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Vol. 7 No. 1 (2014)
Influence of certain climatic factors on some major pepper pests under Egyptian conditions

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ABSTRACT

Pepper crop (Capsicum annuum, L) is considered one of the most important vegetable crops, under greenhouse conditions. This work aim to study influence of certain environmental factors (Temperature and relative humidity) on population of pepper pests i.e. aphid (Aphis gossypii), white fly (Bemisia tabaci) and spider mites (Tetranychus urticae), through growing seasons 2012 and 2013, at two different regions (El-Dokki region, Giza governorate and El-Nobria region, Beheria governorate), Egypt. Population of white fly was the most severity compared with other pests, but population of aphid was moderately severity and population of spider mites was less severity. While, population of tested pests were more severity in El-Nobria region (Beheria governorate) than El-Dokki region (Giza governorate). However, population of tested pepper pests were increased with increasing the temperature through studied seasons. Also, population of tested pests were the most severity during the period from May to June compared with the period from January to March for to growing seasons and two regions. Population of all pepper pests were the most severity during May in El-Nobria region (Beheria governorate) during May-June in El-Dokki region (Giza governorate). Meanwhile, relative humidity was less effectively on population of tested pepper pest through this study.

Keywords: Capsicum annuum, climate region, Aphis gossypii, Tetranychus urticae, Bemisia tabaci, Polyethylene sheet, greenhouse.

INTRODUCTION

Pepper, Capsicum sp. is a member of the Solanaceous family and commonly divided into two groups, pungent and non-pungent, which also called hot and sweet pepper. Sweet pepper includes different cultivars and the most commonly used ones, in greenhouse production, are hybrids that have bell-shaped (Capsicum annuum L.). Sweet pepper is considered one of the most important vegetable crops in Egypt. The average Egyptian annual consumption from pepper is about 5.4 kg/ capita, which mean that the total Egyptian consumption is around 446 tons/ year (Agric. Economic Institute.2007). In addition pepper is one of the most important exportable crops in
Egypt. Egypt has the potential to become an exporter of tomatoes, cucumbers and peppers. However, it is not yet clear whether they will be able to compete price-wise with the Spanish in the winter period. They have the opportunity to produce a guaranteed quality level with which they can maximize the market windows with a quality product in periods of limited supplies and thus compete with Spain. Organic product could be a part of this. The knowledge and the managerial capacity present in Egypt seems sufficient to adopt new technologies and to enter new markets. drew the same conclusion regarding the country's potential. In 2003, some of this potential had become reality. However, exports to Western countries are very small, amounting to hundreds rather than thousands of tons a year. Compared with the Netherlands, the level is negligible.

Although insect pests have been on problem in agriculture through the centuries, phenomenon of pest outbreaks have increased with the change of pest complexities, in the last four decades. Some insects have increased in severity, where others have declined in importance. There is evidence that (specialized species) have been favored by crop intensification. Infestation engrosses the change in cultural practices such as (1) increase of crop cycle per year,(2) augmentation of agricultural chemicals (fertilizer and pesticides), (3) improvement of irrigation facilities and (4) enhancement of higher plant densities (Cuperus, et al.,1982) Manley (1983), Hassan (1983), Bulut et al. (2000), Mohamed (2001) and Saad (2002), Sallam et al. (2009) and Maklad et al. (2012) stated that vegetables under protected cultivation attacked by numerous insects and mites caused serious damage and high yield was lost. The cultivated area from cucumber and pepper plants increased during the last two decades especially in winter plantation, in both open and protected plantation. Spiders are the most abundant predators in agricultural system. Chakraborty (2011) found that a biotic conditions such as maximum, minimum, gradient and average temperature, minimum relative humidity and sunshine hours had significant negative influence on \textit{Aphis gossypii} population, but in case of maximum relative humidity and relative humidity gradient a positive influence. The present work aim to study effect of certain environmental factors (temperature and relative humidity) on population of pepper pests (Aphid, Whitefly and spider mites) under Egyptian conditions.

