

# ECOLOGICAL STUDIES ON CERTAIN PIERCING-SUCKING INSECTS ATTACKING PEACH TREES AND THEIR ASSOCIATED PREDATORY INSECTS AT MANSOURA DISTRICT.

Mohamed, Nadia E.

Plant protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

## ABSTRACT

Field studies had been carried out in peach orchard at Mansoura district to investigate the abundance of the main piercing sucking insect species infesting peach trees and their associated predatory insects, in two successive years 2005 and 2006. Also, the effect of temperature and relative humidity on the population density of some injurious insect species attacking this crop and their associated predatory insects.

The obtained results indicated that, there were seven piercing-sucking insect species belonging to Order Homoptera attacking peach trees. These species namely, *Myzus persicae* Sulzer, *Agallia aegyptiaca* Host; *Empoasca lybica* de Berg; *Empoasca discipiens* Paoli, *Bemisia tabaci* ( Gennadius ) ; *Icerya seychellarum* (Westwood) and *Lepidosaphes ulmi* L. Also, four predators associated with these insect pests namely; *Scymnus intrepitus* Goese; *Rodolia cardinalis* Muls; *Exocomus nigromaculatus* (Goeze) and *Chrysoperla carnea* (seph) were recorded.

Data revealed that *M. persicae* had three peaks on peach trees in the first year where as four peaks in the second year of study. The highest peak was recorded in the first week of June in 2005, while that was in the last week of May in 2006. The results showed that, temperature had non significant, effect on the population density of this insect, while the relative humidity had slightly or greatly effect on the population density of this insect pest. The obtained results recorded that, *I seychellarum* had three peaks during the two years of study. The highest peak was found in the last week of September in the first year, where as in the last week of October in the second year of investigation.

The statistical analysis showed, that temperature components had highly positive significant effect on the population density of *I. seychellarum* during the two years of study, while the Maximum, minimum and average R.H. % had non significant effect on the population density of this insect during the same period of investigation. The results indicated that *S. intrepitus* had three peaks per year during the period of investigation, while *R. cardinalis* recorded two peaks in the first year, and three peaks in the second year of study. The statistical analysis showed that, the temperature and relative humidity components had slightly or greatly effected on the population density of *S. intrepitus* and *R. cardinalis* under field condition during the period of study.

## INTRODUCTION

Peach, *Prunus persica* Stokes is grown extensively in the subtropical and tropical regions of the world. It is highly regarded for its nutritive value and economic importance. Peach orchards occupy about 1068 feddans at Dakahlia, Governoratr (Ministry of Agriculture, 2007). Peach orchards are infested by different injurious insect species. Numerous entomologists in different parts of the world recorded the injurious insects infesting peach orchards (Asser: 1990; Erkilic and uygun, 1995; Kim *et al* 1997; Wilkaniec *et al* 2004 and Bayhan *et al* 2006).

These injurious insect species were attacked by numerous predatory insects (Pedata and Garonna, 2001; Omkar, S.S 2003; El-sherbenie, 2004; Alyokhin *et al* 2005 and Ibrahim, 2005). The population density of the common piercing-sucking insects and their predatory insects were studied by many investigators (Assem *et al* ,1991; Erkilic and uygun, 1995; Erkilic *et al*, 1995 and Ibrahim 2005 and Bayhan *et al* 2006). The effect of certain weather factors on the population density of some piercing-sucking insects infesting peach trees and their predators were investigated by (Assem, 1990; El-Borollosy *et al*, 1990; Kavallieratos *et al* 2004; Ibrahim, 2005) There fore, the present investigation was under taken to study the following points.

- 1- Surveying piercing-sucking insects attacking peach trees and their predatory insects at Mansoura district.
- 2- Studding the population density of certain piercing-sucking insects infesting peach trees and their predators.
- 3- Estimating the effect of certain weather factors on the population density of certain piercing-sucking insects and their predators.

## **MATERIALS AND METHODS**

### **Survey and the population density of piercing-sucking insects infesting peach trees and their associated predatory insects.**

This work was carried out at peach trees (about one feddan) located at Mansoura district in two successive years 2005 and 2006. Peach trees (Variety Baladi) were of eight year old, where no insecticides were applied for the two years of investigation. Visual coun was applied to study certain piercing –sucking insects and their associated predators during the period of study. Ten trees of the same age and size were chosen at random, at the same orchard, in every site for sampling and seared as replicates during the course of this study.

