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SURVEY AND SEASONAL ABUNDANCE OF APHIDS INFESTING LEAVES OF APPLE AND PEACH TREES AND ASSOCIATED APHIDOPHAGOUS INSECTS IN EL-KHATTARA DISTRICT, SHARKIA GOVERNORATE, EGYPT

El-Maghraby, M.M.A.[1], M.M. El-Zohairy[1], Aziza, M. El-Gantiry[2] and Sh. A. M. Ali[2]

[1]Dept. of Plant Protection, Fac. of Agric., Zagazig Univ., Egypt.
[2]Plant Protection Research Institute, Dokki, Giza.

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ABSTRACT: Survey studies on aphid species of apple and peach fruit trees cultivated in newly reclaimed sandy areas at El-khattara district, Sharkia Governorate, Egypt, revealed the occurrence of *Aphis gossypii* Glov. and *Myzus persicae* Sulz. infesting leaves of apple, while *Hyalopterus pruni* (Geoffroy) infesting peach. The results obtained on aphidophagous insects associated with aphids could be summarized as follows :

Insect predators: *Orius albidipennis* Reut. (Anthocoridae; Hemiptera), *Chrysoperla carnea* (Steph.) (Chrysopidae, Neuroptera), *Coccinella undecimpunctata* L., *Cydonia vicina* var. *nilotica* Muls and *Cydonia vicina* var. *isis* Gr. (Coccinellidae, Coleoptera) *Aphidoletes aphidimyza* Reut. (Cecidomyiidae, Diptera) *Syrphus corollae* F. (Syrphidae, Diptera) were recorded, where *Orius albidipennis* Reut. and *Cydonia vicina* var. *isis* were detected only on apple trees.

Parasitoids: *Aphidius colemani* Vier. and *A. matricariae* Hal. were reared from *A. gossypii* and *M. persicae* infesting apple, while *Aphidius colemani* and *A. picipes* (Nees) emerged from *H. pruni* infesting peach.

Four, five peaks and one peak of *A. gossypii* population activity were recorded on apple during the three seasons of study 2001, 2002 and 2003, respectively. In case of *M. persicae* two peaks of activity were recorded in 2001, and only one peak of activity was detected in next two seasons 2002 and 2003 on apple trees.

Three, four and two peaks of *H. pruni* activity were observed on peach trees, through 2001, 2002 and 2003, respectively .

Aphid predators associated with aphids infesting apple trees showed three peaks of activity during the first season 2001, only one peak during the next two seasons of (2002 and 2003).

Aphid predators associated with *H. pruni* infesting peach trees showed three peaks of activity in 2001, two peaks in 2002 and one peak in the third season , 2003.

Parasitoids

***A. colemani* and *A. matricaria* associated with *A. gossypii* and *M.persicae* infesting apple trees were recorded one peak during every season of study 2001, 2002 and 2003.**

Two peaks of *A. colemani* activity in relation to *H. pruni* infesting peach trees in the first and third seasons of 2001 and 2003, while, four peaks were recorded in the second season, 2002.

Two peaks of activity were detected for *A. picipes* parasitizing *H. pruni* on peach trees during the three seasons of study.

Key words : Aphids, aphidophagous insects, apple and peach trees.

INTRODUCTION

The area cultivated with fruit trees is increasing by adding new areas particularly in reclaimed sandy areas, to meet with the increasing demand for local consumption and to increase tonnage for export (Attia 1983).

The most injurious pests attacking fruit trees are aphids. Damage caused by aphids is due to feeding on the plant-sap causing direct injury to the trees. Aphids are also known to transmit virus diseases to the plants Ismail *et al.* (1991) and Hegab, Ola , (2001). In Egypt also, there are some reports on the relative importance of aphids El-Kady *et al.* (1970). Attia 1983, Ibrahim and Afifi, Amal (1993); Ibrahim and Afifi, Amal (1994), recorded that *Hyalopterus pruni* (Geoffroy) is the most injurious aphid species on peach and apricot.

The use of insecticides in controlling aphids, generally, leads to many problems, not only increasing resistant strains of aphids to these chemical substances, but also in induction of pollution to man and beneficial insects such as bees and other pollinators, insect parasitoids and predators(El-Maghraby, 1993).

The relationships between aphids and their natural enemies have drawn the attention of many investigators in Egypt such as: Attia 1983. Abbas 1985,

El-Maghraby *et al.* 1989, Ibrahim *et al.* 1992, El-Maghraby 1993, El-Maghraby *et al.* 1994, Ibrahim 1994, Ali 1996, Saleh *et al.* 2006 and El-Baz 2007 and in the world such as : Carroll and Hoyt 1984 and 1986, Tracewski *et al.* 1984, Hagley and Allen 1990; Fitzgerald *et al.* 2001 and El-Aish Hana *et al.* 2004..

Therefore, the aim of this investigation is to survey and study the seasonal abundance of aphid species and their associated aphidophagous insects on apple and peach trees in the newly reclaimed sandy areas of El-Khattara district, Sharkia Governorate, Egypt which may be helpful in (IPM)crops management in apple and peach orchards.

MATERIALS AND METHODS

To study the population fluctuations of aphids and aphidophagous insects, the present investigation was conducted throughout three successive seasons of 2001, 2002 and 2003, on both apple and peach trees, in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate. Samples were taken weekly. Five trees were chosen randomly from each fruit trees under investigation. Ten leaves of different sizes were picked up, from the different sites of each tree, thus, the sample consisted of 50 infested leaves/ sample/ fruit species. The collected samples were kept each in a paper bag, and carefully transferred to the laboratory, to be examined under a stereoscopic microscope. The number of aphids were directly counted and recorded. Adults of predators in most cases were directly counted, in some few cases laboratory rearing was necessary for the immature stages till the emergence of adults, which were identified and recorded according to El-Maghraby *et al.* 1989. In case of aphid parasitoids, the number of mummies / sample were recorded. Laboratory rearing was made to obtain parasitoids adults. The obtained parasitoids were mounted, identified and recorded according to El-Maghraby *et al.* 1989 and 1994.

Daily records of minimum and maximum temperature along with relative humidities were obtained from the Agrometerological station at Zagazig region during. The relationship between the weekly mean number of aphid individuals and the corresponding weekly means of minimum and maximum temperatures and relative humidity were recorded. The simple correlation, multiple partial regression and explained variance values were calculated according to Snedecor and Cochran 1967 and SAS 1999.

RESULTS AND DISCUSSION

Survey of Aphid Species Infesting Leaves of Apple and Peach Trees and Associated Aphidophagous Insects

Aphid species and their associated aphidophagous insects on the two selected crops had been surveyed during 2001, 2002 and 2003 seasons under normal agricultural practices and pesticide free.

The most common aphid species secured were :

1- *Aphis gossypii* Glov. on apple.
2- *Myzus persicae* Sulz. on apple.
3- *Hyalopterus pruni* Geoffer. on peach.

The total number of *A. gossypii* infesting leaves of apple trees was high during the three seasons of study, and represented by 78.13, 98.11 and 70.53%, respectively, when compared with *M. persicae* 21.87, 1.89 and 29.47% in respect (Table 1).

Generally, the infestation of apple leaves by aphids was higher in the first season, 2001, followed by 2002 and 2003 seasons, (Table 1). On the other hand infestation of peach leaves by *H. pruni* was higher in the second season, 2002, (10777 individuals) when compared with the first one 2001 (7345 individuals) followed by 2003 season (1769 individuals), Table(1). The above results are in agreement with findings of Ismail *et al.* 1986 and 1991, Ibrahim and Afifi, Amal, 1993 and 1994 and Jerraya 1997, where they reported that *H. pruni* infested peach trees.

Two groups of aphidophagous insects were recorded associated with aphid species as follows :

Predators Associated with Aphids Infestation on Apple and Peach Leaves

Hemipterous insects

Orius albidipennis Reut. (Hemiptera, Anthocoridae).

