

Ecological aspects of *Saissetia* spp. (Coccidae: Coccoidea: Hemiptera) and their natural enemies in Egypt

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ABSTRACT

In Egypt, *Saissetia* spp. (Coccidae: Coccoidea: Hemiptera) are the most dangerous soft scale insects infesting fruit trees. The aim of this work is to study the ecological aspects of *Saissetia* spp. and its natural enemies in Egypt. The result indicated that Genus *Saissetia* Deplanche comprises here by two species These are the soft brown scale, *Saissetia coffeae* (Walker) and the Mediterranean black scale, *Saissetia oleae* (Olivier). Genus *Saissetia* recorded here associated with 14 parasitoid species and 16 predator species. The seasonal abundance of *S. coffeae* was studied for two successive years from 2009-2010 on olive trees in Northern Coast. The obtained results showed that, the insect population reached maximum during mid September (7728 and 8368/ 60 leaves/30 twigs) in first year and second year, respectively. Numbers by parasitoids *Metaphycus lounsburyi* (Howard), *Microterys flavus* (Howard) and *Scutellista cyanea* Motschulsky and a predator *Scymnus syriacus* Mars., reached maximum (31,9,3, and 19 /60 leaves/30 twigs) during September, July, September and August, in the first year, respectively and 20,8,2 and 15 during September in the second year, respectively. The seasonal abundance of *S. oleae* was studied for two successive years from 2009-2010 on olive trees in El-Arish. The obtained results showed that, the insect population reached maximum during mid of August (9729/ 60 leaves/30 twigs) in first year and mid of September (6899/ 60 leaves/30 twigs) in the second year. Numbers by the parasitoids, *Metaphycus helvolus* (Compere), *Microterys flavus* (Howard) and the predators, *Coccinella undecimpunctata* L. and *Exochomus flavipes* Thunb., reached maximum (22,5,8 and 28 /60 leaves/30 twigs) during August, August, September and August, in the first year, respectively and 24,19,4 and 22 during September in the second year, respectively.

Keywords: Ecology, *Saissetia* spp., Coccidae, natural enemies, Egypt

INTRODUCTION

The Genus *Saissetia* Deplanche (Coccidae: Coccoidea: Hemiptera) represented in Egypt by two species. These are the soft brown scale, *Saissetia coffeae* (Walker) and the Mediterranean black scale, *Saissetia oleae* (Olivier) (Abd-Rabou, 2000).

The damage of *Saissetia* spp., feed on plant juices, cause a loss of vigor, spots on the foliage due to toxins in the scale saliva, deformation of infested plant parts, loss of leaves, retarded plant growth, even death of the plant and causing premature death of pointed gourd vines (Valand *et al.*, 1989 and Carvalho *et al.*, 2003). *Saissetia* spp. are the most serious soft scale insects infesting fruit trees in Egypt (El-Minshawy *et al.*, 1971, 1974 and Abd El-Razak, 2000).

The hemispherical scale, *S. coffeae* had three generations (El-Minshawy and Saad, 1977), 3-4 peaks (Hanafi, 1977), three generations (El-Agamy *et al.*, 1994), two duration's of activity (Hendawy, 1999) and three and two periods of activity (Moursi, 2010). Abd-Rabou *et al.* (2009) studied the biological aspects of *S. coffeae*. The parasitoids are considered one of the most effective bioagents of *S. coffeae* (El-Minshawy and Saad, 1977; El-Minshawi *et al.*, 1978; Abd-Rabou, 2001b and Moursi, 2010).

The Mediterranean soft black scale *Saissetia oleae* (Olivier) (Hemiptera: Coccidae) had 6 host plant species (Abd El-Razak, 2000). This soft scale insect distributed all over Egypt (Mohammed and Nada, 1991). Also the parasitoids has a good role in controlling *S.oleae* (El-Minshawi *et al.*, 1978; Abd-Rabou, 2001a; Abd-Rabou, 2004, a, b, and Tena *et al.*, 2008). In the other hand the predators of *Saissetia* spp. were recorded and studied by Abd Allah (1988), Hamed and Hassanein (1991), El-Agamy *et al.* (1994) and Abd-Rabou *et al.* (2003).

The present work dealt with the ecological aspects of *Saissetia* spp. and its natural enemies in Egypt.

MATERIALS AND METHODS

Infested leaves and twigs of olive were examined in the field using a pocket magnification lens. Infested leaves and twigs were collected from different host plants and different locations in Egypt during 2009-2010. Identification of *Saissetia* spp. was done by examining adults in Canada Balsam. Also Infested leaves and twigs will be examined in the field, using a pocket lens. The leaves and twigs will be collected and placed separately in paper bags for further examination in the laboratory. Materials will be kept in a well-ventilated container until the emergence of any natural enemies. Identification of natural enemies will be made by examining mounted adults in Hoyer's medium. Abundance of the populations of *Saissetia* sp. and their natural enemies were carried out on olive trees during 2009 and 2010 in El-Arish and Northern Coast. The plant areas selected for these investigations received no chemical control measures for several years. Twenty trees of olive almost similar in age, size, shape and growth condition were randomly chosen for sampling at twice a week intervals for each location.

