ECOLOGICAL STUDIES ON SOME APHID SPECIES ATTACKING COWPEA PLANTS AT MANSOURA DISTRICT

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ABSTRACT

Experiments were carried out at the farm of the Agriculture Research Center of the Faculty of Agriculture, Mansoura University during the two successive seasons 2011 and 2012 to investigate some ecological aspects such as seasonal abundance; effect of some weather factors and the annual generation of certain aphid species infesting cowpea plants at Mansoura district.

The obtained results recorded three aphid species attacking cowpea plants. These species namely: *Aphis cracivora* (Koch.), *Aphis gossypii* (Glov.) and *Myzus persicae* (Sulz.).

The data revealed that, *A. craccivora* individuals began to appear on the plants on the first week of April and the population fluctuated to reach a maximum on the first week of August in the first season 2011 and in last week of July in the second season 2012. The population density of this insect decreased gradually until the end of October during the two seasons of investigation.

The results indicated that, *A. gossypii* began to appear on cowpea plants in the beginning of April, there after the population fluctuated to reach its maximum in the second week of August during the two seasons of study, then decreased gradually until the end week of October.

The obtained results revealed that, *M. persicae* individuals began to appeared on cowpea plants on the first week of April, there after the population fluctuated to reach its maximum in the third week of July in the first season 2011 and in first week of August in the second season 2012, respectively. Then the population density decreased gradually until the end of October during the two seasons of study. The effect of the temperature and relative humidity on the population density of the three aphid species infesting cowpea plants revealed that the combined effect of these factors exerted positive significant correlation in the two seasons of the study. The results cleared that the temperature and relative humidity effecting greatly on the population density of these aphid species.

Keyword: *Aphis craccivora; Apis gossypii; Myzus persicae;* Ecology; Weather factors.

INTRODUCTION

The vegetable cowpea crop is consider as a very important crop from either, the fresh consumption or food processing point of view. It is well known that insects especially piercing-sucking species cause yield losses in cowpea crop as well as other vegetable crops(Angayarkanni and Nadarajan, 2008).

Aphis craccivora Koch. *Aphis gossypii*(Glov.) and *Myzus persicae* (Sulz.)(Homoptera: Aphididae) are the main aphid species attacking cowpea plants. Aphids feed by sucking up plant juices and at the same time, inject saliva into the host. Light infestations are usually not harmful to plants, but higher aphid infestations may result in leaf curl, wilting, stunting of shoot

growth and delay in production of flowers and fruit, as well as a general decline in plant vigor. Some aphid are also important vectors of plant diseases, transmitting pathogens in the feeding process. Numerous authors in different parts of the world recorded certain aphid species infesting cowpea plants (Shlyakhovoi and Bobnih, 1975; Hmid *et al.*, 1977; Buxton *et al.*,2005; Munyuli *et al.*, 2006; Brosius *et al.*, 2007 and Huesing *et al.*, 2012).

Several investigator in different parts of the world studied the population density and the effect of some weather factors on some aphid species attacking certain vegetables crops(Nonita *et al.*, 2007 and Huesing *et al.*, 2012).Therefore the present investigation aimed to study the population density of some aphid species infesting cowpea plants and the effect of certain weather factors on these insect pests.

MATERIALS AND METHODS

The experiments were carried out at the farm of the Agriculture Research Center of the Faculty of Agriculture, Mansoura University during the two successive seasons 2011 and 2012, to investigate some ecological aspects such as seasonal abundance, effect of some weather factors and the annual generation of some aphid species insects infesting cowpea plants at Mansoura district. The cowpea variety was Giza 3. An area of about ¼ feddan was used for this study. The plants received the normal agricultural practices without insecticidal treatments. Two sampling method were used for recorded the aphid species:

A. Sweep net:

For estimating the seasonal abundance , effect of some weather factors of certain aphid species insects infesting cowpea plants.The area was divided to five longitudinal plots. Weakly randomized samples were taken by an sweep net of regular size. The first samples were taken on the first week of April and the last sample was secured on the end of October in the two seasons, respectively. The samples were obtained on particular day, weakly, one at 10 a.m and the other at 2 p.m Each samples was represented by fifty double strokes with the sweep net from each plot area. Thus 250 double stork were fulfilled in the tested area, and Samples were secured during the two season.