**MATERIAL AND METHODS**

The experiment was carried out in the Experimental Protected Cultivation sites at El-Nobria in the North governorate and at El-Dokki region, Giza governorate, Behera, Egypt, during two successive seasons of 2012 and 2013. Four greenhouses were chosen to carry out this study. Area of traditional greenhouse is 240 m² with 40m long, 6m wide and 3.25 M high. Greenhouse unit consists of five rows is 1m wide and 40m long and distance between two seedling in the row is 50 CM. Standard agricultural practices were applied at these greenhouse.

**Meteorological data:**

Climatic data were recorded as maximum and minimum temperatures and relative humidity through the period from January to June for two successive seasons of 2012-2013. Averages of environmental factors were calculated to daily maximum and minimum temperatures and relative humidity under greenhouse conditions were obtained from Central Laboratory for Agriculture Climate, Ministry of agriculture, Giza, Egypt.
Assessment of pepper pests:

Adult insects of whitefly (*Bemisia tabaci*), aphid (*Aphis gossypii*), spider mites (*Tetranychus urticae*) were estimated on pepper leaves. The numbers of pests were weekly counted on the terminal leaflet of one leaf of each plant. Fifty plants per row were randomly selected from the middle row in each plot. Five leaves were examined per plant using a hand lens. In case of whitefly, leaves were carefully inverted and adults counted in the morning hours when adults are less easily disturbed (Czsinszky, *et al.*, 1999). Data were statistically analyzed using the "F" test and LSD value (P=0.5) was calculated according to (Snedicor and Cochran 1981).

**RESULTS AND DISCUSSION**

Data in Table (1) showed that population of whitefly was the most severity compared with other pests, where mean number of adult pest per pepper leaf was ranged from 107.0 to 178.0, but population of aphid was moderately severity where mean number of adult pest per pepper leaf was ranged from 105.0 to 150.0 and population of spider mite was less severity where mean number of adult pest per pepper leaf was ranged from 79.5 to 88.5. Meantime, population of tested pests were more severity in El-Nobria region (Beheria governorate) than El-Dokki region (Giza governorate), where mean number of adult pest per pepper leaf was 84.0 – 178.0 and 79.5-168.0 respectively. Survey of insect and animal pests gives the growers a picture of the risk of plant protection would be take attention to crop management (Manley, 1983). In the recent years, growing vegetables in expanding, under protected cultivation in Egypt.

<table>
<thead>
<tr>
<th>Pest</th>
<th>season</th>
<th>Mean number of adult pest/leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td><strong>Aphid</strong></td>
<td>2012</td>
<td>111.0</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>105.0</td>
</tr>
<tr>
<td><strong>Spider mite</strong></td>
<td>2012</td>
<td>79.5</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>88.5</td>
</tr>
<tr>
<td><strong>whitefly</strong></td>
<td>2012</td>
<td>168.0</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>107.0</td>
</tr>
</tbody>
</table>

A = El-Dokki region, Giza governorate.  
B = El-Nobria region, Beheria governorate  
LSD at 5% for  
Pest: 6.4  
Season: 5.3  
Region: 3.6  
Interaction: 9.2

El-Aidy *et al.*, 2007 The major pests were *Thrips tabaci, Tetranychus cinnabarnus, Aphis gossypii* and *Trialeurodes vaporariorum* on tomato, cucumber, pepper and lecture plants under greenhouse conditions (YasaraKinci and Hincal, 1997).

