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STUDIES ON THE POPULATION DENSITIES OF CERTAIN INSECT PESTS ATTACKING GRAPEVINE TREES AND THEIR ASSOCIATED PREDATORS AT MANSOURA DISTRICT

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ABSTRACT

The present investigation was carried out in the farm of Agriculture Research Center , Faculty of Agriculture, Mansoura

University to study the effect of some weather factors on the population density of per certain insect pests infesting grapevine trees and their associated predators during the successive seasons of 2014 and 2015 at Mansoura district. The obtained results revealed that four peaks for *Retithrips syriacus* Manget season were recorded during the period of study. The highest number for this insect was recorded in the second week of August in the two seasons of study. There were four peaks per season for *Empoasca lybica* deBerg during the period of investigation. The highest number of *E. lybica* was recorded in the first and third week of June during the two seasons of study. The obtained results showed that four peaks for *Empoasca discipiens* Paoli were recorded during the period of study. the highest number for this insect was recorded in the third week of July and in the third week of August during the first and second season of study. Data recorded three peaks for *Lobisia botrana* Schift during the two seasons of study, and the highest number was recorded in the third week of June in the first season and in the first week of July in the second season of study. There were three peaks for *Chryptoblabs. Gnidiella* Miller in the two seasons of study the highest number was recorded in the third week of Jun in the two season of study , The obtained result assured that three peaks for *Cydonia vicina nilotica* Muls in the two seasons of study. The highest number for this insect was recorded in the second week of May in the first season 2014 and in the first week of August in the second season of study. The obtained results revealed that there were four peaks for *Coccinella undecimpunctata* in the two seasons of study,and the highest number for this insect was recorded in the second week of May in the first season and in the third week of August in the second season of study. There were three peaks for *Cydonia vicina isis* in the two seasons of study. The highest number for this insect was recorded in the third week of Jun in the first season and in the first week of August in the second season of study. The obtained result assured that the temperature (maximum, minimum and average) positively affected on the population density of the most main insect species except *C. gnidiella* during the two seasons of study. The relative humidity affected negatively on the population density of these insects .the statistical correlation coefficient between the population density of predatory insects and the temperature and relative humidity showed a highly or slightly significant positive or negatively effect on population density of these insects during the two seasons of study.

INTRODUCTION

Grapevine, *Vitis vinirera* L. (Family: Vitaceae) is grown extensively in the subtropical and tropical regions of the world. The cultivated area of

grapevines in the world reach approximately about ten million hectares, and the value of international grapevine production exceeded 15 Million dollars.
In Egypt, grapevine is considered as economically important crop for its nutritive value and economic importance. About 191, 543 feddans are covered with vineyards in all Egypt. These areas concentrated at Nobaria, Minya, Monfia, Behira, Gharbbia, Bani-Sewef, Dakahlia, Geza, Fayoum, El-Sharkia and Alexandria Governorates. Grapevine orchards occupy about 5860 feddans at Dakahlia Governorate (Ministry of Agriculture 2013).

Insects take a heavy toll on the grape crop. A total of 132 insects are known to attack grapevines worldwide. Of these, only about ten species are considered to cause losses in various regions and different grape-growing states of India. Only some are considered frequently serious, while the others are regarded as minor pests (Mani *et al.*, 1982).

Many insect pests are attacking grape shrubs like mealybugs species, scale insects, Jassidae, whitefly, thrips, honey dew moth, *Chryptoblabs gnidiella* (Millier), grapevine moth *Lobisia botrana* Schift and the cotton leaf worm, some of these insects cause serious damage, hence effect quantity and quality of the fruits and cause economic loss in the crop. The Jassidae (*Emposaca lybica* Deberg and *Empoasca decipiens* Paoli), thrips (*Retithrips syriacus*), honey dew moth, *C. gnidiella*, and grapevine moth, *L. botrana* are very injurious insects pests infesting grapevine, cause serious damage and finally affecting quantity and quality of the fruits and causes economic loss in the crop (Ali and Ahmed, 1990; Tadros *et al.,* 1997; Fatouh, 1999; Soaves, 1999;Abdel-Mageed, 2011; and Ghanim *et al.* 2013).