B. Direct count:

From the whole area about one hundred plants were visually examined weakly. Inspection was started from the beginning of vegetative stage and continued through the flowering and fruiting stages of the plants, collected specimens were kept in paper bags and transferred to the laboratory for identification. The collected insects from each fifty double strokes were placed in a plastic sac immediately anesthetized by ether and then transferred to the laboratory for identification and counting. The weekly catch of each species was recorded. The number of annual generation of some were estimated from mean number data that catched throughout two successive seasons. Each season extended from the time at which the

maximum mean number of catched has been attained could be representing as a peak for a generation.

Statistical analysis:

Data were analyzed by the analysis variance (ANOVA) and Duncan multiple range.

RESULTS AND DISCUSSION

1.Population density of some aphid species attacking cowpea plants:

1- *Aphis craccivora*

Data illustrated in (Figure1) revealed that the population densities of the common aphid species *A. craccivora* in cowpea plants during the two seasons of study 2011 and 2012. *A. craccivora* nymphs and adults began to appear on the plants on 1st week of April with an average number of two individuals in 2011 and 2012 , respectively. There after the population fluctuated to reach a maximum of 560 individuals in the first week of August in the first season and 296 in the last week of July in the second season of study. Then the population density of *A. craccivora* decreased gradually until the end of October during the two seasons of study. These results are in practical agreements with these of Mathew, *et al.*(1972) and Ali and Risk (1980) in Egypt found that *A. craccivora* is the key pest infesting broad bean in the new valley.
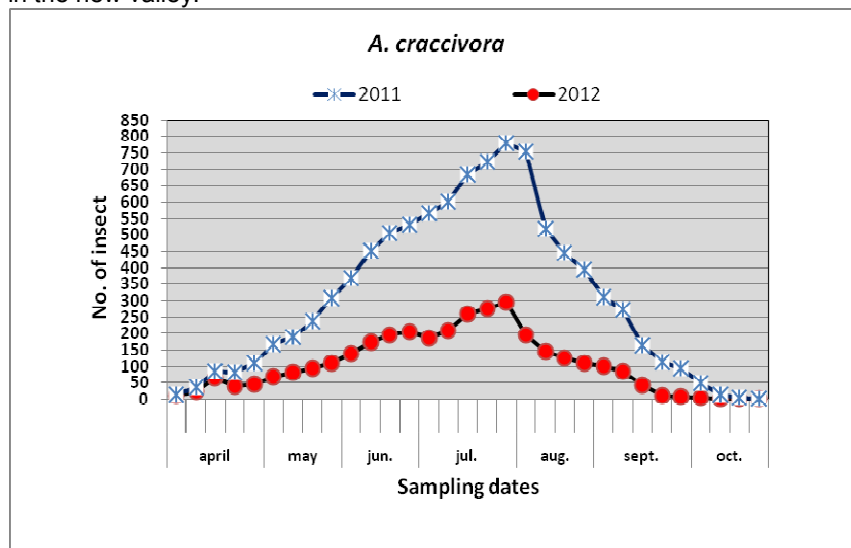

Figure (1): Population density of *A. craccivora* in cowpea fields during the two seasons 2011 and 2012 at Mansoura district.

2- *Aphis gossypii*

Data presented in (Figure 2) showed that the population densities of *A. gossypii* in cowpea plantation during the two seasons of study 2011 and

2012. The *A. gossypii* nymphs and aptera began to appear on the plants on 1st of April with an average of six individuals in 2011 and one individuals in 2012 respectively. There after the population fluctuated to reach a maximum of 578 individuals in the second week of August in first season and 396 in the second week of August in the second season of study. Then the population density of *A. gossypii* decreased gradually until the end of October during the two seasons of study. These results are in general agreement with the results of Ghanim *et al.* (1988). They reported that the dominant speicies infesting soybean in Mansoura region were *A. gossypii* and *A. craccivora*.
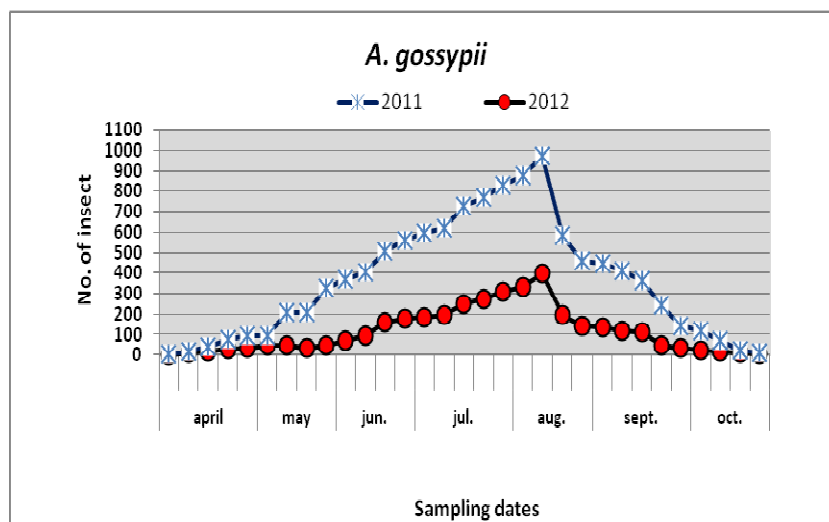

Figure (2): Population density of *A. gossypii* in cowpea fields during the two seasons 2011 and 2012 at Mansoura district.

