

Common scale insects (Hemiptera:Coccoidea) in Egypt

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ABSTRACT

The scale insects are small insects of the order Hemiptera, generally classified as the Superfamily Coccoidea. There are about 8,000 species of scale insects. Scale insects feed on a wide variety of plants, and scale species are considered pests. This review article is presenting the ecological aspects of some important scale insects and mealybugs infesting horticulture plants in Egypt. Armored scale insects (Hemiptera: Diaspididae) like *Aulacaspis tubercularis* Newstead, *Pseudaulacaspis pentagona* (Targioni-Tozzetti), *Parlatoria oleae* (Cloveé), *Parlatoria ziziphi* (Lucas), *Fiorinia phoenicis* Balachowsky and *Hemiberlesia lataniae* (Signoret). While, the soft scale insects (Hemiptera: Coccidae) showed by *Pulvinaria tenuivalvata* (Newstead), *Pulvinaria psidii* Mask., *Saissetia coffeae* (Walker) and *Ceroplastes floridensis* Comstock. In case of mealybugs was represented with *Planococcus ficus* (Signoret) (Hemiptera: Pseudococcidae), *Icerya seychellarum* (Westwood) (Hemiptera: Monophelibidae) and *Ferrisia virgata* (Cockerell) (Hemiptera: Pseudococcidae). Family: Asterolecaniidae exemplified by *Asterolecanium pustulans* Ckll. (Hemiptera: Asterolecaniidae).

Keywords: Common scale insects, Egypt

INTRODUCTION

Scale insects found in different parts of the world fall within 23 Families while only 12 out of that number are found in Egypt. The most important of these are 3 families being armored scale insects (Diaspididae), mealybugs (Margarodidae and Pseudococcidae) and soft scale (Coccidae) and these are dangerous species that attack different important economic crops in Egypt. Most of the species belongs of these families are polyphagous, eurymerous, and attack various parts of the host plant, leaves, stem, bark, crown, fruits and roots. The main injury caused due to their ingestion of plant sap, reduction of plant vigor, drop leaves or spottily yellowing, deformation of shoot and twig, blister like galls, fruit drops and affect on the normal physiological activities of the trees with effect on nitrogen, protein, phosphorus, potassium, calcium, magnesium, chlorophyll "a" and "b".

RESULTS

I. Armored scale insects (Hemiptera: Diaspididae)

Family Diaspididae represent the largest family which includes major pests in Egypt (Ghabbour and Mohammad, 1996), they listed 72 species of this family in Egypt. The armored scales are smaller on the average than the unarmored scales, they may be circular, subcircular, elongate, thread like or may assume a characteristic oyster shell shape. The segmentation of adult female's body is obscure. The head and thorax are fused. The antennae are absent or restigial, the eyes and legs are absent. Two pairs of thoracic spiracles are present, but there are no abdominal spiracles. The

wax is secreted by the wax glands of the pygidium. The exuvia are added to the armor during molting. The body not attached to the armor between molts, the young of armored scale insects are either born alive or hatched from eggs (oviparous).

The most important scales belong to this family are:

1) *Aulacaspis tubercularis* Newstead

The mango scale, *A. tubercularis* is presently a wide spread pest throughout all mango trees in Egypt causing severe damage to leaves and dryness of branches. Radwan (2003) recorded that, *A. tubercularis* are present on mango trees all over the year. The main activity period for the total population took place in the first May until mid of September and the lowest population of this insect was recorded during middle of September. It has three overlapping generations per year. The third generation was the biggest which extended from the first August to end of December (5 months) in the first studied year, and recorded from the first of September to the end of December (4 months) in the second. The combined effect of the weather factors on the activity of *A. tubercularis* and their total population were potency and ranged between 19.5-42.7%. Mohamed (2010) surveyed the most injurious scale insects on mango trees at Qaliobiya Governorate (El-Khanka, Shebeen El-Qanater, Banha & El-Qanater) from August 2005 to July 2007. It is clear that: the most abundant scale insect pest was: the hard scale *A. tubercularis* forming (28.67%) of the all collected species and represented from all localities.

