

**Parasitoids and predators associated with scale insects and mealybugs
(Hemiptera: Coccoidea) on fruit trees at coastal area in Egyptian western desert**

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ABSTRACT

In the present investigation, many insect parasitoids and predators were recorded associated with scale insects and mealybugs (Hemiptera: Coccoidea) on the eleven species of deciduous and evergreen fruit trees in six localities at the Western North Coast of Egypt during December 2007- February 2010. Eighteen parasitoid species of superfamily Chalcidoidea belonging to five families and ten genera were collected. Eleven species of insect predators were found to be associated with scale insects and mealybugs which attacking fruit tree species during the period of study. These species belonging to four orders, Coleoptera, Hemiptera, Mantodea and Neuroptera.

Keywords: Parasitoids, predators, scale insects, mealybugs, fruit trees, Egyptian western desert

INTRODUCTION

Integrated pest management (IPM) aims to control pest populations with the least disruption of the environment. Emphasis is given to the fruit utilization of the regulating and limiting factors, such as natural enemies, existing in the ecosystem. A higher level of environmental quality is assured through the limitations set on the use of pesticides in order to maximize the role of natural enemies. Scale insects especially armored scales are considered among the pests most amenable to biological control because of their sedentary habits, colonial distribution and relative population stability. Parasitoids and predators are likely to be relatively more successful on this type of host or prey population (Erler and Tunc, 2001).

Therefore, it is very important to reestablish and renew a considerable background about the occurring natural enemies (parasitoids and predators) associated with scale insects and mealybugs infested both deciduous and evergreen fruit trees at North Western coast of Egypt under dry and irrigation system.

MATERIALS AND METHODS

In order to survey scale insects and mealybugs associating with some deciduous and evergreen fruit trees as well as their natural enemies (parasitoids and predators) in the western north coast of Egypt, several locations were chosen. These locations represent different types of irrigation as follows:

1. Rain-fed farms (dry ecosystem) at Burg el-Arab (50 km west of Alex.), Merghem (30 km at desert road) and coastal ridge (30-35 km at coastal west of Alex.).
2. Semi-arid farms at kingi-Mariut area (40 km west of Alex.).
3. Irrigated farms at Bahig and El-Hammam (60& 80 km west of Alex., respectively).

The chosen fruit trees species were as follows:

1. Common fig, *Ficus carica* L. (Moraceae) at Coastal ridge – Merghem, Burg El-Arab, Hammam and Bahig.
2. White mulberry, *Morus alba* L. (Moraceae) at Burg El-Arab.
3. Apple guava, *Psidium guajava* L. (Myrtaceae) at Burg El-Arab, Coastal ridge and Merghem.
4. European olive, *Olea europea* L. at Burg El-Arab, Coastal ridge, Merghem, kingi-Mariut, El-Hammam and Bahig.
5. Pomegranate, *Punica granatum* L. (Punicaceae) at El-Hammam.
6. Apple, *Malus domestica* Borkh (Rosaceae) at Burg El-Arab.
7. Pears, *Pyrus communis* L. (Rosaceae) at Burg El-Arab and El-Hammam.
8. Apricot, *Prunus armeniaca* L (Rosaceae) at Burg El-Arab and El-Hammam.
9. European plum, *Prunus domestica* L. (Rosaceae) at Burg El-Arab area.
10. Peach, *Prunus persica* L. Batsch (Rosaceae) at Burg El-Arab area.
11. Almond, *Prunus amygdalus* L. (Rosaceae) at Burg Eel-Arab area.

Inspection were started from December, 2007 till February, 2010 in the different locations under investigation except El-Hammam since the survey in this location started from January, 2009 till December 2009 on fig, olive and pear trees. After leaves and branches had been examined and the sample insects were counted, the specimens were confined in glass jars and kept in the laboratory for securing any emerging parasitoids. For classifying the inspected species of scale insects, slide preparations of adult females were made and examined microscopically at a power of 10-15 X and identified as well as their natural enemies (parasitoids and predators) by Scale Insects and Mealybugs Division, Plant Protection Institute, Agricultural Research Center, Egypt and by the key of parasitoids by Goulet *et al.* (1991) and Hayat (1970).