On each biweekly sampling, 60 leaves and 15 twigs of olive were chosen at random. Thereafter, the leaves and twigs were kept in a closed paper bags and transferred to the laboratory for further examination and counting. For natural enemies each monthly sampling, 60 leaves and 15 twigs of olive trees were chosen randomly. Each leaf and twig were stored in a well-ventilated emergence glass tube and monitored daily for parasitoid emergence. Rate of parasitism was determined by dividing the number of emerging parasitoid from each by the number of hosts existing. Predators was counted in field and transferred to the laboratory for further examination. Simple correlation and regression values were calculated to obtain information about the relationships between the three tested weather factors and the population of the pest and its natural enemies.

RESULTS AND DISCUSSION

1.A list of Genus *Saissetia* in Egypt:

- a. The soft brown scale, *Saissetia coffeae* (Walker)
- b. The Mediterranean black scale, *Saissetia oleae* (Olivier)

2. A list of parasitoids of Genus *Saissetia* in Egypt:

Family: Aphelinidae *Coccophagus lycimnia* (Walker), *C. scutellaris* (Dalman), *Marietta leopardina* Motschulsky., **Family: Encyrtidae.**, *Baeoanusia* sp., *Diversinervus elegans* Silvestri., *Encyrtus inflex* (Embleton), *M. flavus* (Howard). *M. helvolus* (Compered), *M. lounsburyi* (Howard), *M. zebratus* (Mercet), *Microterys flavus* (Howard), *Parechthrodryinus coccidiphagus* (Mercet)., **Family: Mymaridae.** *Alaptus* sp., **Family: Pteromalidae.** *Scutellista cyanea* Motschulsky.

3. List of predators of Genus *Saissetia* in Egypt:

Coleoptera:

Family: Coccinellidae ,*Chilocorus bipustulatus* L.,*Coccinella septempunctata* (L.), *Coccinella undecimpunctata* L., *Cydonia vicina isis* , *Exochomus flavipes* Thunb. *Pharoscymnus varius* Kirsch, *Rodalia cardinals* Muls., *Scymnus syriacus* Mars. *Scymnus interruptus* Goez, **Family: Staphylinidae** , *Paederus alfieri* Koch

Diptera:

Family: Syrphidae, *Syrphus corollae* Fab., *Metasyrphus corollae* Fab. (Diptera), *Paragus compeaitus* Wied. (Diptera), **Hemiptera, Family : Anthocoridae** *Orius laevigatus* Fieb., *O. albidipennis*, **Neuroptera, Family: Chrysopidae** *Chrysoperlla carnae* Steph.,

4. Ecological studies of Genus *Saissetia* in Egypt:

4.1. The hemispherical scale, *Saissetia coffeae* (Walker):

4.1.1. Host Plants:

During the present work, *Olea europaea* was recorded as a host plant of *S. Coffeae*. It is the most serious soft scale insects infesting guava trees in Alexandria (El-Minshawy *et al.*, 1971 and 1974). Abd El-Razak (2000) reported *S. Coffeae* from one plant species .

4.1.2. Distribution:

During the present work this species was recorded distributed in four governorates. These are Alexandria, Mersa Matruh, North and South Sinai. Soft scale insects distributed all over Egypt. Mohammed and Nada (1991) recorded the Egyptian soft scale from Assiut, Aswan, Alexandria, Beheira, Cairo, Dakahlyia, Demietta, Western desert, El-Minya, Gharbiya, Giza, Fayoum, Ismailia, Kafr El-Sheikh, Menoufiya, Qalyubiya, Qena, Sharkiya, Sinai, Siwa Oasis and Suez.

4.1.3. Natural enemies:

4.1.3.1. Parasitoids:

Eight species of aphelinids, encyrtids and pteromalids were recorded and collected from concerned specimen under investigation here found in Egypt. These are: *Coccophagus lycimnia* (Walker), *C. scutellaris* (dalman), *E. inflex* (Embleton), *Marietta leopardina* Motschulsky, *Metaphycus helvolus* (Compere), *M. lounsburyi* (Howard), *Microterys flavus* (Howard) and *Scutellista cyanea* Motschulsky.

