APHIDOPHAGOUS INSECTS OF THE MEALY PLUM APHID *Hyalopterus pruni* (GEOFFROY) IN APRICOT AT SHARKIA GOVERNORATE, EGYPT

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Received: 29/04/2020 ; Accepted: 09/06/2020

ABSTRACT: The present investigation was carried out at El-Khattara District, Sharkia Governorate, Egypt during 2017 and 2018 seasons to evaluate the population density of the aphidophagous insects of the mealy plum aphid *Hyalopterus pruni* in apricot. Two parasitoid species belonging to *Aphidius colemani* Viereck and *Aphidius picipes* (Nees) and eight predator species, namely: *Chrysoperla carnea* Step., *Chrysopa septempunctata*, *Waesmael*, *Ccoccinella septempunctata*, *Coccinella undecimpunctata* L., *Aphidoletes aphidimyza* Rond., *Syrophus corollae* F., *Cydonia vicinia nilotica* Muls. and *Scymnus interruptus* Goze were recorded. *C. undecimpunctata* came in first rank (16.75 and 17.74%) followed by *C. carnea* (14.85 and 17.16%) followed by *C. septempunctata* (12.61 and 14.96%) then *Cydonia vicinia nilotica* (12.26 and 12.76%), while *Ch. septempunctata*, *S. corollae*, *Scymnus interruptus* and *A. aphidimyza* were represented by (11.92 and 11.87%), (11.40 and 9.53%), (10.71 and 9.53%), (9.50 and 6.45%), from the total number of aphid predators during 2017 and 2018 seasons, respectively. The highest percentage of parasitism by the two parasitoids were recorded on the first and last week of May (37.20 and 50.00%) during 2017 season, while in the second season (2018) were recorded in the first week of both May and June (43.28 and 62.01%) respectively, with an average percentage of parasitism 27.12 and 35.98% during the two successive seasons, respectively. Statistical analysis showed that temperature and relative humidity were significant with some insects and insignificant with the other. In general, the parasitoid *A. colemani* and the predator *C. undecimpunctata*, could be mass reared and released for controlling *H. pruni* on apricot trees include integrated pest management programs and crop management against *H. pruni* to save the environment from pollution.

Key words: Contribution in the quality, quantity of the resulting crop.

INTRODUCTION

Aphid species are among the most injurious pests attacking fruit trees, damage caused by aphids is mainly due to feeding on the plant- sap causing direct injury to the trees (Ismail et al., 1991; Ibrahim, 1994; Ali, 2008; El-Maghraby et al., 2008; El-Gantiry et al., 2009; Lozier et al. 2009; Saleh and Ali, 2012; Saleh et al, 2013; Youssif et al., 2014).

Apricot trees are by far one of the most important fruit crops in Egypt. They are widely cultivated in Qalubia Governorate, where their fruit represent one of the most important sources of farmers income. This fruit possesses highly nutritional quality, because of its contents of sugars, proteins and vitamins, especially vitamin "A". Besides, it represents one of the best sources of mineral salts including, Phosphorous, Potassium and Calcium. The apricot fruit trees are liable to attack by the mealy plum aphid *H. pruni* (El- Kady et al., 1970). In Egypt this aphid has been recognized as a pest of stone fruit trees (*Prunus* spp.), causing considerable damage by sucking the juice and resulting in loss of the yield (Ibrahim and Afifi, 1994; Abul-Fadi et al. 2005).

Use insecticides in controlling aphids, 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 (El-Maghraby, 1993; Saleh et al., 2013; Ali et al. 2020).

Hyalopterus pruni (Geoffroy) is one of the important insect pests of apricot and peach in Egypt and in the world (AbulhFadi et al., 2005; Ali, 2008; Baldacchino et al., 2010; Saleh et al., 2013; Youssif et al., 2014). Recently, the attention has been focused on the integrated pest control approach that, appears as an essential aim for sound future of agriculture. The first goal of this approach depends extensively on minimizing the use of chemical pesticides, for avoiding their indiscriminate usage (Abd Elh-Salam, 2000; Elh-Khawas et al., 2003; Elh-Maghraby et al., 2008; Saleh et al., 2013).

Little information are known on the natural relationship between H. pruni infestation and its natural enemies especially, aphidophagous insects on apricot trees, in the newly reclaimed sandy area. For this reason, this work was conducted to shed light on the population dynamics of aphid H. pruni, surveying the most common natural enemies found associated with the previous aphid species, during the period of aphid existence. Such ecological information will undoubtedly help in planning integrated control programs and apricot management against H. pruni.