Neuropterous insects

Chrysoperla carnea Steph. (Neuroptera, Chrysopidae)

Coleopterous insects

Coccinella undecimpunctata L., *Cydonia vicina* var. *nilotica* and *Cydonia vicina* var. *isis* Gr. (Coleoptera, Coccinellidae)

Dipterous insects

Syrphus corollae F. (Diptera, Syrphidae) *Aphidoletes aphidimyza* Rond. (Diptera, Cecidomyiidae).

Where *O. albidipennis* and *Cydonia vicina* var. *isis* were found only on apple trees.

On apple trees

Results are given in Table 1 show clearly that *Cy. vicina* var. *nilotica* came in first rank 28.07% followed by *C. undecimpunctata* 21.05% and both of *O. albidipennis*

Table 1.Total number and percentage of aphid species infesting leaves of apple and peach trees and associated aphidophagous insects during 2001,2002 and 2003 seasons in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate , Egypt.

Aphids and aphidophagous insects	Apple						Peach					
	2001		2002		2003		2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. Aphids (Homoptera; Aphididae)												
Aphis gossypii (Glover)	11884	78.13	3014	98.11	1678	70.53	0		0		0	
Myzus persicae (Sulzer)	3327	21.87	58	1.89	699	29.47	0		0		0	
Hyalopterus pruni (Geoffroy)	0		0		0		7345	100	10777	100	1769	100
Total	15211	100%	3072	100%	2372	100%	7345	100%	10777	100%	1769	100%
2.Aphidophagous:												
a. Predators												
I. Or:: Hemiptera; Anthocoridae												
Orius albidipennis Reut.	27	15.79	16	18.82	8	8.99	0		0		0	
II. Or : Neuroptera; Chrysopidae												
Chrysoperla carnea (Steph.)	27	15.79	7	8.23	30	33.70	22	10.94	27	19.29	0	0
III. Or: Coleoptera; Coccinellidae												
Coccinella undecimpunctata L.	36	21.05	0	0	13	14.61	25	12.44	19	13.57	20	32.26
Cydonia vicina var. *nilotica* Muls.	48	28.07	0	0	22	24.72	29	14.43	38	27.14	0	0
Cydonia vicina var. *isis.* Gr.	0		6	7.06	0	0	0	0	0	0	0	0
IV. Or : Diptera; Cecidomyiidae												
Aphidoletes aphidimyza Reut.	20	11.70	32	37.65	16	17.98	106	52.74	36	25.71	42	67.74
Fam: Syrphidae												
Syrphus corollae F.	13	7.60	24	28.24	0	0	19	9.45	20	14.29	0	0
Total	171	100%	85	100%	89	100%	201	100%	140	100%	62	100%
b. Parasitoids												
Or: Hymenoptera; A phidiidae												
Aphidius colemani Viereck	16	69.57	12	66.67	25	69.44	2146	87.06	1045	88.86	323	85
Aphidius picipes (Nees)	0		0		0		319	12.94	131	11.14	57	15
A. matricariae Hal.	7	30.43	6	33.33	11	30.56	0		0		0	
Total	23	100%	18	100%	36	100	2465	100%	1176	100%	380	100%

and *C. carnea* were represented by 15.79%, while *A. aphidimyza* and *S. corollae* recorded 11.7 and 7.6% from the total number of aphid predators on apple during the first season of 2001. In the second season 2002, the total number of *A. aphidimyza* was the highest and represented by 37.65% followed by *S. corollae* 28.24 %, where *O. albidipennis* recorded 18.82, while *C. carnea* and *Cy. vicina* var. *nilotica* presented by 8.23 %and 7.06% of the total number of aphid predators respectively. In the third season of 2003, total number of *C. carnea* came in first rank 33.70 followed by *Cy. vicina* var. *nilotica* 24.72 where *A.aphidimyza* recorded 17.98, then *C. undecimpunctata* represented by 14.61 % and *O. albidipennis* by 8.99% of total number of aphid predators.

On peach trees

As seen from Table 1, the total number of *A. aphidimyza* was the highest, presented by 52.74% followed by *Cy. vicina* var. *nilotica* (14.43%), *C. undecimpunctata* and *C. carnea* (12.44 and 10.94%) and *S. corollae* with value (9.45%) of total number of aphid predators during the first season 2001. In the second season 2002, total number of *Cy. vicina* var. *nilotica* was the highest and represented by 27.14% followed by *A. aphidimyza* (25.71%), *C. carnea* (19.29%), *S. corollae* and *C. undecimpunctata* by 14.29 and 13.57% respectively of the total number of aphid predators on peach.

In the third season of 2003, Table 1, the total number of *A. aphidimyza* was the highest 67 74% followed by *C. undecimpunctata*, 32.26% of the total number of aphid predators on peach.

Parasitoids Associated with Aphids Infestation on Apple and Peach Leaves

- *Aphidius colemani* Vier. and *A. matricariae* were associated with *A. gossypii* and *M. persicae* infesting leaves of apple trees.
- *Aphidius colemani* and *Aphidius picipes* (Nees) were associated with *H. pruni* infesting leaves of peach trees.

On apple

A. colemani associated with *A. gossypii* and *M. persicae* infested apple by 16, 12, 25 individuals during 2001, 2002 and 2003 seasons, representing of 69.57, 66.67 and 69.44% of the total number ofparasitoids, respectively. While *A. matricariae* recorded 7, 6and11individuals and represented by 30.43, 33.33 and 30.56% of the total number of parasitoids during 2001, 2002 and 2003 seasons respectively,Table (1).

On peach

A. colemani attacked 2146, 1045 and 323 *H. pruni* individuals with percentage of 87.06, 88.86 and 85% of the total number of parasitoids, during 2001, 2002 and 2003 seasons, respectively. While, *A. picipes* recorded 319, 131 and 57 individuals and represented by 12.94, 11.14 and 15% of the total number of parasitoids during 2001, 2002 and 2003 seasons, respectively, (Table 1).

Seasonal Abundance of Aphid Species Infesting Apple and Peach Trees in Relation to Temperature and Relative Humidity, in 2001-2003 Seasons

On apple trees

Leaves of apple trees were infested with two aphid species *Aphis gossypii* and *Myzus persicae*.

A. gossypii

As seen from Fig. 1, four peaks of population activity were recorded during the first season 2001, on the second week of May (237 individuals /sample) at a mean of 30.1°C and 53.3% R.H., 3rd. week of June 4065 individuals / sample at a mean of 27.9°C and 56.3% R.H., 3rd week of July (1323 individuals / sample) at a mean of 27.0°C and 61.6% R.H., and on the 2nd week of Oct. 34 individuals/ sample at mean of 30.5°C and 63.1%R.H., for the five peaks of population respectively

In the second season 2002, Fig 2, five peaks of population activity were recorded in the first week of April 81 individuals/ sample at mean of 17.3°C and 57.1% R.H., first week of May (1283 individuals/sample), at mean of 21.3°C and 55.1% R.H., in the 1st week of July (25 individuals/ sample) at mean of 29.0°C and 54.3% R.H., in the 3rd week of July (25 individuals/ sample) at mean of 28.8°C and 58.6% R.H. and on the 3rd week of Sept. 189 individuals / sample at mean of 28.3°C and 59.9% R.H.

While in the third 2003 Fig 3, only one peak of activity was recorded with a total number of 584, individuals / sample on the 4th week of April at means of 20.7°C & 55.4%, R.H., respectively.

It is worth to mention that a low numbers of *A. gossypii* were collected on the 3rd week of June (13 individuals/ sample) and 4th week of Sept. 18 individuals / sample.