4.1.3.2. Predators:

Twelve species of predators were recorded and collected from concerned specimen under investigation here found in Egypt. These are Coleoptera: Family: occinellidae, *Coccinella septempunctata* (L.), *Exochomus flavipes* Thunb., *Pharoscymnus varius* Kirsch., *Scymnus syriacus* Mars., *Scymnus interruptus* Goez, Family: Syrphidae, *Metasyrphus corollae* Fab. (Diptera), *Paragus compeaitus* Wied. (Diptera), Hemiptera, Family: Anthocoridae, 8. *Orius laevigatus* Fieb., Neuroptera Family : Chrysopidae *Chrysoperlla carnae* Steph.

4.1.4. Abundance of *Saissetia coffeae* in Egypt:

The seasonal abundance of *S. coffeae* was studied for two successive years from 2009-2010 on olive trees in Northern Coast .The obtained results in Fig. (1) showed that, the insect population reached maximum during mid September (7728 and 8368/ 60 leaves/30 twigs) in first year and second year, respectively. Numbers by parasitoids *Metaphycus lounsburyi* (Howard), *Microterys flavus* (Howard) and *Scutellista cyanea* Motschulsky and a predator *Scymnus syriacus* Mars., reached maximum (31,9,3 and 19/60 leaves/30 twigs) during September ,July, September and August, in the first year, respectively and 20,8,2 and 15 during September in the second year, respectively (Figs. 2 &3).

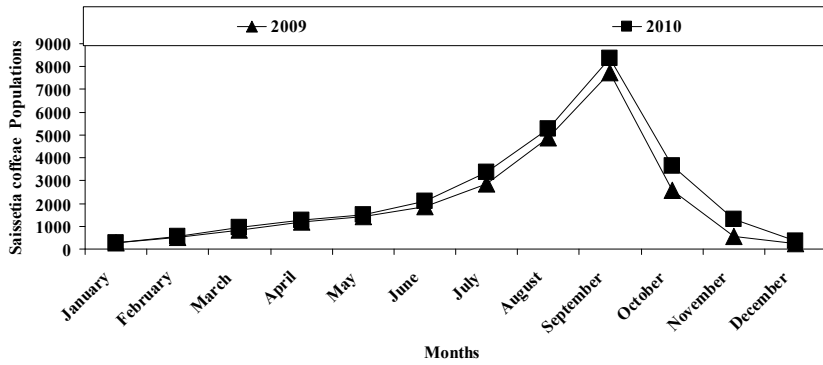


Fig (1): Population dynamics of the soft brown scale, *Saissetia coffeae* on olive trees in Northern Coast region during 2009 and 2010.

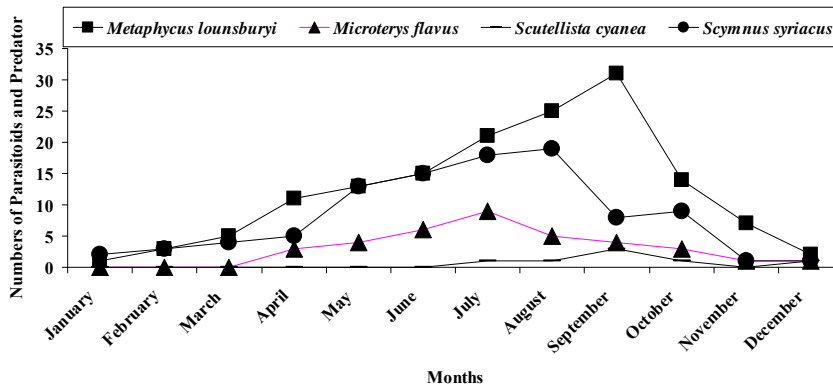


Fig.(2):Population dynamics of parasitoids and predator of soft brown scale, *Saissetia coffeae* on olive trees in Northern Coast region during 2009.

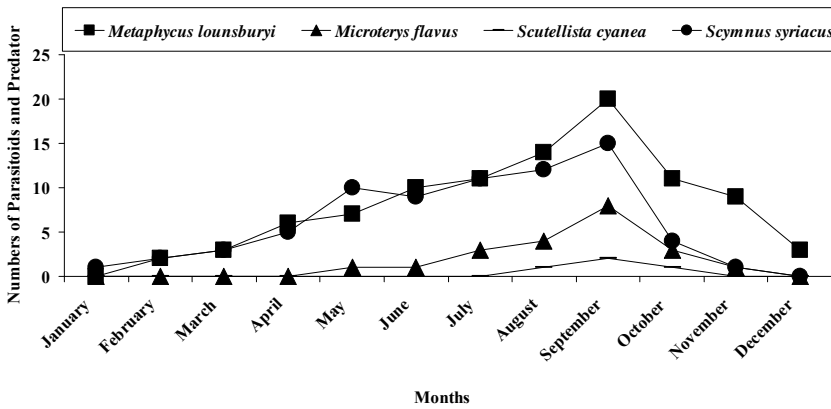


Fig.(3):Population dynamics of parasitoids and predator of soft brown scale, *Saissetia coffeae* on olive trees in Northern Coast region during 2010.