2- *Pseudaulacaspis pentagona* (Targioni-Tozzetti):

Peach orchards infested with numerous pests among of which scale insects especially armored scale insect; the white peach scale attacks branches and twigs, it sucks a great amount of sap causing dry branches and defoliation of leaves. Also, twigs are killed as a result of infestation and defoliation of peach fruits. *P. pentagona* total population recorded five peaks, the first between February and March, the second between April and May, the third recorded in July, the fourth in November while the fifth between December and January. Also, this insect has four depressive periods during March, August, November and January. *P. pentagona* has 3 annual generations the first was present from approximately (April – July), the 2nd from July to September and the third in September, over wintering as a gravid females (Kreiter *et al.*, 1997), while Atteya (2004) recorded 5 generations were recorded on mid March, early May, July, mid August and in October.

3- *Parlatoria oleae* (Cloveé):

P. oleae mainly infests deciduous fruit trees branches and fruits as well as ever green trees as olive. The insect is a major pest on pear, apple, plum, apricot and olive. El-Hakim and Helmy (1982) in Egypt mentioned that *P. oleae* had three peaks in Cairo and Fayoum, and two peaks in Alexandria on olive trees. two generations of *P. oleae* was recorded a year on plum and peach in Beheira. (Kasim, (1995), while Asfoor (1997), reported three generations of *P. oleae* annually on pear trees in Qalyobia Governorate, but only two generations on plum, pear and apple trees. recorded three annual peak on Hollywood plum, maribosa plum, apricot and peach these peaks occurred in May, August and October. She, also, indicated three generations on four deciduous trees the, the first generation appeared on first May, the second appeared on first August and the third generation appeared on first October (Ezz, 1997).

4- *Parlatoria ziziphi* (Lucas)

P. ziziphi is consider an important pest on citrus and it attacks leaves, branches and fruits.

The seasonal variation in the population of *P. ziziphi* on sour orange leaves at Giza region during 1982 and 1983. The insect had two peaks of activity per year in April and October (El Bolok *et al.*, 1985).

Sweilm *et al.* (1985) studied the biology of *P. ziziphi* on sour orange trees in Egypt under field and laboratory conditions. The scale had 2 generations a year. Salama *et al.*, (1985) reported that *P. ziziphi* on grape fruit in Egypt had two annual peaks of abundance in Sept. and May and there were 3 generations a year in Sept.-Oct., Mar.-Apr. and Jun.-Jul. *P. ziziphi* had 2-3 annual generations begin in Jun., Oct. and Apr. to May (Serag,1997). Helmy (2000) stated three generations of *P. ziziphi* a year on four citrus varieties (i.e. mandarin, baladi orange, grape fruit, and trifoliate orange trees). Peaks occurred in Apr., Aug. and Oct.

5- *Fiorinia phoenicis* Balachowsky

In the last few years, scale insect was observed with high numbers on date palm fronds and dates in some governorates in Egypt causing yellowish of the pinnae and dryness of the fronds as well as the infested dates becomes unmarketable and has a large grade. *F. phoenicis* a new pest on date palm in Egypt (Ghabbour and Mohammad, 2010). Elwan *et al.* (2011) studied the seasonal activity of *F. phoenicis*. They found that, the scale insect had three overlapping generations under field conditions. The first generation (early summer generation) peaked in early June and the 2nd generation (late summer generation) peaked around August/September whereas the 3rd generation (autumn generation) peaked in October / November. The shortest generation was the late summer generation (2.5-3.0 months) at 27.9-28.6°C and 63.5-64.8%R.H. whereas the longest one was autumn generation (4.5 months) at 21.6 – 22.0°C and 65.9 – 66.3% R.H. The early summer generation had intermediate duration (4.0 -4.5 months) at 20.9°C and 62.5%R.H. in the two years, respectively. The insect population occurred on date palm fronds all the year round and decreased to lower numbers during winter season and this referred to the cold weather. The basal stratum of date palm leaflets received the highest infestation (37.4 – 38.3 %) than middle (34.4-35.3%) and apical ones (26.4 – 28.2%).

6- *Hemiberlisia lataniae* (Signoret)

Salama and Hamdy (1974) stated that *H. lataniae* had a peak of abundance in September and passed through two annual generations. *H. lataniae* is widely distributed and attacks many species of host plants. Field observation revealed that it is principal scale pest of *Ficus* sp. trees and other ornamental and orchards like *Acacia Arabica*, *Morus* sp., *Psidium guajava*, *Olea europaea* and *Prunus domestica*. This scale insect had two generations per year where the first generation crawlers appearing from mid-June to mid-July and second generation crawlers appearing in September. In Egypt, there are two to four generations per year (Hassan, 1993). Tawfik and Mohammad (2001) *H. lataniae* had four population peaks during the year on *Morus alba* in Giza Governorate.