M. persicae

In the first season 2001 Fig. 1, two peaks of activity were observed with 202 and 538 individuals / sample on the 4th week of May and 3rd week of June at means 28.4 and 27.9°C & 51.6 and 56.3% R.H., respectively. In the second season 2002, Fig. 2, few numbers of *M. persicae* were observed and only one peak of

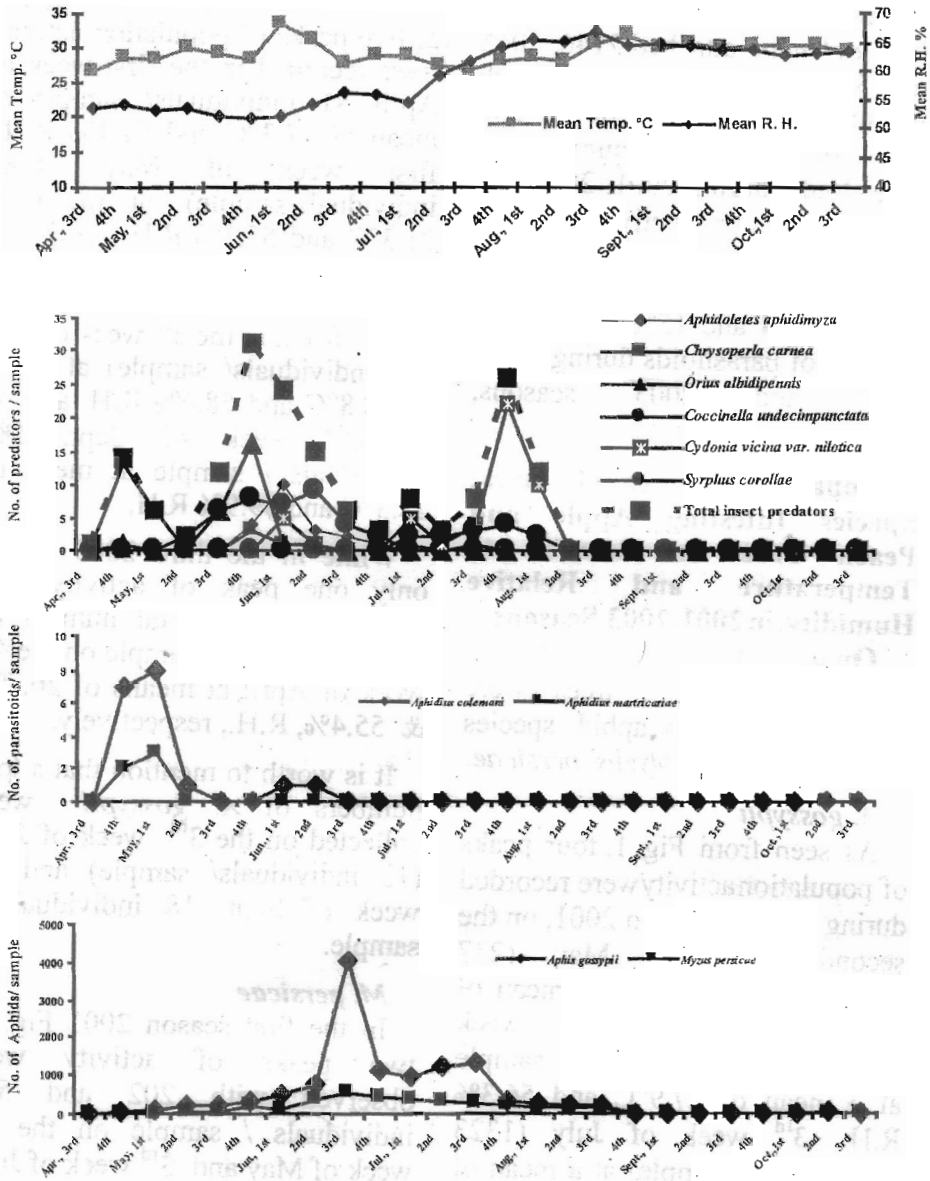

Fig. 1. Seasonal abundance of aphids / sample infesting leaves of apple trees and aphidophagous insects during 2001 season in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate, Egypt.

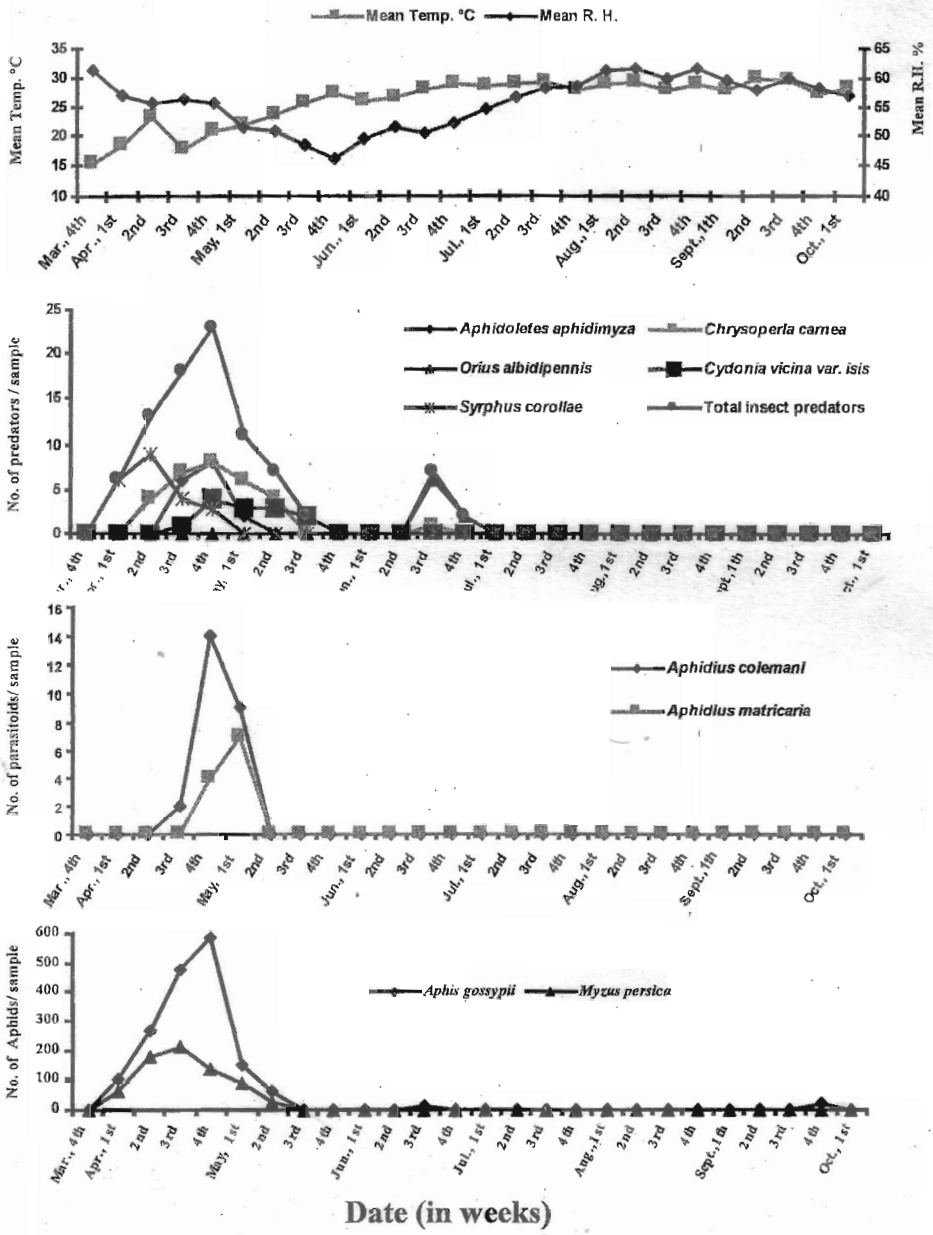

Fig. 3. Seasonal abundance of aphids / sample infesting leaves of apple trees and aphidophagous insects during 2003 season in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate, Egypt.

activity was recorded on the first week of May with 32 individuals/ sample at mean of 21.3°C and 55.1% R.H.

Also one peak of the population activity was recorded in the third season 2003 Fig. 3, on the 3rd week of April with 210 individuals / sample at means of 17.8°C and 56.3% R.H.

On peach trees

Aphid individuals of *H. pruni* prefer the lower surface of the leaves than the upper ones. The weekly counts of this aphid, as seen from Fig. 4, three peaks of activity were recorded during the first season 2001, on the 4th week of each April, May and June with respective values of 1261, 1119 and 324 individuals/sample at means of 28.8, 28.4 and 29.1°C & 54.0, 51.6 and 55.9% R.H., respectively. In the second season of 2002, four peaks of activity were recorded on the 4th week of march with 3270 individuals/ sample recorded at means 17.9°C and 55.8% R.H., 3rd week of April 1234 individuals / sample at 28.1°C and 47.0% R.H., 1st week of May with 1286 individuals/ sample at 21.3°C and 55.1% R.H. and the 1st week of July 393 individuals/ sample at 29.0°C and 54.1% R.H., (Fig. 5).