Result in Figs. (1 and 2) mentioned that population of pepper pests (aphid, whitefly and spider mite) were increased with increasing the temperatures under protected cultivation, through the period from January to June for growing seasons 2012 and 2013, at El-Dokki region (Giza governorate) and El-Nobria region (Beheria governorate), where mean number of adult pest per pepper leaf was increased from 5.0 to 22.0 for spider mite, from 9.0 to 25.0 for whitefly and from 3.0 to 36.0 for
aphid, at El-Dokki region, when the temperature was increased from 13.0 to 27.2°C and mean number of adult pest pepper leaf was increased from 8.0 to 22.0 for spider mite, from 18.0 to 42.0 for whitefly and from 12.0 to 35.0 for aphid, at El-Nobria region, when the temperature was increased from 12.7 to 38.9°C, respectively. Population of tested pests were more severity during the last period (May-June) of this study than the first period (January-March), where in the last period, mean number adult pest per pepper leaf was ranged from 15.0 to 22.0 for spider mite, from 23.0 to 25.0 for whitefly and from 30.0 to 36.0 for aphid in El-Dokki region and from 14.0 to 22.0 for spider mite, from 25.0 to 40.0 for whitefly and from 30.0 to 35.0 for aphid in El-Nobria region, where the temperature was ranged from 25.2 to 27.2°C in El-Dokki region and from 22.0 to 38.9°C in El-Nobria region, respectively, but, in the first period, mean number of adult pest per pepper leaf was ranged from 5.0 to 12.0 for spider mite, from 9.0 to 20.0 for whitefly and from 3.0 to 15.0 for aphid in El-Dokki region and from 8.0 to 14.0 for spider mite, from 18.0 to 13.0 for whitefly and from 12.0 to 23.0 for aphid in El-Nobria region, when the temperature was ranged from 13.0 to 17.3°C in El-Dokki region from 12.7 to 28.7°C in El-Nobria region, respectively. Population of all pepper pests were the most severity during May in El-Nobria region (Beheria governorate) and during May-June in El-Dokki region (Goza governorate), where mean number of adult pests per pepper leaf were ranged from 22.0 to 38.9 and from 22.0 to 40.0, respectively. Meanwhile, relative humidity was less effectively on population of tested pest pests.

Fig. 1: Effect of certain climatic factors (Temperature and Relative humidity) on population of pepper pest (spider mites, whitefly and aphid), at El-Nobria region (Beheria governorate), during growing seasons (A) 2012 and (B) 2013.
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Management of greenhouses should be geared towards optimal production condition via provision of appropriate environmental conditions and production imputes by avoiding condition that favor reproduction and development of plant pests (Taher, 1992). Population of *A. gossypii* might reach very high levels in June, causing economic damage to cucumber (Aly, 1993). Insect and mites are the main groups of pests which attack plants causing many types of damage (van lentern, 1992). (Abou-taka and Zahdy, 1990) mentored that the spider mites in Egypt are one of the most serious pests on vegetable plants. Also, Highly population of *Bemisia tabaci* was found during mid-September to the end of October. Number of *B. tabaci* was moderate in November; low infestation of whitefly was in December and January. Aphid population was high from October to mid-December and then become low before and after this period (Aly, 1993).

**REFERENCES**


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ARABIC SUMMARY

تأثير بعض العوامل المناخية على تضاعف آفات الفلفل الرئيسي تحت نظام الزراعة المحمية

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2 - كلية الزراعة جامعة عين شمس

يعتبر محصول الفلفل من أهم وأكثر المحاصيل الزراعة تحت نظام الزراعة المحمية. أجريت تلك الدراسة بغرض دراسة تأثير بعض العوامل المناخية (حرارة - رطوبة) على تضاعف آفات الفلفل خلال موسمي 2012-2013 لمناطق مختلفة (منطقة النوبارية - منطقة الدقي - منطقة بحيرة الجيزة) تحت الظروف المصرية. وُجد أن معدل تضاعف حشرة الذباب البيضاء أكثر شدة و تضاعف الماء كان معتدل الشدة مع أن العوامل كانت أقل شدة في تضاعف. أظهرت الأفاث المختبرة تضاعف أكثر في منطقة النوبارية بمحافظة البحيرة بالمقارنة مع منطقة الدقي بمحافظة الجيزة. أكدت النتائج أن تعداد آفات الفلفل زادت مع زيادة درجات الحرارة خلال موسمية الدراسة ولذلك وجدنا ارتفاع معدل تعداد تلك الآفات. وجدنا أن الفلفل في منطقة النوبارية ومحافظة البحيرة هما الأحياء، وذلك لأن الفلفل في منطقة الدقي تمتلك أفضل الظروف المواتية للعوامل المذكورة. وعندما أوضحت النتائج أن الرطوبة زائدة فإن تعداد آفات الفلفل زادت مع زيادة درجات الحرارة خلال موسمية الدراسة. وعندما أوضحت النتائج أن الحرارة متزايدة فإن تعداد آفات الفلفل زاد مع ظهور درجات حرارة عالية. لذلك، يمكن أن نستنتج أن الظروف المناخية السلبية للعوامل المذكورة يمكن أن تؤثر على تعداد آفات الفلفل خلال هذه الدراسة.