

SURVEY OF SCALE INSECTS (HEMIPTERA: COCCOIDEA) ON MULBERRY TREES IN EGYPT

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Abstract

Mulberry (*Morus* spp.) is cultivated throughout the world wherever silkworms are raised where their leaves were used as food for silkworms. Many countries were cultivated mulberry trees in fields such as China, Korea and India. Others cultivated them as wild trees around the fields of different crops or at the side of roads and streams (Duke, 1983). Egypt is one of the second categories in mulberry cultivations. Survey of mulberry scale insects (Hemiptera Coccoidea) in ten Governorates (Cairo, Qalyobia, Sharkia, Menofia, Gharbia, Kafer-El Sheikh, Northern coast, Giza, Fayoum, and Beni-Sweaf) in which Mulberry trees are concentrated, for two successive years to determine the most prevailing insects. The work was conducted from early June 1998 till late May 2000. Trees often used as ornamentals, roadsides or boundary markers. Mulberry like most of the economic plantations and field crops is also subject to attack of a vast pests complex belonging to a large number of insect orders which affect the growth of mulberry and cause considerable damage to the plant and loss in leaf yield. Results revealed fourteen species belonging to eleven genera related to five Families of the super-family Coccoidea. Among them, *H. lataniae*, *Asterolicanium pustulans* (Cockerell), *C. floridensis*, *Coccus hesperidum* Linnaeus, *Pulvinaria psidii* Maskell, and *I. seychellarum* were the six major insects belonging to Super-Family Coccoidea that infest Mulberry trees in the 10 studied Governorates. On the other hand, Qalyobia and Sharkia represented the most two Governorates where the surveyed fourteen insect species distributed allover the 10 Governorates. *H. lataniae*, *C. floridensis* and *I. seychellarum* were abundant in all Governorates and were able to survive under its variable weather conditions.

INTRODUCTION

Mulberry and silkworms constitute the basic material for sericulture. Sericulture is the most important commercial use for white mulberry (*Morus alba* L.). For thousands of years, silk has been consider a luxury trade good par excellence because it fetches a high price, is relatively easy to transport and is always in demand among the wealthy, (Hamon, 1998).

Of about 200 species of insects, that attack mulberry trees (Kikuchi, 1976), the most important in Egypt are scale insects and mealy bugs, besides some other insects belonging to other orders

Scale insects (Coccoidea Hemiptera) attack all parts of plants from roots to buds, flowers, and fruits. Some produce honeydew in great quantities, whereas others, such as Diaspididae (armored scales) do not produce the excretion. They spread on a plant or plants nearby by the active first instar or crawler stage. Over longer distances some crawlers may be spread by wind, but generally the movement of infested plant material in commerce has been responsible for dispersal over long distances.

During last decade, significant changes have been occurring in the economic importance of scale insects. They become destructive pests due to their remarkable build up of resistance. Hall (1922) and (1923) in Egypt, recorded some scale insects species attacking mulberry trees *Morus alba* (Order: Urticales, Fam.: Moraceae). Those species were, *Aonidiella aurantii* (Maskell), *Aspidiotus hederiae* (Vallot), *Asterolecanium pustulans* (Cockerel), *Chrysomphales aonidum* (Linnaeus), *Hemiberlesia lataniae* (Signoret), *Ceroplastes floridensis* Comstock, *Coccus hispidum* L., *Saissetia coffeae* (Walker), *Icerya aegyptiaca* (Douglas), *Icerya seychellarum* (Westwood) and *Maconellicoccus hirsutus* (Green).

The present work deals with the survey of scale insects that attacking mulberry trees in Egypt.

MATERIALS AND METHODS

Insect sources

A survey of scale insects infesting mulberry trees in Egypt, was conducted in 10 Governorates throughout a period of 24 months extending from early June 1998 until the second half of May 2000. The Governorates and their localities were Cairo (El-Maadi and Helwan), Qalyobia (El-Kanater El-Khairiya), Sharkia (belbees), Menofia (Shebeen El-Koum), Gharbia (Kafr El-Zayat), Kafer-El Sheikh, Northern coast, Giza (Dokki), Fayoum (Sennores), and Beni-Sweaf (Beni-Sweaf).

Samples collection

Samples of infested branches (each of about 30 cm. in length and 1.8 cm. in diameter and bears many leaves) were collected randomly from each Governorate for two years (1998 – 2000). Samples considered all over the Mulberry plantation area, included infested branches and leaves whenever possible.