Two peaks of activity were recorded during the third season, as shown in 2003, Fig. 6 on the 4th week of April 828 individuals/ sample at means of 20.7°C and 55.4% R.H. and 229 individuals/ sample obtained on the 2nd week of May at means of 23.5°C and 50.8% R.H. The results agree with those recorded by Jerraya (1997) who found that *H. pruni* infested peach trees at the beginning of May, where natural enemies and very high summer temp. (>43°C) led to total aphid mortality.

Seasonal Abundance of Aphidophagous Insects Associated with Aphids Infesting Apple and Peach Trees During Three Successive Seasons of 2001, 2002 and 2003 in El-Khattara District, Sharkia Governorate, Egypt

On apple trees

C. carnea

One peak of *C. carnea* activity was recorded in each season of 2001, 2002 and 2003, Figs. 1-3 on the 4th week of April, first week of May and 4th week of April with values 13, 3 and 8 individuals/ sample at means of 28.8, 21.3 and 20.7°C & 54.0, 55.1 and 55.4% R.H., respectively.

A. aphidimyza

Fig. 1, shows that *A. aphidimyza* recorded one peak of activity, (10 individuals/sample) on the first week of June at means of 33.7°C and 52.2% R.H. during the first seasons, 2001. Also one peak of activity was recorded in both 2002

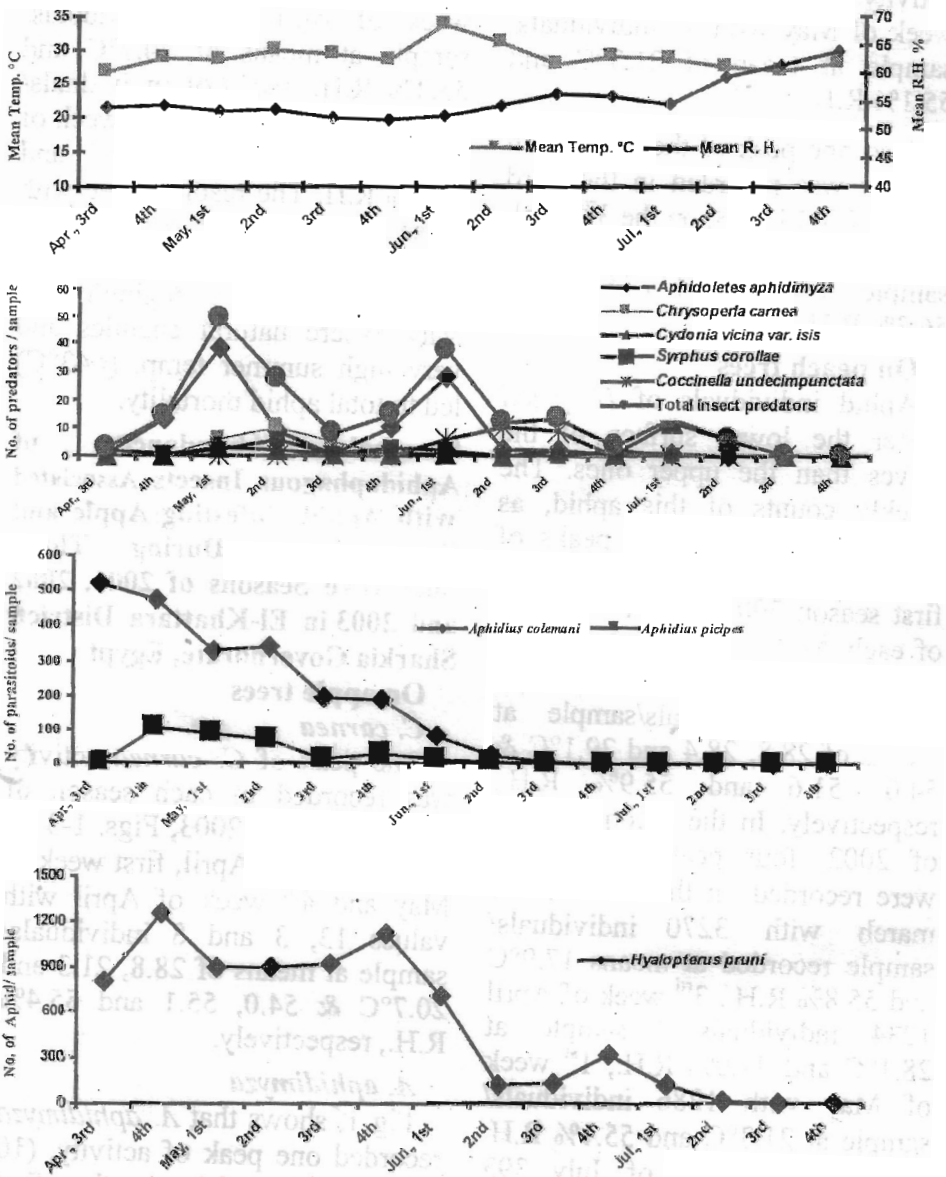

Fig. 4. Seasonal abundance of aphid / sample infesting leaves of peach trees and aphidophagous insects during 2001 season in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate, Egypt.

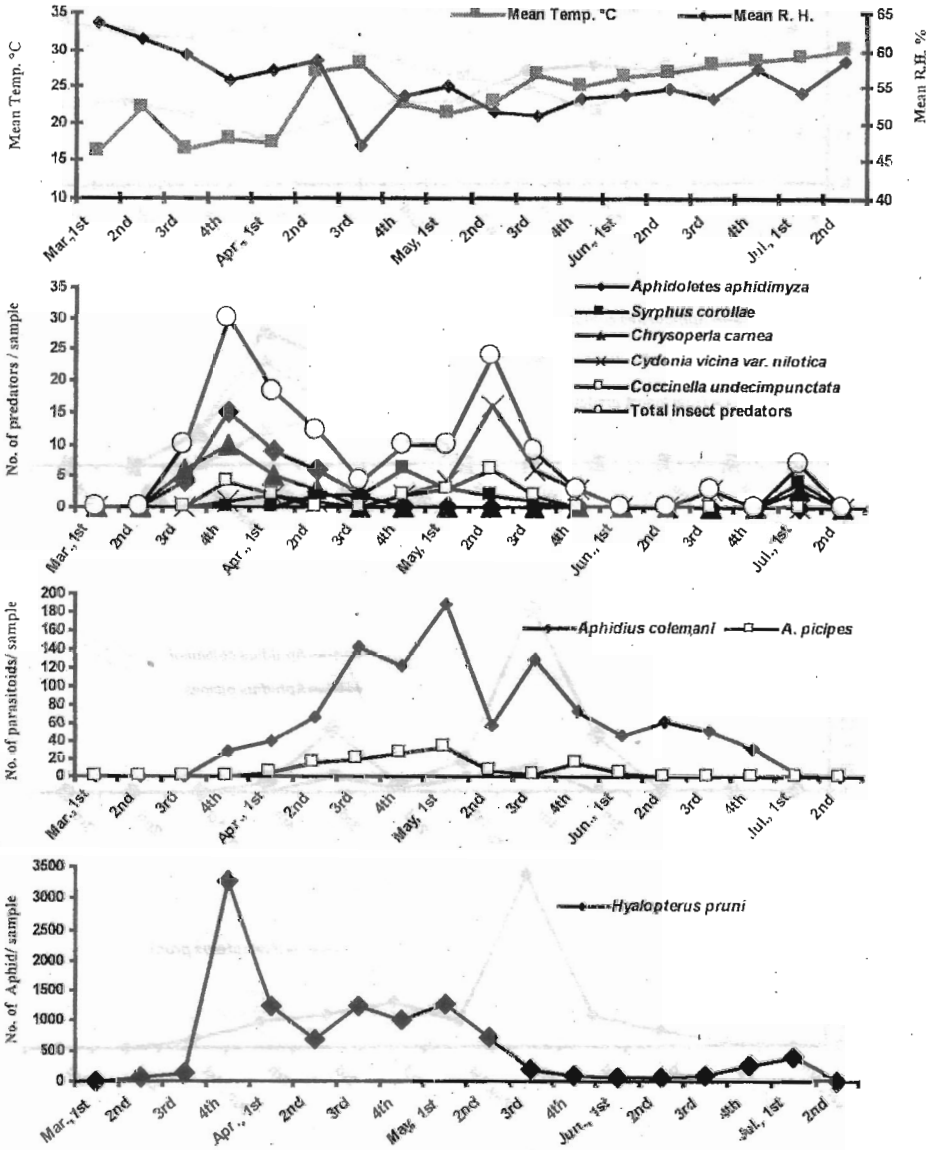

Fig. 5. Seasonal abundance of aphid / sample infesting leaves of peach trees and aphidophagous insects during 2002 season in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate, Egypt.

