HOST RANGE AND SEASONAL ABUNDANCE OF THE CORN LEAF APHID, *Rhopalosiphum maidis* FITCH IN SHARKIA, EGYPT
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ABSTRACT

Host range and seasonal abundance of the corn leaf aphid, *Rhopalosiphum maidis* Fitch (CLA) was estimated at Zagazig district, Sharkia Governorate during two continues years (2001/2002 and 2002/2003)

*Rhopalosiphum maidis* Fitch found infesting 21 plant species two as grain crops (maize presented and wheat), 5 species as foliage crops (millet, broom corn, soccharia, maize and Johnson grass) and 14 species of weeds (jungle rice, barnyard grass, rabbit grass, green fox tail, little seed canary grass, wild oat, sugar can (solitary plants), common reed, dog grass, annual bluegrass, rabbit foot grass, purple nut sedge and mosa (solitary plants)). The grain crop plants (Z. mays) harbored relatively the highest numbers (presented with 24.46% of the total number of aphid) followed by foliage plants (especially, Sorghum vulgare presented with 22.21%) and weeds.

Seasonal abundance of *R h. maidis* population on the different hosts indicated that population density of CLA on foliage crop and weed plants was raised before and after suitable growing periods of maize and wheat plants. The infestation of *R h. maidis* started on the weed plants Echinochloa colonum Link, Polyepogon monspeliensis Desf and Cyperus rotundus L.) from end November till mid or end January then aphid migrate to wheat and maize which cultivated as foliage crops the infestation continuous reaching to mid April and then migrate to early summer plantation maize (grain crop), also the aphids migrate from *Bucharia eruciformis* G.-sbb and Setaria spp to maize (grain and foliage crops) and to soccharia (foliage crop)

INTRODUCTION

The corn leaf aphid, *Rhopalosiphum maidis* Fitch is ranked as one of the most important insect pest by cereal growers over the world. The aphid is considered as the key pest attacking gramineae plants. The aphid occurs all over the year and its distribution is not limited. The gramineae plants were colonized by *R h. maidis* in different densities of infestation [Hassan (1957); Gangulu and Raychaudhuri (1980) and Megahed et al (1983)]. The corn leaf aphid (CLA) began to be a serious injurious pest on maize plants (Youssef (1990) and Abd El-Rahim et al (1991)). This aphid species causes severe damage (20-33%) and colonize wide range of cereal hosts (El Hariry (1979); El Naggar et al (1982-1983); Tawfik et al (1974); Ismaiel et al (1993); Dean (1974); Waterman and Redhead (1976) and Megahed (2000)).

The effective Pest Management Program always needs more and recent information. The present work aimed to scout host range and study seasonal abundance of CLA on gramineae plants at Zagazig district.
MATERIAL AND METHODS

The present work was carried out at Zagazig district (Sharkia Governorate at end of November 2001 till early December 2003. Five kilometers distant from Kafr Abd El-Aziz to Zerkia village were selected for screening the host range (economic and weed plants) and seasonal abundance of corn leaf aphid. Weekly the numbers of different stages of *Rhopalosiphum maidis* were counted on ten plants for each plant species in the field as following schedule: 1-Maize, ten plants till tassel emergence then ten longitudinal inch on main stem of tassels were inspected. 2-the millet, broom corn, jonson grass, sacchara, wheat, jungle rice, barnyard grass, rabbit grass, green fox tail, giant reed, wild oat, little seed canary grass, rabbit foot grass, sugarcane, purple nut sedge dog grass, mosa, annual blue grass, common reed: ten tillers for each plant species. The weed plants: samples presented by plants found between economic plants and out fields beside road and irrigation canals banks. Relative abundance (R%) of *Rh. maidis* population on each host plants was calculated as follow:

\[ R\% = \frac{\text{total number of aphid on each host plant}}{i \text{ total number of aphid on all host plants}} \]