Twenty five peach leaves were collected from each tree and thus 250 leaves were chosen at weekly intervals from peach trees. The samples were initiated from the first week of January till end of December during the two years of study. The peach leaves were carefully investigated and the insects on upper and lower surfaces were recorded. Also the same leaves were put in plastic bags tightly closed and transferred to the laboratory of Economic Entomology Department, Faculty of Agriculture, Mansoura University for examination a live nymphs and adult of some piercing sucking insects except for the first nymphal instar (crawlers) were counted on both surfaces of peach leaves under the stereomicroscope and recorded. Identifications were achieved by the aid of the Taxonomy Department, plant Protection, Research Institute, ARC, Giza, Egypt.

Daily records of temperature and relative humidity during the period of investigation were obtained from the Meteorological station, Ministry of Defense at showa Air Base station about 5KM from Mansoura. The effect of temperature and relative humidity on the relative abundance of some piercing-sucking insect species and their associated predators found in peach orchard have been studied. Costat computer program (1990) was used to

compute the effect of these weather factors on the population density of these insects. The simple correlation coefficients of the relationships between biweekly average of temperature and relative humidity components and the biweekly average number of the dominant insect species infesting peach trees and their predatory insects were computed.

## RESULTS AND DISCUSSION

### Surveying major piercing-sucking insect species attacking peach trees and their associated predatory insects

#### A- Major piercing-sucking insects

Table (1) shows the total number of piercing-sucking insect species and their percentages to the total catch on peach trees during the two years of study 2005 and 2006. The obtained data indicated that seven insect species belong to the one Order : Homoptera were recorded. Order Homoptera was represented by seven species belong to five families; Jassidae, Aphididae, Aleyrodidae, Margrodidae and Diaspididae, these seven insect species namely; *Agallia aegyptiaca* Hast., *Empoasca lybica* de Berg, *Empoasca discipiens* Paoli, *Myzus persicae* Sulzer, *Bemisia tabaci* (Gennandius), *Icerya seychellarum* (West wood) and *Lepidosaphes ulmi* L. The number and percentage of count insect species related to the total all insect numbers are given in Table (1).

**Table (1) Total number of certain piercing-sucking insect species and their percentages to the total insect numbers on peach trees during the two successive years 2005 and 2006 at Mansoura district.**

Species	2005		2006	
	Total	(%)	Total	(%)
1. Order Homoptera				
Family: Jassidae				
1- <i>Agallia aegyptiaca</i> Hast.	4632	18.98	3217	15.42
2- <i>Empoasca lybica</i> de Berg	4191	17.17	3953	18.94
3- <i>Empoasca discipiens</i> Paoli	3618	14.83	3254	15.59
Family : Aphididae				
<i>Myzus persicae</i> Sulzer	2771	11.36	3456	16.56
Family : Aleyrodidae				
<i>Bemisia tabaci</i> (Gennandius)	4527	18.55	3110	14.90
Family : Margrodidae				
<i>Icerya seychellarum</i> (Westwood)	3545	14.53	2828	13.55
Family : Diaspididae				
<i>Lepidosaphes ulmi</i> L.	1118	4.58	1051	5.04
Total	24402	100	20869	100

From these results, it can be seen that the dominant species was *A. aegyptiaca* during the year of 2005 as it formed 18.98% of the total number of insect species and the dominant species was *E. lybica* during the year of 2006 as it formed 18.94% of the total number of these insects. These results are in general agreement with those obtained by Ibrahim, 2005, who found

that, Homopterous insects were the most important insect pests infesting persimmon trees at Mansoura district during two successive seasons 2002 and 2003. He found six species infesting this crop. These species namely : *Bemisia* spp. ; *I. seychellarum*; *E. lybica*; *Aphis gossypii* Glover; *Hemeberlisia lattania* and *Psidii pulvinaria* Mask.

