

## Hymenptrous parasitoids as a bioagents for controlling maybugs (Hemiptera: Pseudococcidae) in Egypt

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### ABSTRACT

A wide range of parasitoids are found attacking the mealybug species belonging to families namely Aphelinidae, Encyrtidae, Platygasteridae, and Signiphoridae. A list of 26 species of parasitoids were recorded attacking the different species of mealybug; 20 species belong to family Encyrtidae, and one species from Platygasteridae are primary parasitoids. The rest of parasitoids (5 species) are secondary parasitoids which belong to the families; Aphelinidae, Encyrtidae, Pteromalidae, Signiphoridae and information about host insects, host plants, distribution, biological notes and role in the biological control for mealybug' parasitoids were recorded in this paper.

**Keywords:** Hymenptrous parasitoids, mealybugs, Egypt

### INTRODUCTION

Mealybugs are small soft-bodied insects with sucking mouthparts belonging to order Hemiptera. A list of 55 species of mealybugs were recorded in Egypt until 2008 belong to Margarodidae and Pseudococcidae ( 6, 49 species in respective). The mealybug species, *Planococcus ficus*, *Planococcus citri*, *Ferrisia virgatus*, *Maconellicoccus hirsutus*, *Saccharicoccus sacchari*, *Icerya aegyptiaca* and *Icerya purchasi* are considered as serious pests of many economic important plant and ornamental plant in Egypt. The population of mealybugs on Citrus, Mango, Guava, Apple and Pears are under control by its associated natural enemies but on Grape vine, *Vitis vinifera* which is considered one of the most important crops in Egypt is infested by the pseudococcid, *Planococcus ficus* causing damage by feeding activity of its nymphs and adults, on clusters. Moreover, during its feeding on different parts of the plant and excreting honey dew that supports the growth of sooty mould. Sooty and sticky bunches harboring mealybug individuals and their white cottony wax masses tend to be inferior in the marketing value as table grapes. In addition to this obvious damage, *P. ficus* is capable of transmitting grape vine leafroll disease from plant to another.

The problem with *P. ficus* in grapevine is already very grave and ways to diminish the losses caused by this mealybug should be searched for and the only sustainable way on long- term basis in biological control. A wide range of encyrtid parasitoids in the world are found attacking the vine mealybug; i.e., *Anagyrus pseudococci*, *Leptomastix flavus*, *Clausenia josefi*, *Coccidoxenoides pergrinus* and *Leptomastix abnormis*. These parasitoids are located on the Egyptian fauna. Rearing and releasing these parasitoids will produce the hope to impact this pest.

## RESULTS

Table 1, represents a list of parasitoids attacking mealybugs in Egypt.

Table 1: List of parasitoids attacking mealybugs in Egypt:

The parasitoids	Family	The common host insect	References
1. <i>Acerophagus</i> sp.	Encyrtidae	<i>Nipaecoccus viridis</i>	Abd-Rabou and Abd El- Gawad
2. <i>Allotropa mecrida</i> (Walker)	Platygastridae	<i>Maconellicoccus hirsutus</i>	Abd- Rabou(2000b) and Mouas <i>et. al.</i> 2001
3. <i>Anagyrus aegyptiacus</i> Moursi	Encyrtidae	<i>Nipaecoccus viridis</i>	Moursi (1948)
4. <i>Anagyrus greeni</i> (Howard)	Encyrtidae	<i>Saccharicola sacchari</i>	Abd- Rabou(2000a)
5. <i>Anagyrus kamali</i> Moursi	Encyrtidae	<i>Maconellicoccus hirsutus</i>	Moursi (1948), Awadallah <i>et al.</i> (1999) Abd- Rabou (2000b) and Mousa <i>et.al.</i> (2001)
6. <i>Anagyrus pseudococci</i> (Girault)	Encyrtidae	<i>Maconellicoccus hirsutus</i>	Priesner and Hosny (1940)
7. <i>Anagyrus saccharicola</i> Timberlake	Encyrtidae	<i>Saccharicola sacchari</i>	Abd- Rabou(2002b)
8. <i>Anagyrus shahidi</i> Hayat	Encyrtidae	<i>Antonina graminis</i>	Karam and Abou-Elkhir (1996)
9. <i>Blepyrus insularis</i> (Cameron)	Encyrtidae	<i>Ferrisia virgata</i>	Awadallah <i>et al.</i> (1999)
10. <i>Chartocerus subaeneus</i> (Foerster)	Signiphoridae	<i>Allotropa sp., Leptomastidea abnormis, Clausenia josefi</i> and <i>Leptomastix dactylopii</i>	Awadallah <i>et al.</i> (1999), Mousa <i>et.al.</i> (2001) and Attia (2003)
11. <i>Clausenia josefi</i> (Rosen)	Encyrtidae	<i>Planococcus ficus</i>	Awadallah <i>et al.</i> (2002)
12. <i>Coccidoxenoides peregrines</i> (Timberlake)	Encyrtidae	<i>Planococcus citri</i> and <i>Planococcus ficus</i>	Attia and El Arnaouty (2009).
13. <i>Gyranusoidea indica</i> Shaffee, Alam & Agarwal	Encyrtidae	<i>Maconellicoccus hirsutus</i>	Awadallah <i>et al.</i> (1999) and Abd-Rabou (2000b) and Mousa <i>et.al.</i> 2001
14. <i>Homalotylus vicinus</i> Silvestri	Encyrtidae	<i>Maconellicoccus hirsutus</i>	Priesner and Hosny (1940)
15. <i>Leptomastidea abnormis</i> (Girault)	Encyrtidae	<i>Maconellicoccus hirsutus</i>	Awadallah <i>et al.</i> (1999) and Abd-Rabou (2000b) and Mousa <i>et.al.</i> 2001
16. <i>Leptomastix dactylopii</i> Howard	Encyrtidae	<i>Maconellicoccus hirsutus</i> and <i>Planococcus ficus</i>	Abd-Rabou (2000b) and Awadallah <i>et al.</i> (2002)
17. <i>Leptomastix flava</i> Mercet	Encyrtidae	<i>Nipaecoccus viridis</i>	Priesner and Hosny (1940) and Abd-Rabou and Abd El- Gawad
18. <i>Leptomastix nigrocoxalis</i> Compere	Encyrtidae	<i>Nipaecoccus viridis</i> and <i>Maconellicoccus hirsutus</i>	Abd- Rabou (1999)
19. <i>Marietta leopardina</i> Motschulsky	Aphelinidae	<i>Anagyrus kamali, Gyranusoidea indica</i> and <i>Leptomastix dactylopii</i>	Awadallah <i>et al.</i> (1999)
20. <i>Marietta picta</i> (Andre)	Aphelinidae	Primary parasitoids of <i>Maconellicoccus hirsutus</i>	Abd- Rabou (2000b)
21. <i>Microterys</i> sp.	Encyrtidae	<i>Saccharicola sacchari</i>	Abd- Rabou (2000a)
22. <i>Neoplatycerus palestinensis</i> (Rivany )	Encyrtidae	<i>Planococcus ficus</i>	Awadallah <i>et al.</i> (2002)
23. <i>Pachyneuron</i> sp.	Pteromalidae	<i>Leptomastix nigrocoxalis</i> and <i>L. flava</i>	Abd- Rabou (2001)
24. <i>Praphaenodiscus</i> sp.	Encyrtidae	<i>Saccharicola sacchari</i>	Abd- Rabou (2000a)

According to Table (1) each parasitoid will be discussed taking into consideration host insect, host plant, distribution, remark notes, biological notes and its role in the biological control in concern.