3- *Myzus persicae*

Data arranged in (Figure 3) cleared that the population densities of the *A. gossypii* in cowpea plantation during the two seasons of study 2011 and 2012. The *M. persicae* nymphs and adults began to appeared on the plants on 1st of April with an average of zero individuals in 2011 and one individuals in 2012 respectively. There after the population fluctuated to reach a maximum of 194 individuals in the third week of July in first season and 380 in the first week of August in the second season of study. Then the population density of *M. persicae* decreased gradually until the end of October during the two seasons of study. Salim *et al.* (1987) in Egypt, mentioned that *A. cracivora* and *M. presicae* population showed only one peak for each of them on cowpea plants.
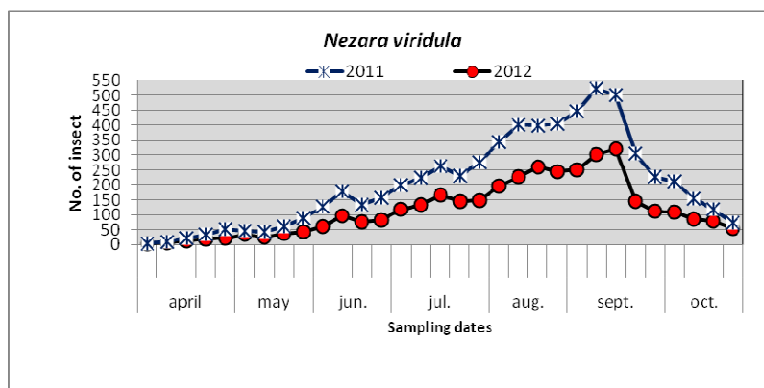
Figure (3): Population density of *M. persicae* in cowpea fields during the two seasons 2011 and 2012 at Mansoura district.

2. Evaluating the effect of some weather factors on the population density of certain aphid speicies infesting cowpea plants:

1- *A. craccivora:*

Data given in (Table 1 and 2) showed that the simple correlation coefficients values between the temperature, relative humidity and the weekly catch of *A. craccivora* during the two seasons of study (2011 and 2012). The results in this table revealed that both temperature and relative humidity exerted positive and negative effect varying from slight to significant on the population density of *A. craccivora*. The temperature parameters indicated highly significant positive in 2011and 2012. While the relative humidity parameters revealed that the maximum relative had non significant negative correlation during the two seasons of study. The minimum and the mean relative humidity had significant and highly negative significant on the population density of *A. craccivora* during the period of investigation. The obtained results cleared that temperature and relative humidity affected greatly on the population density of *A. craccivora.* This is in complete agreement with the results of El-Serafi (1991) and El-Mashaly (2013). She reported that compined effet of temperature and relative humidity are the major factors affecting the activity of *A. craccivora.*

2- *A. gossypii*:

The obtained results in (Table 1 and 2) revealed that the simple correlation coefficients values between the temperature, relative humidity and the weekly catch of *A. gossypii* during the two seasons of study (2011 and 2012). The results in this table revealed that both temperature and relative humidity exerted positive and negative effect varying from slight to significant on the population density of *A. gossypii*. The temperature parameters showed highly significant positive in 2011 and 2012. While the relative humidity parameters revealed that the maximum relative had significant negative correlation in 2011 and non significant negative correlation in 2012 .The minimum and the mean relative humidity had highly negative significant in 2011and non significant negative in 2012 on the population density of *A. gossypii* during the period of investigation. The obtained results cleared that

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temperature and relative humidity affected greatly on the population density of *A. gossypii.* These results are in agreement with the results of El-serafi (1991) and El-Mashaly (2013).

