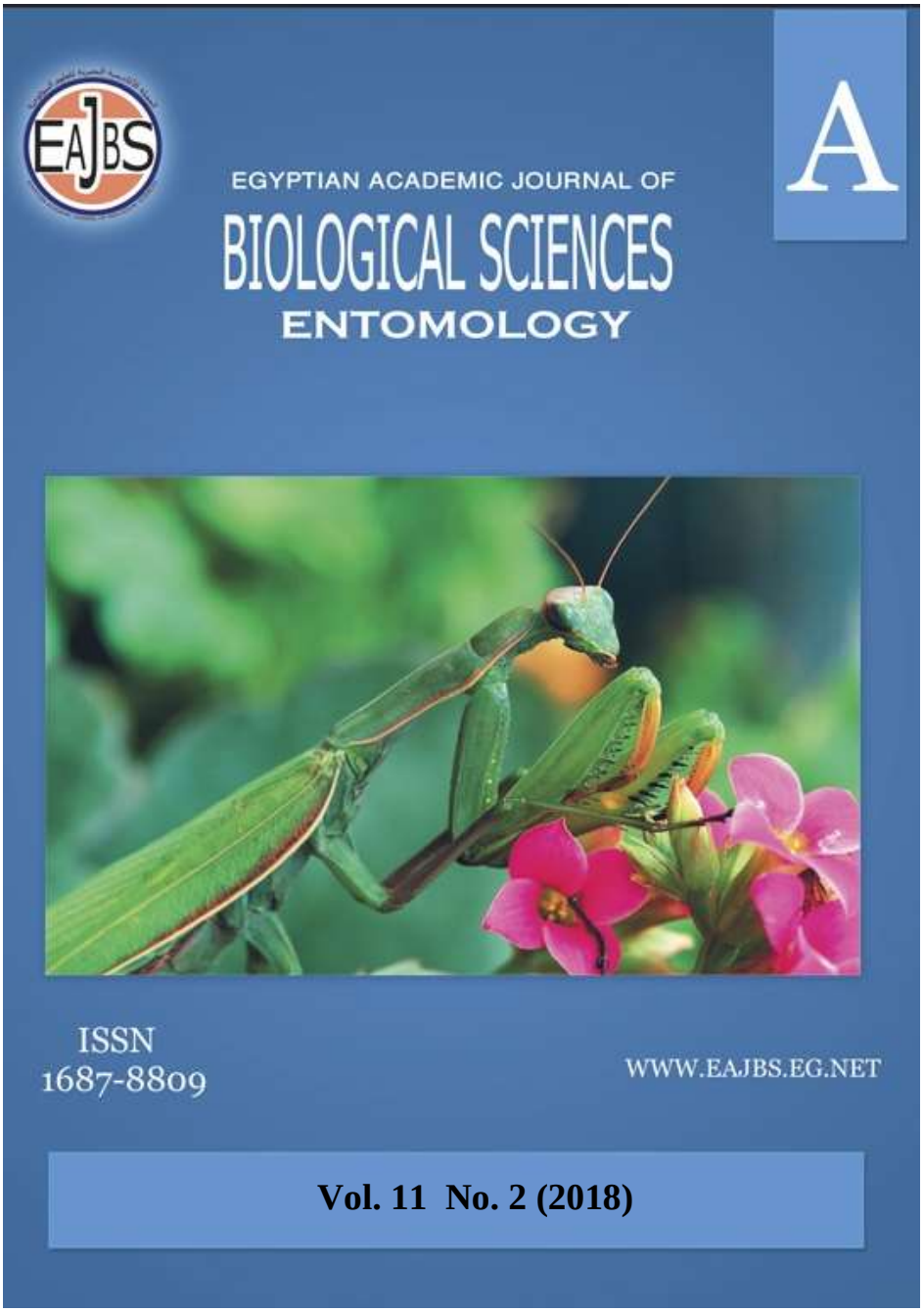

Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.
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www.eajbs.eg.net

Citation: *Egypt. Acad. J. Biolog. Sci. (A. Entomology) Vol. 11(2)pp: 101- 111(2018)*

Egypt. Acad. J. Biolog. Sci., 11(2): 101–111 (2018)

Egyptian Academic Journal of Biological Sciences
A.Entomology

ISSN 1687- 8809
www.eajbs.eg.net

Effect of Certain Weather Factors and Some Natural Enemies on The Population Densities of Four Piercing-Sucking Insects on The Cotton Crop at Kafr El-Sheikh Governorate

Somaa, H.M.H.; Khalil, A.E.H. and El-Sarand, E.A.
Plant Protection Research Institute, Agric. Res. Center, Giza, Egypt

ARTICLE INFO
Article History
Received: 5/3/2018
Accepted: 6/4/2018

Keywords:
weather factors, natural enemies ,population densities, piercing-sucking pests, Kafr El-Sheikh Governorate

ABSTRACT

The effect of prevailing weather factors (mean daily of temperature, relative humidity and wind speed) and some natural enemies (six insect predators were recorded; *Coccinella undecimpunctata*, L.; *Scymnus interruptus* Goez.; *Paederus alfierii* Koch, *Syrphus* spp., *Orius* spp. and *Chrysoperlla carnea* (Steph.) on the population densities of the cotton aphid (*Aphis gossypii* Glover), whitefly (*Bemisia tabaci* (Genn.), Jassids (*Empoasca* spp.) and green stink bug (*Nezara viridula* (L.)), during 2016 to 2017 cotton growing seasons was studied at the Farm of Sakha Agricultural Research Station, Kafr El-Sheikh Governorate. Results revealed that:

1. The initial infestation cotton aphid on cotton plants appeared in the second week of July of 2016 and 2017 seasons (12th and 11th of July of the two seasons, respectively) and had three peaks of population activity of both seasons of the long period of 12th of July till the 20th of September of the first season, and 11th of July till the 26th of September of the second season. The aphid population density was affected positive significantly (0.498*) in the first season and unsignificantly (0.310) in the second season by the temperature. Whereas, the relative humidity was affected positive unsignificantly in both seasons (0.375 and 0.320), respectively, but the effect by the wind speed was negative and highly significant in the two seasons 2016 and 2017 (-0.582** and 0.710**), respectively. The effect by the insect predators on the population density of *A. gossypii* were positive and highly significant correlations recorded in both seasons were (0.587** and 0.620**), respectively.
2. The cotton whitefly began to appear on cotton leaves at 28th of June of both seasons and had four peaks of population activity of both seasons, of the long period of 28th of June till the 4th of October in the first season and 28th of June till the end of the second season (24th of October). The whitefly population density was affected positive highly significant (0.727**) in the first season, and unsignificantly (0.383) in the second season by the temperature. Whereas, the relative humidity was affected positive unsignificantly (0.378) in the first season and significant (0.490*) in the second season, but the affected by the wind speed was unsignificantly positive and negative (0.090 and -0.280) in the

2016 and 2017 seasons, respectively. The effect by the insect predators on the population density of *B. tabaci* were positive and significant correlations recorded in both seasons were (0.505* and 0.470*), respectively.

3. The cotton jassids began to appear on cotton leaves at 30th of May and 6th of June in the two seasons, respectively, and had five peaks of population activity in 2016 season of the long period of 30th of May till the 27th of September and six peaks in 2017 season of the long period of 6th of June till the end of the season (24th of October). The relationship between the temperature and the population density of this insect was positive and highly significant (0.713**) in the first season, and unsignificant (0.420) in the second season. So, the effect by the relative humidity on the population density of jassids was positive and unsignificant (0.221 and 0.400) in both seasons, respectively. While, the wind speed was positively insignificantly and negatively significantly (0.298 and -0.490*) with insect numbers in 2016 and 2017 seasons, respectively. While the effect by the insect predators on the population density of *Empoasca* spp. were positive and significant correlations recorded in both seasons were (0.485* and 0.510*), respectively.
4. The green stink bug began to appear on cotton leaves at 14th and 13th of June in the 2016 and 2017 seasons, respectively, and had three peaks of both seasons of the long period of 14th of June till 18th of October in the first season and 13th of June till 17th of October of the second season. The population density of this insect on cotton plants was affected negatively and unsignificantly (-0.086 and 0.180) in both seasons by the temperature, respectively. But, the relative humidity had unsignificantly positive and negative (0.021 and -0.060) in both seasons, respectively. While, the effect of the wind speed was negative and unsignificantly (-0.237 and -0.080) in both seasons, respectively. The population density of *N. viridula* on cotton plants was affected by the insect predators were positive and significant correlations recorded in both seasons were (0.515* and 0.499*), respectively. Study the effect of abiotic and naturally occurring biotic factors on seasonal population fluctuations of insect pests, this factors to played the main factor in the evolution and distribution of this insect pest.

INTRODUCTION

Insect pests one of the major limiting factors in cotton production. Cotton plants are subjected to attack by a wide range of insect pests throughout growing stages until near maturity. Among the main insect pests are piercing-sucking pests. These pests are deleterious during early season of the cotton plants growth and development. Aphids, *A. gossypii*, whitefly, *B. tabaci*, Jassids, *Empoasca* spp. And green stink bug, *N. viridula*. In addition to sucking the sap of plant tissues, virus diseases, transmitted by some of sucking insects, may increase the severity of the injury and reduce the yield (Buttler *et al*., 1986; Andrews and Kitten, 1989; Harris *et al*., 1992 and El-Mezayyen, 2004). The most serious damage to cotton is a result of honey dew excreted by certain sucking insects which makes the lint sticky, resulting in difficulties in the ginning and spinning process (Perkins, 1987; Anonymous, 1989 and Hassanein *et al*., 1995). Chemical control of these insects is expensive and environmentally disruptive and largely ineffective. The information about the

behavior and abundance of the piercing- sucking pests on cotton as affected by changes in the environmental weather factors and natural enemies are required to facilitate the prediction of their population density which may help to reduce the amount of the used insecticides for their control. The relationship between the infestation by piercing sucking pests and certain weather factors and natural enemies was studied by (Ali and Ewiess, 1977; Hassanein *et al*., 1995; Khattab, 2003; El-Mezayyen *et al*., 2006; Hanumantharaya *et al*., 2008 and Hans *et al*., 2015). This study aimed to evaluate the effect of three prevailing weather factors (mean daily of temperature, relative humidity and wind speed) and some natural enemies (six insect predators) on the population density of the four piercing- sucking pests during the two successive cotton growing seasons, 2016 and 2017.