**b- Surveying predatory insect species associated with injurious piercing sucking insects on peach trees**

Table (2) illustrates abundance numbers and percentages of the predatory insects found associated with major insect pests on peach trees during the two years of study. As shown in this table, Four predatory insects belong to two orders with a total number of 667 individual in 2005 and 626 individuals in 2006 were recorded.

Order Coleoptera was the most dominant order in the two years of study as it formed (80.81%) of the total insect numbers in 2005 and (83.87%) in 2006. The obtained results indicated that three predatory insect species belong to this order. There species namely: *Scymnus intrepitus* Goeze, *Rodolia cardinalis* Muls and *Exochomus nigromaculatus* (Goeze) were collected from this order. The most abundant species was *S. intrepitus* during 2005, as it formed 31.63% of the total number of insect and the most abundant species was *R. cardinalis* during 2006 as it formed 39.30% of the total number of insects. Order Neuroptera was represented only by one species, *C.carnea*, as it formed 19.19 % and 16.13 % of the total number of these insect during the two years of study respectively.

**Table (2) Total number of predatory insect species and their percentages to the total insect numbers on peach trees at Mansoura district during the two successive years 2005 and 2006.**

seasons Species	2005		2006	
	Total	(%)	Total	(%)
Order : Coleoptera Fam : Coccinellidae <i>Scymnus intrepitus</i> Goeze	211	31.63	191	30.51
<i>Rodolia cardinalis</i> Muls	193	28.94	246	39.30
<i>Exochomus nigromaculatus</i> (Goeze)	135	20.24	88	14.06
Order : Neuroptera Fam : Chrysopidae <i>Chrysoperla carnea</i> (Steph.)	128	19.19	101	16.13
Total	667	100	626	100

**2: Population density of some piercing-sucking insects attacking peach trees and the effect of temperature and R.H. % on their abundance**

**A- *Myzus persicae***

Figures (1 and 2) revealed that *M. persicae* had three peaks in the first year where as four peaks in the second year of study. The highest peak was found during in the first week of June (550 individuals /250 leaves) in the first year, while that was in the last week of May (801 individuals / 250 leaves) in

the second year of study, when the temperature reached 25.8, 21.5 °C and R.H. 64.2, 60.8 % , respectively. The other two peaks in the first year were recorded in last week of April and last week of September at an average of 20.9, 23.4 °C and 60.2, 65.9 % R.H. Where as the other three peaks in the second year were recorded in the second week of April, last week of September and first week of November at an average of 17.6, 26.2, 20.3 C° and 64.3; 65.9, 67.3 % R.H. These findings in general agree with those of Halima and Hamouda (2004).