Data in Table (1), show that the simple correlation between the population of *Metaphycus lounsburyi*, *Scymnus syriacus*, maximum, minimum temperature, relative humidity% and the mean number of the soft brown scale, *Saissetia coffeae* were significant ($r = 0.63, 0.60, 0.84, 0.79$ and 0.81), respectively and non-significant ($r = 0.41$ and 0.38) between *Microterys flavus* (Howard) and *Scutellista cyanea* Motschulsky and the mean number of the soft brown scale during the 2009 . Also, results in Table (1), show that the simple regression for changing the population of *Metaphycus lounsburyi*, *Scymnus syriacus*, maximum, minimum temperature, relative humidity% and the mean number of *S. coffeae* were significant ($b = 0.62, 0.66, 0.81, 0.80$ and 0.78), respectively and non-significant ($b = 0.37$ and 0.32) between the *Microterys flavus* (Howard) and *Scutellista cyanea* Motschulsky and the mean number of the soft brown scale during the 2009.

Table 1: Simple correlation and regression values of the population dynamics of the soft brown scale, *Saissetia coffeae* and its parasitoid and predator on olive trees in Northern Coast Governorate during 2009.

Variable	Simple correlation "r"	Probability "P"	Regression	Probability "P"
<i>Metaphycus lounsburyi</i>	0.63	*	0.62	*
<i>Microterys flavus</i>	0.41	Ns	0.37	Ns
<i>Scutellista cyanea</i>	0.38	Ns	0.32	Ns
<i>Scymnus syriacus</i>	0.60	*	0.66	*
Maximum	0.84	**	0.81	**
Minimum	0.79	**	0.80	**
R.H. %	0.81	**	0.78	**

Data in Table (2), show that the simple correlation between the population of *Metaphycus lounsburyi*, *Scymnus syriacus*, maximum, minimum temperature, relative humidity % and the mean number of the soft brown scale, *Saissetia coffeae* were significant ($r = 0.71, 0.68, 0.87, 0.82$ and 0.85), respectively and non-significant ($r = 0.36$ and 0.29) between *Microterys flavus* (Howard) and *Scutellista cyanea* Motschulsky and the mean number of the soft brown scale during the 2010 . Also, results in Table (2), show that the simple regression for changing the population of *Metaphycus lounsburyi*, *Scymnus syriacus*, maximum, minimum temperature, relative humidity% and the mean number of *S. coffeae* were significant ($b = 0.70, 0.69, 0.85, 0.84$ and 0.73), respectively and non-significant ($b = 0.31$ and 0.30) between the *Microterys flavus* (Howard) and *Scutellista cyanea* and the mean number of the soft brown scale during the 2010.

S. coffeae had three generations, during April-May, June-July and August-September. The third generation overwinters as second nymphal instar from November till February (El-Minshawy and Saad, 1977). While Hanafi in the same year recorded 3-4 peaks for this soft scale. El-Agamy *et al.* (1994) recorded three generations of *S. coffeae* on guava trees in Kafr El-Sheikh governorate in May, August and October. Hendawy (1999) stated that *S. coffeae* had two duration's of activity, the first from October to November, while the second from May up to

August, it is note worthy that the adults (usually females) are absent from December to February; Moursi (2010) found *S. coffeae* had three and two periods of activity during the first and second seasons, respectively.

Table 2: Simple correlation and regression values of the population dynamics of the soft brown scale, *Saissetia coffeae* and its parasitoid and predator on trees in Northern Coast Governorate during 2010.

Variable	Simple correlation "r"	Probability "p"	Regression	Probability "p"
<i>Metaphycus lounsburyi</i>	0.71	*	0.70	*
<i>Microterys flavus</i>	0.36	Ns	0.31	Ns
<i>Scutellista cyanea</i>	0.29	Ns	0.30	Ns
<i>Scymnus syriacus</i>	0.68	*	0.69	*
Maximum	0.87	**	0.85	**
Minimum	0.82	**	0.84	**
R.H. %	0.85	**	0.83	**

El-Minshawy and Saad (1977) mentioned that *Scutellista cyanea* Motsch, was the most important enemy attacking *S. coffeae*. This parasitoid was present on *S. coffeae* and *S. oleae* from August to November and on *C. floridensis* in March and September (El-Minshawi *et al.*, 1978). Abd-Rabou (2001b) studied the dynamic of the hemispherical scale, *Saissetia coffeae* (Walker) in Alexandria. He recorded the total rate of parasitism reached 27.0%, out of which *M. helvolus* was responsible for 13 %. In the Northern Coast region, the total rate of parasitism reached 31.9% out of which *C. lycimnia* was responsible for 10.6%. *M. helvolus* was collected from all investigated locations. Moursi. (2010) found *S. coffeae* associated with six parasitoids, *Coccophagus lycimnia* Walker, *Encyrtus inflex* (Embleton), *Metaphycus helvolus* Comp., *Microterys flavus* (Howerd), *Scutellista cyanea* Motch. and *Eublemma scitula* Ramb. The hyperparasitoid, *Marietta leopardina* Motch. was also found associated with *S. Coffeae*.