3- *M. persicae*

Data presented in (Table 1 and 2) cleared that the simple correlation coefficients values between the temperature, relative humidity and the weekly catch of *M. persicae* during the two seasons of study (2011and 2012). The results in this table revealed that both temperature and relative humidity exerted positive and negative effect varying from slight to significant on the population density of *M. persicae* . The temperature parameters showed highly significant positive in 2011 and 2012. While the relative humidity parameters revealed that the maximum relative had non significant negative correlation during the two seasons of study. The minimum and the mean relative humidity had significant and highly negative significant on the population density of *M. persicae* during the period of investigation. The obtained results cleared that temperature and relative humidity affected greatly on the population density of *M. persicae* .

Table (1). Simple correlation coefficient between the population density of some aphid species and the temperature and relative humidity components in season 2011 at Mansoura district.

Weather factors	Temperature			Relative humidity		
Aphid Species 2011	Max.	Min.	Average	Max.	Min.	Average
A. craccivora	0.78495502 ***	0.77973065 ***	0.718757 ***	-0.35236 ns	-0.45147 *	-0.56099 **
A. gossypii	0.82640685 ***	0.83454432 ***	0.7989956 ***	-0.40599 *	-0.5330 **	-0.64729 ***
M. pericae	0.72965465 ***	0.74346449 ***	0.62927052 ***	-0.343607 ns	-0.389846 *	-0.490484 **

ns = in significant * = significant with varied degree where r = correlation coefficient   p = probability   s = significant sign.

Table (2). Simple correlation coefficient between the population density of some aphid species and the temperature and relative humidity components in season 2012 at Mansoura district.

Weather factors Insect Species 2012	Temperature			Relative humidity		
	Max.	Min.	Average	Max.	Min.	Average
A. craccivora	0.81029369 ***	0.80590612 ***	0.81520997 ***	-0.1691594 ns	-0.522420 **	-0.5064436 **
A. gossypii	0.84290450 ***	0.91584760 ***	0.88555920 ***	-0.0147146 ns	-0.2547642 ns	-0.2329146 ns
M. pericae	0.85236977 ***	0.82228415 ***	0.84523151 ***	-0.218200 ns	-0.587971 ***	-0.575098 ***

ns = in significant * = significant with varied degree where r = correlation coefficient
p = probability   s = significant sign.

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دراسات ايكولوجية علي بعض أنواع المن التي تهاجم نباتات اللوبيا في منطقة المنصورة

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أجريت التجارب في مزرعة مركز البحوث الزراعية بكلية الزراعة، جامعة المنصورة خلال موسميين متتاليين ٢٠١١ و ٢٠١٢، لدراسة بعض الجوانب البيئية مثل الوفرة الموسمية, تأثير بعض العوامل الجوية و الأجيال السنوية لأنواع المن التي تصيب نباتات اللوبيا في منطقة المنصورة .النتائج التي تم الحصول عليها سجلت ثلاثة أنواع من المن التي تهاجم نباتات اللوبيا. هذه الأنواع هي *Aphis craccivora* (Koch.)و *Aphis gossypii* و *Myzus persicae*. و أوضحت النتائج التي سجلت أن *Aphis craccivora* بدأ في لظهور على النباتات في الأسبوع الأول من ابريل ووصلت الكثافة العددية إلى الحد الأقصى له في الموسم الأول في الأسبوع الأول من أغسطس وفي الأسبوع الأخير من يوليو في الموسم الثاني. ثم انخفضت الكثافة العددية لهذه الحشرة تدريجيا حتى نهاية أكتوبر خلال الموسمين. أشارت النتائج إلى أن *Aphis gossypii* يظهر على نبات اللوبيا في الأول من أبريل، بعد ذلك زادت التعداد ثم وصلت إلى الحد الأقصى في الأسبوع الثاني من أغسطس خلال الموسمين من الدراسة، ثم انخفضت تدريجيا حتى نهاية الأسبوع أكتوبر .

كما أوضحت النتائج أن *Myzus persicae* بدأ في الظهور على نبات اللوبيا خلال الأسبوع الأول من شهر إبريل، هناك بعد ذلك زادت التعدادات للوصول إلى الحد الأقصى في الأسبوع الثالث من يوليو في الموسم الأول، وفي الأسبوع الأول من أغسطس في الموسم الثاني على التوالي .ثم انخفض التعداد تدريجيا حتى نهاية أكتوبر خلال الموسمين من الدراسة .كشفت نتائج دراسة تأثير درجة الحرارة والرطوبة النسبية على الكثافة العددية لثلاث أنواع المن التي تصيب نبات اللوبيا أن التأثير المشترك لهذه العوامل أن هناك علاقة ارتباط عالي المعنوية موجب في موسمي الدراسة .أكدت النتائج أن درجة الحرارة والرطوبة النسبية أثرت بشكل كبير على كثافة العددية لأنواع المن مجال الدراسة.