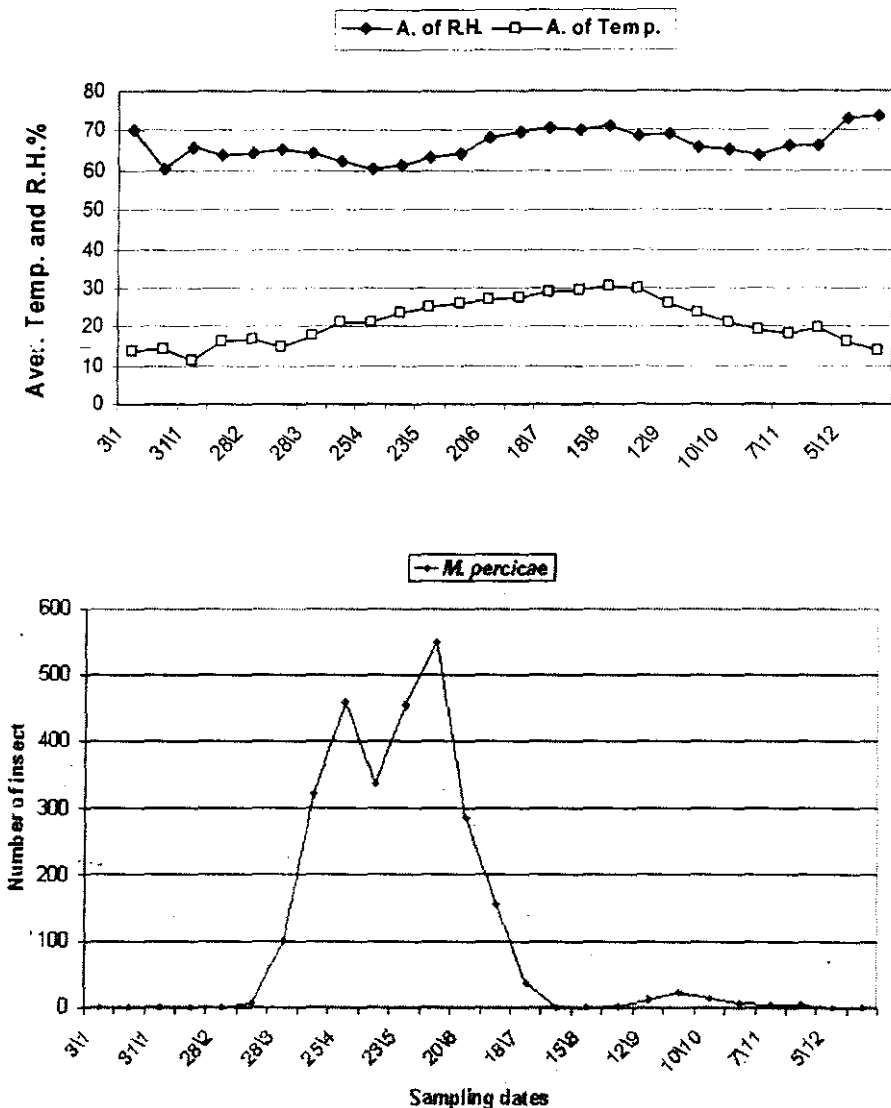


Fig (1) :Population density of *Myzus persicae* on 250 peach leaves during 2005 year at Mansoura district.



R.H.% showed positive significant impacts on the population density of this insect during 2005 and 2006.

**Table (3) : Simple correlation coefficient between the population density of *M. persicae* and the temperature and relative humidity components in peach orchard during 2005 and 2006 at Mansoura district.**

Weather variables	Season 2005			Season 2006		
	R	P	S	R	P	S
Maximum Temp.	0.3448	0.0844	ns	0.1406	0.4930	ns
Minimum Temp.	0.2330	0.2518	ns	-0.0177	0.9315	ns
Average Temp.	0.2933	0.1458	ns	0.0728	0.7237	ns
Maximum R.H.	0.4052	0.0400	*	0.1393	0.4972	ns
Minimum R.H.	-0.3473	0.0820	ns	-0.7838	2.1673	***
Average R.H.	-0.4653	0.0165	*	-0.4709	0.0151	*

ns =in significant   \* = significant with varied degree where R = Correlation coefficient P= Probability S = significant sign.

### B- *Icyria seychellarum*

Figures (3,4) revealed that *I. seychellarum* had three peaks in the two years of study. The highest peak was found during the last week of September (374 individuals / 250 leaves) in the first year, where as in the last week of October (329 individuals /250 leaves) in the second year of study, when the temperature reached 23.4, 23.2 °C and R.H. 65.9, 63.9% respectively. The other two peaks were recorded in the first year in the first week of May and in the first week of November at an average of temperature 25.8, 18.2 C° and 64.2, 66.3 % R.H., while that were in the last week of May and last week of September at an average 21.5, 26.2°C and R.H. 60.8, 65.9% in the second year of study.

Data in Table (4) Cleared the statistical correlation coefficient between the population density of *I. seychellarum* infesting peach trees at Mansoura district and temperature degrees and R.H. % during 2005 and 2006. Maximum, Minimum and Average temperature affected greatly in the population density of this insect during the two years of study. While the maximum, minimum, average R.H. % showed in significant effect during the two years of study. The present results are in line with those of El-Borollosy *et al* (1990) who stated that maximum temperature had positive significant effect in 1987 on *Cycus revolute* thumb. Alyokhin,et al (2005) reported that, weather factors had influence on the population activity of *I. seychellarum*. Ibrahim, (2005) found that the maximum, minimum and average temperature had positive significant effect on the population density of *I. seychellarum* during 2002 but showed in significant effect in 2003. While R.H. showed in significant impacts on this insect during 2002 and 2003