Abd Allah (1988) recorded that the coleopterous insect predators feeding on soft scale infesting citrus, mango and ledge plants in Mansoura region were *Cydonia vicina isis* Cr., *Cydonia vicina nilotica* Muls., *Coccinella septempunctata* L., *C. undecimpunctata*, *Scymnus interruptus* Goez, *S. cyriacus*, *Exochomus flavipes* Thunb., *Rodalia cardinalis* Muls. And *Paederus alfieri* Koch. He added two neuropetrous predators, *Chrysopa carnea* Steph. And *C. septempunctata* Wesm.; two hemipterous predators, *Orius laevigatus* Fieb. And *O. albidipennis* and two dipterous predators, *Metasyrphus corollae* Fab. and *Paragus compeaitus* Wied. The predators, *C. bipustulatus*, *S. syriacus*, *Pharaoscymnus Varius* Kirsch and *R. cardinalis* were found feeding on some soft scale insects and *Chrysop* sp. larvae are very common and polyphagous predators feeding on many soft scale insects (Hamed and Hassanein, 1991). *C. bipustulatus*, *S. syriacus*, *C. carnea*, *C. septempunctata* and *Orius laevigatus* Fab. Recorded associated with different species of soft scale insects in Kafr El-Sheikh (El-Agamy *et al.*, 1994).

4.2. The Mediterranean black scale, *Saissetia oleae* (Olivier)

4.2.1. Host Plants:

During the present work, *Olea europaea* was recorded as a host plant of *S. oleae*. The Mediterranean soft black scale *S. oleae* is a cosmopolitan and polyphagous soft scale pest of more than 60 plant species in the Mediterranean region, including citrus and olives (Carvalho *et al.* 2003). Abd El-Razak (2000) reported *S. oleae* (Olivier) from 6 host plant species.

4.2.2. Distribution:

During the present work this species was recorded distributed in three governorates. These are Mersa Matruh, North and South Sinai. Soft scale insects distributed all over Egypt. Mohammed and Nada (1991) recorded the Egyptian soft scale from Assiut, Aswan, Alexandria, Beheira, Cairo, Dakahlyia, Demietta, Western desert, El-Minya, Gharbiya, Giza, Fayoum, Ismailia, Kafr El-Sheikh, Menoufiya, Qalyubiya, Qena, Sharkiya, Sinai, Siwa Oasis and Suez.

4.2.3. Natural enemies:

4.2.3.1. Parasitoids:

Twelve species of aphelinids, encyrtids, mymarids and pteromalids were recorded and collected from concerned specimen under investigation here found in Egypt. These are: *Alaptus* sp., *Baeoanuisa* sp., *Coccophagus lycimnia* (Walker), *Diversinervus elegans* Silvestri, *Marietta leopardina* Motschulsky, *Metaphycus flavus* (Howard), *M. helvolus* (Compere), *M. zebratus* (Mercet), *Microterys flavus* (Howard), *Parechthrodryinus coccidiphagus* (Mercet) and *Scutellista cyanea* Motschulsky.

4.2.3.2. Predators:

Twelve species of predators were recorded and collected from concerned specimen under investigation here found in Egypt. These are Coleoptera: Family: Coccinellidae, *Chilocorus bipustulatus* L., *Coccinella septempunctata* (L.), *Coccinella undecimpunctata* L., *Cydonia vicina isis*, *Exochomus flavipes* Thunb., *Pharoscymnus various* Kirsch., *Rodalia cardinalis* Muls., *Scymnus syriacus* Mars., *Scymnus interruptus* Goez, Family: Staphylinidae *Paederus alfieri* Koch Diptera: Family: Syrphidae *Syrphus corollae* Fab. *Metasyrphus corollae* Fab. (Diptera) *Paragus compeaitus* Wied. (Diptera) Hemiptera Family: Anthocoridae *Orius laevigatus* Fieb. *O. albidipennis* Neuroptera Family: Chrysopidae *Chrysoperlla carnae* Steph.

