 individuals) for *C. carnea* and *Syrphus* ssp.in April 2.

In the second season (2001/2002) the total number of predators increased gradually from Feb.7 to mid May with one peak (62 individuals) in Apr. 4.

*C. undecimpunctata* was the most common species during this season with total number (80 individuals) and one peak (34 individuals) in Apr.4 (table 2 and fig. 2). On the other hand, *Orius albidipennis* and *Paederus alfieri* were found at lowest population in the 2nd season (23 and 18 individuals) respectively.
Table 1
Table 2

<table>
<thead>
<tr>
<th>Order</th>
<th>Family</th>
<th>Scientific name</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) predators:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td>Coccinellidae</td>
<td><em>Coccinella undecimpunctata</em> L.</td>
</tr>
<tr>
<td>Hemiptera</td>
<td>Staphylinidae</td>
<td><em>Paedrus alfieri</em> Kock.</td>
</tr>
<tr>
<td>Diptera</td>
<td>Anthocoridiae</td>
<td><em>Orius albidipennis</em> (Reuter)</td>
</tr>
<tr>
<td>Neuroptera</td>
<td>Syrphidae</td>
<td><em>Syrphus</em> spp.</td>
</tr>
<tr>
<td>Hymenoptera</td>
<td>Chrysopidae</td>
<td><em>Chrysopela carnea</em> Steph.</td>
</tr>
<tr>
<td>b) parasitoids:</td>
<td>Aphidiidae</td>
<td><em>Aphidius</em> sp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Aphelinus</em> sp.</td>
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<td></td>
<td></td>
<td><em>Diaeretiella rapae</em> M.</td>
</tr>
</tbody>
</table>

4) Population fluctuation of parasitoids:

In the 1st season (2000/2001), the total number of parasitoids started with few numbers during Feb. 19 and March 19 (1-2 individuals), then the population of parasitoids increased and reached a peak (24 individuals) in Apr.16. *Aphidius* sp. was the most common species of parasitoids during this season (21 individuals). *Aphidius* sp. started to appear in Feb.19. The highest parasitoids (13 individuals) were found during mid-April. (table 1 and fig. 1). In the 2nd year (2001/2002) the total number of parasitoids was higher than that of the 1st season (2000/2001). It began to appear from Feb.7 to mid-May with a peak (14 individuals) in Apr. 4. Also, *Aphidius* sp. was the most common species among all parasitoids found. This species started to appear in the last Feb. reaching a peak (10 indiv.) on Apr.4, then the number of this parasitoid decreased till the end of this season (2001/2002). On the other hand, the other parasitoids (*Aphelinus* sp. and *D. rapae*) appeared in few numbers during the 2nd season (12 and 11 individuals, respectively).

5) Correlations between experimental insects and weather factors:

As for statistical analysis during the two seasons (2000/2001) and (2001/2002), the simple correlation values of max. temperature, min. temp. and R.H were insignificant on aphid, predators and parasitoids. While the effect of predators was highly significant (r = 0.968** and 0.913**) in the 1st season (2000/2001) and in the 2nd season 2002, respectively on aphid. Also the effect of parasitoids were significant (r = 0.643*) in the 1st season (2000/ 2001) on aphid numbers.

Ibrahim and Afifi (1991) and Ali et al., 1997 reported that the fluctuation of aphid number occur due to the effect of natural enemies. Also El-Heneidy and Attia (1988), stated that the highest rates of aphid infestation were observed during March. Populations of aphidphagous predators increased gradually towards the end of the season and reach their maximum during April. Also the highest percentages of parasitism were estimated during March.

REFERENCES


ECOLOGICAL STUDIES ON CEREAL APHID SCHIZAPHIS


دراسات أيكولوجية لمن القمح علي نبات القمح وأعدائها الطبيعية في الفيوم

نارمين أحمد يوسف ، سهام سيد الجندي
قسم وقاية النبات – كلية الزراعة – جامعة القاهرة – فرع الفيوم

 grosse نارمين أحمد يوسف سهام سيد الجندي


And you will notice that the number of aphids per plant is high in the early stages of development and decreases as the plant matures.

Also, the number of aphids is reduced by the natural enemies of aphids, which are important in controlling the population of aphids. Aphidius sp