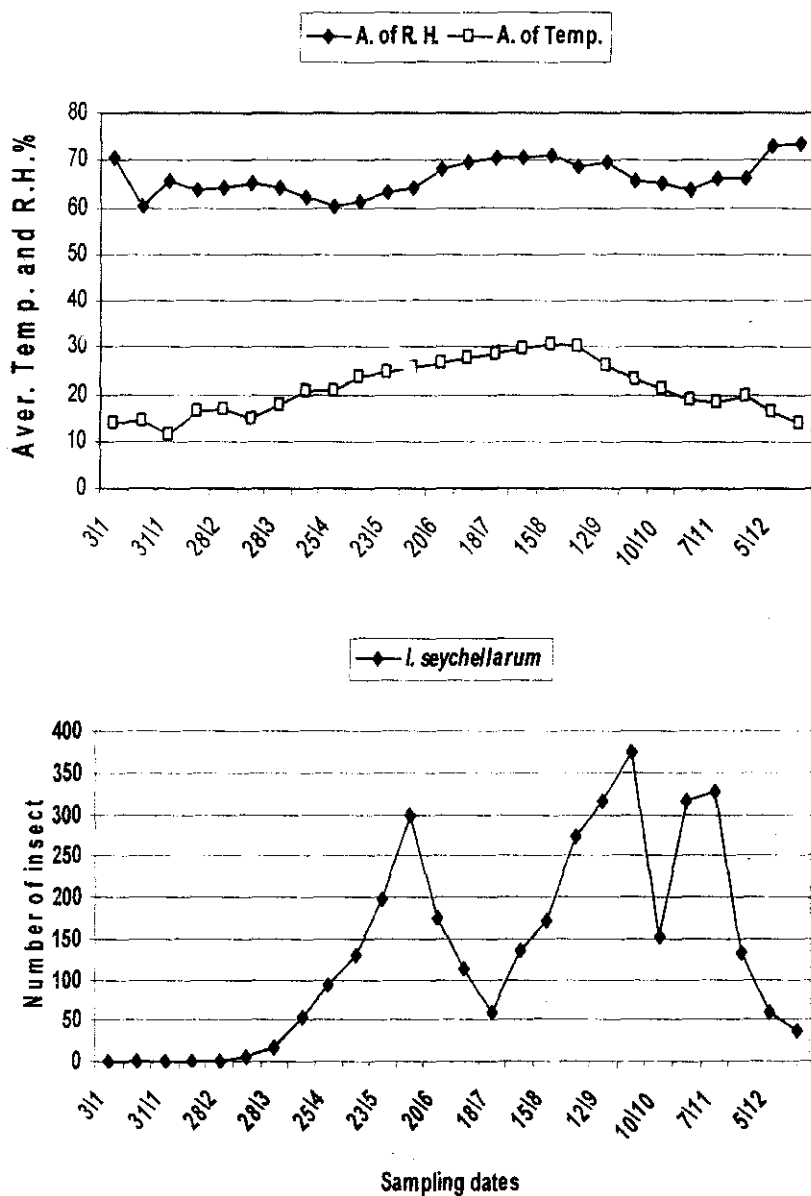


Fig. (3) Population density Of *Icerya seychellarum* on 250 peach leaves during 2005 year at Mansoura district .