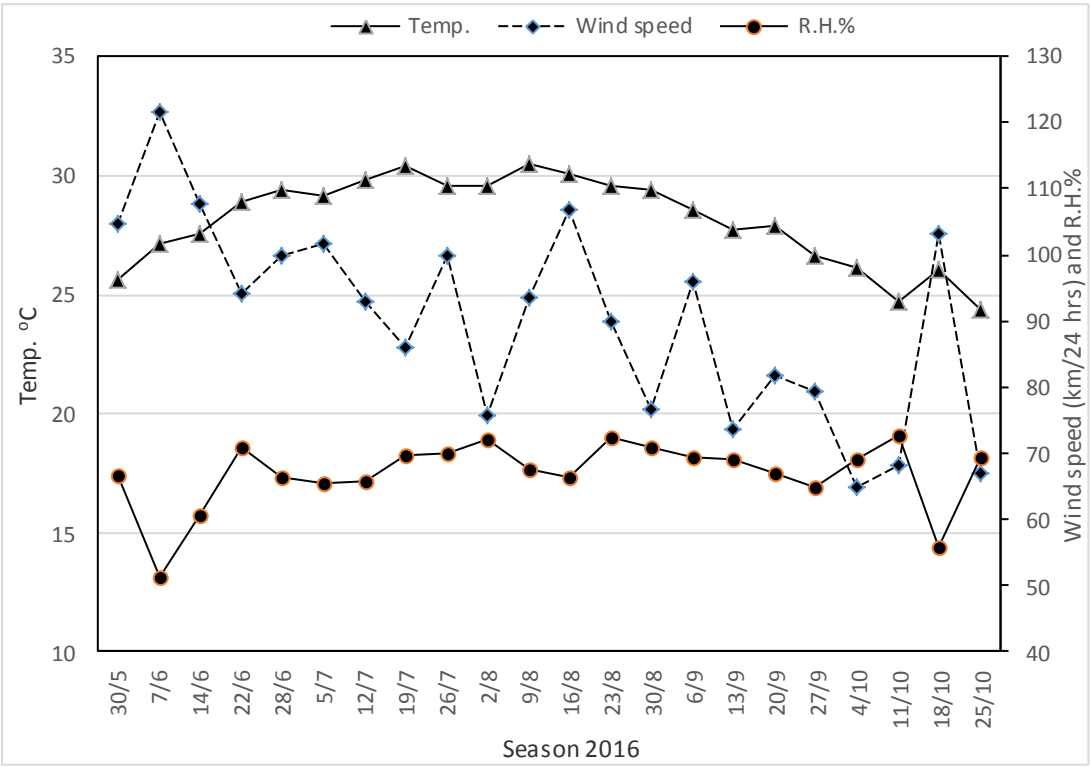
MATERIALS AND METHODS

This experiment was conducted at Sakha Agricultural Research Station, Kafr El-Sheikh Governorate, north Delta during the two successive seasons 2016 and 2017. In order to study the population density of the piercing-sucking insects (four pests), aphid, *A. gossypii* (adults and nymphs), whitefly, *B. tabaci* (adults), jassids, *Empoasca* spp. (adults and nymphs) and green stink bug, *N. viridula* (adults and nymphs) and six insect predators were recorded, *C. undecimpunctata* (adults and larvae), *S. interruptus* (adults and larvae), *P. alfierii* (adults and larvae), *Syrphus* spp. (larvae), *Orius* spp. (adults and nymphs) and *C. carnea* (larvae). Plot size measured 42 m^2 (1/100 feddan) with four replicates was cultivated with Giza 88 cotton variety on 15 and 25 March in both 2016 and 2017 seasons, respectively. All agricultural practices were followed in due time and no pesticidal treatments were applied. To determine the population density of above four piercing -sucking insects and the six insect predators were estimated by counting the total numbers of pests and predators on 25 seedlings early in the cotton season and both surfaces of 25 leaves on the plants (one leaf per plant)/replicate, at early morning. Three weeks after sowing and continued at weekly intervals till harvest, these leaves were random from different levels of plant height. For studying the effect of certain ecological weather factors such as temperature, atmospheric relative humidity and wind speed on the population density of the four insect pests. The daily means of the three factors were provided by the Ministry of Agriculture, Agric. Res. Center, Rice Res. Training Center, during the whole period of the two tested seasons of 2016 and 2017. The statistical analysis was conducted using the software programme MSTATC to show the effect of each factor as well as the interactions on the population density of the studied pests.

RESULTS AND DISCUSSION

1. The cotton aphid, *Aphis gossypii* Glover:

The data illustrated in Figures, (1 and 2) indicate that the initial infestation of cotton plants with *A. gossypii* (adults and nymphs) appeared in the second week of July of 2016 and 2017 seasons (12^{th} and 11^{th} of July of the two seasons, respectively). This insect appeared the three peaks of numbers of the long period of 12^{th} of July till the 20^{th} of September of 2016 season and 11^{th} of July till the 26^{th} of September of 2017 season.