Numerous studies have been illustrated the population density of some insect pests infesting grapevine in different parts in the world (Tarouk, 1969; Iren, 1975; Elkorashy, 1976; Youssef, 1991; Fatouh, 1999; Abdel Rahman, *et al.*, 2007; Abdel Mageed, 2011; and Mohamed, 2013). The natural enemies of a pest are, to a greatextent, responsible for the variation in pest abundance. The role of predatory insects in controlling the main insect pests attacking grapevine orchards have been studies by several investigators (Prasad, 1990; Grafton *et al.*, 2005; Ibrahim, 2005; and Mohamed, 2013). Therefore ,the aim of this work was to investigate the population density of the main insect pests infesting grapevine and their predatory insects and evaluate the effect of some weather factors on the population density of certain injurious insects attacking grapevine and their predatory insects.

MATERIALS AND METHODS

1- Population density of the main insect pests infesting grapevine trees and their associated predatory insects.

The present investigation was carried out in the farm of Agriculture Research Center , Faculty of Agriculture, Mansoura University to study the effect of certain weather factors on some insect pests infesting grapevine trees and their associated predators during the two successive seasons 2014 and 2015 at Mansoura district. No insecticides were applied during the period of study. The area of study was half feddan cultivated with the variety Thompson seedless.

The population density of main insects attacking grapevine trees and their associated predators

Direct counting.

Five trees of the same age and size from grapevine were chosen and used as replications. Samples were collected weekly during the two successive seasons from the beginning of March till the end of August. Each sample consisted of 100 leaves and 25 branches.Samples were randomly collected (20 leaves and 5 branches from each tree for the four directions and the middle of each tree. The collected leaves and branches from tree were taken to the laboratory in polyethylene bags. Starting from the flowering period ,ten clusters flower parts or berries were chosen in random to survey the lepedopterous insects inhabiting these parts grapevine trees the number of the injurious insects and their associated predators were counted. The predatory insects which observed on each sample in spot close to the colonies of the colonies of insect pests were collected by an aspirator and counted.

Monitoring *L. botrana* with sexual pheromone traps.

Adult populations were monitored with delta traps baited with 1 mg of synthetic sex pheromone (E7, Z9-12Acetate). Traps were placed 1.5m above the ground and checked weekly. Two traps were monitored from March 2014 until August 2015. The area was divided in to two plots and the trap was placed in the middle of each plot. Pheromone Lures were replaced weekly and sticky bottom whenever necessary. The numbers of the males were recorded weekly. The peaks of this insect were determined.

2-Effect of some weather factors on population density of the main insects infesting grapevine trees and their predators.

To study the effect of some weather factors (temperature and relative humidity) on the population density of the main insect pests and their predators, the temperature and relative humidity were obtained from the Agro meteorological Station in Mansoura region. Biweekly averages of temperature and relative humidity were calculated.

Data analysis

Costat software program (2004) was used to compute the effect of these weather factors on the population densities of the main insect pests and their predators. The simple correlation coefficients of the relationships between the bi-weekly average number of these insects and their predators and the biweekly average of temperature and relative humidity components were computed.

RESULTS AND DISCUSSION

I. Population density of the main insect pests attacking grapevine trees and their associated predators.

A:Major insect pests

***Retithrips syriacus* Manget**

The Data illustrated in Figure (1) showed that the population density of *R. syriacus* during the two seasons of study. It can be seen that there were 3-4 peaks for this insect during the period of investigation. These peaks were recorded in the end week of April, in the first week of June, in the first week of

July, and in the second week of August, during the first season of study, respectively. Meanwhile, these peaks were recorded in the end week of April, in the first week of June, and in the second week of August, during the second season of investigation, respectively. As a conclusion, the highest peak for *R. syriacus* in the first week of Jun in the first season and in the second week of August in the second season of study respectively. El-Korashy (1976) in Egypt reported that this insect is an important pest on grapevine trees in several vineyards. Tadros *et al.* (1997) recorded *R. syriacus* as major insect pest attacking grapevine trees in Egypt. Further more Mani et al. (2008) in India reported that *R. syriacus* has caused severe losses on grapevine trees.