### 1. *Acerophagus* sp. (Family: Encyrtidae).

**Host insect:** *Nipaecoccus viridis* (Newstead) (Homoptera :Pseudococcidae ).

**Host plant:** *Lebbek* sp.

**Distribution:** Beni-Suef governorate.

**Remarks:** This species was recorded for the first time in Egypt by Abd-Rabou and Abd El-Gawad (2002).

**Role in the biological control:** *Acerophagus* sp. was recorded attacking *N.viridis* with an average parasitism rates 3.6 and 2.9% during the two years under considerations. The peaks of parasitism rates by this species were 18.3 and 14% Abd-Rabou and Abd El-Gawad (2002).

## **2. *Allotropia mecrida* (Walker) (Family: Platygasteridae)**

**Host insect:** *Maconellicoccus hirsutus*, *Pseudococcus longispinus* (Targioni-Tozzetti) (Homoptera: Pseudococcidae).

**Host plant:** *Hibiscus* sp.

**Distribution:** Alexandria governorate.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou (2000b) as a *Allotropia* sp. Later Abd-Rabou and Hendawy (2005) nominated this parasitoid.

**Role in the biological control:** This species parasitized *Maconellicoccus hirsutus* with an average parasitism rates of 9.8 % and the maximum parasitism rate was 27% (Abd-Rabou, 2000b).

## **3. *Anagyrus aegyptiacus* Moursi (Family: Encyrtidae)**

**Host insect :** *Pseudococcus filamentosus* Ckll. (Homoptera :Pseudococcidae ).

**Host plant :** *Lebbek* sp.

**Distribution:** Beni-Suef and Giza governorates.

**Remarks:** This species was recorded for the first time in Egypt by Moursi (1948)

**Biological notes:** The duration of the life cycle is 28 days at a temperature of 25°C and 16 days at 31° C and the sex ratio being 1:1 among parasites collected in the field or reared in the laboratory, there are two to three generation of the parasite for every host generation. The parasite shows predilection to the first, second and early third instars of the host while male prepupae, pupa and egg laying females are not attacked (Moursi, 1948).

**Role in the biological control:** *A. aegyptiacus* was reared from *N.viridis*, with an average parasitism rates of 12% and the maximum parasitism rates was 30.4% Abd-Rabou and Abd El-Gawad (2002).

## **4. *Anagyrus greeni* (Howard) (Family : Encyrtidae)**

**Host insect:** *Antonina* sp., *Pseudococcus* sp. and *Saccharicola sacchari* (Cockerell) (Homoptera :Pseudococcidae)

**Host plant:** Sugar cane

**Distribution:** Cairo, Giza and Qalyubiya governorates.

**Remarks:** This species was recorded for first time in Egypt by (Abd-Rabou, 2001).

**Role in the biological control:** *A. greeni* was reared from *S. sacchari* with an average parasitism rates of 1.3% and the maximum parasitism rates was 6.5% (Abd- Rabou, 2000a).

## **5. *Anagyrus kamali* Moursi (Family : Encyrtidae)**

**Host insect:** *Maconellicoccus hirsutus* (Homoptera :Pseudococcidae ).

**Host plant:** *Hibiscus* sp.

**Distribution:** Cairo, Giza and Qalyubiya governorates.

**Remarks:** This species was recorded for the first time in Egypt by Moursi (1948).

**Biological notes:** The duration of the life cycle is 18 days at a temperature of 25°C and the sex ratio being 1 : 1 among parasites collected in the field or reared in the laboratory, there are two to three generation of the parasite for every host generation. The parasite shows predilection to the first, second and early third istars of the host while male pre pupae, pupa and egg laying females are not attacked (Moursi, 1948).

**Role in the biological control:** *A. kamali* was reared from: *M. hirsutus*, with an average parasitism rates of 20.7% and the maximum parasitism rates was 37% (Abd-Rabou, 2000b).

**6. *Anagyrus pseudococci* (Girault) (Family : Encyrtidae)**

**Host insect:** *Maconellicoccus hirsutus* and *Planococcus citri* (Homoptera : Pseudococcidae).

**Host plant:** *Vitis venifera*

**Distribution:** Alexandria and Giza governorates.

**Remarks:** This species was recorded for first time in Egypt by Priesner and Hosny (1940).

**Role in the biological control:** *A. pseudococci* was reared from *N. viridis* with an average parasitism rates of 9.4% and the maximum parasitism rates was 35.4% Abd-Rabou and Abd El-Gawad (2002). This parasitoid was reared from *S. sacchari* with an average parasitism rates of 1.8 % and the maximum parasitism rates was 12% (Abd-Rabou, 2000a).