RESULTS AND DISCUSSION

Eighteen species of super family Chalcidoidea belonging to five families and ten genera were collected during the period of study (December, 2007 till November, 2009) associated with armored and soft scales. The obtained results in Table (1) shows the parasitoid species, its coccid hosts, host plants, localities and date of inspection.

These parasitoid species can be listed as follows:

I. Family: Aphelenidae

1- *Aphytis* sp.

This parasitoid was observed parasitizing the fig scale, *Lepidosaphes conchiformis* (Gmelin) (Hemiptera: Diaspididae) associated with fig trees at Burg el-Arab area in rain-fed farm during February (Table 1)

2- *Aphytis aonidiae* (Mercet)

It is a major parasitoid of San Jose Scale (SJS), *Quadraspidiotus perniciosus* (Comstock) in Southern California (Gulmahamad & DeBach, 1978). This Parasitoid is produced parthenogenetically and the males were rare and a single female was able to kill 62 first instar scale, 75.3 of 2nd instar nymphs or 37.1 mated females by sucking their body fluid. According to Universal Chalcidoidea Database (2010), *A. aonidiae* distributes in many regions of the world as Argentina, Armenia, Chile, Cyprus, Egypt, Europe, Greece, Hungary, Iran, Italy, Romenia, Spain, Turkey, UK, USA and USSR. During the present study, *A. aonidiae* was collected from

Hemiberlesia lataniae (Signoret) infesting olive trees at Burg el-Arab during February and November and from El-Hammam during November. It parasitized the fig scale, *L. conchiformis* in Burg el-Arab and El-Hammam during March and March- April, respectively (Table1). The data also showed that *A. aonidiae* parasitized SJS, *Q. perniciosus* on pear trees during November in the farm under irrigation at Burg el-Arab and El-Hammam.

3- *Aphytis coheni* De Bach

A. coheni is known as California red scale parasitoid. It is a primary parasitoid of *Aonidiella aurantii* (Maskell), *Aonidiella citrina* (Coquillett), *Aspidiotus hederae* (Vallot), *Aspidiotus nerii* Bouche, *Chrysomphalus dictyospermi* (Morgan) and *Hemiberlesia lataniae* (Signoret) (Universal Chalcidoidea Database, 2010). Abd-Rabou (1999) recorded *A. coheni* on *A. aurantii* in Egypt. It distributes in many countries as Cyprus, Egypt, Greece, Israel, South Africa and USA. Data in Table (1).

Table 1: Chalcidoid parasitoids recorded with scale insects infesting fruit tree species at Western Northern Coast of Egypt during December, 2007 to November, 2009.