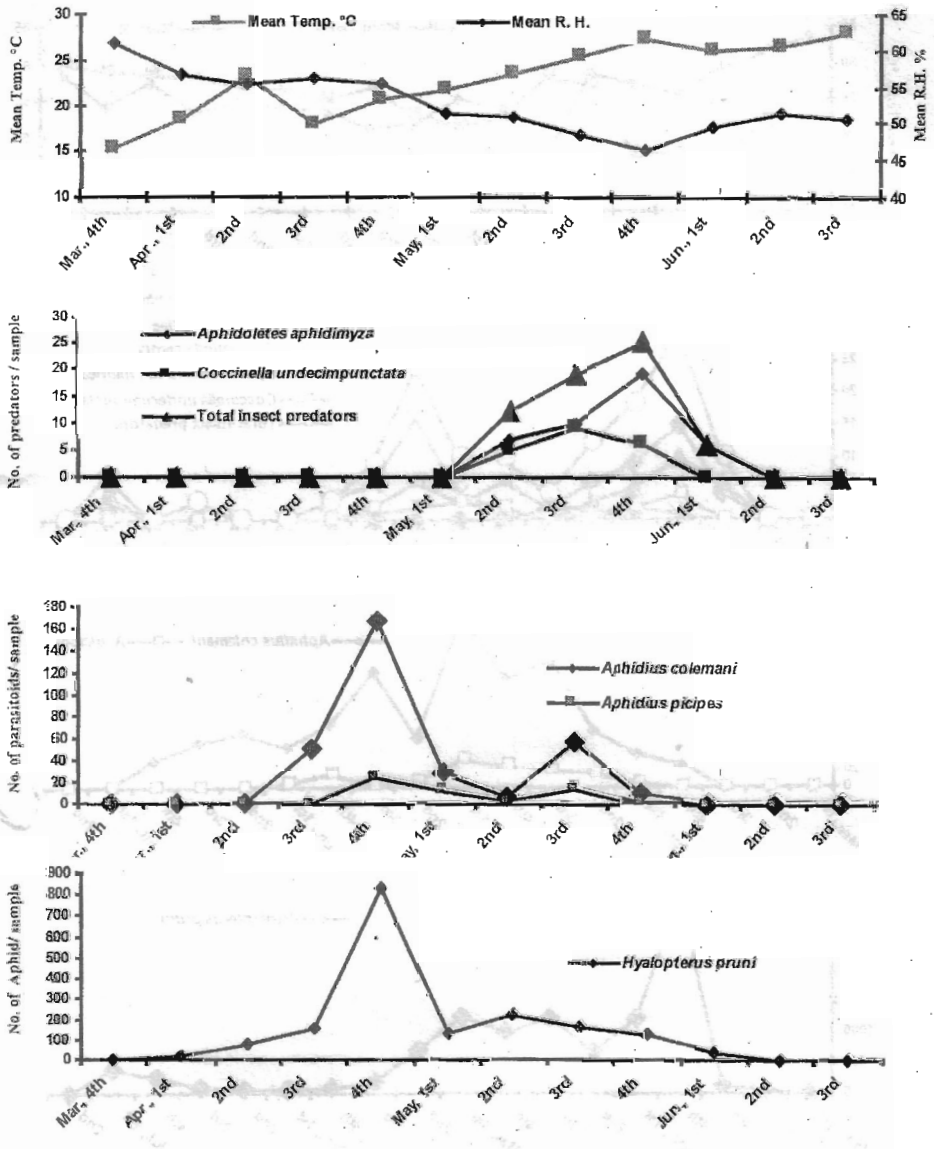

Fig. 6. Seasonal abundance of aphid / sample infesting leaves of peach trees and aphidophagous insects during 2003 season in newly reclaimed sandy area of El-Khattara district, Sharkia Governorate, Egypt.

and 2003 seasons by 17 and 8 individuals/sample on the 2nd week of May and 4th week of April at means of 23.0 and 20.7°C & 51.6 and 55.4% R.H., respectively Figs. (2 and 3)

O. albidipennis

Data in Fig. 1 indicate that *O. albidipennis* recorded one peak of activity by 16 individuals/sample on the 4th week of May at means 28.4°C and 51.6% R.H. during the first season of study, 2001. In the second season 2002, Fig. 2, two peaks of activity with 5 individuals / sample were recorded on the 4th week of April and on 3rd week of Sept. at means of 22.8 and 28.3°C &53.7and59.9%R.H., respectively. One peak of activity was recorded on the 3rd week of June (6 individuals /sample) at means of 28.0 and 50.6% R.H. Fig. 3 in the third season.

C. undecimpunctata

One peak of activity was recorded during both of the first season (2001) and third season 2003, with respective values of 9 and 4 individuals/sample on the 2nd week of June and 4th week of April at means of 31.2 and 20.7°C & 54.1 and 55.4% R.H., respectively, Figs. (1 and 3).

While in the second season of study 2002 no individuals of *C. undecimpunctata* were recorded associating with aphids infested apple trees.

Cy. vicina* var. *nilotica

During the first season (2001) Fig. 1 shows that three peaks of population activity were recorded in the first week of June, 1st and 4th week of July with respective values 5,5 and 22 individuals / sample, at means of 33.7, 28.9 and 28.1°C & 52.2, 54.5 and 64.1% R.H., respectively. No individuals of *Cy.vicina* var. *nilotica* were recorded during the second season of 2002. One peak of activity recorded 9 individuals/ sample in the 2nd week of April at means 23.2°C and 55.6R.H. during the third season (2003) Fig. (3).

S. corollae

As shown in Fig. 1, one peak of activity was recorded on the 4th week of July by 4 individuals/ sample, at means of 28.1°C and 64.1%R.H., during the first season, 2001, also one peak of activity was recorded during the second season, 2002 with 10 individuals/sample, on the first week of May at means of 21.3°C and 55.1% R.H., Fig. 2. No individuals of *S. corollae* were recorded during the third season of study, 2003.

Total predators

The following discussions on the population density of predators, are based on the records of the total number of them. In the first

season threepeaksof the population density of predators were noticed on 4th week of each April, May and July by total numbers of14,31 and 26 individuals / sample at means of 28.8, 28.4 and 28.1°C & 54.0, 51.6 and 64.1%R.H., respectively, while in both of 2nd and 3rd season (2002 and 2003)only one peak was recorded on 2nd week of May (28 individuals/ sample at means of 23.0°Cand 51.6%R.H.and 4th week of April, 2003 (23 individuals / sample) at means of 20.7°C and 55.4%R.H.

The obtained results agree with El-Maghraby *et al.* 1989, who found that *S. corollae, C. carnea, Orius* spp., *C. septempunctata* and *C.undecimpunctata* associated with *A. gossypii* and *M. persicae* infested cucumber and cantaloupe cultivated in newly reclaimed sandy area of El-Kassasien district, Egypt. Mangoud 2000, found two peaks of predators associated with *A. gossypii* and *M. persicae* infesting apple trees in mid-May and mid-June with mean numbers of 11.8 and 9.7 predators/terminal leaf, respectively.