**7. *Anagyrus saccharicola* Timberlake ( Family: Encyrtidae)**

**Host insect:** *Saccharicola sacchari* (Homoptera: Pseudococcidae)

**Host plant:** Sugar cane

**Distribution:** Beni-Suef governorate.

**Remarks:** This species was imported, reared and released for first time in Egypt by Abd-Rabou (2002a).

**Role in the biological control:** About 146163 parasitoid adults of *A. saccharicola* mass reared and released in five governorates in Upper Egypt. This parasitoid established readily and spread rapidly (Abd-Rabou, 2002a).

**8. *Anagyrus shahidi* Hayat (Family : Encyrtidae)**

**Host insect:** *Antonina graminis* (Homoptera : Pseudococcidae).

**Host plant:** grass

**Distribution:** Alexandria governorate.

**Remarks:** This species was recorded for first time in Egypt by Karam and Abou-ElKhair (1996).

**Role in the biological control:** This species is a primary parasitoid of *A. graminis* with rare parasitism rates.

**9. *Blepyrus insularis* (Cameron) (Family : Encyrtidae)**

**Host insect:** *Ferrisia virgata* (Homoptera : Pseudococcidae).

**Host plant:** *Acalypha macrophylla*, *Lantana camara*, *Sesbania aculata* , *Guava* trees and mulberry trees *Morus alba*.

**Distribution:** Cairo and Giza Governorate

**Remarks:** This species was recorded for first time in Egypt by Angel R. Attia (1997).

**Biological notes:** This parasitoid is a solitary endoparasitoid on *F. virgata* .The second nymphal instar of the host is the most preferred one for parasitism; *Ferrisia* adults are never attacked. The means of total developmental period for the parasitoid was 37.9 days. Most of the progeny (96.4%) was females, while 3.6% were males (Awadallah *et. al* 1999).

**Role in the biological control:** The parasitoid was collected from August 1<sup>st</sup> and showed two peaks of abundance; on September 1<sup>st</sup> and on October 15<sup>th</sup> and vanished completely from the collected samples from February 1<sup>st</sup> to July 15<sup>th</sup>. Rates of parasitism was ranged between 1.4% and 16.4% on the host plant *Acalypha macrophylla* and ranged between 16.7 % to 70.6 % on the host plant *Lantana camara* (Attia, 1997).

**10. *Chartocerus subaeneus* (Foerster) (Family: Signiphoridae)**

**Primary parasitoid:** *Allotropa* sp., *Leptomastidae abnormis*, *Clausenia josefi* and *Leptomastix dactylopii* (Hymenoptera : Encyrtidae)

**Host insect :** *Maconellicoccus hirsutus*, *Planococcus citri*, *Planococcus ficus*, *Ferrisia virgata* and *Saccharicola sacchari* (Homoptera : Pseudococcidae).

**Host plant:** *Hibscus* sp., *Vitis vinifera* and Sugar cane

**Distribution:** Giza, Alexandria, Assiut, Beni-Suef, and Cairo governorates.

**Remarks:** This species was recorded for first time in Egypt during the period of 1991 – 1993 by Attia (1997).

**Biological notes:** This is deuterotokous species and an obligatory direct hyperparasite of mealybugs which develops ectoparasitically on fully developed larvae and pupae of various primary encyrtid parasites in mummified mealybugs. Development from egg to adult emergence took 16.4 days at 28°C.