Chalcidoid parasitoids	Host scale insects	Host plant	Site & system	Date
Family: Aphelinidae 1. <i>Aphytis</i> sp.	<i>L. conchiformis</i>	Fig	B.D	Feb.
2. <i>A. aonidiae</i>	<i>L. conchiformis</i>	Fig	B.D H.I	Mar. Mar. - Apr.
	<i>H. lataniae</i>	Olive	B.D H.I	Feb. & Nov. Nov.
	<i>D. perniciosus</i>	Pear	B.I H.I	Nov. Nov.
3. <i>A. coheni</i>	<i>L. riccae</i>	Olive	B.D	Jan. May, June, Sep. & Nov.
4. <i>A. lepidosaphes</i>	<i>L. conchiformis</i>	Fig	B.D H.I	Mar. - Apr., Nov. & Dec. Mar.-May
	<i>H. lataniae</i>	Olive	B.D	Feb. - Mar.
	<i>D. perniciosus</i>	Pear	H.I.	Oct.
5. <i>A. maculicornis</i>	<i>P. oleae</i>	Pear	B.I.	Apr.
	<i>H. lataniae</i>	Plum	B.I.	Mar. - Apr.
		Guava	B.I.	Feb. - Apr.
		Fig	B.D	Apr.
		Olive	B.D H.I.	Apr. - Nov. Feb., May, June & Dec.
	<i>H. rapax</i>	Apple	B.I.	Feb. - Apr.
	<i>A. aurantii</i>	Olive	H.I.	Mar. - Apr.
6. <i>A. paramaculicornis</i>	<i>P. oleae</i>	Pear	B.I.	Mar.
7. <i>Habrolepis aspidioti</i>	<i>H. lataniae</i>	Olive	B.D	Jan. & Nov. & Dec.
	<i>H. rapax</i>	Apple	B.I.	Oct.
	<i>D. perniciosus</i>	Apple	B.I.	July
		Pear	H.I.	Nov.
	<i>A. nerii</i>	Olive	B.D.	July
8. <i>Marietta leopardina</i>	<i>H. lataniae</i>	Olive	B.D.	Nov.
		Olive	H.I.	Nov.
Family: Encyrtidae 9- <i>Anagyrus</i> sp.	<i>P. citri</i>	Guava	B.I.	April
10- <i>Cheiloneurus</i> sp	<i>L. conchiformis</i>	Fig	M.D.	Apr.
	<i>S. coffeae</i>	Olive	B.D.	July-Aug. & Oct.
11. <i>Metaphycus</i> sp.	<i>R.pustulans pustulans</i>	Fig	H.I	Feb. - Mar. & Aug.
12. <i>M. flavus</i>	<i>S. coffeae</i>	Olive	B.D.	July
13. <i>M. lounsbury</i>	<i>S. oleae</i>	Olive	B.D.	May - June
14. <i>Diversinervus elgans</i>	<i>C. longulus</i>	Guava	M.D.	May
Family: Eulophidae 15. <i>Tetrastacus</i> sp.	<i>S. coffeae</i>	Olive	B.D.	Aug.
16. <i>T. Ceroplastae</i>	<i>C. rusci</i>	Fig	M.D. C.r.D	Apr. July
Family: Pteromalidae 17. <i>Scutellista caerulea</i>	<i>S. oleae</i> <i>S. coffeae</i>	Fig	B.D.	May - Aug.
		Olive	B.D. H.I.	June-Sep., Nov. & Dec. July - Aug.
		Fig	B.D.	July - Oct.
		Fig	B.D.	May
	<i>C. rusci</i>	Guava	B.I.	Nov.
Family: Signophoridae 18. <i>Signophora</i> sp.	<i>H. lataniae</i>	Guava	B.I.	Feb. & Dec.
		Fig	B.D H.I.	Feb. Feb.
		Olive	B.D.	Mar.
			H.I.	Nov.
	<i>H. rapax</i>	Apple	B.I.	Nov.

B = Burg El-Arab H = Hammam C.r = Costal ridg M = Merghem I = Irrigation D = Dry

showed that *A. coheni* a parasitoid of *Leucaspis riccae* Targioni-Tozzetti was found on olive trees at Burg el-Arab under rain-fed system during January-May, June, September and November.

4- *Aphytis lepidosaphes* Compere

The mussel scale parasitoid, *A. lepidosaphes* is an ectoparasitoid of *A. aurantii*, *Chrysomphalus aonidum* (Linnaeus), *Cornuaspis beckii* Newman, *Insulaspis gloverii* (Packard), *Lepidosaphes* sp. This species also play as a hyperparasite on some Hymenopterous parasitoids (Universal Chalcidoidea Database, 2010). Abd-Rabou (1999) recorded *A. lepidosaphes* on *C.beckii* in Egypt. *A. lepidosaphes* was recorded parasitizing *L.conchiformis* on fig trees at Burg el-Arab during March-April and November-December, while in the farm under irrigation at el-Hammam, it was observed during March - May. It is important to mention here that, this species was found in samples of *L. conchiformis* on fig at Libya during October. *A. lepidosaphes* was also found parasitizing *H. lataniae* which infest olives at Burg el-Arab during February-March and parasitizing *Q. perniciosus* on pear under irrigation at El-Hammam during October (Table 1).