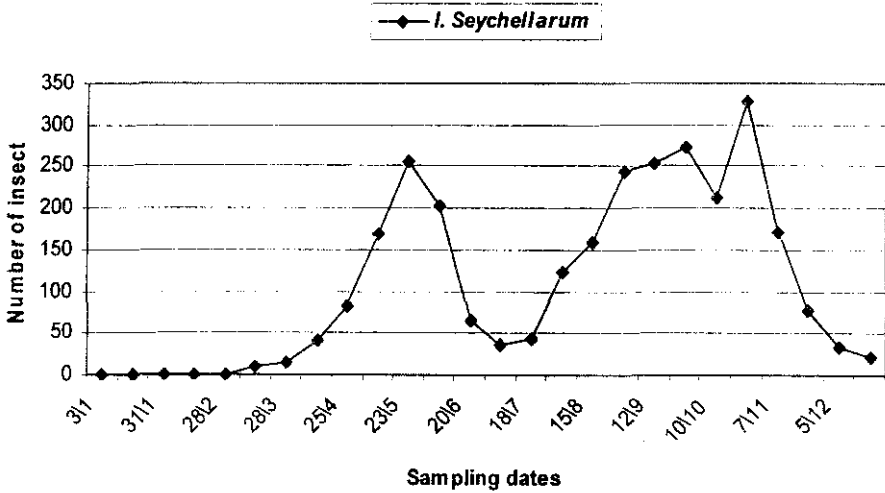
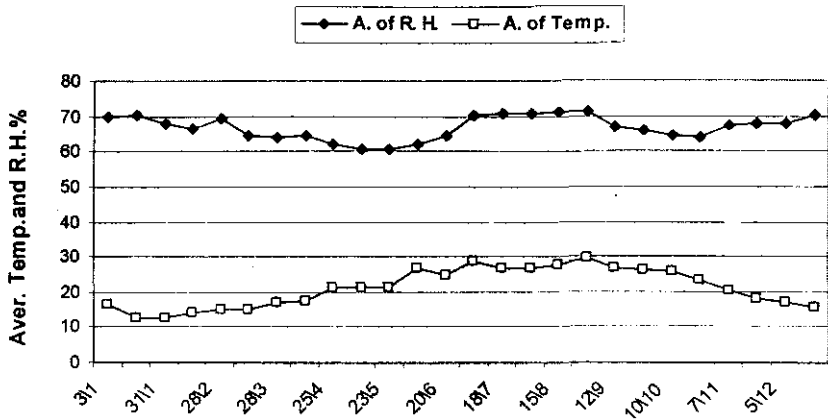


Fig. (4) Population density of *Icerya seychellarum* on 250 peach leaves during 2006 year at Mansoura district .

Table (4) :Simple correlation coefficient between *I. seychellarum*, temperature and relative humidity in peach orchard during 2005 and 2006 at Mansoura district.

Weather Variables	Season 2005			Season 2006		
	R	P	S	R	P	S
Maximum Temp.	0.5226	0.00615	**	0.7090	5.0137	***
Minimum Temp	0.5215	0.0062	**	0.6155	8.1671	***
Average Temp	0.5307	0.0052	**	0.6663	2.0195	***
Maximum R.H.	0.3433	0.0858	ns	0.1767	0.3876	ns
Minimum R.H.	-0.1084	0.5979	ns	0.1199	0.5594	ns
Average R.H.	0.0140	0.9456	ns	0.0079	0.9692	ns

ns=in significant    \* = significant with varied degree

Where: R= correlation coefficient

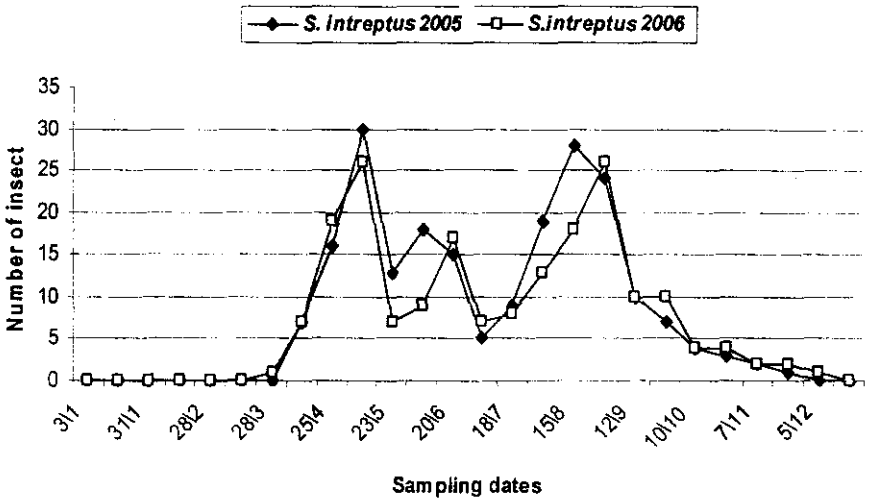
P= probability

S= significant sign.