4.2.4. Abundance of *Saissetia oleae* in Egypt:

The seasonal abundance of *S. oleae* was studied for two successive years from 2009-2010 on olive trees in El-Arish. The obtained results in Fig. (4) showed that, the insect population reached maximum during mid of August (9729/ 60 leaves/30 twigs) in first year and mid of September (6899/ 60 leaves/30 twigs) in the second year. Numbers by the parasitoids, *Metaphycus helvolus* (Compere), *Microterys flavus* (Howard) and the predators, *Coccinella undecimpunctata* L. and *Exochomus flavipes* Thunb., reached maximum (22,5,8 and 28 /60 leaves/30 twigs) during August, August, September and August, in the first year, respectively and 24,19,4 and 22 during September in the second year, respectively (Figs 5&6).

Data in Table (3), show that the simple correlation between the population of *Metaphycus helvolus*, *Exochomus flavipes*, maximum, minimum temperature, relative humidity% and the mean number of the soft brown scale, *Saissetia coffeae* were significant ($r = 0.66, 0.71, 0.86, 0.77$ and 0.74), respectively and non-significant ($r = 0.27$ and 0.31) between *Microterys flavus*, *Coccinella undecimpunctata* and the mean

number of the soft brown scale during the 2009. Also, results in Table (3), show that the simple regression for changing the population of *Metaphycus helvolus*, *Exochomus flavipes*, maximum, minimum temperature, relative humidity% and the mean number of *S. coffeae* were significant ($b = 0.71, 0.70, 0.84, 0.74$ and 0.73), respectively and non-significant ($b = 0.25$ and 0.29) between the *Microterys flavus*, *Coccinella undecimpunctata* and the mean number of the soft brown scale during the 2009.

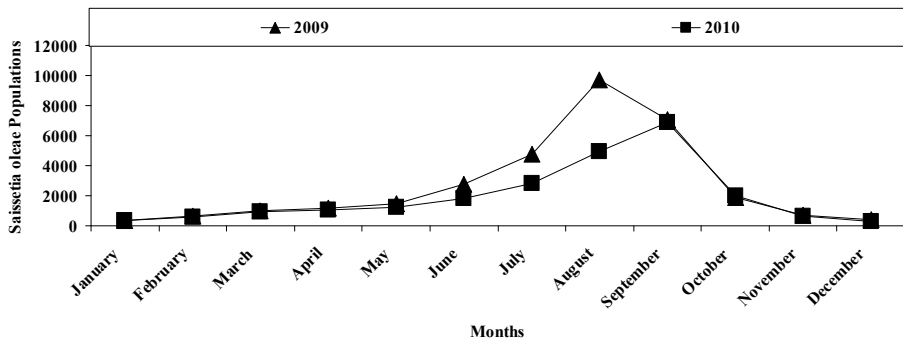


Fig (4): Population dynamics of the Mediterranean black scale, *Saissetia oleae* on olive trees in Al-Arish region during 2009 and 2010.

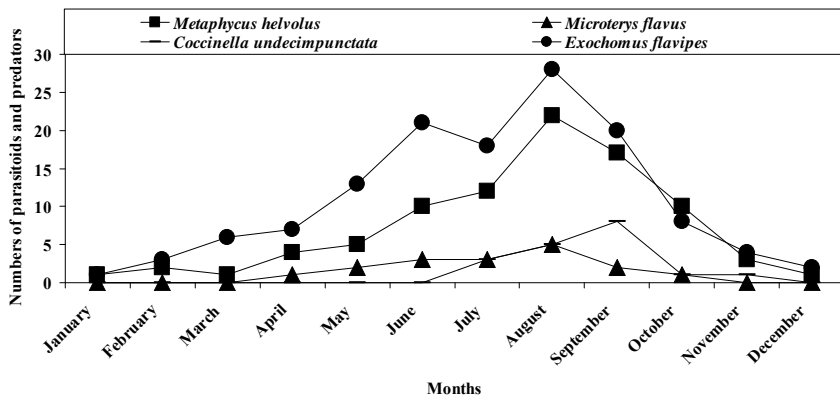


Fig.(5):Population dynamics of parasitoids and predator of the Mediterranean black scale, *Saissetia oleae* on olive trees in Al-Arish region during 2009.

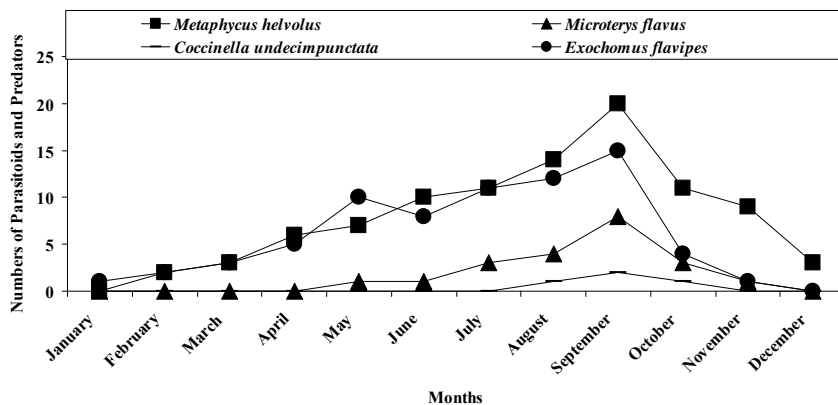


Fig.(6): Population dynamics of parasitoids and predator of the Mediterranean black scale, *Saissetia oleae* on olive trees in Al-Arish region during 2010.