5- *Aphytis maculicornis* (Masi)

The primary hosts of *A. maculicornis* are *A. aurantii*, *Aspidiotus cyanophylli* Signoret, *A. nerii*, *Chionaspis salicis* (Linnaeus); *C. dictyospermi*; *C. aonidum* ; *Diaspis echinocactus* Bouche; *Epidiaspis lepenii* Signoret; *H. cyanophylli*; *H. lataniae*, *L. conchiformis*, *L. gloverii*, *Parlatoresopsis longispinus* (Newstead), *Parlatoria* sp., *Parlatoria camelliae* Comstock, *Parlatoria oleae* Colvee; *Parlatoria pergandei* Comstock ; *Parlatoria theae* Cockerell and *Quadraspidotus juglansregiae* (Comstock). It distributes in Afghanistan, Algeria, Argentina, Armenia, Egypt, France, Greece, India, Iran, Iraq, Israel, Italy, Mexico, Morocco, Pakistan, China, Russia, S. Africa, Spain, Turkey and USA. (Universal Chalcidoidea Database, 2010). This species of aphelinid parasitoid was recorded on *P.oleae* in Egypt (Abd- Rabou, 1999) Data in Table (1) show that *A. maculicornis* parasitizing *P. oleae* which infest pear and plum trees at Burg el-Arab under irrigation during April and March-April, respectively. It was recorded parasitizing *H. lataniae* at Burg el-Arab on guava trees (February-April), fig (April), olive (April-November) and on olive farm under irrigation at El-Hammam during February, May, June and December. *A. maculicornis* was also found parasitizing on *Hemiberlesia rapax* (Comstock) infesting apple trees at Burg el-Arab during February- April and on the red scale, *A. aurantii* associated with olive trees at El-Hammam during March- April. (Table 1).

6- *Aphytis paramaculicornis* (De Bach & Rosen)

According to the data of Universal Chalcidoidea Database (2010), this species distributes in Egypt, India, Iran, Iraq, Israel, Pakistan, Saudi Arabia, South Africa and USA. It is a primary parasitoid of *A.aurantii*, *A. nerii*, *D. echinocacti*, *H. latania*, *Lepidosaphes* sp., *Lepidosaphes kirgisica* Borchsenius, *Lepidosaphes ulmi* (Linnaeus), *Parlatoria blanchardii* (Targioni – Tozzetti), *P.oleae*, *P. pergandii*; and *Q.perniciosus*. *A. maculicornis* was observed parasitized *P. oleae* on pear trees under irrigation at Burg el-Arab during March. (Table 1).

7- *Habrolepis aspidiotii* Compere & Annecke

Abd- Rabou (1999) recorded *H. aspidiotii* on *H. lataniae* and *Parlatoria ziziphi* in Egypt. On olive trees at Burg el-Arab under dry system, *H. aspidiotii* was recorded parasitized on *H. lataniae* during January & November – December and *A. nerii* during July (Table,1). The data obtained also showed that it parasitized on *H. rapax* and *Q. perniciosus* infesting apple trees under irrigation at Burg el-Arab during

October and July, respectively. On pear trees at El-Hammam area *Q. perniciosus* was parasitized by *H. aspidiotii* during November (Table 1).