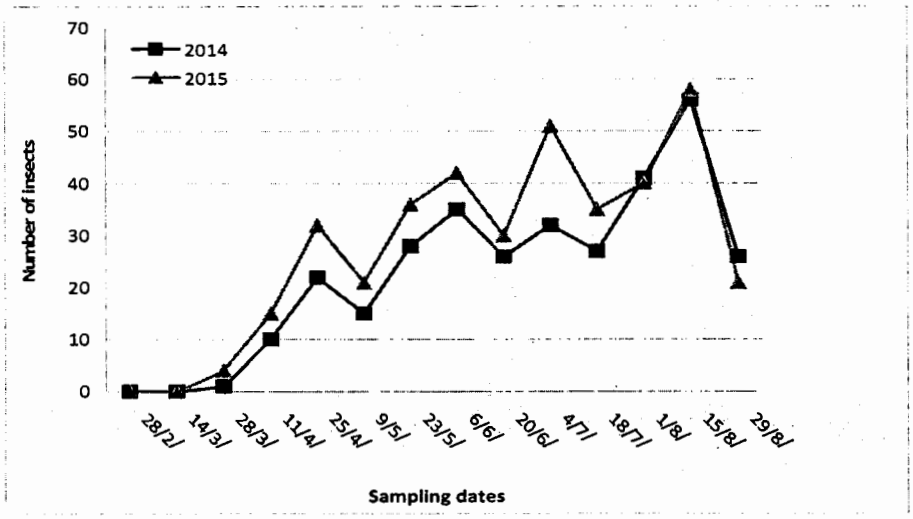

Figure (1): Population density of *R. syriacus* on grapevine trees during the two successive seasons (2014 and 2015) at Mansoura district.

***Empoasca lybica* De Berg**

The results arranged in Figure (2) recorded that the population density of *E. lybica* during the period of investigation. It can be noted that, there were four peaks for this insect during the two seasons of study. These peaks were found in the first season in the end of April, in the first week of June, and in the end week of August. In the second season, these peaks were recorded in the end week of April, in the end week of May, in the third week of June, and in the first week of August. As a conclusion, the highest peak for *E. lybica* was found in the first week of Jun in the first season while that was in the third week of August in the second season of investigation. Sohi and Singh (1970) reported that *E. lybica* is known to be attack grapes in India. Furthermore, Tadros *et al.* (1997) recorded *E. lybica* as a major insect pest infesting grapevine trees in Egypt.

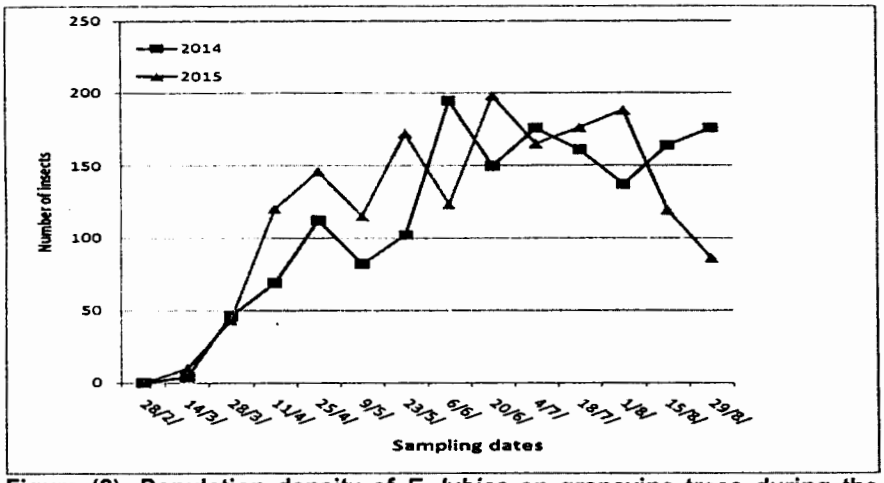

Figure (2): Population density of *E. lybica* on grapevine trees during the two successive seasons(2014 and 2015)at Mansoura district

***Empoasca discipiens* Paoli**

The data represented in Figure (3) showed that the population density of *E. discipiens* during the two seasons of study. The obtained results recorded four peaks for this insect on grapevine trees during the two seasons of investigation. In the first season (2014), theses peaks were found in the last week of April, in the third week of June, in the second week of July, and in the end of August. In the second season of study, the peaks were found in the end of April, in the end of May, in the first week of July, and in the second week of August, respectively. As a conclusion the highest peak for *E. discipiens* was recorded in the second week of July in the first season and in the second week of August in the second season of study. Fathouh (1999) reported that, *E. discipiens* infesting grapevine threes in Egypt