MATERIALS AND METHODS

Estimation the Role Aphidophagous Insects of Hyalopterus pruni Population in the Field

This work was carried out at El-Khattara district, Sharkia Governorate, Egypt during 2017 and 2018 seasons. An area of a faddan (4200m²) was selected. This area received all normal recommended agricultural practices, except absence of any chemical insecticidal treatment. Sampling started in the first week of March. Inspections continued till the 2nd and 3rd week of June during 2017 and 2018 seasons. Weekly sampling of 60 infesting leaves (12 leaves from 5 trees) were randomly, respectively for apricot trees. Collected, kept in paper bag and transferred to the laboratory. The numbers of Hyalopterus pruni (nymphs and adults) were recorded for each sample. Meanwhile, the numbers of predators associated with aphid were also recorded. To estimate parasitism rates, mealy plum aphid individuals were fed in the laboratory on their host plant and kept in Petri-dishes until formation of mummies. The mummies were isolated and kept in small glass tubes until emergence of adult parasitoids. Adult emerged from mummies, were classified, counted and their percentages were also calculated. Emerged parasitoids were mounted and identified at the Biological Control Department, ARC, Giza, Egypt. Percentage of parasitism was calculated as weekly means according to Ferrell and Stufkens (1990).

\[
\text{Percentage of Parasitism} = \frac{A + B}{A + B + C} \times 100
\]

Where:
A= Number of mummified aphids counted at the date of inspection
B= Number of mummified host appeared during the laboratory rearing
C= Number of unparasitized aphids

Effect of Certain Climatic Factors (Maximum, Minimum Temperature and Mean Relative Humidity) on the Population Density of Mealy plum Aphid and Associated Aphidophagous Insects on Apricot at El-Khattara District

For clearing the effect of certain weather factors such as temperature and atmospheric relative humidity on the population density of the studied aphid and their aphidophagous, the daily records of both maximum, minimum temperature and mean relative humidity throughout the two seasons (2017 and 2018) were provided by the Meteorological Central Laboratory for Agricultural Climate, Agricultural Research center, Dokki, Giza, during the whole period of the study, to show the effect of factors as well as their total effect on insects population density, the values of simple correlation coefficient (r), partial regression coefficient (P) and total explained variance (EV%) were calculated using CoSTAT Software Microcomputer Program (CoSTAT, 2005).
RESULTS AND DISCUSSION

Survey of Aphid Infesting Apricot and Aphidophagous Insects in El-Khattara District

Results presented in Table 1 show that only the mealy plum aphid *Hyalopterus pruni* (Geoffroy) infested leaves of apricot during two successive seasons of 2017 and 2018 in newly reclaimed sandy area of El-Khattara District, Sharkia Governorate. The total number of *H. pruni* was higher during 2018 season (14688 individuals) than in the first season 2017 (12120 individuals). These results are in agreement with those of Abul-Fadi et al. (2005) and Youssif et al. (2014).

Two groups of aphidophagous insects associated with *H. pruni* on apricot trees were recorded as follows:

**Predators associated with *H. pruni* infested apricot trees**

**Neuropterous insects**

*Chrysoperla carnea* (Steph.) *Chrysopa septempunctata* Wesmael (Chrysopidae)

**Coleopterous insects**

*Coccinella septempunctata* L., *Coccinella undecimpunctata* L., *Cydonia vicina nilotica* and *Scymnus interruptus* (Coccinellidae)

**Dipterous insects**

*Aphidoletes aphidimyza* (Rond.) (Cecidomyiidae)

*Syrphus corollae* (Syrphidae)

Results in Table 1 show that *C. undecimpunctata* came in first rank (16.75%) followed by *C. carnea* (14.85%) then *C. septempunctata* (12.61%) then *Cydonia vicina nilotica* constituted about 12.26% while *Ch. septempunctata, S. corollae, Scymnus interruptus* and *A. aphidimyza* were represented by 11.92, 11.40, 10.71 and 9.50%, respectively, in the first season (2017).

In the second season (2018), the same trend was observed where *C.undecimpunctata* came in first rank (17.74%) followed by *Ch. carnea* (17.16%) then *C. septempunctata* (14.96%), while *Cydonia vicina nilotica, Ch. septempunctata, S. interruptus, S. corollae* and *A. aphidimyza* were represented by 12.76, 11.87, 9.53, 9.53 and 6.45% from the total number of aphid predators, respectively (Table 1).