On peach trees

A. aphidimyza

As shown in from Fig. 4, two peaks of activity were recorded in the first week of May and first week of June by 38 and 28 individuals/ sample at means of 28.5 and 33.7°C & 53.1 and 52.2% R.H, respectively, during the first season, 2001. One peak of activity of *A. aphidimyza* on peach trees by 15 individuals/ sample were recorded in the last week of March at means of 17.9°C and 55.8% R.H., in the second season, 2002 Fig. 5. Also one peak of activity was recorded during the third season of study, in the 4th week of May with 19 individuals/ sample at means of 27.3°C and 46.2% R.H. Fig. (6).

S. corollae

Figs. 4 and 5 show that, two peaks of activity were obtained in both 2001 and 2002 seasons, on the 2nd and 4th week of May, by 6 and3 individuals/ sample, at means 30.1 and 28.4°C & 53.3 and 51.6% R.H. respectively and in the 4th week of April and 1st week of July. with 6 and 4 individuals/ sample, at means 22.8 and 29.0°C & 53.7 and 54.3% R.H., respectively. In the third season of study 2003 no individuals of *S. corollae* were recorded associating *H. pruni* infesting peach trees.

C. carnea

Fig. 4 shows one peak of activity by 10 individuals/sample in the first season, 2001 on the 2nd week of May, at means 30.1°C and 53.3% R.H. In the second season 2002, two peaks of activity were

obtained on the 4th week of march and 1st week of July with, respective values 10 and 3 individuals/sample, at means temp. 17.9 and 29°C & 55.8 and 54.3% R.H. respectively.

No individuals of *C. carnea* were recorded in the third season of 2003.

Cy. vicina* var. *nilotica

Fig. 4 shows two peaks of activity obtained on the first week of May and 1st week of July with respect values 3 and 12 individuals/ sample at means temp. 28.5 and 28.9°C & 53.1 and 54.5% R.H. in the first season 2001.

In the second season (2002), Fig. 5, shows three peaks of activity on the first week of April, 2nd week of May and 3rd week of June by 2, 10 and 3 individuals/ sample, at means temp. 17.3, 23.0 and 28.0°C & 55.8, 51.6 and 53.5 % R.H., respectively.

No individuals of *Cy. vicina* var. *nilotica* were associated with *H. pruni* infesting leaves of peach trees during the third season.

C. undecimpunctata

As shown in Fig. 4, one peak of activity was recorded on the 2nd week of June, 10 individuals/sample, at means 31.2°C and 54.1% R.H. during the first season 2001.

In the second season 2002 Fig. 5, two peaks of activity were recorded on the 4th week of March and 2nd week of May by 4 and 6 individuals/sample at means temp. 17.9 and 23.0°C & 55.8 and 51.6% R.H. respectively.

One peak of activity was obtained by 9 individuals/sample in the 3rd week of May at mean temp. 25.4°C and 48.3% R.H. during the third season, 2003, Fig. (6).

Total predators

As seen in Fig. 4, three peaks of the population density of predators were recorded in 2001 season, the first one occurred on 1st week of May with a total number of 49 individuals/ sample at mean temp. 28.5°C and 53.1%R.H the second peak was noticed on 1st week of June by 37 individuals/ sample at mean temp. 33.7°C and 52.2%R.H. and the third peak was recorded by a low number (13 individuals/ sample at mean temp. 28.9°C and 54.5% R.H. on 1st week of July. During the second season of 2002 Fig. 5 two peaks of the predators population density were recorded, the first one occurred on 4th week of March with a total number of 30 individuals /sample at mean temp.17.9°C and 55.8% R.H. and the second peak was obtained on 2nd week of May with a total number of 24 individuals/ sample, at means temp. 23.0°C and 51.6% R.H. Few numbers of predators were collected during June and July 2002, while in the 3rd season, 2003 Fig. 6, only one peak of

predators population density occurred on the 4th week of May by a total number of 25 individuals/ sample at mean temp. 27.3°C and 46.2% R.H.

It is worth to mention that no individuals of *C. carnea* and *Cy. vicina* var. *nilotica* were recorded on peach samples during 2003 season, also no individuals of *C. undecimpunctata* were recorded on apple samples during 2002 season.

Parasitoids

***A.colemani* and *A. matricaria*, on *A. gossypii* and *M. persicae* infesting apple leaves**

A. colemani

A.colemani individuals recorded high numbers of this wasp on the first week of May, first week of April and 4th week of April, with respective values of 8, 7 and 14 individuals/sample at means 28.5, 17.3 and 20.7°C & 53.1, 57.1 and 55.4% R.H. during the three seasons 2001, 2002 and 2003 respectively, (Figs. 1-3).

A. matricariae

This wasp was observed with high numbers on the first week of each of May, April and May with 3, 4 and 7 individuals /sample, at means 28.5, 17.3 and 21.8°C & 53.1, 57.1 and 51.4% R.H., during the three seasons of 2001, 2002 and 2003 respectively, (Figs.1-3).

It is worth to mention that *A. colemani* and *A. matricaria* individuals were recorded a low numbers during the period from the 4th week of April to 2nd week of May, 2002 , during the first half of April , 2003 and 3rd , 4th week of April and 1st week of May, 2003.

***A. colemani* and *A. picipes* associated with *H.pruni* infesting peach leaves**

A. colemani

As shown in Fig. 4 *A. colemani* recorded two peaks of activity in the 3rd week of April and 2nd week of May with values of 518 and 339 individuals/sample, at means 26.7 and 30.1°C & 53.6 and 53.3% R.H. respectively, during the first season, (2001).

In the second season (2002), Fig. 5, shows four peaks of *A. colemani* activity by 143, 190, 128 and 62 individuals/sample, on the 3rd week of April, on the first and 3rd week of May and on the 2nd week of June with means temp. 28.1, 21.3, 26.6 and 27.0°C & 47.0, 55.1, 51.1 and 54.7% R.H., respectively.

Two peaks of activity were recorded on the 4th week of April and 3rd week of May, with values of 167 and 58 individuals/sample at means of 20.7 and 25.4°C & 55.4 and 48.3% R.H., respectively,

Table 2. Multiple partial regression, simple correlation and (E.V%) values between aphids and associated aphidophagous insects on apple and peach trees and climatic factors (Max. Temp. °C. , Min. Temp. °C and Mean R.H.%) during 2001 season at El-Khattara district, Sharkia Governorate , Egypt.