RESULTS AND DISCUSSION


Data in Table (1) cleared that, the corn leaf aphid colonized wide range of gramineae economic crops (6 species) and weed plants (14 species). These hosts could be arranged in descending order as follows:

a. Economic crops: Mean numbers of CLA infested gramineae plants were varied significantly from host to another. The highest occurrence of CLA were recorded on maize plants Zea mays which cultivated as grain crop presented with 24.64% of general total numbers recorded on economic and weeds plants, followed by millet plants, Sorghum vulgare (foliage crop) by 22.21%, broom corn, S. technicus (foliage crop) with 11.05%. The moderate percentages were recorded on sacchara, Z.mays saccharata (foliage crop) with 7.82%, Z mays which cultivated as foliage crop with 7.21% of general total. The relatively low occurrence percentages recorded on jonson grass, S. virgatum with 5.14% followed by wheat, Trilicum vulgare (grain crop) with 0.68% of general total numbers.

b. Weed plants:

i. Gramineae weeds: The weed plants were arranged in descending order according to the harbored aphid numbers as follows; Echinochloa colonum (jungle rice) harbored 6.95% followed, by E. crus gali (Barnyard grass) harbored 5.48%, Bachiaria eruciformis (rabbit grass) with 1.93% Arundo donaxl (Giant reed) with 1.65% Setaria sp (green foxtail) with 1.16%, Phalaris minor (little seed canary grass) with 0.95% Avena fatua (wild oat) with 0.62%, Phypothen monspeliensis (rabbit foot grass harbored 0.57% solitary plants of
**Saccharum officinarum** (sugar can) with 0.44% *Cynodon dactylon* (dog grass) with 0.35%, *Poa annua* (Annual Blue grass) with 0.17% and *Phragmites australis* (common reed) with 0.13% of general total numbers of CLA on different hosts.

**Table (1): Host range and relative abundance of the corn leaf aphid, *Rhopalosiphum maidis* at Zagazig region during 2001/2002 and 2002/2003 years.**

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific name</th>
<th>Common name</th>
<th>Growth habit</th>
<th>The mean</th>
<th>Relative abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graincactae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - Economic plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A - Folage crops</td>
<td>Sorghum vulgare</td>
<td>Millet</td>
<td>P</td>
<td>2811</td>
<td>22.21</td>
</tr>
<tr>
<td></td>
<td>S. bicolor</td>
<td>Broom corn</td>
<td>P</td>
<td>1249</td>
<td>11.05</td>
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<tr>
<td></td>
<td>Zea mays saccardae</td>
<td>Sacchara</td>
<td>P</td>
<td>884</td>
<td>7.62</td>
</tr>
<tr>
<td></td>
<td>Z. mays</td>
<td>Corn</td>
<td>AS</td>
<td>815</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td>S. virgatum</td>
<td>Jonton grass</td>
<td>P</td>
<td>581</td>
<td>5.14</td>
</tr>
<tr>
<td>B - Grain crops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z. mays</td>
<td>Corn</td>
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<tr>
<td></td>
<td>Tricca vulgare</td>
<td>Wheat</td>
<td>AW</td>
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<td>C - Sugary crops</td>
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<td>Banana</td>
<td>P</td>
<td>24</td>
<td>0.21</td>
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<td></td>
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<td></td>
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<td>Jungle rice</td>
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<tr>
<td></td>
<td>Link</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E. crus gali L</td>
<td>Barnyard Grass</td>
<td>AS</td>
<td>620</td>
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<tr>
<td></td>
<td>Bachara arundinasis</td>
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<tr>
<td></td>
<td>Arundo donax L</td>
<td>Giant reed</td>
<td>P</td>
<td>186</td>
<td>1.65</td>
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<td></td>
<td>Setaria spp.</td>
<td>Green fox tail</td>
<td>AS</td>
<td>131</td>
<td>1.18</td>
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<td></td>
<td>Phalaris minor Retz</td>
<td>Little seed canary grass</td>
<td>AS</td>
<td>106</td>
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<tr>
<td></td>
<td>Avena fatua L</td>
<td>Wild oats</td>
<td>AN</td>
<td>70</td>
<td>0.62</td>
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<td></td>
<td>Pooypon monspersians</td>
<td>Rabbit foot grass</td>
<td>P</td>
<td>63</td>
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<tr>
<td></td>
<td>Cynodon dactylon Era</td>
<td>Dog grass</td>
<td>P</td>
<td>40</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Poa annua L</td>
<td>Annual blow grass</td>
<td>AW</td>
<td>19</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Phragmites communis</td>
<td>Common reed</td>
<td>P</td>
<td>15</td>
<td>0.13</td>
</tr>
<tr>
<td>Cyperaceae</td>
<td>Cyperus rotundus</td>
<td>Purple nut sedge</td>
<td>P</td>
<td>39</td>
<td>0.34</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>11308</td>
<td>100</td>
</tr>
</tbody>
</table>