**2- Population density of some predatory insects and the effect of temperature and R.H. % on their abundance.**

**A-Scymnus intrepitus**

Figure (5) shows that, *S. intrepitus* has been appeared in the second week of April and in the end of March during 2005 and 2006 respectively. It recorded three peaks per year during this investigation. In the first year these peaks found in the second week of May; first week of June and half August. In the second year these peaks were found in the second week of May; third week of June and last week of August. These results in general agree with those of Kavallieratos *et al* 2004 and Ibrahim (2005).



**Fig. ( 5) Population density of *S. intrepitus* on 250 peach leaves during 2006 year at Mansoura district .**

Table (5) showed the simple correlation coefficient values between biweekly numbers of *S. intrepitus* and certain weather factors on peach trees during 2005 and 2006. The data indicated that there was a highly significant positive effect between the population density of *S. intrepitus* and max. ; min. ; ave. temperature during The two years of study, Also there was a significant positive effect between the population density of this insect and maximum of R.H. % on peach trees in 2005.

**B: *Rodolia cardinalis***

Figure (6) indicated that *R. cardinalis* has been appeared in the second week of March during the two years of investigation. It recorded two peaks in the first year, and three peaks in the second year of study. In the first year 2005, these peaks were occurred in third week of May and in the second week of October, while that were found in third week of April; third week of May and in last week of October in the second year of study.

Table (5): Simple correlation coefficient between *S. intreptus* temperature and relative humidity in peach orchard during 2005 and 2006 year at Mansoura district.

Weather Variables	Season 2005			Season 2006		
	R	P	S	R	P	S
Maximum of. Temp.	0.7971	1.0909	***	0.6812	1.2736	***
Minimum of. Temp.	0.7405	1.5183	***	0.6401	4.2831	***
Average of. Temp.	0.7739	2.7631	***	0.6709	1.7556	***
Maximum of. R.H.	0.5847	0.0017	**	0.1930	0.3446	ns
Minimum of. R.H.	-0.1743	0.3942	ns	-0.2292	0.2599	ns
Average of. R.H.	-0.0108	0.9581	ns	-0.1699	0.4065	ns

ns=in significant    \* = significant with varied degree  
 Where: R= correlation coefficient    P= probability    S= significant sign.

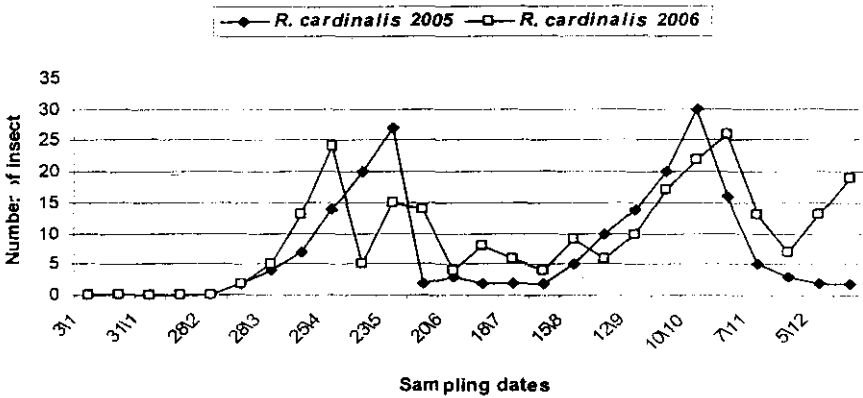


Fig.(6) Population density of *R. cardinalis* on 250 peach leaves during 2006 year at Mansoura district.

Table (6): Simple correlation coefficient between the population density of *R. cardinalis* and the temperature and relative humidity in peach orchard during 2005 and 2006 year at Mansoura district.

Weather Variables	Season 2005			Season 2006		
	R	P	S	R	P	S
Maximum of. Temp.	0.3185	0.1127	ns	0.3905	0.0485	*
Minimum of. Temp.	0.2200	0.2799	ns	0.2988	0.1381	ns
Average of. Temp.	0.2712	0.1801	ns	0.3518	0.0779	ns
Maximum of. R.H.	0.3076	0.1262	ns	0.2419	0.2336	ns
Minimum of. R.H.	-0.4738	0.0144	*	-0.4842	0.0121	*
Average of R.H.	-0.3281	0.1017	ns	-0.3989	0.0434	*

ns=in significant    \* = significant with varied degree  
 Where: R= correlation coefficient    P= probability    S= significant sign.