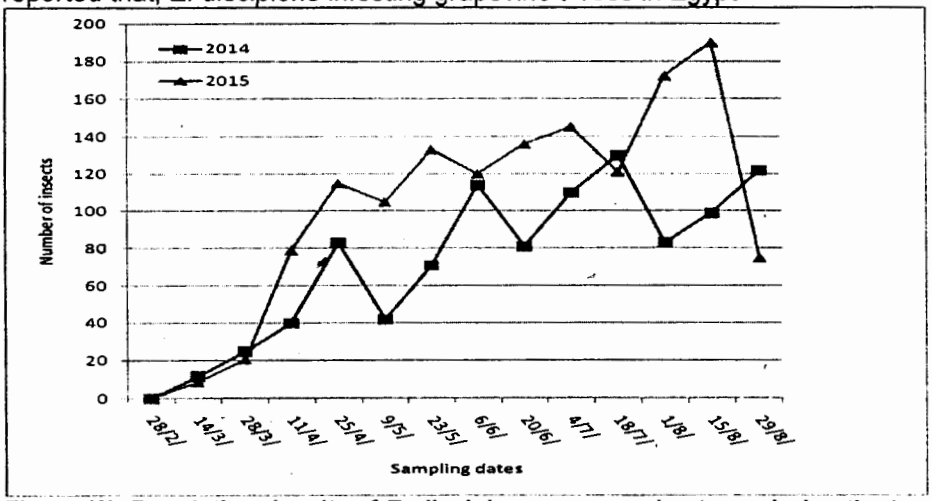

Figure (3): Population density of *E. discipiens* on grapevine trees during the two successive seasons (2014 and 2015) at Mansoura district.

***Lobesia botrana* Schift**

The results illustrated in Figure (4) recorded that the population density of *L. botrana* during the period of investigation. It can be noted that, there were three peaks for this insect during the two seasons of study. These peaks were found in the first season in the end March, in the end of April, and in the end week of Jun. In the second season, these peaks were recorded in the second week of April, in the end of May, and in the first week of July. As a conclusion, the highest peak for *L. botrana* was found in the end of June in the first season while that was in the first week of July in the second season of investigation. Tadros *et al.* (1997) in Egypt recorded about 11 insect species as major pests attacking vineyards including *L. botrana* and *C. gnidiella*. . Furthermore, Monica et al. (2010) recorded that *L. botrana* for the first time in North America attacking grapevine trees.

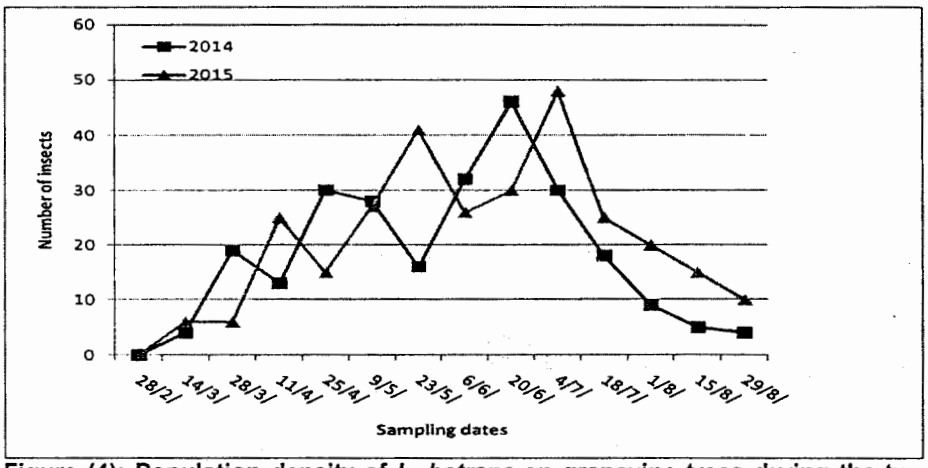

Figure (4): Population density of *L. batrana* on grapevine trees during the two successive seasons (2014 and 2015) at Mansoura district.