Table 3: Simple correlation and regression values of the population dynamics of The Mediterranean black scale, *Saissetia oleae* and its parasitoid and predator on olive trees in Al-Arish region during 2009.

Variable	Simple correlation "r"	Probability "p"	Regression	Probability "p"
<i>Metaphycus helvolus</i>	0.66	*	0.71	*
<i>Microterys flavus</i>	0.27	Ns	0.25	Ns
<i>Coccinella undecimpunctata</i>	0.31	Ns	0.29	Ns
<i>Exochomus flavipes</i>	0.71	*	0.70	*
Maximum	0.86	**	0.84	**
Minimum	0.77	*	0.74	*
R.H. %	0.74	*	0.73	*

Data in Table (4), show that the simple correlation between the population of *Metaphycus helvolus*, *Exochomus flavipes*, maximum, minimum temperature, relative humidity% and the mean number of the soft brown scale, *Saissetia coffeae* were significant ($r = 0.73, 0.71, 0.89, 0.70$ and 0.72), respectively and non-significant ($r = 0.28$ and 0.22) between *Microterys flavus*, *Coccinella undecimpunctata* and the mean number of the soft brown scale during the 2010 . Also, results in Table (4), show that the simple regression for changing the population of *Metaphycus helvolus*, *Exochomus flavipes*, maximum, minimum temperature, relative humidity % and the mean number of *S. coffeae* were significant ($b = 0.72, 0.62, 0.88, 0.77$ and 0.75), respectively and non-significant ($b = 0.27$ and 0.21) between the *Microterys flavus*, *Coccinella undecimpunctata* and the mean number of the soft brown scale during the 2010 .

Table 4: Simple correlation and regression values of the population dynamics of The Mediterranean black scale, *Saissetia oleae* and its parasitoid and predator on olive trees in Al-Arish region during 2010.

Variable	Simple correlation "r"	Probability "p"	Regression	Probability "P"
<i>Metaphycus helvolus</i>	0.73	*	0.72	*
<i>Microterys flavus</i>	0.28	Ns	0.27	Ns
<i>Coccinella undecimpunctata</i>	0.22	Ns	0.21	Ns
<i>Exochomus flavipes</i>	0.71	*	0.62	*
Maximum	0.89	**	0.88	***
Minimum	0.70	*	0.77	*
R.H. %	0.72	*	0.75	*

Abd-Rabou (2001a) conducted a survey of the parasitoids of *S. oleae* was carried out monthly between April 1995 and March 1997 in three different locations in Egypt. Five species of Encyrtidae, a species of Pteromalidae and an aphelinid

hyperparasite were found. Three of these records were new for Egypt. The parasitoid, *S. caerulea* was recorded for the first time associated with *S. oleae* by Abd-Rabou (2004a). The parasitoid, *S. caerulea* which associated with *S. oleae* infested olive in Northern Coast. The maximum parasitism rate reached 38.2 and 40.9 % during the first and second years, respectively. While average parasitism rates was 21.3 and 23.5 % during the first and second years, respectively. Later, Abd-Rabou (2004) mass reared and released the parasitoid at monthly intervals in olive groves infested with *S. oleae* at three localities in Egypt and percentages of parasitism increased after releasing from 14 to 35%. Abd-Rabou (2004b) studied the Indigenous parasitoid *Metaphycus lounsburyi* from different localities in Egypt, were manipulated, reared and mass-produced for classical biological control in Egypt, more than 193,130 parasitoids were released. Several releases were made between May 1999 and April 2001. Increases of the parasitism from 17.4 to 42.0 and from 6.4 to 19.2 during the first year (1999-2000) and the second year (2000-01), respectively, in the Northern Coast. This parasitoid became established in some of the release sites in El-Arish and Matruh Governorates. Tena *et al.* (2008) Overall, the results show that the most abundant and widely distributed parasitoids of black scale in citrus and olive crops in eastern Spain are *S. caerulea*, *M. flavus* and *M. lounsburyi*. These parasitoids should be considered when determining the side effects of pesticides on beneficials, as an important component of Integrated Pest Management strategies.