* P = Perennial  A = Annual  S = Summer  W = Winter
The Cyperaceae plants: this family was represented by *Cyperus rotundus* (purple nut sedge). It harbored 0.34% of the total numbers of CLA on different hosts.

iii. The Mosaceae plants: this family was represented by solitary plants of *Musa paradisiaca* (mosa or banana). It harbored 0.21% of the total numbers of CLA on different hosts.

The obtained results agree with those of Hassan, (1957), Ismail, et al (1983), Megahed (2000) and Mohammad (2000) they found that, *Rh. maidis* colonized mainly on economic cereal, maize and sorghums with relatively high numbers: while on wheat, broom corn, jonson grass and scoccharia it occurred with relatively low numbers. The authors added that the main weeds infested by *Rh. maidis* were *Bromus arvensis* L., *Cynodon dactylon* Pers., *Echinochloa colonum* Link., *Eleusine indica* L. and *Polygonum sp.*

### 2. Seasonal abundance of *Rh. maidis*.

**a. Economic hosts:**

1. **Maize plants**, *Zea mays*:

   The data illustrated in Fig (1) showed that *Rh. maidis* colonized maize plants from early April till the end of August during the 1st season. Three peaks were recorded. The highest one was at early August (222 individuals/plant). The infestation period extended from mid-March till early October during the 2nd Season. Three peaks were recorded too; the greatest one was recorded at the end of August (267 individuals/plant).

2. **The millet plants**, *S. vulgare*.

   The CLA, *Rh. maidis* occurred on sorghum plants throughout the study years except some short periods. The first extended from the 3rd week of January till the 2nd week of April 2002. During the 2nd year they were during the 3rd and the 4th week of January, June and the 1st week of July. The population of CLA fluctuated recording 6 peaks during the 1st year, the highest one was 200 individuals/tiller at 4th week of June 2002. During the 2nd year, 8 peaks were recorded. The highest one was 135 individuals/tiller at the 4th week of September (Fig. 1).

3. **The broom corn**, *S. technicus*.

   The broom corn harbored *Rh. maidis* throughout the periods extended from the 3rd week of December 2001 till early May 2002, from the 1st week of June till the 4th week of July, from the 3rd week of August till the 2nd week of September and from the 3rd week of October 2002 till the 4th week of April 2003, while the last period extended from the 2nd week of August till early December 2003. The population of CLA fluctuated throughout the occurrence periods. Five peaks were recorded at 2002. the highest one was 75.0 individuals/tiller. There were three peaks during 2003. The highest was recorded at the 1st week of September (37.0 individuals/tiller) (Fig. 1).

4. **Soccharia, Z. mays saccharae**.

   The obtained results clarified that the soccharia plants harbored *Rh. maidis* at four periods throughout the study period: the 1st one extended from the 1st week of December 2001 till the 4th week of January 2002, from the 1st
week of June till the 3rd week of August, from the 1st week of November 2002 till the 2nd week of January 2003 and from the 4th week of June till the 1st week of August 2003. The CLA recorded 4 weak peaks, the greatest were recorded at the 2nd week of July 2002, and the 3rd week of July 2003 with 125.0, individuals/tiller for each one (Fig. 1).

Fig. (1): Seasonal abundance of leaf corn aphid, *Rhopalosiphum maidis* on main economic plants at Zagazig region during 2001/2002 and 2002/2003 years
The foliage maize plants harbored CLA with 4 periods, extended from the 4th week of February 2002 to the 4th week of April (with one peak 21 individuals/plant at the end of March), from the 3rd week of August till the 3rd week of January 2003 (with 2 peaks at the 1st week of September and the end of November with 29.0 and 41.0 individuals/plant, respectively), from the 4th week of February till early May 2003 (with one peak at the end of March with 20 individuals/plant) while the 4th period extended from the 3rd week of August till early December 2003 (with two peaks at the 4th week of September and at the 2nd week of November 2003 recorded 32.0 and 55.0 individuals/plant, respectively) (Fig. 1).