8- *Marietta leoperdina* Motschulsky

This aphelinid parasitoid, *M. leoperdina* has been recorded in many regions in the world, i.e., Egypt, India, Indonesia, Israel, Japan, Kenya, Libya, Madagascar, Malaysia, Morocco, Nigeria, Pakistan, Philippines, Saudi Arabia, S. Africa, Taiwan, Turkey and USA (Universal Chalcidoidea Database 2010). Its primary hosts belonging to coccoid species are *Asterodiaspis quercicola* (Bouche), *Asterolecanium bambusae* (Boisduval), *Asterolecanium pustulans* (Cockerell), *Cerococcus* spp., *Ceroplastes* sp., *Ceroplastes floridensis* Comstock, *Ceroplastes rusci* (Linnaeus), *Pulvinaria psidii* Maskell, *Coccus hesperidum* (Linnaeus), *Coccus longulus* (Douglas), *P. psidii*, *Saissetia coffeae* (Walker), *Saissetia oleae* Olivier, *A. aurantii*, *A. citrina*, *H. lataniae*, *H. rapax*, *P. oleae*, *Q. perniciosus* and *Planococcus citri* (Risso). It is also hyperparasitoid on many hymenopterous parasitoid as mentioned by Universal Chalcidoidea Database (2010). Abd-Rabou (1999) recorded *M. leoperdina* on *A. aurantii*, *P. oleae* and *Parlatoria ziziphi* (Lucas) in Egypt. The present investigation revealed that, *M. leoperdina* parasitized on *H. lataniae* associated with olive trees under irrigation at El-Hammam and in rain fed farm at Burg el-Arab during November (Table1).

II. Family Encyrtidae

9- *Anagyrus* sp.

Encyrtid species of the genus *Anagyrus* (Howard) is the most successfully used in Biological control and survey conducted during 2000/2001 in different localities in Egypt revealed this genus on 7 species of mealybugs (Abd-Rabou, 2003). The data tabulated in Table (1) shows that *Anagyrus* sp. was parasitized on *P. citri* infesting guava trees at Burg el-Arab during April.

10- *Cheiloneurus* sp.

It is hyperparasitoids on other Chalcidoidea mainly Encyrtidae and Aphelinidae (Hymenoptera) (Noyes & Hayat, 1984). During the present study *Cheiloneurus* sp was collected from *Lepidosaphes conchiformis* at Merghem during April and *S. coffeae* infesting olive at Burg el-Arab during July-August and October (Table 1).

11- *Metaphycus* sp.

The species of the encyrtid genus *Metaphycus* are primary parasitoid of scale insects belonging to families Coccidae, Eriococcidae and Asterolecaniidae (Benzeya and Hayat, 1993). This Encyrtid parasitoid was recorded parasitized on fig pit scale, *Russelaspis pustulans pustulans* (Hemiptera: Asterolecanidae) on fig under irrigation at El-Hammam area during the period of February to March and August (Table1).

12- *Metaphycus flavus* (Howard)

M. flavus is a facultative gregarious parasitoid of different soft scales. Benzeya and Hayat (1993) mentioned that its host in India is *Pulvinaria maxima* Green (Hemiptera: Coccidae) and it distribute in Palaearctic; Nearctic; Neotropical and Australian zones. *M. flavus* was recorded parasitized on *S. coffeae* infesting olive trees in rain-fed farm at Burg El-Arab area during July (Table 1).

13- *Metaphycus lounsburyi* (Howard)

This species was recorded on *S. oleae* associated with olive trees at Burg El-Arab under dry system during May-June.

14- *Diversinervus elegans* (Silvestri)

Table (1) showed that *D. elegans* is a parasitoid of *C. longulus* associated with guava trees under irrigation system at Merghem during May.

III. Family: Eulophidae

15- *Tetrastichus* sp.

Egg parasitoid, *Tetrastichus* sp. was observed during this study associated with *S. coffeae* on olive trees at Burg el-Arab during August. Table (1).

16- *Tetrastichus ceroplastae* (Girault)

It is known as white wax parasitoid. It is a primary one on *C. rusci* associated with fig trees at Merghem and coastal ridge during April and July, respectively (Table 1).