Table 1. Total collected numbers (A) and occurrence percentage (B) of *Hyalopterus pruni* on apricot and associated predators and parasitoids during 2017 and 2018 seasons

| Insect species | 2017 | 2018 |
|---------------|------|------|
| **Insect pest** |      |      |
| *Hyalopterus pruni* | 12120 | 100 |
| **Insect predators:** |      |      |
| *Chrysoperla carnea* | 86 | 14.85 | 117 | 17.16 |
| *Chrysopa septempunctata* | 69 | 11.92 | 81 | 11.87 |
| *Coccinella septempunctata* | 73 | 12.61 | 102 | 14.96 |
| *Coccinella undecimpunctata* | 97 | 16.75 | 121 | 17.74 |
| *Cydonia vicina nilotica* | 71 | 12.26 | 87 | 12.76 |
| *Scymnus interruptus* | 62 | 10.71 | 65 | 9.53 |
| *Aphidoletes aphidimyza* | 55 | 9.50 | 44 | 6.45 |
| *Syrphus corollae* | 66 | 11.40 | 65 | 9.53 |
| **Total** | 579 | 100 | 682 | 100 |
| **Insect parasitoids:** |      |      |
| *Aphidius colemani* | 1653 | 65.21 | 3208 | 70.24 |
| *Aphidius picipes* | 882 | 34.79 | 1359 | 29.76 |
| **Total** | 2535 | 100 | 4567 | 100 |
Parasitoids of *H. pruni* on apricot

Results in Table 1 show that two primary parasitoid species, *Aphidius colemani* (Viereck) and *Aphidius picipes* (Nees) were recorded, the primary parasitoid *A. colemani* was the most dominant species with mean relative densities 65.21 and 70.24% followed by *Aphidius picipes* 34.79 and 29.76% during 2017 and 2018 seasons, respectively.

Population Density of *H. pruni* on Apricot Trees

Results in Fig. 1 show the population of *H. pruni* was appeared in the 2nd week of March by 90 individuals/sample, two peaks of population activity were recorded on the first week of April 1340 individuals/ 60 leaves at mean temp. 19.3°C and 62.0% RH, the second peak of activity 2620 individuals/ sample on the first week of May at mean temp. 22.3°C and 53.9% RH, in the first season 2017. In the second season 2018, the infestation started in the 2nd week of March by 75 individuals/ sample and increased to record two peaks of population activity in the 1st week of April and May by 1415 and 2715 individuals/ sample at mean 21.8°C and 56.6% RH as well as 24.5°C and 68.3% RH, respectively.

From the aforementioned results, it could be concluded that, the *H. pruni* was observed with its highest population during April and early May, it appears that, the active period of this aphid species under investigation occurred during the period from March until May. Therefore, this period represents a critical period, for Integrated Pest Management (IPM) programs to protect apricot trees from aphid attacks. *El-Kady et al. (1970)* showed that, *H. pruni* is the most injurious aphid species on peach and apricot as well as on reed weed. *Ibrahim and Afifi (1994)* reported two peaks of infestation of *H. pruni* occurred on both peach and reed plants, the first was during March and the second one was during July on peach trees and August on reed plants. They added that, *H. pruni* existed allover the year on reed plants and only during the nine months from February to October on peach trees. The population density of *H. pruni* on apricot and peach trees also reported by others (*Abul-Fadi et al., 2005, Adil and Muhammed, 2008, Ali, 2008, Saleh et al., 2013 and Youssif et al., 2014*).

Population Density of Predators on *H. pruni* Infested Apricot Trees

**Chrysoperla carnea**

Fig. 2 show that *C. carnea* individuals were appeared in the 3rd week of March by two individuals/sample, and increased gradually to record two peaks by 14 and 16 individuals/ sample at means (20.3°C and 59.2% RH as well as 21.3°C and 53.9% RH) in the 2nd week of April and first week of May, respectively and decreased untile the 4th week of May during the first season 2017. While in the second season were appeared in the 2nd week of March, 8 individuals / sample, and recorded two peaks by 18 and 14 individuals/sample at means (21.8°C and 56.6% RH as well as 23.5°C and 52.0% RH) in the first and 4th week of April, respectively (Fig. 4).

**Chrysopa septempunctata**

The population of activity to this predator recorded two peaks in the 2nd week of April and in the first week of May during two seasons with (12 and 15 individuals at means 20.3°C and 59.2% RH as well as 21.3°C and 53.9% RH) and (14 and 13 individuals/sample) at means 22.7°C and 57.4% RH as well as 24.5°C and 68.3% RH) during 2017 and 2018 seasons (Figs. 2 and 4), respectively.