Jonson grass was colonized by relatively low numbers of CLA. Fig. (1) showed 4 occurrence periods with weak fluctuation. The highest density was 24.0 individuals/tiller recorded at the end of December 2001 and the end of April 2003.

7. Wheat, *Triticum vulgare*  
The wheat plants were colonized by CLA at 3 periods with low numbers. The first one extended from the end of December 2001 till the 2nd week of March 2002. The others were short (from the 2nd week of December 2002 till the 2nd week of January 2003 and from the 2nd week of February till the 3rd week of March 2003). The highest number was 91 individuals/tiller (Fig. 1). These results are in agreement with those of Issam (1993); El-Hariry (1974); Tawfik et al. (1979); Hassan (1957) and Mohammad (2000) who found *Rh. maidis* infesting maize from June till September and from November till mid-March on wheat.

b - Weeds plants:  
1. Jungle rice, *Echinochloa colonum*  
The highest numbers of CLA on weed plants recorded on Jungle rice, *E. colonum* plants. The population of CLA fluctuated with weak peaks. The greatest one was 60 individuals/tiller at the 4th week of April (Fig. 2).

2. The barnyard grass, *E. crus galli*  
According to the population of aphids the barnyard grass followed the pervious weed plant. It harbored aphids from the 2nd week of August till the end of November 2002. Two peaks of 69.0 and 74.0 individuals/tiller were recorded at the 1st week of September and the 3rd week of October 2002, respectively. Also, aphids were harbored from the 2nd week of August till early October 2003. One peak of 29.0 individuals/tiller was recorded at 3rd week of September 2003 (Fig. 2).

3. Rabbit grass, *Bachinia eruciformis*  
The followed weed species was the rabbit grass, *B. eruciformis*. occurred from the 2nd week of April till the 3rd week of May 2002 with one peak at the end of April with 35.0 individuals/tiller. The CLA was found during the 2nd years from the 2nd week of August till early October 2003. The CLA had one peak of 33.0 individuals/tiller at early May (Fig. 2).

4. The Giant reed, *Arundo donax*.
The Giant reed thirdly ranked in aphid population. Two occurrence periods, the first one extended from the 2nd week of March till early May 2002 with one peak at the 4th week of April (30.0 individual/ tiller). The 2nd period extended from the 2nd week of March till the 2nd week of May 2003 with one peak too, at the end of March (18.0 individual/ tiller) (Fig. 2).

Fig. (2): Seasonal abundance of leaf corn aphid, *Rhopalosiphum maidis* on weed plants at Zagazig region during 2001/2002 and 2002/2003 years

5. The green fox tail, *Setaria* sp
Ibraheem, M. M. A. et al.

The green fox tail, Setaria sp. harbored CLA by 4 short occurrence periods, the 1st extended from the 2nd week of April till the 2nd week of May, the 2nd from early October till early November 2003, the 3rd from end of March till early May and the 4th from the 3rd week of October till the 2nd week of November 2003 with weak oscillation, the highest density of CLA on Setaria sp was 16 individuals/tiller at the 4th week of April 2003, these periods are very important because their timing is between the aphid occurrence on the other hosts (Fig. 2).

6. The little seed canary grass, Phalaris minor

The little seed canary grass, P. minor harbored the CLA from the 1st week of March till the 4th week of April 2002 with very weak peak 9 individuals/tiller at the end of March. The population of the CLA fluctuated during 2003. It was recorded relatively high numbers of 15.0 individuals/tiller at the 4th week of April 2003 (Fig. 2).

7. The wild oat, Avena fatua

The wild oat, A. fatua was colonized by low numbers of CLA at two periods. The 1st one extended from the 1st week of February till mid-March 2002 with low numbers ranged 2-8 individuals/tiller. The 2nd period extended from the end of January till the 3rd week of March 2003 ranged 1-13 individuals/tiller (Fig. 2).