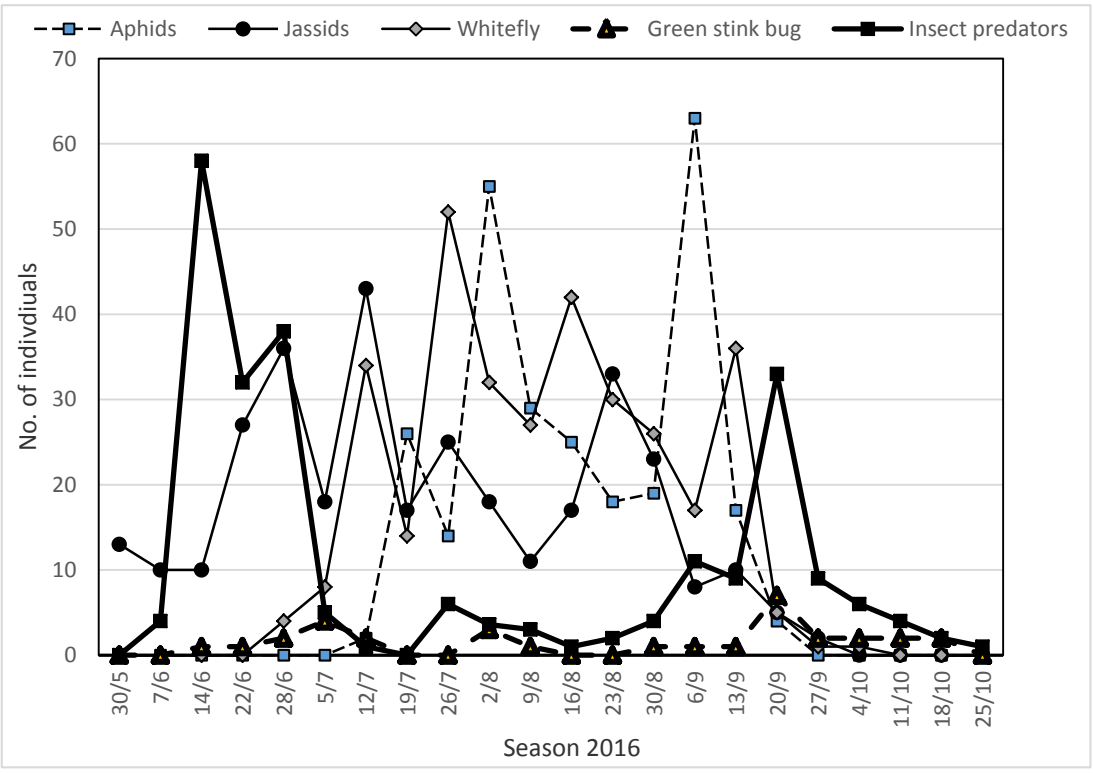


Fig. (1): The population density of the aphid, jassids, whitefly, green stink bug and insect predators and means of three weather factors during 2016 season.

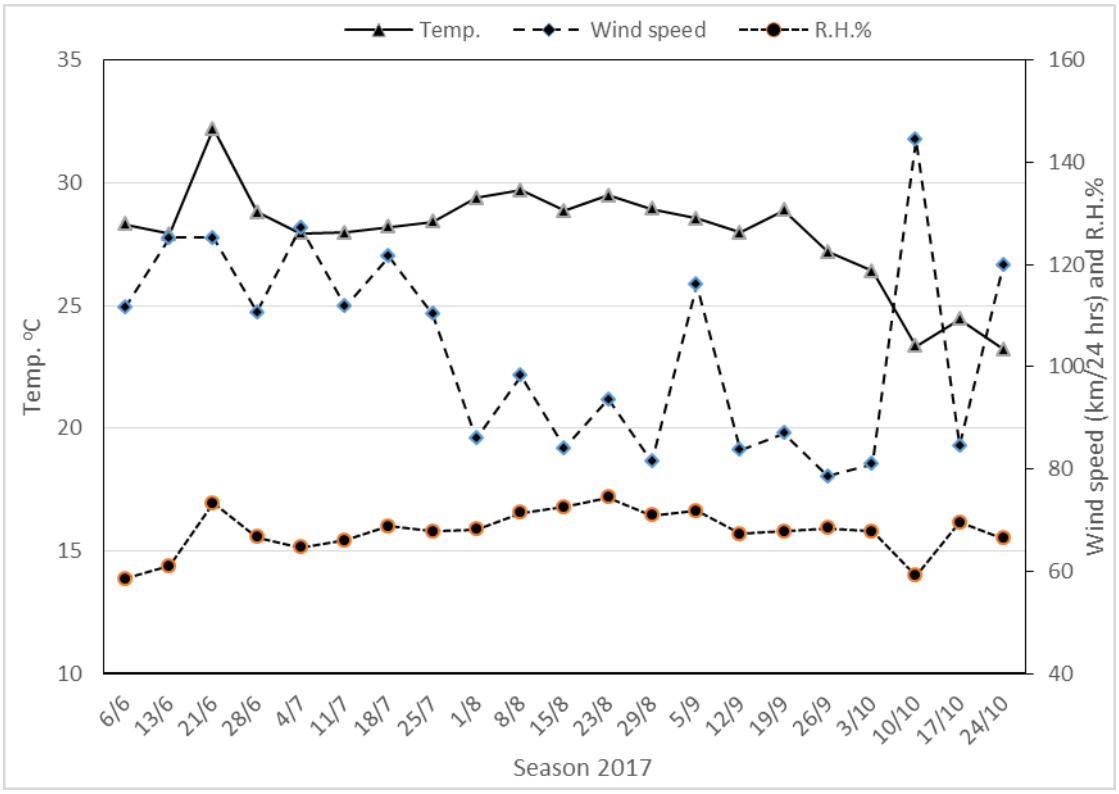


Fig. (2): The population density of the aphid, jassids, whitefly, green stink bug and insect predators and means of three weather factors during 2017 season.