**Coccinella septempunctata**

As seen from Fig. 2, two peaks of activity were recorded on the first week of both April and May by 9 and 14 individuals/sample at means 19.5°C and 62.0% RH as well as 21.3 and 53.9% RH during first season (2017). In the second season (2018), two peaks of population activity were recorded on the same time by 16 and 18 individuals/sample at mean of 21.8°C and 56.6% RH as well as 24.5°C and 68.3% RH, respectively (Fig. 4).

**Coccinella undecimpunctata**

In the first season (2017) as shown in Fig. 2, two peaks of activity were recorded on the 2nd week of April and first week of May by 15 and 20 individuals/sample at means 20.3°C and 59.2% RH as well as 21.3°C and 53.9% RH, respectively. In The second season 2018 (Fig. 4) two peaks of population activity were recorded on the first week of both April and May by 19 and 17 individuals/sample at means 21.8°C and 56.6% RH as well as 24.5°C and 68.3% RH, respectively.
Fig. 1. Weekly total number of aphid (*Hyalopterus pruni*) infesting apricot trees and associated parasitoids during 2017 season at El-Khattara District, Sharkia Governorate, Egypt
Fig. 2. Weekly total number of aphid (Hyalopterus pruni) infesting apricot trees and associated predators during 2017 season at El-Khattara District, Sharkia Governorate, Egypt
Fig. 3. Weekly total number of aphid (*Hyalopterus pruni*) infesting apricot trees and associated parasitoids during 2018 season at El-Khattara District, Sharkia Governorate, Egypt
Fig. 4. Weekly total number of aphid (*Hyalopterus pruni*) infesting apricot trees and associated predators during 2018 season at El-Khattara District, Sharkia Governorate, Egypt.
Cydonia vicina nilotica

As seen from Fig. 2, two peaks of activity were recorded during 2017 season on the 2nd week of April and first week of May by 13 and 14 individuals/sample for each means 20.3°C and 59.2% RH as well as 21.3°C and 53.9% RH, respectively. Also two peaks of activity were recorded in the second season (2018), on the first and the 4th week of April by 12 and 18 individuals/sample at means 21.8°C and 56.6% RH as well as 23.5°C and 52.0% RH, respectively (Fig. 4).

Scymnus interruptus

In the first season 2017 (Fig. 2) two peaks of activity were recorded by 9 and 12 individuals/sample, on the 2nd week of both April and May, at means 20.3°C and 59.2% RH as well as 23.5 and 55.2% R.H., respectively. While in the second season two peaks were recorded on the 2nd week of April and first week of May by 13 and 10 individuals/sample at means 22.7°C and 57.4% RH as well as 24.5 and 68.3% RH, respectively (Fig. 4).

Aphidoletes aphidimyza

Results in Fig. 2 show that two peaks of activity were recorded on the first week of both April and May, with values 8 and 13 individuals/sample at means 19.5°C and 62% as well as RH 21.3°C and 53.9% RH, respectively during 2017 season. In the second season (Fig. 4), two peaks of population activity were observed on the 2nd week of April and first week of May by 8 and 12 individuals/sample at means 22.7°C and 57.4% RH as well as 24.5°C and 68.3% RH, respectively.

Syrphus corollae

In the first season (2017) as shown in Fig. 2, two peaks of activity were recorded on the 2nd week of both April and May by 8 and 15 individuals/sample at means 20.3°C and 59.2% RH as well as 23.5°C and 55.2% RH, respectively. In the second season 2018 (Fig. 4), two peaks of population activity were observed on the first and 4th week of April by 9 and 16 individuals/sample at means 21.8°C and 56.6% RH as well as 23.5°C and 52.0% RH, respectively.

Total aphid predators

Fig. 2 show the number of common predators associated with H. pruni on apricot trees. The insect predators belonged to three insect orders: Neuroptera, Coleoptera and Diptera, and four families namely: Chrysopidae, Coccinellidae, Syrphidae and Cecidomyiidae. The total number of insect predators were first appear by two individuals / sample in the second week of March and increased gradually to record two peaks of population density 82 and 114 individuals / sample in the 2nd week of April and first week of May, respectively. Then, their numbers declined towards the end of the first season. In second season (2018) it appeared by 3 individuals/ sample in the 3rd week of March and increased to record two peaks of population density (93 and 1020 individuals/ sample) during first week of both April and May, respectively (Fig. 4).