IV. Family: Pteromalidae

17- *Scutellista caerulea* Fonscolombe

This species was recorded parasitizing on three soft scales, *S. oleae* on fig trees at Burg el-Arab during May to August, *S. coffeae* at Burg el-Arab on olive during June-September, November and December, while on fig trees was recorded during July-October at Burg el-Arab too, in El-Hammam area during July-August. *S. caerulea* was recorded parasitizing on *C. rusci* on fig trees during May and on guava during November at Burg el-Arab (Table 1). It is important to mention here that *S. caerulea* was observed also parasitized on *C. rusci* associated with fig trees at Libya during May. El-Minshawy *et al.* (1978) found that *S. cyanea* was prevalent on *S. coffeae* and *S. oleae* from August to November and on *C. floridensis* in March and September in Egypt.

V. Family: Signophoridae

18- *Signiphora* sp.

This species of genus *Signiphora* Ashmead were recorded parasitized on *H. lataniae* associated with guava trees during February and December at Burg el-Arab; on fig trees during February and on olive during March in the same location. At El-Hammam area, *Signiphora* sp was recorded *H. latania* associated with fig and olive trees during February and November, respectively. The data also showed that it parasitized on *H. rapax* infesting apple trees under irrigation at Burg el-Arab during November (Table 1).

2. The predators

Eleven species of insect predators were found to be associated with scale insects and mealybugs which attacking the concerned fruit trees during the period of study. These species are belonging to four orders. Order Coleoptera represented by eight coccinellid species and each of Order Hemiptera, Order Mantodea and Order Neuroptera represented by one species.

Table (2) showed that the scientific name of these species, host plant, site and recorded date of each species.

The predator species can be listed as follows:

I. Order Coleoptera

A. Family Coccinellidae

1- *Chilocorus* sp

Data in Table (2) showed that this species was observed during February, April, May and October on fig trees at El-Hammam under irrigation system.

2- *Coccinella undecimpunctata* L.

According Zipcode Zoo (2006), this species distributes in many countries as Australia, Denmark, Egypt, France, Germany, Italy, Japan, Malta, Portugal, Sweden, Syria and UK. The data obtained by El-Serafi *et al.* (2004) in Egypt showed that *C. undecimpunctata* was observed on guava trees infesting *H. lataniae*, *Icerya seychellarum seychellarum* (Westw.), *Icerya aegyptiaca* (Douglas), *C. longulus*, *Coccus hesperidum* (Linnaeus), *C. floredensis* and *Pulvinaria psidii* Maskell. This

species was observed during May on Guava trees at Burg El-Arab under irrigation system (Table 2).

Table 2: The Predators recorded with scale insects and mealybugs infesting fruit trees species at Western Northern Coast of Egypt during December, 2007 to November, 2009.

Scientific name	Host plant	Site	Date	Observation
Order: Coleoptera Family: Coccinellidae				
1. <i>Chilocorus</i> sp	Fig	H.I	Feb, April, May & Oct	
2. <i>Coccinella undecimpunctata</i>	Guava	B.I	May	
3. <i>Cydonia vicina</i> var <i>nilotica</i>	Guava	B.I	June	
4. <i>Exochomus flavipes nigripennis</i>	Fig Fig Olive	C.r.D B.D C.r.D	June May June	
5. <i>Hyperaspis</i> sp.	Olive	B.D	Mar & July	Associated with <i>Aspidiotus nerii</i>
6. <i>Rodalia cardinalis</i>	Guava Guava Pear	B.I M.D B.I	May, June & Dec June Nov.	Associated with <i>Icerya seychellarum</i>
7. <i>Scymnus</i> sp.	Olive Olive Fig	B.D H.I H.I	Feb-Apr, June & July July Oct	
8. <i>Scymnus subvillosus</i>	Fig Fig Fig	C.r.D H.I B.D	June May May – Nov	
Order: Hemiptera Family: Reduviidae				
9. <i>Reduvius</i> sp.	Olive	H.I	June	
Order: Neuroptera Family: Chrysopidae				
10. <i>Chrysopa</i> sp.	Olive Plum Pear Olive Fig	B.D B.I B.I H.I C.r.D	Oct & June July July June July	
Order: Mantodea Family: Mantidae				
11. <i>Sphodromantis bioculata</i>	Fig	H.I	Aug.	