In the first season, the first peak was the weakest showing the mean number of 26 aphids/25 leaves and occurred on the 19th of July at means of (30.43°C, 69.71%

R.H. and 86.14 km/24 hrs). The second peak (55 aphids/25 leaves) was recorded on the 2nd of August at means of (29.60°C, 72.14 R.H. and 75.86 km/24 hrs). The third peak was the highest (63 aphids/25 leaves) and was recorded on the 6th of September at means of (28.59°C, 69.29 % R.H. and 95.86 km/24 hrs). In the second season, three peaks of 43, 103 and 15 aphids/25 leaves were detected on the 18th of July, 8th of August and 12th of September at means of (28.20, 29.69 and 27.96°C), (68.79, 71.50 and 67.29% R.H.) and (121.57%, 98.29 and 83.71 km/24 hrs), respectively. Similar results were obtained by Hassanein *et al*. (1995). Table (1) show the population density of *A. gossypii* as relatively higher in the second season (13.19 aphids/25 leaves) than that in the first season (12.36 aphids/25 leaves). Regarding the effect of the three tested weather factors (temperature, relative humidity and wind speed) on the building of *A. gossypii* population, the results presented in Table (2) clearly show that the aphid population density was affected positive significantly (0.498*) in the first season and unsignificantly (0.310) in the second season by the temperature, whereas the relative humidity was affected positive unsignificantly in the first and second seasons (0.375 and 0.320), respectively, but the effect by wind speed was negatively highly significantly in the two seasons (2016 and 2017) were (-0.582** and -0.710**), respectively. These results agreed with Hassanein *et al*. (1995); El-Mezayyen (2004) and Gosalwad *et al*. (2009) for the effect by the three factors on the population density of aphids. The data presented in Table (3) reveal that the effect by insect predators (*Coccinella undecimpunctata* L.; *Scymnus interruptus* Goez., *Paederus alfierii* Koch, *Syrphus* spp., *Orius* spp. And *Chrysoperlla carnea* (Steph.) on the population density of *A. gossypii* were positive and highly significant correlations recorded in both seasons (2016 and 2017) were (0.587** and 0.620**), respectively. Lu, Yanhui *et al*. (2012), they found the arthropod predators (ladybirds, lacewings and spiders to decreased abundance of aphid pests. So, the above results agreed with Abo-Sholoa (2001), El-Mezayyen *et al*. (2006), Hanumantharaya *et al*. (2008) and Gosalwad *et al*. (2009).

Table (1):Means of certain pests and some insect predators on cotton plants and some weather factors during 2016 and 2017 seasons at Kafr El-Sheikh governorate.

Pests, predators and weather factors	**Season 2016**	**Season 2017**
Average number/25 leaves		
Aphis gossypii	12.36	13.19
Bemisia tabaci	14.96	9.33
Empoasca spp.	14.82	9.37
Nezara viridula	1.46	1.14
Insect predators	10.61	13.38
Mean of some weather factors		
Temperature °C	28.14	27.92
Relative humidity %	66.98	67.75
Wind speed km/24 hrs	90.28	103.95

2.The cotton whitefly, *Bemisia tabaci* (Genn.):

Figures (1 and 2) show the seasonal population fluctuations of the whitefly (adults) occurring on cotton plants in 2016 and 2017 seasons. During both seasons, the insect began to appear on cotton leaves in relatively low mean numbers of 4 and 3 insects per 25 leaves on the 28th of June of both seasons, at means of (29.37°C, 66.29% R.H. and 99.86 km/24 hrs) and (28.80°C, 66.64 % R.H. and 110.71 km/24 hrs), respectively. During 2016 season, after the insect first appearance, its population slightly fluctuated to reach the first weakest peak (34 insects/25 leaves), which occurred on 12th of July at means of (29.79°C, 65.86% R.H. and 93.00 km/24

hrs). This highest second peak with a mean number of (52 insects/25 leaves) on the 26th of July at means of (29.57°C, 70.00% R.H. and 100.00 km/24 hrs.) Afterward, the third and fourth peaks with the mean number of (42 and 36 insects/25 leaves) on the 16th of August and 13th of September at means of (30.11°C, 66.43% R.H. and 106.86 km/24 hrs) and (27.76°C, 69.00% R.H. and 73.71 km/24 hrs), respectively. The insect decreased in the number of disappearing completely on the 11th of October. In the second season of 2017, the cotton plants were attacked by the whitefly throughout the period on the 28th of June to 24th of October. During this period of activity, the insect had four peaks of abundance, the first peak with a mean number of (19 insects/25 leaves), which occurred on 11th of July at means of (27.97°C, 66.08% R.H and 111.86 km/24 hrs). The highest second peak with a mean number of (31 insects/25 leaves) has occurred on the 1st of August at means of (29.39°C, 68.14% and 86.00 km/24 hrs). The third and fourth peaks with mean numbers of (30 and 15 insects/25 leaves), respectively. They occurred on the 15th and 5th of August and September, respectively. The corresponding means of temperature, atmospheric relative humidity and wind speed were (28.85, 28.56°C, 72.58, 71.79% R.H. and 84.13, 116.14 km/24 hrs). From the present results in Table (1), it is obvious that the occurrence and rate of cotton infestation with the whitefly insects in the first season (14.96 insects/25 leaves) were higher than in the second season (9.33 insects/25 leaves). These results agreed with Hassanein *et al*. (1995). As clearly shown in Table (2), the whitefly population density on cotton plants was affected differently by the changes of the three weather factors. Moreover, this effect was not contrasted from one season to another. The insect number was correlated very significantly and insignificantly with temperature showing the positive relationship (0.727** and 0.383) in the 2016 and 2017 seasons, respectively. Relative humidity had the positive effect on the insect population in both seasons, is insignificant in the first season only (0.378), significant (0.490*) in the second season. The effect by the wind speed was insignificantly in both seasons showing the positive and negative relationship (0.090 and -0.280) in both seasons, respectively.