Abul-Fadi et al. (2005) found that most common predators recorded associated with H. pruni on apricot trees. Several predaceous species belonging to four orders namely: Neuroptera, Coleoptera, Hemiptera and Diptera during the period of study, 2017 and 2018 seasons. Also, Adil and Muhammed (2008), showed that mealy plum aphid, H. pruni was recorded on apricot trees, were associated with 8 species of predators, 5 of them from family Coccinellidae and order Coleoptera, they were: Scymnus syriacus (Muls.), S. apetzi (Muls.), Synharmonia couglubata L. and 2 species of order Diptera, one species, Metasyrphus corollae F. from family Syrphidae, the other species, Phaenobremia aphidovora Rubs. from family Cecidomyiidae; and Chrysoperla carnea Steph. From family Chrysopidae and order Neuroptera.

Saleh et al. (2013) studied the seasonal activity of the parasitoids and predators associated with the mealy aphid Hyalopterus pruni population
and found six predator species, *Chrysoperla carnea*, *C. undecimpunctata*, *Aphidoletes aphidimyza*, *Syrphus corollae*, *Cydonia vicinia nilotica* and *Scymnus interruptus* on peach trees.

**Rate of parasitization**

Table 1 shows that two primary parasitoid species *Aphidius colemani* Vier. and *Aphidius picipes* (Nees) were recorded, the percentages of parasitism ranged from 8.89% and 50.00% during the first season and from 16.00% and 62.01% during the second season (Table 3). In the first season (2017), the percentage of parasitism started by 8.89% in the second week of March, it increased to record two peaks by 37.20% and 50.0% in the first and 5th week of May, respectively. In the second season (2018), the percentage of parasitism started by 16.0% in the second season of March, and it increased to record two peaks of 43.28% and 62.01% in the first week of both May and June, respectively.

Total means of parasitism rate of *A. colemani* and *A. picipes* together were 27.12% and 35.98% during 2017 and 2018, respectively. The primary parasitoid *A. colemani* was the most dominant species with mean relative density (68.47% and 67.43%) during the two seasons, respectively. Meanwhile, the mean relative densities of primary parasitoid *A. picipes* were 24.87% and 26.33% during 2017 and 2018 seasons Table (2 and 3), respectively.

The present results are agree with those of *Abul-Fadi et al.* (2005), *Adil and Muhammed* (2008), *Ali* (2008) and *Saleh et al.* (2013).

**Combined effects of meteorological factors on the mealy plum aphid and associated aphidophagous insects**

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

Results in Table 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 meteorological factors play a great role in regulating the population density and seasonal abundance of aphids and their associated aphidophagous insects. These results are in agreement with those of *El-Maghraby* (1993), *El-Maghraby et al.* (1994), *El-Maghraby et al.* (2008), *El-Gantiry et al.* (2009), *Saleh et al.* (2013), *Shoukry et al.* (2018) and *El-Falogy* (2020).

Results in Table 5 show the values of the correlation coefficient of relation between predators and the population density of *H. pruni* during the two successive seasons. The predators *Ch. carnea*, *Ch. septempunctata*, *C. septempunctata* and *C. undecimpunctata* showed highly positive significant correlation (0.6808* and 0.3207*), (0.8814* and 0.8384*), (0.8737* and 0.8970*) and (0.8952* and 0.8396*) during 2017 and 2018 seasons, respectively. Also the correlation coefficient of relation between other predators and *H. pruni* were *cydoina vicina nilotica, S. interruptus, A. aphidimyaz and S. corollae* showed highly positive significant correlation (0.8575* and 0.6785*), (0.8372* and 0.7880*), (0.9352* and 0.8696*) and (0.7987* and 0.6991**) during 2017 and 2018 seasons, respectively.

In case of the parasitoids *Aphidius colemani* and *A. picipes* showed highly positive significant correlation (0.7914*and 0.9285*) and (0.9142* and 0.8716**) during 2017 and 2018 seasons, respectively.
Table 2. Percentage of parasitism on *H. pruni* on apricot during 2017 season at El-Khattara District, Sharkia Governorate, Egypt