Variable			Apple											Peach								
			Aphids		Aphidophagous insects									Aphid	Aphidophagous insects							
					Parasitoids				Predators						Parasitoids		Predators					
Source			*A. gossypii*	*M. persicae*	*Aphidius colemani*	*A. matricariae*	*Aphidoletes aphidimyza*	*Chrysoperla carnea*	*Ortus albidipennis*	*Coccinella undecimpunctata*	*Cydonia vicina* var. *nilotica*	*Syrphus corollae*	Total insect predators	*H. pruni*	*A. colemani*	*A. picipes*	*A. aphidimyza*	*S. corollae*	*C. carnea*	*Cydonia vicina* var. *nilotica*	*C. undecimpunctata*	Total insect predators
Max. Temp. °C	P.R.	b+/.	-0.2053	-0.3909	0.0592	0.0431	0.4246	0.0171	-1.4961	0.1426	0.5556	-0.8918	-0.3275	-0.1835	-0.0528	-0.0524	0.3491	0.2860	-0.4073	-0.5075	0.8351	0.3370
		t	0.689	1.328	0.203	0.206	1.911	0.060	0.538	0.637	2.171	4.559	1.325	-0.522	0.135	0.100	0.718	0.597	0.803	0.956	1.805	0.736
		p	n.s	n.s	n.s	ns	n.s	n.s	n.s	n.s	*	***	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	-0.129	-0.145	0.187	0.185	0.624	0.160	0.152	0.502	-0.414	-0.701	-0.142	0.435	0.198	0.233	0.494	0.436	0.156	-0.221	0.416	0.562
		p	n.s	n.s	n.s	n.s	**	n.s	n.s	*	n.s	**	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	*
Min. Temp. °C	P.R.	b+/.	-0.2291	0.1166	-0.1792	-0.1780	0.4620	-0.2382	0.1536	0.4992	0.5984	0.5050	0.6697	-0.1845	-0.5373	-0.0842	0.0446	-0.2108	0.1903	0.2829	0.0639	0.1395
		t	0.636	0.328	0.509	0.511	1.720	0.691	0.457	1.844	1.934	2.136	2.242	0.789	2.071	0.242	0.137	0.662	0.564	0.801	0.208	0.458
		p	n.s	n.s	n.s	n.s	n.s	n.s	ns	n.s	n.s	*	*	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	-0.246	-0.110	-0.321	-0.323	0.017	-0.381	-0.264	-0.124	0.364	0.282	-0.113	-0.380	-0.628	-0.171	0.047	-0.225	-0.004	0.156	0.276	0.121
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	0.601	0.114	n.s	n.s	n.s	*	n.s	n.s	n.s	n.s	n.s	n.s	n.s
Mean R.H. %	P.R.	b+/.	-0.0723	-0.4111	-0.1850	-0.1842	-0.5267	0.1963	0.6231	-0.8445	0.4615	-0.5250	-0.1054	-0.8423	-0.410	-0.3883	-0.1835	-0.2292	-0.7136	-0.3344	0.5612	-0.2758
		t	0.173	0.997	0.454	0.461	1.692	0.491	1.599	2.692	1.288	1.917	3.048	2.361	1.038	0.730	0.370	0.472	1.385	0.620	1.195	0.593
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	**	n.s	n.s	***	*	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	-0.127	-0.123	-0.343	-0.345	-0.422	-0.375	-0.436	-0.565	0.255	0.302	-0.684	-0.741	-0.482	-0.366	-0.439	-0.490	-0.365	0.109	-0.059	-0.503
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	**	n.s	n.s	**	**	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s
E.V.%			9.20	11.40	13.20	14.30	49.50	16.70	20.80	48.70	33.0	60.90	37.60	61.5	52.5	14.4	25.5	28.40	19.60	12.0	33.20	34.5

Table 3. Multiple partial regression, simple correlation and (E.V%) values between aphids and associated aphidophagous insects on apple and peach trees and climatic factors (Max. Temp. °C., Min. Temp. °C and Mean R.H. %) during 2002 season at El-Khattara district, Sharkia Governorate , Egypt.

Variable			Apple										Peach								
			Aphids		Aphidophagous insects								Aphid	Aphidophagous insects							
					Parasitoids			Predators						Parasitoids			Predators				
Source			*A. gossypii*	*M. persicae*	*Aphidius colemani*	*A. matricaria*	*A. aphidimyza*	*C. carnea*	*O. albidipennis*	*Cydonia vicina* var. *isis*	*S. corollae*	Total insect predators	*H. pruni*	*Aphidius colemani*	*A. picipes*	*A. aphidimyza*	*S. corollae*	*C. carnea*	*O. albidipennis*	*Cydonia vicina* var. *nilotica*	Total insect predators
Max. Temp. °C	P.R.	b+/.	-0.685	-0.697	-0.432	0.324	-0.168	-0.800	-0.704	0.350	-0.536	-0.409	-0.906	-0.660	-0.978	-0.619	-0.694	-0.518	0.307	-0.300	-0.539
		t	2.883	2.951	1.756	1.812	0.647	3.575	2.928	1.467	2.153	1.627	3.181	2.571	4.005	1.954	2.292	1.694	0.958	0.978	1.831
		p	**	**	n.s	n.s	n.s	**	**	n.s	*	n.s	**	*	**	n.s	*	n.s	n.s	n.s	n.s
	Correlation	r	-0.506	-0.494	-0.509	0.621	-0.325	-0.535	-0.326	-0.068	-0.487	-0.411	-0.571	0.009	-0.238	-0.623	-0.043	-0.643	0.064	-0.379	-0.577
		p	**	**	**	**	**	**	n.s	n.s	*	*	*	n.s	n.s	**	n.s	**	n.s	n.s	*
Min. Temp. °C	P.R.	b+/.	0.344	0.389	-0.163	0.452	-0.197	0.487	0.677	-0.609	0.186	0.067	0.237	0.558	0.799	-0.020	0.755	-0.131	-0.646	-0.432	-0.284
		t	1.270	1.443	0.581	1.613	0.663	1.907	2.467	2.234	0.655	0.235	0.873	2.282	3.436	0.067	2.614	0.450	2.114	1.480	1.013
		p	n.s	n.s	n.s	n.s	n.s	n.s	*	*	n.s	n.s	n.s	*	**	n.s	*	n.s	*	n.s	n.s
	Correlation	r	-0.260	-0.243	-0.340	0.016	-0.410	-0.217	-0.001	-0.465	-0.310	-0.360	-0.232	0.342	0.306	-0.424	0.406	-0.503	-0.305	-0.477	-0.530
		p	n.s	n.s	n.s	n.s	*	n.s	n.s	*	n.s	*	n.s	n.s	n.s	n.s	n.s	*	n.s	n.s	*
Mean R.H. %	P.R.	b+/.	-0.321	-0.360	0.208	-0.531	-0.208	-3.714	-0.445	-0.165	-0.298	-0.324	-0.417	-0.697	-0.489	-0.022	-0.353	0.087	-0.432	-0.486	-0.350
		t	1.544	1.742	0.968	1.672	0.915	1.893	2.111	0.791	1.366	1.469	1.854	3.441	2.540	0.091	1.477	0.364	1.706	2.008	1.510
		p	n.s	n.s	n.s	n.s	n.s	n.s	*	n.s	n.s	n.s	n.s	**	*	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	0.227	-0.264	0.068	-0.411	-0.330	-0.240	-0.206	-0.421	-0.280	-0.347	-0.103	-0.592	-0.324	0.249	-0.295	0.352	-0.359	-0.220	-0.030
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	*	n.s	n.s	n.s	*	n.s	n.s	n.s	n.s	n.s	n.s	n.s
E.V.%			33.60	34.5	29.0	25.40	20.50	41.02	32.1	32.9	27.1	25.7	50.6	59.8	63.7	38.9	44.1	43.0	37.3	42.7	47.2

Table 4. Multiple partial regression, simple correlation and (E.V%) values between aphid and associated aphidophagous insects on apple and peach trees and climatic factors (Max. Tem. °C., Min. Temp. °C and R.H.%) during 2003 season at El-Khattara district, Sharkia Governorate , Egypt.

Source	Variable		Apple											Peach					
			Aphid	Aphidophagous insects									Aphid	Aphidophagous insects					
				Parasitoids				Predators						Parasitoids		Predators			
			A. gossypii	*M. persicae*	*Aphidius colemani*	*A. matricaria*	*A. aphidimyza*	*C. carnea*	*O. albidipennis*	*C. undecimpunctata*	*Cydonia vicina* var. *nilotica*	Total insect predators	*H. prani*	*A. colemani*	*A. picipes*	*A. aphidimyza*	*C. undecimpun ctata*	Total insect predators
Max. Temp. °C	P.R.	b+/.	0.174	-0.172	0.200	0.041	0.464	0.456	-0.433	1.262	-0.893	0.148	2.180	1.881	1.792	0.056	1.421	0.555
		t	0.429	0.453	0.335	0.210	0.944	1.093	0.683	2.892	1.901	0.383	1.575	1.367	1.210	0.068	1.531	0.679
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	**	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	-0.742	-0.804	-0.430	0.178	-0.600	-0.668	0.203	-0.392	-0.732	0.740	-0.095	-0.181	0.028	0.839	0.724	0.840
		p	***	***	*	n.s	**	***	n.s	n.s	***	***	n.s	n.s	n.s	**	*	**
Min. Temp. °C	P.R.	b+/.	-1.109	-0.765	-0.769	-0.162	-1.285	-1.367	0.751	-2.015	0.196	-1.083	-1.014	-1.113	-1.041	0.025	-0.839	-0.287
		t	2.388	1.763	1.129	0.513	2.291	2.869	1.037	4.046	0.366	2.441	1.450	1.603	1.391	0.061	1.789	0.595
		p	*	n.s	n.s	n.s	*	**	n.s	**	n.s	*	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	-0.720	-0.744	-0.487	0.312	-0.611	-0.751	0.084	-0.660	0.565	0.789	-0.279	-0.397	-0.215	0.672	0.377	0.600
		p	***	***	**	n.s	**	***	n.s	***	*	***	n.s	n.s	n.s	*	n.s	n.s
Mean R.H. %	P.R.	b+/.	0.515	0.331	0.250	0.146	0.623	0.515	-0.659	0.703	-0.087	0.362	1.504	1.188	0.936	-0.809	-0.014	-0.562
		t	1.864	1.284	0.617	0.514	1.868	1.819	1.530	2.373	0.275	1.373	1.379	1.096	0.803	1.234	0.020	0.872
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	*	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s
	Correlation	r	-0.891	-0.030	-0.131	-0.122	-0.020	-0.167	-0.276	-0.331	0.050	0.168	0.205	0.243	0.022	-0.881	-0.731	-0.872
		p	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	n.s	**	*	**
E.V.%			65.4	69.8	25.6	22.4	49.5	63.6	15.7	60.2	53.9	68.4	38.3	39.1	29.4	77.7	72.3	78.5

