SIMULATING THE DAMAGE CAUSED BY CERTAIN INSECTS FOR WHEAT PANICLES IN RELATION TO YIELD LOSSES

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Abstract

An experiment was carried out to clarify the effect of an artificial insect damage, at different rates, for wheat panicles on the yield. The experiment was established at Sharkia governorate, using Salvia 93-variety, during 2002/2003 season. Six levels of damage, 0, 10, 20, 30, 40, and 50% cut panicles were done on 27/3/2003, beginning of the flower stage. Mean weight of the grain yield was significantly affected with the damage and showed a regression coefficient of 0.94%. Also, mean weight of the panicles was affected and had a regression coefficient of 1.01%. On the other hand, mean weight of 100 grains was not significantly affected and had a regression coefficient of 0.26% only.

INTRODUCTION

Wheat crop, in Egypt, is an important source for grains and flour used in the different human and animal purposes. This crop exposes to several insect pests either in the field or in the store. Some of these insects cause a pronounced reduction in the yield due to feeding on the foliage and panicles in the field. The most harmful damage is happened when the panicles are destroyed with certain insects such as Triainota squillida Scop., Gryllotalpa spp., Cephaloscaena sp. Aphid sp. and Cophus tabulatus F. Several entomologists had estimated the grain yield losses for some field crops, Sherif et al (1991) and Khadr et al (1991) on rice, El-Borai et al (1992) and Lotfallah et al (2003) on soybean, Abd-Ala et al (1997) on maize and El-Sawy (1999) on wheat.

All previous trials, in this respect, on the wheat depended on the destroyed leaf area. So, the present work is considered a new trial for estimating wheat yield losses due to the destroyed panicles which artificially executed to simulate those resulting from the natural insect infestation. Thus will be helpful to determine the economic injury level in wheat fields.
MATERIALS AND METHODS

At Minia El – Kamh (Sharkia governorate), an area was chosen to carry out this work during 2002/2003 season. The area was cultivated with Skha 93 wheat variety on 15/11/2002. All normal agricultural practices were done and using the recommended insecticides, 10 days intervals, to suppress the natural insect infestation level. On 27/3/2003, six groups of healthy plants, 50 individuals each, were used to carry out 6 reduction rates (treatments) for the panicles, 2, 10,20,30,40 and 50%. These rates were done by using sharp scissors for cutting 1, 5,10,15,20 and 25 panicles from the treatments, respectively. Each treatment was repeated three times in addition to another three similar replicates were completely untouched to be used as a check. All groups were randomly distributed in the area and the plants of each replicate were carefully surrounded together, with a plastic rope, to avoid the breakage and also to be easy for doing the desired treatments.

At harvest, on May 8, all panicles in each replicate were gathered in a plastic bag and transferred to the laboratory. Mean weights of each panicle, net grain yield and 100 grains were calculated. Simple regression and F-test were used in this work.

RESULTS AND DISCUSSION

Data found in Table 1 revealed that, mean weight of grain yield was significantly affected with the damage especially at rates up to 10%. While this mean was 68.00 and 65.57 gm at 2 and 10% damage, respectively, it sharply decreased to 54.28, 47.79, 44.35 and 36.88 gm at the levels of 20, 30, 40, and 50% damage, respectively compared with 70.22 gm in the check. The reduction was calculated as 3.16, 6.62, 22.70, 31.94, 36.84 and 47.48% at the different levels of the damage, respectively with a regression coefficient value of 0.944. El – Serwy (1999) reported 5.26 % losses in the wheat grain for 1 or 2 mines in the flag or sub-flag leaf, respectively. Sheriff (1991) found similar results in the rice, each 1% white heads caused 0.86 – 1.19 % yield loss according to the variety.
Mean weight of the panicles was also significantly affected with the damage, 90.6 and 90.3 gm for the 2 and 10% levels, respectively decreased to 78.1, 65.0, 57.5 and 49.2 gm for the other respective levels with 94.0 gm for the check panicles. The reduction was calculated as 3.62, 3.94, 16.92, 30.85, 38.83 and 47.66% for the six damage treatments, respectively. Regression coefficient value in this case showed that, each 1% damaged panicles caused 1.01% reduction in the weight.

With regard to the mean weight of 100 grains, it insignificantly affected with the previous levels of damage when recorded 5.18, 4.34, 4.13, 4.33, 4.64 and 4.61 gm opposite the same respective treatments with 5.21 gm in the check. Reduction percentages in this case ranged 0.58 – 20.73 and regression coefficient value was too little (0.086%).

Table 1. Reduction in wheat grain yield due to different levels of artificially damaged panicles during 2002/2003 season.

<table>
<thead>
<tr>
<th>Damage level (%)</th>
<th>Grain wt.</th>
<th>%Reduction</th>
<th>Panicles wt.</th>
<th>%Reduction</th>
<th>100 - grains wt.</th>
<th>%Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>68.00 a</td>
<td>3.16</td>
<td>90.6 a</td>
<td>3.62</td>
<td>5.18 a</td>
<td>0.58</td>
</tr>
<tr>
<td>10</td>
<td>65.57 a</td>
<td>6.62</td>
<td>90.3 a</td>
<td>3.94</td>
<td>4.34 a</td>
<td>16.7</td>
</tr>
<tr>
<td>20</td>
<td>54.28 b</td>
<td>22.7</td>
<td>78.1 ab</td>
<td>16.92</td>
<td>4.13 a</td>
<td>20.73</td>
</tr>
<tr>
<td>30</td>
<td>47.79 c</td>
<td>31.94</td>
<td>65.0 bc</td>
<td>30.85</td>
<td>4.33 a</td>
<td>16.89</td>
</tr>
<tr>
<td>40</td>
<td>44.35 c</td>
<td>36.84</td>
<td>57.5 c</td>
<td>38.83</td>
<td>4.64 a</td>
<td>19.94</td>
</tr>
<tr>
<td>50</td>
<td>36.88 d</td>
<td>47.48</td>
<td>49.2 c</td>
<td>47.66</td>
<td>4.61 a</td>
<td>11.52</td>
</tr>
<tr>
<td>Check</td>
<td>70.22 a</td>
<td></td>
<td>94.0 a</td>
<td></td>
<td>5.21 a</td>
<td></td>
</tr>
</tbody>
</table>

- Calculated F 36.6
- L.S.D. 0.05 6.34
- Numbers, within each column, had similar letters not significantly differed
REFERENCES


محاكاة ضرر بعض الحشرات لسلال القمح
وعلاقته بالفقد في المحصول

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أجريت تجربة لمحرفة تأثير غياب سلالة القمح (بطرقة تطبيقات) على المحصول الناتج. تم زراعة الشفاف مساحة 93 مباقطة للبرية موسم 2003/2004، وثم عمل ستة مستويات من الغياب بطرق مختلفة مساحة بمعدل 2000٪، بالإضافة إلى المقارة. تأثر محصول العنب بكثيراً ودرجة معنوية وكان معدل الزيادة 94% نسب إلى معدلات الزيادة لكل 1٪ غياب سلالة. كانت تأثير الزيادة في وزن المحصول بصورة معنوية وكان معدل الزيادة 101% - أما معدل وزن ماتية حيث كان التأثير عليه ضعيفاً وغير معنوي. وسجلت المحصول 000٪ فقط.