| Sampling dates | No. of aphid | No. of parasitoid aphid | Total parasitism (%) | Emerged parasitoids | Total Weather factors |
|----------------|--------------|-------------------------|----------------------|---------------------|----------------------|
|                | A    | B     | Total | Aphidius colemani | Aphidius picipes | Mean °C | Mean RH |
| Mar. 1st       | 0    | 0     | 0     | 0           | 0            | 0      | 0     |
|                | 90   | 0     | 8     | 8.89       | 6             | 19.9   | 63.2  |
|                | 145  | 10    | 6     | 11.03      | 10            | 19.5   | 62.1  |
|                | 732  | 60    | 35    | 12.98      | 45            | 18.3   | 60.3  |
|                | 1340 | 130   | 115   | 18.28      | 148           | 19.5   | 62.0  |
|                | 920  | 140   | 120   | 28.26      | 152           | 20.3   | 59.2  |
|                | 810  | 150   | 85    | 29.01      | 155           | 20.3   | 53.9  |
|                | 1215 | 315   | 137   | 31.03      | 185           | 25.5   | 50.3  |
|                | 2620 | 240   | 220   | 37.20      | 215           | 21.3   | 53.9  |
|                | 1510 | 205   | 195   | 26.49      | 195           | 23.5   | 55.2  |
|                | 980  | 185   | 120   | 31.12      | 140           | 24.9   | 50.3  |
|                | 715  | 130   | 118   | 22.09      | 135           | 25.5   | 53.2  |
|                | 520  | 140   | 120   | 50.00      | 120           | 26.4   | 54.5  |
| Apr. 1st       | 915  | 140   | 80    | 24.04      | 120           | 21.3   | 53.9  |
|                | 1415 | 240   | 195   | 26.49      | 195           | 23.5   | 55.2  |
|                | 1105 | 220   | 185   | 36.65      | 210           | 24.9   | 50.3  |
|                | 645  | 265   | 185   | 43.28      | 220           | 23.5   | 52.0  |
| Apr. 2nd       | 915  | 140   | 80    | 24.04      | 120           | 21.3   | 53.9  |
|                | 1415 | 240   | 195   | 26.49      | 195           | 23.5   | 55.2  |
|                | 1105 | 220   | 185   | 36.65      | 210           | 24.9   | 50.3  |
|                | 645  | 265   | 185   | 43.28      | 220           | 23.5   | 52.0  |
|                | 2175 | 760   | 415   | 43.28      | 340           | 24.5   | 68.3  |
|                | 1820 | 330   | 210   | 29.67      | 315           | 21.8   | 59.0  |
|                | 1205 | 305   | 200   | 41.91      | 310           | 24.1   | 60.7  |
|                | 970  | 290   | 190   | 49.48      | 280           | 24.2   | 58.0  |
|                | 810  | 265   | 185   | 55.55      | 250           | 25.7   | 58.5  |
| May 1st        | 645  | 230   | 170   | 62.01      | 210           | 26.3   | 61.3  |
|                | 318  | 120   | 30    | 47.17      | 80            | 26.4   | 60.1  |
|                | 80   | 20    | 10    | 37.50      | 20            | 28.9   | 59.2  |
| Mean           | 918.00 | 219.19 | 141.25 | 360.44 | 175.5 | 67.42 | 26.33 | 260.44 |
| Total          | 14688 | 3507  | 2260  | 5767      | 2808          | 4167   | 2535 |

A = Number of mummified aphids counted at the date of inspection
B = Number of mummified host appeared during the laboratory rearing
RD = Relative density

Table 3. Percentage of parasitism on *H. pruni* on apricot during 2018 season at El-Khattara District, Sharkia Governorate, Egypt

| Sampling dates | No. of aphids | No. of parasitoid aphid | Total parasitism (%) | Emerged parasitoids | Total Weather factors |
|----------------|--------------|-------------------------|----------------------|---------------------|----------------------|
|                | A    | B     | Total | Aphidius colemani | Aphidius picipes | Mean °C | Mean RH |
| Mar. 1st       | 0    | 0     | 0     | 0           | 0            | 19.5   | 61.5  |
|                | 75   | 0     | 12    | 16.00       | 6             | 20.2   | 63.0  |
|                | 430  | 62    | 33    | 22.09       | 30            | 19.9   | 60.2  |
|                | 915  | 140   | 80    | 24.04       | 120           | 20.5   | 59.4  |
| Apr. 1st       | 1415 | 240   | 180   | 29.68       | 205           | 21.8   | 56.6  |
|                | 1105 | 220   | 185   | 36.65       | 210           | 22.7   | 57.4  |
|                | 980  | 205   | 170   | 38.27       | 212           | 23.0   | 51.0  |
|                | 1205 | 320   | 190   | 42.32       | 220           | 23.5   | 52.0  |
| May 1st        | 2715 | 760   | 415   | 43.28       | 340           | 24.5   | 68.3  |
|                | 1820 | 330   | 210   | 29.67       | 315           | 21.8   | 59.0  |
|                | 1205 | 305   | 200   | 41.91       | 310           | 24.1   | 60.7  |
|                | 970  | 290   | 190   | 49.48       | 280           | 24.2   | 58.0  |
|                | 810  | 265   | 185   | 55.55       | 250           | 25.7   | 58.5  |
| Jun. 1st       | 645  | 230   | 170   | 62.01       | 210           | 26.3   | 61.3  |
|                | 318  | 120   | 30    | 47.17       | 80            | 26.4   | 60.1  |
|                | 80   | 20    | 10    | 37.50       | 20            | 28.9   | 59.2  |
| Mean           | 918.00 | 219.19 | 141.25 | 360.44 | 175.5 | 67.42 | 26.33 | 260.44 |
| Total          | 14688 | 3507  | 2260  | 5767      | 2808          | 4167   | 2535 |