during the third season 2003, Fig. 6. The above results are in agreement with the findings of Ibrahim and Afifi, Amal (1993 and 1994) in Egypt. They found that the maximum percentage of parasitism of *A. colemani* occurred in May (64.5%).

A. picipes

Data illustrated in Fig. 4 showed two peaks of *A. picipes* activity during the first season 2001, in the 4th week of April and May with values of 102 and 28 individuals/sample, at means 28.8 and 28.4°C & 54.0 and 51.6% R.H., respectively.

In second season 2002, also two peaks of activity were recorded on the first and 4th week of May by values 34 and 16 individuals/ sample, at means 21.3 and 25.0°C &55.1and 53.5%R.H., respectively (Fig. 5).

Two peaks of activity were recorded during the third season (2003) by 26 and 15 individuals/ sample, on the 4th week of April and 3rd week of May at means temp. 20.7 and 25.4°C & 55.4 and 48.3% R.H., respectively, Fig. (6). These results are in agreement with those recorded by Ibrahim and Afifi, Amal (1993 and 1994) in Egypt. They reported that *A. colemani* and *A. picipes* emerged from *H. pruni* infesting peach trees.

Combined Effects Of Meteorological Factors

The effect of minimum temperature, maximum temperature and mean relative humidity on aphids and associated aphidophagous insects were estimated by calculating the multiple partial regression analysis.

Data in Tables 2-4 explain variance by the three meteorological factors and show that the considered factors have played a conspicuous role in activity of aphid species and aphidophagous insects during the aforementioned investigated seasons. These results ensure that the tested metrological factors play a great role in regulating the population density and seasonal abundance of aphids and associated aphidophagous insects. These results agree with those of Hegab *et al.* (1988), Hassanein *et al.* (1992), El-Maghraby (1993)and El-Maghraby *et al.* (1994).

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الحصر والوفرة الموسمية لأنواع المن التى تصيب أوراق أشجار التفاح والخوخ ومفترساته الحشرية فى منطقة الخطارة، محافظة الشرقية، مصر

محمد مصطفى أحمد المغربى[1] - منصور محمد الزهيرى[1]
عزيزة محمد محمود الجنتيرى[2] - شحته على محمد على[2]
1- قسم وقاية النبات – كلية الزراعة بالزقازيق – جامعة الزقازيق.
2- معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى – جيزة.

أجريت دراسة حصر لأنواع المن المختلفة التى تصيب نوعين من أشجار الفاكهة هما التفاح والخوخ فى منطقة الخطارة بمحافظة الشرقية كأحد المناطق المستصلحة حديثاً وأوضحت النتائج وجود ثلاثة أنواع لحشرات المن هى من القطن *Aphis gossypii Glover*، من الخوخ الأخضر *Myzus persicae Sulzer* يصيبان أوراق أشجار التفاح بينما من البرقوق الدقيقى *Hyalopterus pruni (Geoffroy)* يصيب أوراق أشجار الخوخ فقط بمجرد ظهور النموات الحديثة. كذلك تم حصر مجموعتين من مفترسات المن الحشرية.

المجموعة الأولى : المفترسات وتشمل :

Orius albidipennis **Reut. (Anthocoridae, Hemiptera)** ***Chrysoperla carnea*** **(Steph.) (Chrysopidae, Neuroptera),** ***Coccinella undecimpunctata*** **L.** ***Cydonia vicina*** **var.** ***nilotica*** **Muls and** ***Cydonia vicina*** **var.** ***isis*** **Gr. (Coccinellidae, Coleoptera).** ***Aphidoletes aphidimyza*** **Reut. (Cecidomyiidae, Diptera)** ***Syrphus corollae*** **F. (Syrphidae, Diptera)**

ولقد سجل بق الأزهار المفترس وأبى العيد الأسود ***Orius albidipennis*** **and** ***Cydonia vicina*** **var.** ***isis*** فقط بمصاحبة من القطن ومن الخوخ الأخضر على أشجار التفاح.

المجموعة الثانية : طفيليات المن

كان منها مصاحباً لمن القطن ومن الخوخ الأخضر الذى يصيب أوراق التفاح طفيليان هما *Aphidius colemani* and *Aphidius matricariae* بينما يصاحب من البرقوق الدقيقى على أشجار الخوخ الطفيليان *Aphidius colemani* and *A. picipes*.

ومن خلال دراسة الوفرة الموسمية لأنواع المن وجد أن لمن القطن أربع، خمس ، وقمة واحدة للنشاط على أشجار التفاح خلال مواسم الدراسة ٢٠٠١، ٢٠٠٢، ٢٠٠٣ على التوالى. أما فى حالة من الخوخ الأخضر فسجل قمتين نشاط خلال موسم ٢٠٠١ وقمة نشاط واحدة خلال كلا من موسمى الدراسة ٢٠٠٢، ٢٠٠٣ على أوراق أشجار التفاح. بينما سجل من البرقوق الدقيقى ثلاث، أربع وقمتى نشاط على أوراق أشجار الخوخ خلال مواسم الدراسة ٢٠٠١، ٢٠٠٢، ٢٠٠٣ على التوالى.

أما فى حالة مفترسات المن، فسجل مجموع تعدادها على أشجار التفاح ثلاث قمم للنشاط خلال موسم ٢٠٠١ وقمة واحدة للنشاط خلال موسمى ٢٠٠٢، ٢٠٠٣.

بينما سجل تعداد المفترسات المصاحب لمن البرقوق الدقيقى على أشجار الخوخ ثلاث قمم للنشاط خلال موسم الدراسة ٢٠٠١ وقمتان للنشاط خلال ٢٠٠٢ أما خلال موسم الدراسة ٢٠٠٣ فسجل تعداد المفترسات قمة نشاط واحدة.

طفيليات المن :

سجل كلا من الطفيل *Aphidius colemani* والطفيل *Aphidius matricariae* قمة نشاط واحدة لكل منها خلال كل موسم من مواسم الدراسة ٢٠٠١، ٢٠٠٢، ٢٠٠٣ على المن المصاحب لأوراق أشجار التفاح.

ولكن على أشجار الخوخ سجل الطفيل *A. colemani* قمتين للنشاط خلال موسم الدراسة ٢٠٠١، أربع قمم للنشاط خلال موسم ٢٠٠٢ وقمتى نشاط خلال موسم الدراسة ٢٠٠٣.

أما فى حالة الطفيل *Aphidius picipes* فسجل تعداده قمتى للنشاط خلال كل موسم من مواسم الدراسة ٢٠٠١، ٢٠٠٢، ٢٠٠٣.

ولقد وجد أيضاً أن نشاط المن يرتبط أرتباطاً وثيقاً فى معظم الأحيان بدرجات الحرارة والرطوبة وكذلك مفتاتاته الحشرية من مفترسات أو طفيليات ولا شك أن مثل هذه النتائج قد تفيد فى وضع برامج المكافحة المتكاملة للسيطرة على المن فى بساتين الفاكهة بصفة عامة والتفاح والخوخ بصفة خاصة .