B = Burg El-Arab H = Hammam C.r = Coastal ridge M = Merghem I = Irrigation D = Dry

3- *Cydonia vicina* var. *nilotica* (Mulsant)

The data in Table (2) shows that *C. vicina* var *nilotica* was collected from guava trees under irrigation system at Burg El-Arab during June. El-Serafi *et al.* (2004) recorded *C. vicina isis* on guava trees in Egypt.

4- *Exochomus flavipes nigripennis* Korschefsky

This species distributes in North western India, Pakistan, Palaearctic and Africa (Poorani, 2004). Table (2) showed that this predator was collected during June at Coastal ridge from fig trees and olive trees, while at Burg El-Arab it was observed during May on fig trees.

5- *Hyperaspis* sp.

The larvae of *Hyperaspis* sp. was observed during this study associated with *A. nerii* on olive trees at Burg El-Arab during March and July (Table 2).

6- *Rodalia cardinalis* (Mulsant) L.

This species was found to be distributed in Australia, Cyprus, France, Italy, Japan, Malta, Portugal and US (Zipcode Zoo 2006). El-Serafi *et al.* (2004) recorded *R. cardinalis* on guava trees in Egypt.

The data in Table (2) showed that this species was observed on *I. seychellarum seychellarum* infesting guava trees at Burg El-Arab during May, June, December and in Merghem during June, while on pear trees under irrigation system it was observed at Burg El-Arab during November.

7- *Scymnus* sp.

This predator was observed on olive trees at Burg El-Arab during February, March, April, June, July and in El-Hammam during July, while on fig trees it observed at El-Hammam during October. (Table 2).

8- *Scymnus subvillosus* (Goeze)

S. subvillosus is common in the olive grove of the Mediterranean region and both adult and larvae are predaceous stages (Ba M'hamed and Chemseddine, 2002). According to Zipcode Zoo (2006), this predator distributes in many regions of the world as Afghanistan, Austria, Cyprus, France, Germany, Greece, Hungary, Italy, Malta, Portugal, Romania, Spain and Turkey. *S. subvillosus* was collected from fig trees in Coastal ridge during June, at El-Hammam during May and at Burg El-Arab during the period of May-November (Table 2).

II- Order Hemiptera**9- *Reduvius* sp.**

Table (2) shows that *Reduvius* sp. (belonging to Family Reduviidae) was associated with olive trees under irrigation system at El-Hammam during June.

III- Order Neuroptera**10- *Chrysopa* sp.**

During this study *Chrysopa* sp. (belonging to Family Chrysopidae) was observed in Burg El-Arab on olive trees during October and June, on plum trees and pear trees during July, while at El-Hammam it was associated with olive trees during June and at coastal ridge on fig trees it was recorded during July (Table,2).

IV- Order Mantoidea**11- *Sphodromantis bioculata* (Burmeister)**

This species which is belonging to Family Mantidae was recorded on fig trees at El-Hammam during August (Table 2).

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ARABIC SUMMARY

الطفيليات والمفترسات المرتبطة بالحشرات القشرية والبق الدقيقي التي تصيب اشجار الفاكهه بالساحل الشمالي الغربي-مصر

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2- كليه الزراعه(سابا باشا)-جامعة الإسكندريه

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اشتملت هذه الدراسة على إجراء حصر للأعداء الحيوية (متطفلات ومفترسات) المرتبطة بالحشرات القشرية والبق الدقيقي على 11 نوع من أشجار الفاكهه المستديمة والمتساقطة الأوراق في ستة مواقع بالساحل الشمالي الغربي تمثل أنظمة الري المختلفة (زراعات مطرية – نصف مروية – مروية). أختيرت ستة مواقع للدراسة تتبع محافظتي الإسكندرية ومطروح وهذه المواقع هي: منطقة برج العرب (زراعة مطرية ومروية) – مرغم (زراعة مطرية) – الطريق الساحلي (الكيلو 30-35 ك غرب الإسكندرية – زراعة مطرية) – الكينج مريوط (نصف مروية) – قرية بهيج (زراعة مروية) – الحمام (زراعة مروية).