A = Number of mummified aphids counted at the date of inspection
B = Number of mummified host appeared during the laboratory rearing
RD = Relative density
Table 4. Simple correlation coefficient values between temperature, relative humidity and the total number of *H. pruni* and some predators and parasitoids in El-Sharkia Governorate during 2017/18 seasons

| Weather factors | Aphid *Hyalopterus pruni* | Chrysoperla carnea | Ch. septempunctata | Cydnida victina nitidula | L. meigeni | L. olivacea | L. scutellaris | Total insect predators | L. columnaris | L. fulica |
|-----------------|---------------------------|-------------------|-------------------|-------------------------|-----------|-----------|-------------|------------------------|------------|----------|
| Max. °C Slope (b) | -0.1217± 0.2750 | -0.3543± 0.2613 | -0.3317± 0.2630 | -0.2744± 0.2667 | -0.3606± 0.2586 | -0.3604± 0.2638 | 0.0177± 0.2773 | -0.2207± 0.2705 | 0.0769± 0.2765 | 0.2399± 0.2692 | 0.3148± 0.2632 | 0.1206± 0.2753 |
| P NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Corr (r ±SE) | 0.0551± 0.2668 | 0.4730± 0.2334 | 0.0528± 0.2668 | -0.1917± 0.2658 | -0.2831± 0.2563 | -0.1289± 0.2650 | -0.1171± 0.2654 | 0.0252± 0.2672 | -0.1237± 0.2648 | -0.2045± 0.2646 | 0.2653± 0.2576 | 0.2376± 0.295 |
| Min. °C Slope (b) | 3.4445± 31.0880 | -0.3125± 33.6544 | -0.0435± 31.5893 | -0.0628± 31.7692 | -0.1902± 32.7479 | -0.1002± 31.9136 | -0.1106± 31.8813 | 0.0276± 31.3611 | -0.1120± 31.8238 | -0.0221± 32.3191 | 0.0059± 30.1832 | 0.0164± 29.9726 |
| P NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Corr (r ±SE) | 0.1005± 0.2659 | 0.6122± 0.2313 | 0.1482± 0.2643 | -0.2669± 0.2575 | -0.3436± 0.2519 | -0.4375± 0.2493 | -0.1716± 0.2632 | -0.0386± 0.2670 | -0.3669± 0.2486 | -0.3613± 0.2492 | 0.0530± 0.2668 | 0.0903± 0.2672 |
| Mean R.H. Slope (b) | -0.0025± 0.57.9795 | -0.1924± 57.8632 | -0.2279± 57.8083 | -0.2348± 57.9303 | -0.1722± 57.8738 | 0.2175± 57.7899 | -0.4801± 58.7447 | -0.2793± 57.7841 | -0.4468± 58.7261 | -0.0384± 58.2451 | 0.0396± 56.7617 | 0.0563± 60.0722 |
| P NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Corr (r ±SE) | 0.0551± 0.2668 | 0.4730± 0.2334 | 0.0528± 0.2668 | -0.1917± 0.2658 | -0.2831± 0.2563 | -0.1289± 0.2650 | -0.1171± 0.2654 | 0.0252± 0.2672 | -0.1237± 0.2648 | -0.2045± 0.2646 | 0.2653± 0.2576 | 0.2376± 0.295 |
| Min. °C Slope (b) | 3.4445± 31.0880 | -0.3125± 33.6544 | -0.0435± 31.5893 | -0.0628± 31.7692 | -0.1902± 32.7479 | -0.1002± 31.9136 | -0.1106± 31.8813 | 0.0276± 31.3611 | -0.1120± 31.8238 | -0.0221± 32.3191 | 0.0059± 30.1832 | 0.0164± 29.9726 |
| P NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Corr (r ±SE) | 0.1005± 0.2659 | 0.6122± 0.2313 | 0.1482± 0.2643 | -0.2669± 0.2575 | -0.3436± 0.2519 | -0.4375± 0.2493 | -0.1716± 0.2632 | -0.0386± 0.2670 | -0.3669± 0.2486 | -0.3613± 0.2492 | 0.0530± 0.2668 | 0.0903± 0.2672 |
| Mean R.H. Slope (b) | -0.0025± 0.57.9795 | -0.1924± 57.8632 | -0.2279± 57.8083 | -0.2348± 57.9303 | -0.1722± 57.8738 | 0.2175± 57.7899 | -0.4801± 58.7447 | -0.2793± 57.7841 | -0.4468± 58.7261 | -0.0384± 58.2451 | 0.0396± 56.7617 | 0.0563± 60.0722 |
| P NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| E.V NS | 73.44 | 58.32 | 57.64 | 63.19 | 65.28 | 59.86 | 57.21 | 54.87 | 54.70 | 63.66 | 67.90 | 85.85 |