Cryptoblabes gnidiella

The results represented in Figure (5) showed that the population density of *C. gnidiella* during the period of investigation. It can be noted that there were three peaks for this insect during the two seasons of study. These peaks were found in the end of March, in the second week of May, and in the third week of June in the first season. In the second season, these peaks were found in the end of March, in the second week of May, and in the third week of June. As a conclusion, the highest peak for *C. gnidiella* was found in the third week of June during the two seasons of study. Hashem *et al.* (1997) in Egypt, indicated that *C. gnidiella* as a serious polyphagous pest attacking grapevine trees, vegetable, and field crops.

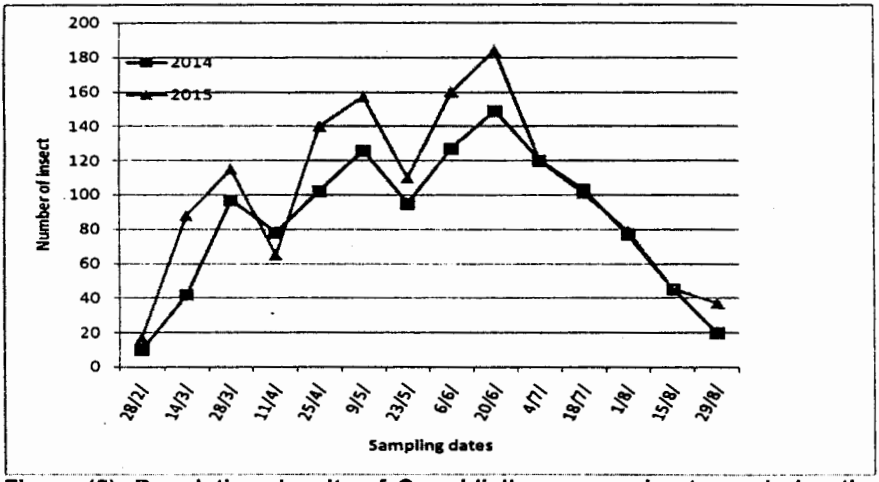

Figure (5): Population density of *C. gnidiella*on grapevine trees during the two successive seasons (2014 and 2015) at Mansoura district.

Predatory insects:

Cydonia vicina isis

The obtained results presented in Figure (6) indicated that *C. vicina isis* has been appeared in the second week of May during the first season of investigation. It recorded three peaks for each season of study. In the first season, these peaks were occurred in the second week of May, in the third week of Jun, and in the first week of August, while these peaks were found in the end week of April, in the third week of June, and in the first week of August in the second season of investigation, respectively.

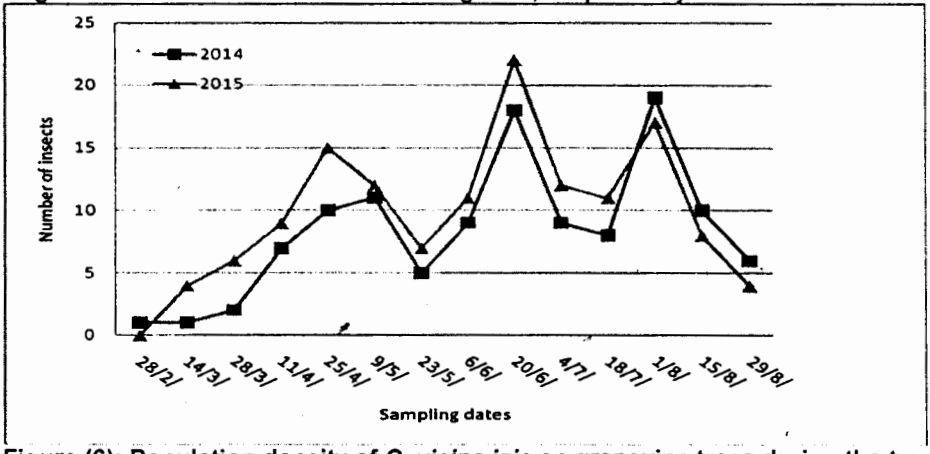

Figure (6): Population density of *C. vicina isis* on grapevine trees during the two successive season (2014 and 2015) at Mansoura district.