Table (2): Analysis of variance for all traits in 2016 and 2017 seasons

S.O.V.	d.f	*Aphis gossypii*	*Bemisia tabaci*	*Empoasca* spp.	*Nezara viridula*	Insect predators	Temp. °C	R.H. %	Wind speed (km/24 hrs)
2016 season									
Rep.	2	55.81**	18.31	43.68	6.31**	127.65	18.18**	12.92	22.00**
Reading date	21	994.72**	822.99**	456.46**	8.77**	708.40	10.18**	82.00**	694.621**
Error	42	8.39	7.93	12.15	0.842	74.90	0.182	25.21	0.001
2017 season									
Rep.	2	45.19	2.71	1.15	2.28*	16.33	21.20**	17.19**	20.77**
Reading date	20	2170.98**	311.8**	170.63**	4.88**	497.54**	13.29	54.91	1143.81**
Error	40	30.24	4.61	8.89	0.58	6.08	0.001	0.19	0.001

*, ** significant at 0.05 and 0.01 levels of probability, respectively

These results agreed with Hassanein *et al*. (1995), Singh *et al*. (2007), Dhaka and Pareek (2008) and Gosalwad *et al*. (2009). As clearly shown in Table (3), the whitefly population density on cotton plants was affected by the insect predators were positive and significant correlations recorded in both seasons (2016 and 2017) were (0.505* and 0.470*), respectively. These results agreed with Abo Sholoa (2001), El-Mezayyen *et al*. (2006), Hanumantharaya *et al*. (2008) and Gosalwad *et al*. (2009).

Table (3): Simple correlation coefficient (R) between four traits and four traits for 2016 and 2017 seasons**.**

R	*Aphis gossypii*		*Bemisia tabaci*		*Empoasca* spp.		*Nezara viridula*	
	2016	2017	2016	2017	2016	2017	2016	2017
Insect predators	0.587**	0.620**	0.505*	0.470*	0.485*	0.510*	0.515*	0.499*
Temp.	0.498*	0.310	0.727**	0.383	0.713**	0.420	-0.086	-0.180
R.H.	0.375	0.320	0.378	0.490*	0.221	0.400	0.021	-0.060
Wind speed	-0.582**	-0.710**	0.090	-0.280	0.298	-0.490*	-0.237	-0.080

3.The cotton leaf hoppers, *Empoasca* spp.

The data illustrated in Figuers (1 and 2) show that, the initial infestation of cotton plants with *Empoasca* spp. Appeared in mean numbers of (13 and 2 insects/25 leaves) on the 30th of May and 6th of June in the two seasons (2016 and 2017), respectively. Afterward, the insect population fluctuated to indicate five of activity in 2016 season of the long period of 30th of May till the 27th of September and six peaks in 2017 season of the long period of 6th of June till the end of the season (24th of October). The peaks of the first season can be arranged in a descending order according to the size of their population as follows: 1st, 2nd, 3rd, 4th and 5th (36, 43, 25, 33 and 10 insects/25 leaves) at means of (29.37, 29.79, 29.57, 29.59 and 27.76^{o}C; 66.29, 65.86, 70.00, 72.50 and 69.00% R.H. and 99.86, 93.00, 100.00, 90.00 and 73.71 km/24 hrs), that occurred on 28th of June, 12th of July, 26th of July, 23rd of August and 13th of September, respectively. In the second season, the level of abundance ranged between (8 insects/25 leaves) (1st and 2nd peaks) and (33 insects/25 leaves) (3rd peak) at means of (32.20, 27.97, 29.39^{o}C; 73.29, 66.08, 68.14% R.H and 125.29, 111.86, 86.00 km/24 hrs), respectively. The lowest level occurred on the 21st of June and 11th of July, whereas the highest one was detected on 1st of August. While the 4th, 5th and 6th peaks (20, 17 and 13 insects/25 leaves), at means of (28.85, 28.95, 28.90^{o}C; 72.58, 71.00, 67.79% R.H. and 84.13, 81.43, 87.00 km/24 hrs), that occurred on 15th and 29th of August and 19th of September, respectively. Hassanein *et al*. (1995) found six peaks of activity in 1992 season and eight peaks in 1993 season for the jassid population density on cotton plants.