Abd-Rabou *et al.* (2003) recorded 19 predators of *S. oleae* and studied the population dynamics of six of them. These are *C. bipustulatus*, *Chrysoperla carnea* (Stephens), *C. undecimpunctata* (L.), *E. flavipes*, *Orius* sp. and *Scymnus syriacus*. Two peaks were recorded annually for *C. bipustulatus* and *C. undecimpunctata* while one peak in case of *C. carnea* and *S. syriacus*, *E. flavipes* and *Orius* sp. recorded as a low population throughout the two years under considerations. Abd Allah (1988) recorded that the coleopterous insect predators feeding on soft scale infesting citrus, mango and ledge plants in Mansoura region were *Cydonia vicina isis* Cr., *C. v. nilotica* Muls., *Coccinella septempunctata* L., *C. undecimpunctata*, *Scymnus interruptus* Goez, *S. cyriacus*, *Exochomus flavipes* Thunb., *Rodalia cardinalis* Muls and *Paederus alfieri* Koch. He added two neuropetrous predators, *Chrysopa carnea* Steph. and *C. septempunctata* Wesm.; two hemipterous predators, *Orius laevigatus* Fieb. and *O. albidipennis* and two dipterous predators, *Metasyrphus corollae* Fab. and *Paragus compeaitus* Wied. The predators, *C. bipustulatus*, *S. syriacus*, *Pharaoscymnus Varius* Kirsch and *R. cardinalis* were found feeding on some soft scale insects and *Chrysop* sp. larvae are very common and polyphagous predators feeding on many soft scale insects (Hamed and Hassanein, 1991). *C. bipustulatus*, *S. syriacus*, *C. carnea*, *C. septempunctata* and *Orius laevigatus* Fab. Recorded associated with different species of soft scale insects in Kafr El-Sheikh (El-Agamy *et al.*, 1994).

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ARABIC SUMMARY

الدراسات البيئية لجنس سيساشيا والأعداء الحيوية المصاحبه له في مصر

هدى بدارى

معهد بحوث وقاية النباتات - مركز البحوث الزراعية- الدقي- الجيزة- مصر

يعتبر جنس سيساشيا من أهم الحشرات الرخوة التي تصيب بساتين الفاكهة. الهدف من هذا العمل هو عمل بعض الدراسات البيئية على جنس سيساشيا والأعداء الحيوية المصاحبه له في مصر. وقد أشارت النتائج أن جنس سيساشيا يتميز الى نوعين في مصر الأول حشرة النصف كروية الرخوة و حشرة البحر المتوسط الرخوة وأن جنس سيساشيا مصاحب ل ١٤ طفيل و ١٦ مفترس. الحشرة النصف كروية الرخوة تم دراسة التوزيع الموسمي لها لمدة سنتين ٢٠٠٩ و ٢٠١٠ على الزيتون في الساحل الشمالى. و قد أتضح من النتائج أن اعلى تعداد كان ٧٧٢٨ و ٨٣٦٨ لكل ٦٠ ورقة و ٣٠ ساق في العام الأول و الثانى على التوالي في شهر سبتمبر. وان أعداد طفيليات ميتافيكس لينزوبرى و ميكروتيرس فلافس و اسكيوتيلستا سيانى و المفترس أسكىمنس سيرياكس وصلت أعلى تعداد ٣١ و ٩ و ٣ و ١٩ لكل ٦٠ ورقة و ٣٠ ساق أثناء سبتمبر و يوليو و سبتمبر و أغسطس في السنة الأولى والثانية على الترتيب و ٢٠ و ٨ و ٢ و ١٥ كل ٦٠ ورقة و ٣٠ ساق أثناء سبتمبر في السنة الثانية على الترتيب. أما حشرة البحر المتوسط الرخوة فقد تم أيضا دراسة التوزيع الموسمي لها لمدة سنتين ٢٠٠٩ و ٢٠١٠ على الزيتون في العريش. و قد أتضح من النتائج أن اعلى تعداد كان ٩٧٢٩ لكل ٦٠ ورقة و ٣٠ ساق في العام الأول في نصف شهر أغسطس أما العام الثانى في نصف شهر سبتمبر كان اعلى تعداد كان ٦٨٩٩ لكل ٦٠ ورقة و ٣٠ ساق. وان أعداد طفيليات ميتافيكس هيلفولس و ميكروتيرس فلافس و المفترسان كوكسينلا أنديسمبكتاتا و أكسوكوس فلابيس وصلت أعلى تعداد ٢٢ و ٥ و ٨ و ٢٨ لكل ٦٠ ورقة و ٣٠ ساق أثناء أغسطس و أغسطس و سبتمبر و أغسطس في السنة الأولى على الترتيب و ٢٤ و ١٩ و ٤ و ٢٢ كل ٦٠ ورقة و ٣٠ ساق أثناء سبتمبر في السنة الثانية على الترتيب.