***Coccinella undecimpunctata* L.**

The obtained results illustrated in Figure (7) revealed that *C. undecimpunctata* has been appeared in the end week of March during the

first season and in the second week of March in the second season of investigation. It recorded four peaks in the first season of study. In the first season these peaks were occurred in the second week of May, in the third week of June, and in the first and end week of August, while that were found in the end week of April, in the end week of May, in the first of July, and in the third week of August in the second season of investigation, respectively.

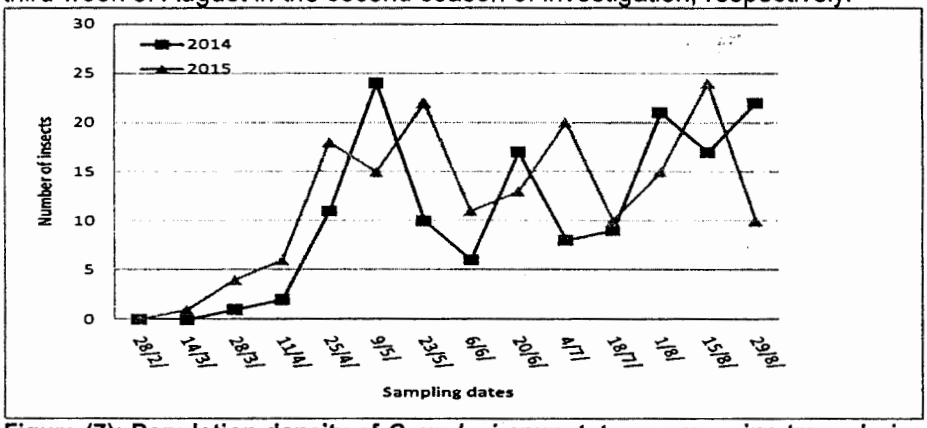

Figure (7): Population density of *C. undecimpunctata* on grapevine trees during the two successive seasons (2014 and 2015) at Mansoura district.

Cydonia vicina nilotica

Data arranged in Figure (8) indicated that *C. vicina nilotica* has been appeared in the end week of March during the two seasons of investigation. It recorded three peaks in the first season and four peaks in the second season of study. In the first season ,these peaks were occurred in the first week of May in the third week of June and in the end week of August while that were found in the second week of April, in the end week of May, in the first week of July and in the first week of August, in the second season of investigation, respectively.

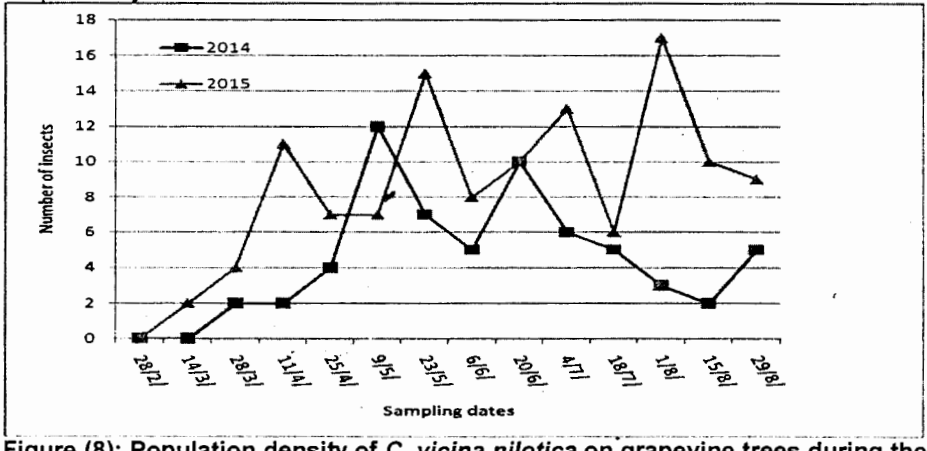

Figure (8): Population density of *C. vicina nilotica* on grapevine trees during the two successive seasons (2014 and 2015) at Mansoura district.

II- Effect of some weather factors on the population density of main insect pests attacking grapevine and their associated predators.

-Insect pests:

Retithrips syriacus:

Data presented in Table (1) and (2) revealed that the temperature (maximum, minimum and average) showed highly significant positive correlation on population density of *R. syriacus* in the two seasons of study(2014 and 2015) . While, the R.H. parameters exerted insignificant correlation in first season and highly significant negative in average during the second season (2015)of study.