**Role in the biological control:** *C. subaeneus* was reared as a hyperparasitoid from *S. sacchari* with an average parasitism rates 0.8. % and maximum parasitism rate was 4% (Abd-Rabou, 1999)

**11. *Clausenia josefi* Rosen (Family: Encyrtidae)**

**Host insect:** *Planococcus ficus* ( Signoret) (Homoptera : Pseudococcidae).

**Host plant:** *Vitis vinifera*

**Distribution:** Giza governorate.

**Remarks:** This species was recorded for first time in Egypt by Awadallah *et al.* (2002).

**Biological notes:** This parasitoid is a solitary endoparasitoid and an arrhenotokous species, as unfertilized eggs develop into males only. The total mean number of progeny per virgin female was 118 individuals (males) and the total mean number of progeny per fertilized female was 95.9 individuals; 70.6 males and 25.3 females (Angel R. Attia 2003).

**Role in the biological control:** Parasitoid's counts were not enough to overcome and impact the population of grapevine mealybug *Planococcus ficus* (Attia, 2003)

**12. *Coccidoxenoides peregrines* (Timberlake): (Family: Encyrtidae)**

**Host insect:** *Planococcus citri* (Risso)

**Host plant:** *Codiaeum variegatum*

**Distribution:** Giza governorate.

**Remarks:** This species was recorded for first time in Egypt by Attia and El-Arnaouty (2009).

**Biological notes:** This parasitoid is a solitary, endoparasitoid and thelytokous species.

**Role in the biological control:** The parasitoid *C. peregrines* was collected from the citrus mealybug, *Planococcus citri* infested Croton plant at Giza region (with mean number of 118.3 – 134 individuals / 20 leaves during November 2008) associated with the other natural enemies such as, the hemerobiid predator, *Symphorobius amicus* Navas, the coccinellid predator, *Scymnus syriacus* (Mars.) and the chrysopid predator, *Chrysoperla carnea* (Stephens). The population of the previous natural enemies cannot reduce the population of citrus mealybug, *Planococcus citri* on Croton plant (Afifi, *et al.* 2010).

**13. *Gyranusoidea indica* Shaffee, Alam & Agarwal (Family: Encyrtidae)**

**Host insect :** *Maconellicoccus hirsutus* (Homoptera : Pseudococcidae).

**Host plant :** *Hibscus rosa sinensis*

**Distribution:** Giza governorate.

**Remarks:** This species was recorded for first time in Egypt during 1991 -1993 by Awadallah *et al.* 1999

**Role in the biological control:** This parasitoid was reared from *M. hirsutus* with an average parasitism rates of 6.2% and the maximum parasitism rates was 20 % (Abd-Rabou, 2000b).

**14. *Homalotylus vicinus* Silvestri (Family: Encyrtidae)**

**Host insect:** *Maconellicoccus hirsutus* (Homoptera : Pseudococcidae).

**Host plant:** *Hibiscus* sp.

**Distribution:** Cairo governorate.

**Remarks:** This species was recorded for first time in Egypt by Priesner and Hosny (1940).

**Role in the biological control:** This species was collected in a few numbers by Abd-Rabou (2006).

**15. *Leptomastidea abnormis* (Giraut) (Family: Encyrtidae)**

**Host insect:** *Maconellicoccus hirsutus*, *Nipaecoccus nipae* and *Planococcus citri* and *Planococcus ficus* (Homoptera: Pseudococcidae).

**Host plant:** *Hibiscus rosa sinensis*, *Acalypha macrophylla*, *Lantana camara* (Awadallah *et al.* 1999) and *Vitis vinifera* (Mona *et al.*)

**Distribution:** Alexandria, Cairo and Giza governorates.

**Remarks:** This species was recorded for first time in Egypt during 1991 – 1993 by Awadallah *et al.* 1999

**Role in the biological control:** *L. abnormis* was reared from *M. hirsutus* with maximum parasitism rate was 21% (Abd- Rabou, 2000b).

**16. *Leptomastix dactylopii* Howard (Family: Encyrtidae)**

**Host insect:** *Maconellicoccus hirsutus* and *Planococcus ficus* (Homoptera : Pseudococcidae).

**Host plant:** *Hibiscus* sp. and *Vitis vinifera* (Mona *et al.*2005)

**Distribution:** Cairo, Alexandria and Giza governorates.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou (2000b).