The results are given in Table (1) clearly reveal that the population density of this insect in the first season (14.82 jassids/25 leaves) was higher than that recorded in the second season (9.37 jassids/25 leaves). With regard to the sensitivity of *Empoasca* spp. to the changes in the three climatic factors, the data are given in Table (3) show the relationship between the temperature and population density of jassids was positive and highly significant in the first season (0.713**), and not significant in the second season (0.420). So, the effect of relative humidity on the population density of this insect was positive and not significant in both seasons 2016 and 2017 (0.221 and 0.400), respectively. The wind speed was positively insignificantly and negatively significantly correlated with insect numbers in 2016 and 2017 seasons were (0.298 and -0.490*), respectively. Different results of effect by above three climatic factors on the population density of this insect by Hassanein *et al*. (1995), Singh *et al*. (2007), Dhaka and Pareek (2008) and Gosalwad *et al*. (2009). In Table (3), the jassids population density on the cotton plant was affected by the insect predators were positive and significant correlations recorded in both seasons (2016 and 2017) were (0.485* and 0.510*), respectively. These results

agreed with Abo-Sholoa (2001), El-Mezayyen *et al*. (2006), Hanumantharaya *et al*. (2008) and Gosalwad *et al*. (2009).

4.**The green stink bug, *Nezara viridula* (L**.):

The results illustrated in figs. (1 and 2) indicate that the *N. viridula* individuals stated to appear on cotton plants on the 14th and 13th of June with mean numbers of (1 and 1) insect/25 leaves at means of (27.57, 27.92°C; 60.79, 61.00% R.H. and 107.86, 125.29 km/24 hrs) in the 2016 and 2017 seasons, respectively, and its found throughout the whole period of the growing of cotton plants in both seasons (till the 18th and 17th of October), respectively. After the insect first appearance, its numbers fluctuated showing three peaks of the first and second seasons, in the first season, the first peak (4 insects/25 leaves), which occurred on 5th of July at means of (29.14°C, 65.51% R.H. and 101.57 km/24 hrs). The weakest second peak with a mean number of (3 insects/25 leaves) on the 2nd of August at means of (29.60°C, 72.14% R.H. and 75.86 km/24 hrs). Afterward, the highest third peak with a mean number of (7 insects/25 leaves) on the 20th of September at means of (27.90°C, 66.86% R.H. and 81.71 km/hr). In the second season of 2017, the insect had three peaks of abundance, the first peak (4 insects/25 leaves) which occurred on 11th of July at means of (27.97°C, 66.08% R.H. and 111.86 km/24 hrs). The weakest second peak with a mean number of (3 insects/25 leaves) on the 29th of August at means of (28.95°C, 71.00% R.H. and 81.43 km/24 hrs). So, the highest third peak with a mean number of (5 insects/25 leaves) on the 3rd of October at means of (26.40°C, 67.76% R.H. and 81.00 km/24 hrs). Also, Khattab (2003) found three peaks of activity for the green stink bug in 2000 and 2001 seasons. From the present results in Table (1), it is obvious that the occurrence and rate of cotton infestation with this insect in the first season (1.46 insects/25 leaves) was higher than in the second season (1.14 insects/25 leaves). As clearly shown in Table (3), the green stink bug population density on cotton plants was affected negatively and insignificantly (-0.086 and -0.180) in both seasons 2016 and 2017 by the temperature, respectively. But, the relative humidity had insignificant positive and negative (0.021 and -0.060) in both seasons, respectively. While, the effect by the wind speed was negative and insignificant (-0.237 and -0.080) in both seasons 2016 and 2017, respectively. These results agreed with Khattab (2003), so, Ali and Ewiess (1977), they found the optimum temperature for the greatest rate of development and survival of immature stages of *N. viridula* was 25°C. The results in Table (3), the green stink bug population density on cotton plants was affected by the insect predators were positive and significant correlations recorded in both seasons (2016 and 2017) were (0.515* and 0.499*), respectively. These results agreed with Khattab (2003). Study the effect of abiotic and naturally occurring biotic factors on seasonal population fluctuations of insect pests, this factors to played a main factors in the evolution and distribution of this insect pests.

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ARABIC SUMMARY

تأثير بعض العوامل الجوية وبعض الأعداء الحيوية على الكثافة العددية لأربعة آفات ثاقبة ماصة على محصول القطن فى محافظة كفرالشيخ ـ مصر

حسن محمد حسن صومع ، عبد الحليم السيد حسين خليل ، السيد أحمد الصرند
معهد بحوث وقاية النباتات ـ مركز البحوث الزراعية ـ الجيزة ـ مصر

تأثير بعض العوامل الجوية (درجة الحرارة ونسبة الرطوبة وسرعة الرياح) وبعض الأعداء الحيوية (ستة مفترسات حشرية وهى أبو العيد ١١ نقطة وحشرة الاسكمنس والحشرة الرواغة وذبابة السرفس وبقة الاوريس وأسد المن) على الكثافة العددية لمن القطن والذبابة البيضاء وجاسيد القطن والبقة الخضراء على محصول القطن وتم تقييمها خلال موسمين ٢٠١٦ ، ٢٠١٧ فى مزرعة محطة البحوث الزراعية بسخا ـ محافظة كفرالشيخ والنتائج كانت كالتالى:

١-ظهرت حشرة من القطن على نباتات القطن فى الاسبوع الثانى من يوليو فى عامى الدراسة (٧/١٢ ، ٧/١١) على التوالى وكان لها ثلاث ذروات للتعداد فى كلا الموسمين خلال الفترة من ٧/١٢ حتى ٩/٢٠ من عام ٢٠١٦ والفترة من ٧/١١ حتى ٩/٢٦ من عام ٢٠١٧م.