Table (1): Simple correlation coefficient between the temperature and relative humidity components and the biweekly numbers of the main insect species attacking grapevine trees during season 2014 at Mansoura district.

Weather factors / Insect species	Temperature c°			RH%		
	Max	Min	Average	Max	Min	Average
R. syriacus	0.86**	0.86**	0.87**	0.09	0.48	-0.02
E. lybica	0.94**	0.92**	0.92**	- 0.04	0.11	-0.15
E. discipiens	0.91**	0.90**	0.9**	0.05	0.13	-0.07
L. botrana	0.31	0.29	0.38	0.53 --	-0.47	-0.56*
C. gnidiella	0.34	0.26	0.27	-0.59*-	-0.49	-0.013

** correlation coefficient is significant at 0.01 level

Table (2): Simple correlation coefficient between the temperature and relative humidity components and the biweekly numbers of the main insect species attacking grapevine trees during season 2015 at Mansoura district.

Weather factors / Insect species	Temperature c°			RH%		
	Max	Min	Average	Max	Min	Average
R. syriacus	0.80**	0.76**	0.76**	0.36	-0.31	-0.77**
E. lybca	0.75**	0.68**	0.68**	0.33	-0.53	-0.72**
E. discipiens	0.83**	0.77**	0.78**	0.39	-0.34	0.72**
L. batran	0.54*	0.45	0.42	0.29	-0.68**	-0.55*
C. gnidiella	0.17	0.05	0.03	-0.13	-0.74**	-045

*high significant; **highly significant

Empoasca lybica:

The obtained results in Table (1) and (2) cleared that the temperature showed highly significant positive correlation (maximum, minimum and average)on population density of *E. lybica* in the two seasons (2014 and 2015)of study. While, the R.H. parameter exerted insignificant correlation in first season, highly significant negative in average during the second season of study 2015.

-Emposaca discipiens:

The data arranged in Tables (1) and (2) showed that the temperature had highly significant positive correlation (maximum, minimum and average) on population density of *E. discipiens* in the two seasons (2014 and 2015)of study. While the relative humidity parameters exerted insignificant correlation in first season. Average temperature recorded highly significant negative correlation in the second season of study2015.

-Lobesia botrana:

The obtained results in Tables (1) and (2) revealed that the temperature (maximum, minimum and average) showed insignificant positive correlation on population density of *L. botrana* in the first season of study, and the temperature (maximum) had high significant positive correlation in the second season of study. While the maximum and minimum R.H. % revealed high significant negative correlation in average in first season of study. The minimum and average R.H. revealed highly and high significant negative correlation in the second season of study, respectively.

-Cryptoblabes gnidiella:

The data arranged in Tables (1) and (2) cleared that the temperature correlation9maximum, minimum and average) insignificant positive on population density of in the two seasons of study. The maximum of R.H. recorded high significant negative correlation for *C. gnidiella* in first season. The (minimum) showed highly significant negative correlation in the second season of study.

Table (3): Simple correlation coefficient between the temperature and relative humidity components and the biweekly numbers of the associated predatory insects inhabiting grapevine trees during 2014 season at Mansoura district.

Simple correlation						
Weather factors / Insect species	Temperature c°			RH%		
	Max	Min	Average	Max	Min	Average
C. vicina nilotica	0.5	0.41	0.48	-0.51	- 0.34	–0.59*
C. unedcimpunctata	0.73**	0.71**	0.73**	-0.02	0.04	- 0.14
C. vicina isis	0.66*	0.67**	0.67**	-0.03	0.09	-0.09

*high significant; ** highly significant

Table (4): Simple correlation coefficients between the temperature and relative humidity components and the biweekly numbers of the associated predatory insects inhabiting grapevine trees during season 2015 at Mansoura district.

Simple correlation						
Weather factors / Insect species	Temperature c°			RH%		
	Max	Min	Average	Max	Min	Average
C. vicina nilotic	0.68**	0.63*	0.63*	0.28	-0.29	-0.48
C.unedcimpunctata	0.66*	0.56*	0.58*	0.30	-0.47	-0.70**
C.vicina isis	0.49	0.43	0.41	0.17	-0.44	-0.50

B- predatory insect species

***Cydonia vicina Nilotic*:**

Data arranged in Tables (3) and (4) illustrated the (maximum, minimum and average) temperature had insignificantly positive correlation effect on population density of *C. vicina nilotica* at first season of study. The temperature (maximum, minimum and average) showed highly and high significantly positive correlation in the second season, respectively. The average R.H. showed high significantly positive impacts on the population density of this insect in the first season. The maximum R.H. showed highly significantly and high significantly positive for the minimum and the average in the second season of study.