(1) حصر أنواع المتطفلات:

تم تسجيل 18 نوع من الطفيليات غشائية الأجنحة تتبع فوق عائلة Chalcidoidea تنتمي إلى خمس عائلات وعشرة أجناس وهي:

أ. عائلة Aphelenidae

1. *Aphytis* sp. : وجد متطفلاً على حشرة التين المحارية.
2. *A. aonidiar* : وجد متطفلاً على حشرة اللاتانيا القشرية التي تصيب أشجار الزيتون وحشرة التين المحارية وحشرة البرنشيوزا على أشجار الكمثرى.
3. *A. coheni* : يتطفل على حشرة الزيتون المحارية في المناطق المطرية.
4. *A. lepidosaphes* : مرتبط بحشرة التين المحارية وحشرة اللاتانيا على الزيتون وحشرة البرنشيوزا على الكمثرى.
5. *A. maculicornis* : لوحظ متطفلاً على حشرة البرقوق القشرية التي تصيب الكمثرى والبرقوق وأيضاً على حشرة اللاتانيا القشرية على أشجار الجوافه والحشرة القشرية الحمراء على أشجار الزيتون في المناطق المروية.
6. *A. paramaculicornis* : سجل على حشرة البرقوق القشرية على أشجار الكمثرى.
7. *Habrolepis aspidiotii* : سجل على حشرة اللاتانيا وحشرة الهيدرا المرتبطتان بأشجار الزيتون ، أيضاً وجد متطفلاً على حشرة التفاح القشرية والبرنشيوزا على التفاح والكمثرى.
8. *Marietta leopardina* : يتطفل على حشرة اللاتانيا المرتبطة بأشجار الزيتون.

ب. عائلة Encyrtidae

9. *Anagyrus* sp. : سجل على بق الموالح الدقيقي على أشجار الجوافه.
10. *Cheiloneurus* sp. : سجل على حشرة التين المحارية على التين والحشرة البنية الرخوة على الزيتون.
11. *Mytaphycus* sp. : سجل هذا الطفيل على الحشرة البنية الرخوة على أشجار الزيتون في المناطق المطرية.
12. *Metaphycus flavus* : يتطفل على الحشرة البنية الرخوة على أشجار الزيتون في المناطق المطرية.
13. *Metaphycus lounsburyi* : وجد هذا الطفيل مرتبط بحشرة الزيتون الشمعية في المناطق المطرية.
14. *Diversinervus elegans* : وجد على الحشرة القشرية الرخوة المطالولة المرتبطة بأشجار الجوافه.

ج. عائلة Eulophidae

15. *Tetrasticus* sp. : طفيل بيض مرتبط بالحشرة البنية الرخوة على أشجار الزيتون.
16. *Tetrasticus ceroplastae* : وجد على حشرة التين الشمعية

د. عائلة Pteromalidae

17. *Scutellista caerulea* : يتطفل على ثلاث حشرات قشرية رخوة وهي حشرة الزيتون الشمعية والحشرة البنية الرخوة وحشرة التين الشمعية.

هـ. عائلة Signophoridae

18. *Signophora* sp. : يتطفل على حشرة اللاتانيا القشرية المرتبطة بأشجار الجوافه والزيتون والتين وحشرة التفاح القشرية على أشجار التفاح.

(2) حصر أنواع المفترسات:

تم تسجيل 11 نوع من المفترسات الحشرية المرتبطة بالحشرات القشرية والبق الدقيقي في مناطق الدراسة تتبع أربع رتب حشرية. من رتبة غمدية الأجنحة سجلت ثمانية أنواع من أنواع أبي العيد والفيدياليا ومن رتبة نصفية الأجنحة تم تسجيل نوع واحد يتبع جنس *Reduvius* sp أما من رتبة فرس النبي فقد سجل نوع من فرس النبي ذو البقعتين ومن رتبة شبكية الأجنحة سجل نوع من أسد المن.