NS: Not significant  * Significant  ** Highly significant
Table 5. Correlation coefficient between *H. pruni* and some predators and parasitoids in El-Sharkia District during 2017 and 2018 seasons

| Species          | Natural enemies | 2017                        | 2018                        |
|------------------|----------------|-----------------------------|-----------------------------|
|                  |                | Corr(r) ± S.E. | Slop (b) | P | Corr(r) ± S.E. | Slop (b) | P |
| Ch. carnea       |                | 0.8608 ± 0.1411 | 108.6349 ± 185.1595 | ** | 0.5207 ± 0.2281 | 59.7218 ± 481.2836 | * |
| Ch. septmpunctata|                | 0.8814 ± 0.1309 | 123.0183 ± 242.1155 | ** | 0.8384 ± 0.1456 | 121.3650 ± 303.5895 | ** |
| C. septempunctata|                | 0.8737 ± 0.1348 | 127.7274 ± 186.3929 | ** | 0.8970 ± 0.1181 | 97.1660 ± 298.5662 | ** |
| C. undecimpunctata|               | 0.8952 ± 0.1235 | 99.0007 ± 167.7951 | ** | 0.6785 ± 0.1963 | 92.5244 ± 414.8982 | ** |
| C. vicina niloticae|             | 0.8575 ± 0.1426 | 123.5275 ± 223.3029 | ** | 0.6991 ± 0.1910 | 103.5583 ± 497.2919 | ** |
| S. interruptus   |                | 0.8327 ± 0.1535 | 135.1361 ± 249.4372 | ** | 0.7880 ± 0.1645 | 130.5467 ± 387.6539 | ** |
| A. aphidimyza    |                | 0.9352 ± 0.0981 | 159.0659 ± 224.7580 | ** | 0.8696 ± 0.1319 | 164.8212 ± 464.7415 | ** |
| S. corollae      |                | 0.7987 ± 0.1668 | 111.4840 ± 317.4703 | ** | 0.6991 ± 0.1910 | 103.5583 ± 497.2919 | ** |
| Total insect     | predator       | 0.9253 ± 0.1051 | 17.2915 ± 140.5452 | ** | 0.8629 ± 0.1350 | 16.5076 ± 214.3621 | ** |
| A. colemani      |                | 0.7914 ± 0.1695 | 7.2689 ± 74.8059    | ** | 0.9285 ± 0.0992 | 3.6307 ± 190.0334 | ** |
| A. picipes       |                | 0.9142 ± 0.1123 | 12.0407 ± 100.0033 | ** | 0.8716 ± 0.1309 | 10.570 ± 19.5272  | ** |

NS= Not significant *Significant **Highly Significant

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مقدمة

في المشمش بمحافظة الشرقية - مصر

أجريت هذه الدراسة بمنطقة الخطرة، محافظة الشرقية، مصر وذلك خلال موسم 2018، لتقدير الكثافة المادية لمفترسات من البرقوق الحقيقي Chrysoperla carnea (Geoffroy) في البرقوق الحقيقي Cydonia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy). A. colemani و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy).

في الفترة من شهر مايو إلى أوائل نيسان (مارس) من عام 2018، تم قبض على 2087 مثال من البرقوق الحقيقي Cydonia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy) و Cydnia vicinia nilotica (Geoffroy).

وقد أجريت هذه الدراسة على التوالي وجد أيضاً أن نسبة التحكم بالطفيلين A. colemani و A. colemani و A. colemani و A. colemani و A. colemani

المكونين:

1. د. علي عبدالعزيز الشيخ
2. د. محمد مصطفى أحمد المغربي