- كان تأثر أعداد حشرة من القطن بالتغيرات فى درجات الحرارة موجبا ومعنويا (٠,٤٩٨*) فى الموسم الأول وغير معنوى (٠,٣١٠) فى الموسم الثانى.
- بينما كان هذا التأثير للتغير فى نسبة الرطوبة النسبية موجبا وغير معنوى فى كلا الموسمين (٠,٣٢٠ ، ٠,٣٧٥) فى الموسمين بالترتيب.
- لكن سرعة الرياح كان تأثيرها سالبا وعالية المعنوية (-٠,٥٨٢** ، -٠,٧١٠**) على أعداد حشرة من القطن فى كلا الموسمين بالترتيب.
- وكانت العلاقة موجبة وعالية المعنوية بين الكثافة العددية لحشرة من القطن والمفترسات الحشرية (٠,٦٢٠** ،٠,٥٨٧**) فى كلا الموسمين بالترتيب.

٢-ظهرت حشرة الذبابة البيضاء فى ٦/٢٨ فى كلا الموسمين وكان لها أربع ذروات للتعداد فى كلا الموسمين خلال الفترة من ٦/٢٨ حتى ١٠/٤ فى الموسم الاول ومن ٦/٢٨ حتى نهاية الموسم (١٠/٢٤) فى الموسم الثانى.

- كان تأثر الكثافة العددية لحشرة الذبابة البيضاء بالتغيرات فى درجات الحرارة موجبا وعالى المعنوية (٠,٧٢٧**) فى الموسم الأول وغير معنوى (٠,٣٨٣) فى الموسم الثانى.
- بينما كان هذا التأثير للتغير فى نسبة الرطوبة النسبية موجبا وغير معنوى (٠,٣٧٨) فى الموسم الأول ومعنوى (٠,٤٩٠*) فى الموسم الثانى.
- لكن سرعة الرياح كان تأثيرها موجبا وغير معنوى)(٠,٠٩٠) فى الموسم الأول وسالبا (-٠,٢٨٠) فى الموسم الثانى على الكثافة العددية لحشرة الذبابة البيضاء.
- وكانت العلاقة موجبة ومعنوية بين الكثافة العددية لحشرة الذبابة البيضاء والمفترسات الحشرية (٠,٥٠٥* ، ٠,٤٧٠*) فى كلا الموسمين بالترتيب.

٣-ظهرت حشرة جاسيد القطن فى ٥/٣٠ ، ٦/٦ فى كلا الموسمين فكان لها خمس ذروات عددية فى الموسم الأول فى الفترة من ٥/٣٠ حتى ٩/٢٧ ، وست ذروات عددية فى الموسم الثانى فى الفترة من ٦/٦ حتى نهاية الموسم فى ١٠/٢٤.

- كان تأثر الكثافة العددية لحشرة جاسيد القطن بالتغيرات فى درجات الحرارة موجبا وعالية المعنوية (٠,٧١٣**) فى الموسم الأول وغير معنوى (٠,٤٢٠) فى الموسم الثانى.
- بينما كان هذا التأثير للتغير فى نسبة الرطوبة النسبية موجبا وغير معنوى (٠,٢٢١ ، ٠,٤٠٠) فى كلا الموسمين بالترتيب.
- لكن سرعة الرياح كان تأثيرها موجبا وغير معنوى (٠,٢٩٨) فى الموسم الأول وسالبا ومعنوى (-٠,٤٩٠*) فى الموسم الثانى على الكثافة العددية لحشرة جاسيد القطن.
- وكانت العلاقة موجبة ومعنوية (٠,٤٨٥* ، ٠,٥١٠*) بين الكثافة العددية لحشرة جاسيد القطن والمفترسات الحشرية فى كلا الموسمين بالترتيب.

٤-ظهرت حشرة البقة الخضراء فى ٦/١٤ ، ٦/١٣ فى كلا الموسمين وكان لها ثلاث ذروات للتعداد فى كلا الموسمين خلال الفترة من ٦/١٤ حتى ١٠/١٨ فى الموسم الأول ومن ٦/١٣ حتى ١٠/١٧ فى الموسم الثانى.

- كان تأثر الكثافة العددية لحشرة البقة الخضراء بالتغيرات فى درجات الحرارة سالبا وغير معنوى (-٠,٨٦٠ ، -٠,١٨٠) فى كلا الموسمين بالترتيب.
- بينما كان هذا التأثير للتغير فى نسبة الرطوبة النسبية موجبا وغير معنوى (٠,٠٢١) فى الموسم الأول وسلبى (-٠,٠٦٠) فى الموسم الثانى.
- لكن سرعة الرياح كان تأثيرها سلبى وغير معنوى (-٠,٢٣٧ ، -٠,٠٨٠) فى كلا الموسمين بالترتيب على الكثافة العددية لحشرة البقة الخضراء
- وكانت العلاقة موجبة ومعنوية (٠,٥١٥* ، ٠,٤٩٩*) بين الكثافة العددية لحشرة البقة الخضراء والمفترسات الحشرية فى كلا الموسمين بالترتيب.

ولذلك فإن دراسة تأثير العوامل الحيوية والغير حيوية على التغيرات الموسمية فى حجم العشيرة لهذه الآفات هام جدا لأن هذه العوامل تلعب الدور الرئيسى فى تطور وانتشار هذه الآفات الحشرية.