II. Mealybugs:

The second largest family, it has 47 species of mealybug belong to 28 genera (Nada, 1999). The mealybugs (Family: Pseudococcidae), especially those of the genus *Pseudococcus*, are widely distributed throughout the world on ornamental plants and orchards. They occur on a large number of hosts, but in temperature regions they are found mainly in greenhouses. They have soft, oval, flattened, distinctly segmented bodies. They are covered with white, mealy wax and usually with lateral waxy filaments. They cause injury by extracting plant sap and by excreting honeydew, which forms a medium for the growth of sooty mold fungus. They may cause fruits drop when they cluster about the fruit stems.

1-*Planococcus ficus* (Signoret) (Hemiptera: Pseudococcidae)

The pseudococcid, *P. ficus* is a very important one, as through the feeding activity of its nymphs and adults, direct damage to clusters is caused. Moreover, during its feeding on the different parts of the plant, excretes honey dew that supports the growth of sooty mould. Sooty and sticky bunches harboring mealybugs individuals and their white cottony wax masses tend to be inferior in the marketing value as table grapes, and raisins cannot be prepared from such infested bunches. In addition to this obvious damage, *P. ficus* as well as the other species of mealybug are capable of transmitting grape vine leafroll from plant to another (Attia, 2003). The individuals of mealybugs were found throughout the year beneath the bark, infestation with *P. ficus* began in mid April and appeared in mid June. The most active period covered from mid August to October 1st showing the highest peak. She also, mentioned that, the population of mealybugs on root showed in February 1st. The decrease of mealybug individuals after this date referred to the movement of individuals from roots to trunks.

2-*Icerya seychellarum* (Westwood) (Hemiptera: Monophlebidae)

In recent year, *I. seychellarum* become established and increased in Egypt. Tawfik and Mohammad (2001) recorded *I. seychellarum* on *Morus alba* in Giza Governorate and had two peaks. El-Serafi *et al.*, (2004) found *I. seychellarum* on guava trees at Mansoura district. Hassan and Radwan (2008) detected that, the incandescent population of all stages of *I. seychellarum* on persimmon (*Diospyros kaki*) through August and summer convenient season for *I. seychellarum* activity in contract winter and spring were inept for its activity so population infirmly were shown. It has four overlapping generations on kaki trees.

3-*Ferrisia virgata* (Cockerell) (Hemiptera : Pseudococcidae)

Abd El-Said (1997) studied *F. virgata* population density of *F. virgata* was studied at Giza region on two host plant shrubs; *Acalypha macrophylla* and *Lantana camara*. The nymphs of *F. virgata* on the first host increased gradually from 1st July until reaching the first peak on September 1st and the second peak was in October 1st. While on lantana shrub population density of *Ferrisia* nymphs increased gradually from 1st July till 1st peak on September 15th and the 2nd peak was in 15th of October. Which means that *F. virgata* has two annual generations on the both hosts. Balboul (2003) mentioned that *F. virgata* individual insects of 1st generation appeared during the first half of November and the first peak was recorded in the middle of December, while the second generation occurred during the period extending from about first half of June and the second peak was recorded in the middle of October.

III. Soft scale insect) (Hemiptera: Coccidae):

The third largest family of scale insects (Hamons and Williams, 1984), Family Coccidae represented by number of species of unarmored or soft scales, they have widely spread on orchards and ornamental plants with importance as armored scales. The unarmored scales as their name implies not possess the scale covering or "armor", their bodies are relatively soft in the younger instars but the mature females may possess a derm which together with its waxy secretions, segmentation is indistinct also antennae and legs are usually present after the first instar.

1-*Pulvinaria tenuivalvata* (Newstead):

P. tenuivalvata become one of the most important pest infesting sugar cane in Egypt especially in Qena Governorate. It attacks the sugar cane leaves causing serious damage and noticeable reduction in the yield. *P. tenuivalvata* emerged as a chronic pest of sugar cane plants at Giza, Beni Sweif and Qena Governorates (Haries, 2006). Helmy *et al.*, (2001) stated that, over the last five years *P. tenuivalvata* became one of

the most important pest infesting sugar cane especially in Qena Governorate. Helmy (2001) found that sugar cane soft scale insect *P. tenuivalvata* is the most important pest infesting sugar cane in El-Saff district, Giza Governorate. It has five peaks of abundance in each season. Concerning *P. tenuivalvata* different stages nymphs has two small peaks in mid February and early June followed by three other peaks on early August, September and the fifth and highest peak was on mid October. It had five overlapping generations on the sugar cane plants.