8. The rest weeds species were harbored very low numbers of Rh. maidis at relatively short occurrence periods.

Generally, the Rh. maidis found on graminineae hosts throughout the two years of study. The graminineae economic crops harbored highest numbers of CLA during long occurrence periods (especially maize and millet). The foliage crops were found as perennial shelter plants. They gave the aphids continues occurrence. The weed plants complete this roll as alternative hosts, especially before or after growing seasons of economic crops (between plantation periods), the economic crops plants are unsuitable (as morphological or physiological characters). The highest population density of CLA was recorded on maize, millet and broom corn as economic crops and on jungle rice and barnyard grass as weed plants. Therefore, it could be classified the hosts of CLA to three groups, i.e. grain crop hosts (maize and wheat), foliage crop hosts and weed hosts, that gave a clear focus about the economic importance of host scouting study, where the grain crops presented by two species (maize and wheat) harbored CLA at two periods of occurrence throughout each year, the 1st extended from the end of December 2001 till mid-March 2002 on wheat as winter grain crop host and the 2nd period from the 2nd week of April till early September 2002 on maize as summer grain crop host. During the 2nd winter season the occurrence on wheat recorded two periods. The 1st extended from the 2nd week of December 2002 till the 2nd week of January, while the 2nd period to the summer occurrence of aphid. The infestation was earlier than the 1st season and extended till early October 2003 (Fig. 2).

The foliage crop plants harbored relatively high numbers of CLA throughout the hole period of study except one week of mid-June: 1- during October till December (after maize growing season and before suitable
growing stage of wheat). 2- during April and early June (after wheat growing season and before suitable growing stage of maize)

The weed plants as alternative hosts of CLA found harbored by four occurrence periods, extended from the 4th week of November 2001 till the end of May with relatively high numbers during April, from mid-August 2002 till the 2rd week of January 2003 from the end of August till mid-September (after the maize growing season and before the suitable growing stage of wheat) While the 3rd period extended from the end of January till the end of May at the period extended from the end of March till mid-May (after the wheat growing season and before the suitable growing stage of maize). The 4th occurrence period of CLA on weeds extended from the 2rd week of August till early December 2003 (after maize growing season and before wheat suitable growing stage).

It could be concluded that the raise in population density of CLA on maize and wheat plants and the serious damage to these grain crops due to the continues of gramineae foliage crops and lets weed plants without control.

REFERENCES


المدى المحلي والمتوافقة الموصوف لعُوافذ الذرة في محافظة الشرقية - مصري

محمد محمد أحمد إبراهيم - حماية نبات الآمن - محمد عبد الوهاب aracı

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حماية نبات الآمن

يعتبر من أحداث الحياة التوافد الشبة الشامانية النباتية الأخرى، وقلت كان لهان من معرفة مدى توافد هذه الحيوانات في منطقة الأراضي خلف عادات متماثلة بينها من 2000 حتى 2012، وهذا ما ينتج بسبب 21 نوع من النباتات في منطقة الدراسة على مدار العام، منها نوعين كمحاصيل حيوان مستمرة جيدة ونوع واحد عادة عند 44.12%، ونوع واحد عادة عند 9.96%، وذلك من جملة التعداد المداول، وكان ذلك خمس عوافذ النباتات النارية والتي تزعم ك_triangle معمرة ومنها الذرة. ينجم التعداد عادة على 44.12%، ونوع واحد عادة عند 4.98%، ونوع واحد عادة عند 1.18%، ونوع واحد عادة عند 0.33%.

وعبر العمليات (4.44% و 0.45% والصبلزم (0.45% و 0.24% و 0.26% و 0.15% من الحافة المتوسطة ونيابة المنز الفردي (21.2%) من علاقة النمو.

سجل التعداد عدل عن التدفقات خلال فترة الدراسة على المواقع المختلفة، وسجل أعلى تعداد على نباتات الجحب، ثم نباتات الفن النباتي، ثم نباتات الفن النباتي بجانب نباتات الفن النباتي. ينجم التعداد عادة على المواقع بشكل متوازي على الأرغام والأطواش، قبل وراء نباتات الفن النباتي. تأكسد الإصابة على العوافذ حيث تزعم نباتات الفن النباتي، ونظام نباتات الفن النباتي، ونظام نباتات الفن النباتي، ونظام نباتات الفن النباتي، ونظام نباتات الفن النباتي، ونظام نباتات الفن النباتي، ونظام نباتات الفن النباتي.