**Biological notes:** *Leptomastix dactylopii* is solitary endoparasitic species was secured from the vine mealybug, *Planococcus ficus* on grapes in Egypt but its population was low so it cannot reduce the population of the vine mealybug (Mona *et al.*2005).

**Role in the biological control:** *L. dactylopii* was reared from *M. hirsutus* with maximum parasitism rate was 8% (Abd- Rabou, 2000b).

**17. *Leptomastix flava* Mercet (Family: Encyrtidae)**

**Host insect:** *Nipaecoccus viridis* (Homoptera : Pseudococcidae).

**Host plant:** *Lebbek* sp.

**Distribution:** Beni-Suef governorate.

**Remarks:** This species was recorded for first time in Egypt by Priesner and Hosny (1940).

**Role in the biological control:** *L. flava* was reared from *N. viridis* with maximum parasitism rate was 26.6 % ( Abd-Rabou and Abd El-Gawad ,2002).

**18. *Leptomastix nigrocoxalis* Compere (Family: Encyrtidae)**

**Host insect:** *Nipaecoccus viridis* and *Maconellicoccus hirsutus* (Homoptera : Pseudococcidae).

**Host plant:** *Lebbek* sp.

**Distribution:** Beni-Suef and Cairo governorates.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou(1999).

**Role in the biological control:** *L. nigrocoxalis* was reared from *Nipaeococcus viridis* with an average parasitism rates of 8.4% and the maximum parasitism rates was 21% Abd-Rabou and Abd El-Gawad (2002). Also this parasitoid attacked *M.hirsutus* with an average parasitism rates of 2.4% and the maximum parasitism rates was 13% (Abd- Rabou, 2000b).

**19. *Marietta leopardina* Motschulsky Family: Aphelinidae**

**Host insect:** *Dysmicoccus brevipes* (Cockerell), *Maconellicoccus hirsutus*, *Niacoccus minor* Green, *Nipaeococcus nipae* (Maskell) and *Planococcus citri* Risso (Homoptera: Pseudococcidae).

**Host plant:** *Hibscus* sp.

**Distribution:** Behira, Cairo and Giza governorates.

**Remarks:** This species was recorded for the first time in Egypt by Priesner and Hosny (1940).

**Role in the biological control:** This species has been recorded by Awadallah *et al.* (1999) as a hyperparasitoids on the primary parasitoids *Anagyrus kamali* (Moursi), *Anagyrus* Sp. and *Gyranusoidea indica* (Shafee, Alam & Agarwal)

**20. *Marietta picta* (Andre) Family: Aphelinidae**

**Distribution:** Alexandria governorate.

**Host insect :** *Maconellicoccus hirsutus* (Homoptera :Pseudococcidae ).

**Host plant:** *Hibscus* sp.

**Remarks:** This species was recorded for the first time in Egypt as a hyperparasitoids associated with *M. hirsutus* by Abd- Rabou (2000b).

**Role in the biological control:** This species collected by Abd-Rabou (2006) .

**21. *Microterys* sp. (Family: Encyrtidae)**

**Host insect :** *Saccharicola sacchari* (Homoptera : Pseudococcidae).

**Host plant:** Sugar cane

**Distribution:** Assiut and Qena governorates.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou (2000a).

**Role in the biological control:** *Microterys* sp. was reared from *S. sacchari* with an average parasitism rates of 3.1% and the maximum parasitism rate was 13% (Abd-abou, 2000a).

**22. *Neoplatycerus palestinensis* (Rivany) Family: Encyrtidae**

**Host insect:** *Planococcus ficus* ( Signoret) (Homoptera : Pseudococcidae).

**Host plant:** *Vitis vinifera*

**Distribution:** Giza governorate.

**Remarks:** This species was recorded for first time in Egypt by Awadallah *et al.* (2002).

**Biological notes:** The encyrtid parasitoid, *Neoplatycerus* is a solitary endoparasitoid. When reared in *Planococcus ficus*, the average total developmental period of parasitoid Female and male at 30°C was 31.5 and 29.9 days. The second nymphal instar of its host seems to be the most suitable instar than the third one, as resulted to the greatest number of progeny (62.7 individuals) (Awadallah *et al.* 2004).