2-Pulvinaria psidii Mask.:

P. psidii is the most important pest on mango and guava growers. Insects attack trees and result in a poor crop of poor quality and quantity. The insects secrete honey dew to cover the upper surface of the leaves and prevents the photosynthesis and respiration. Pre adults of *P. psidii* were found all over the year and the greatest of *P. psidii* were recorded during November, December and January El-Minshawy *et al.*, (1974). Hendawy (1999) mentioned that the total number of nymphs and adult females of *P. psidii* on guava has two peaks on November and August. Radwan (2003) recorded that, *P. psidii* were achieved three peaks on mango trees at the first of April, first of September and mid of November and had four overlapped generation per year. Also, *P. psidii* recorded highest population density on guava trees at first of December and had four overlapping generation per year. *P. psidii* had three annual peaks on guava trees at Qalubiya Governorate which achieved at 1st May, 1st August and mid October (Mohammad, 2010). Elwan, *et al.* (2011) mentioned that, the population dynamics of the green shield scale, *P. psidii* on guava, occurred on guava trees all the year round and has two overlapping generations a year.

3- Saissetia coffeae (Walker)

In Egypt it is considered as the most serious pest attacking guava, olive and latania palms (Hassan, 1993). This pest sucks the sap and causes dry up of leaves and small branches. It also, secretes honey dew on which the black fungus grows up which results in a reduction in both yield and marketing value of the fruits. Three peaks of abundance of *S. coffeae* were recorded on *Cycas revoluta* in El-Zohreya Botanical Garden Giza Governorate. The highest peak was in March with 1210.10 individuals/10 leaflets with maximum temperature (23.45°C), minimum temp. (13.84 °C) and Relative humidity % (54.18%). While the lowest population was recorded from mid August till the end of October (El-Sahn, 2007).

4- Ceroplastes floridensis Comstock

C. floridensis recorded for the first time on orange trees near Alexandria in 1905 (Willcocks, 1922). It has three peaks, the first peak occurred at April, the second peak at June and the third at November. The third peak was the highest one while the first was the lowest. The population of *C. floridensis* showed two peaks only on grape fruit (El-Imery, 1985).

IV. Family: Asterolecaniidae

1. Asterolecanium pustulans Ckll. (Hemiptera:Asterolecaniidae)

A. pustulans are major pests of fig trees in Burg El-Arab. The former species had two generations, the first about four months from January till the end of April, while the second generation took about 3 months from the beginning of October till the end of December (Eraki, 1991).

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ARABIC SUMMARY

الحشرات القشرية الشائعة في مصر

نجوى علي حسن و سوسن جاب الله رضوان و أمينة محمد نبيل الصحن
معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي- جيزة- مصر

تعتبر الحشرات القشرية من الحشرات الصغيرة الحجم والتي تتبع رتبة نصفية الأجنحة وفوق فصيلة Coccoidea. يوجد حوالي 8000 نوع من الحشرات القشرية وتتغذى على أنواع مختلفة من المحاصيل الاقتصادية الهامة، ولهذا فإنها تعتبر من الآفات الضارة بالنبات. يعرض هذا المقال بعض المظاهر الإيكولوجية لأهم الحشرات القشرية والبق الدقيقي بمصر. تتمثل الحشرات القشرية المسلحة التي تتبع عائلة Diaspididae بالأنواع التالية: حشرة المانجو القشرية البيضاء، حشرة الخوخ القشرية البيضاء، حشرة الزيتون القشرية، حشرة النبق القشرية، حشرة الفيورنيا القشرية و حشرة اللاتانيا القشرية. والحشرات القشرية الرخوة (عائلة Coccidae) مثل حشرة القصب الرخوة، حشرة الجوافة الرخوة، حشرة النصف الكروية الرخوة و حشرة الموالح الشمعية. وحشرات البق الدقيقي مثل بق العنب الدقيقي (Pseudococcidae)، بق السشيلارم الدقيقي (Monophlebidae) وبق الفرجاتس الدقيقي (Pseudococcidae). وهذا بالإضافة لحشرة التين الفجانية (Asterolecaniidae).