Table (6) demonstrate the simple correlation coefficient values between biweekly number of this insect and certain weather factors. The results cleared that variables c. maximum temperature in year 2005 and

minimum, average R.H. % had positive significant effect on the population density of this insects in 2005 and 2006.

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## دراسات ايكولوجية على بعض الحشرات الثاقبة الماصة التي تهاجم اشجار الخوخ والمفترسات الحشرية المرتبطة بها في منطقة المنصورة نادية الحسيني محمد معهد بحوث وقاية النباتات مركز البحوث الزراعية-الدقي - الجيزة - مصر

أجريت تجارب حقلية على الخوخ في منطقة المنصورة لدراسة الكثافة العددية للحشرات الماصة والتي تصيب هذا المحصول وبعض المفترسات الحشرية المرتبطة بها. ولقد أوضحت النتائج المتحصل عليها وجود سبعة أنواع من الحشرات الثاقبة الماصة تتبع رتبة متشابهة الأجنحة تهاجم اشجار الخوخ وهذه الأنواع هي :-

*Myzus persicae* Sulzer ; *Agallia aegyptiaca* Host; *Empoasca lypica* de Berg ; *E. discipiens* Paoli; *Bemisia tabaci* (Gennanius) ; *Icerya seychellarum* (Westwood) and *Lepidosaphes ulmi* L.

كذلك تم تسجيل أربعة أنواع من المفترسات الحشرية المرتبطة بهذه الحشرات وهي تتبع رتبتين هما رتبة غمدية الأجنحة وشبكية الأجنحة والمفترسات التي تتبع رتبة غمدية الأجنحة هي

*Scymnus intrepitus* Goese; *Rodolia cardinalis* Muls; *Exocomus nigromaculatus*(goeze).

ومن رتبة شبكية الأجنحة تم تسجيل النوع أسد المن *Chrysoperla carnea* (Steph.) وأوضحت النتائج أن من الخوخ الأخضر *M. persicae* له ثلاث ذروات أو قمم على اشجار الخوخ في السنة الأولى ولكن في السنة الثانية فكان لهذه الحشرة أربعة قمم. وسجلت أعلى ذروة لها في الأسبوع الأول من شهر يونيو سنة ٢٠٠٥ بينما كانت هذه الذروة في الأسبوع الأخير من شهر يونيو ٢٠٠٦. وأظهرت نتائج التحليل الأحصائي أن لدرجة الحرارة تأثير غير معنوي على الكثافة العددية لهذه الحشرة، بينما الرطوبة النسبية فكان لها تأثير معنوي موجب بين الضعيف والقوي على الكثافة العددية لهذه الآفة الحشرية خلال عامي الدراسة. وسجلت النتائج المتحصل عليها أن حشرة *I. seychellarum* لها ثلاث ذروات أو قمم خلال عامي الدراسة وكان أعلى قمة لها في الأسبوع الأخير من سبتمبر في السنة الأولى ولكن في السنة الثانية وجدت هذه القمة في الأسبوع الأخير من شهر أكتوبر. وأوضح التحليل الأحصائي أن لدرجة الحرارة تأثير معنوي عالي موجب على الكثافة العددية لهذه الحشرة خلال عامي الدراسة. بينما الرطوبة النسبية فكان تأثيرها غير معنوي على الكثافة العددية لهذه الحشرة. وتوضح النتائج أن النوع المفترس *S. intrepitus* له ثلاث قمم أو ذروات في السنة خلال سنتي الدراسة بينما المفترس

*R. cardinalis* فله في السنة الأولى ذرتين بينما في السنة الثانية فله ثلاث ذروات وأوضح التحليل الأحصائي أن لدرجة الحرارة والرطوبة النسبية تأثير تراوح فيما بين المعنوي الموجب الضعيف أو القوي على الكثافة العددية لهاتين الحسرتين خلال عامي الدراسة.