Coccinell undecimpunctata:

The obtained results in Tables (3) and (4) showed that the temperature (maximum, minimum and average) showed highly and high significantly positive impacts on the population density of *C. undcimpunctata* in the two seasons of study, respectively. The R.H. showed highly significantly negative impacts on the population density in the second season of study.

Cydonia vicina isis:

Data arranged in Tables (3) and (4) the (maximum, minimum and average) temperature had high and highly significantly positive correlation effect on population density of *C. vicina isis* in the first season of study respectively. The minimum and average R.H. showed insignificantly impact on the population density of this insect during the two seasons of study.

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دراسات على الكثافات العددية لبعض الافات الحشرية التي تهاجم أشجار العنب والمفترسات المصاحبة لها في منطقة المنصورة

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أجريت هذه الدراسة في مزرعة مركز التجارب والبحوث التابع لكلية الزراعة –جامعة المنصورة لدراسة تأثير بعض العوامل الجوية على الكثافة العددية لبعض الآفات الحشرية التي تصيب أشجار العنب والمفترسات المصاحبة لها خلال موسمي ٢٠١٤-٢٠١٥ في منطقة المنصورة .وأوضحت النتائج المتحصل عليها أن لثربس العنب أربعة ذروات لكل موسم خلال فترة الدراسة وسجل أعلى عدد لهذه الحشرة في الاسبوع الثاني من اغسطس كما تم تسجيل أربعة ذروات لنطاط أوراق القطن وكان أعلى تعداد لهذه الحشرة خلال الاسبوع الاول والثاني من شهر يونيو خلال فترة الدراسة .أيضا تم تسجيل ٤ ذروات انطاطات أوراق البطاطس وكان أعلى تعداد لهذه الحشرة في الاسبوع الثالث من يوليو والاسبوع الثالث من اغسطس خلال موسمي الدراسة على التوالي.ولقد سجلت النتائج أن لدودة ثمار العنب ثلاثة ذروات للتواجد خلال موسمي الدراسة وكان أعلى تعداد لها في الاسبوع الثالث من يونيو في الموسم الاول بينما كان ذلك في الاسبوع الاول من يوليو في الوسم الثاني .كما أظهرت النتائج أن لدودة الندوة العسلية ثلاثة ذروات خلال موسمي الدراسة وكان اعلى تعداد لهذه الحشرة في الاسبوع الثالث من يونيو خلال موسمي الدراسة .أما بالنسبة للمفترسات الحشرية المصاحبة لهذه الحشرات فقد أظهرت النتائج أن أبو العيد السمني كان له ثلاثة ذروات للتواجد خلال موسمي الدراسة وأن اعلى تعداد له كان في الاسبوع الثاني من مايو في الموسم الاول وكان ذلك في الاسبوع الاول من اغسطس في الموسم الثاني .أما بالنسبة لأبو العيد ذو احدى عشر نقطة فلقد سجلت النتائج ان له أربعة ذروات خلال موسمي الدراسة وأن أعلى تعداد له كان في الاسبوع الثاني من مايو في الموسم الاول وفي الاسبوع الثالث من اغسطس في الموسم الثاني .أما بالنسبة لأبو العيد الاسود فكان له ثلاثة ذروات خلال فترةالدراسة ولقد أكدت النتائج أن لدرجة الحرارة تأثير موجب وواضح على الكثافة العددية للحشرات الضارة الرئيسية التي تصيب اشجار العنب كذلك أثرت الرطوبة النسبية تأثير سالبا على الكثافة العددية لهذه الآفات الحشرية .كما أظهرالتحليل الاحصائي أن هناك ارتباط معنوي واضح لتأثير درجات الحرارة والرطوبة النسبية سواء كان موجبا أو سالبا على الكثافة العددية للمفترسات الحشرية المصاحبة لهذه الحشرات الضارة.