**Role in the biological control:** Awadallah *et al.* (2002) recorded this species in a few individuals in April.

**23. *Pachyneuron* sp. (Family: Pteromalidae)**

**Host insect:** *N. viridis* (Homoptera : Pseudococcidae).

**Host plant:** lebbke

**Distribution:** Beni-Suef governorate.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou (2001)

**Role in the biological control:** *Pachyneuron* sp. was reared as a hyperparasitoid from *N. viridis* with an average parasitism rate 0.5 % and maximum parasitism rates was 3.5% (Abd-Rabou and Abd El-Gawad, 2002).

**24. *Paraphaenaodiscus* sp. (Family: Encyrtidae)**

**Host insect:** *S. sacchari* (Homoptera : Pseudococcidae).

**Host plant:** sugar cane

**Distribution:** Qena governorate.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou (2000c).

**Role in the biological control:** *Paraphaenaodiscus* sp. was reared from *S. sacchari* with an average parasitism rates 0.2% and maximum parasitism rate was 1% (Abd-Rabou, 2000a).

**25. *Prochiloneurus aegyptiacus* (Mercet) (Family: Encyrtidae)**

**Host insect:** *Maconellicoccus hirsutus* (Homoptera : Pseudococcidae).

**Host plant:** *Hibiscus* sp.

**Distribution:** Alexandria governorate.

**Remarks:** This species was recorded for first time in Egypt during the period of 1991 - 19993 (Attia, 1997).

**Biological notes:** This is a secondary parasitoid of the primary parasitoid, *Anagyrus* sp. and *Gyranusoidea indica* in the host insect *Maconellicoccus hirsutus* (Angel R. Attia 1997)

**Role in the biological control:** This species was recorded as a hyperparasitoid of *M. hirsutus* with a few numbers Abd-Rabou (2000b).

**26. *Rhopus nigriclavus* (Girault) (Family: Encyrtidae)**

**Host insect:** *S. sacchari* (Homoptera : Pseudococcidae).

**Host plant:** sugar cane

**Distribution:** Beni-Suef governorate.

**Remarks:** This species was recorded for first time in Egypt by Abd-Rabou (2000a).

**Role in the biological control:** *R. nigriclavus* was reared from *S. sacchari* with an average parasitism rates 0.2% and maximum parasitism rate was 2% (Abd-Rabou, 2000a).

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## ARABIC SUMMARY

### طفيليات البق الدقيقى فى مصر

أنجيل رشدى عطية

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى- جيزة – مصر

تم تسجيل أنواع عديدة من الطفيليات التى تهاجم عدة أنواع من البق الدقيقى وتنتمى هذه الطفيليات لاربع عائلات تسمى اينسيرتيدي و بلاتيجاستيريدي و أفيلينيدي وسيجنيفوريدي. تم تسجيل 26 نوعا من الطفيليات المهاجمة للأنواع المختلفة للبق الدقيقى منها 20 نوعا من الطفيليات الأولية التابعة لعائلة اينسيرتيدي ونوع اخر طفيل اولى ينتمى لعائلة بلاتيجاستيريدي اما الخمس انواع الأخرى هى طفيليات ثانويه تنتمى لاحدى العائلات التى تسمى سيجنيفوريدي أو أفيلينيدي أو اينسيرتيدي أو بتيروماليدي. فى هذا المقال تم القاء الضوء على انواع البق الدقيقى كعائل هام لكل طفيل وايضا العائل النباتى والتوزيع الجغرافى للطفيليات مع ذكر بعض الملاحظات البيولوجية للطفيليات ودورها فى المكافحة البيولوجية لضبط تعداد البق الدقيقى.