Immediately after collection, the samples were picked up in paper bags with minute holes and taken to the laboratory for examination.

Laboratory examination

The whole samples including branches and leaves were examined in the laboratory for counting all the scale insects by means of stereo-binocular microscope.

Identification of species were carried out at the Plant Protection Research Institute, Dokki, Giza, Egypt.

RESULTS AND DISCUSSION

As shown in Table (1), survey study revealed fourteen scale insect species belonging to eleven genera related to five Families of the super-family Coccoidea were found infesting Mulberry trees in Egypt. These species are:

Family: Diaspididae represented by four species, Latania scale, *Hemiberlesia lataniae* (Signoret), California red scale, *Aonidiella aurantii* (Maskell), *Aonidiella citriena* (Coq.) and Mulberry (Peach) scale, *Pseudaulacaspis pentagona* Targioni & Tozzetii.

Family: Asterolecaniidae represented by one species only, Oleander pit scale, *Asterolecanium pustulans* (Cockerell).

Family: Coccidae represented by five species, Florida wax scale, *Ceroplastes floridensis* Comstock, Brown soft scale, *Coccus hesperidum* Linnaeus, Green shield scale, *Chloropulvinaria psidii* (Maskell), Black scale *Saissetia oleae* (Oilver) and Hemispherical scale, *Saissetia coffeae* Walker.

Family: Margarodidae represented by the two species, Seychelles fluted scale, *Icerya seychellarum* (Westwood) and Egyptian mealy bug, *Icerya aegyptiaca* (Douglas).

Family: Pseudococcidae represented by the two species, white mealy bug, *Ferrisia virgata* (Cockerell) and Hibiscus (Pink) mealy bug, *Maconellicoccus hirsutus* (Green).

Table 1. Species of scale insects infesting mulberry trees, *Morus alba* L. in different Governorates of Egypt throughout 1998-2000

Order	Family	Insect species	Governorates										No. of Governorates
			Cairo	Qalyobia	Sharkia	Menofia	Gharbia	Kafer-El Sheikh	Northern coast	Giza	Fayoum	Beni-Sweaf	
Homoptera	Diaspididae	1) – Latania scale <i>Hemiberlesia lataniae</i> (Signoret)	* Jan., 2000	* Mar., 1999	* Aug., 1998	* Sep., 1998	* Oct., 1999	* Nov., 1998	* Nov., 1999	* Jan., 1999	* Jul., 1998	* May, 2000	10
		2) – California red scale <i>Aonidiella aurantii</i> (Maskell)	* Mar., 1999	* Apr., 2000	* Jul., 1998	* Aug., 1998	* Oct., 1999	-	-	* Sep., 1998	* Oct., 1998	* Nov., 1999	8
Homoptera	Diaspididae	3) – <i>Aonidiella citriena</i> (Coq.)	* Jul., 1999	* Aug., 1998	* Sep., 1998	* Jun., 1999	* Oct., 1999	-	-	* May, 2000	* Dec., 1999	* Jun., 1998	8
		4) – Mulberry (Peach) scale <i>Pseudaulacaspis pentagona</i> Targioni & Tozzetti	* Jun., 1998	* Aug., 1999	* Sep., 1999	* Mar., 2000	* Aug., 2000	-	-	* Jul., 1999	-	* Nov., 1999	7
Homoptera	Asterolicaniida	5) – Oleander pit scale <i>Asterolicanium pustulans</i> (Cockerell)	* Aug., 1999	* Jul., 1998	* Sep., 1998	* Oct., 1999	* Jun., 1999	* Nov., 1998	* Aug., 1998	* Apr., 2000	* May, 2000	* Dec., 1999	10
	Coccidae	6) – Florida wax scale <i>Ceroplastes floridensis</i> Comstock	* Aug., 1999	* Sep., 1999	* Jul., 1999	* Oct., 1998	* Nov., 1998	* Nov., 1999	* Mar., 2000	* Oct., 1998	* Aug., 1999	* Apr., 1998	10

Order	Family	Insect species	Governorates										No. of Governorates
			Cairo	Qalyobia	Sharkia	Menofia	Gharbia	Kafer-El Sheikh	Northern coast	Giza	Fayoum	Beni-Sweaf	
Homoptera	Coccidae	7) – Brown soft scale <i>Coccus hesperidum</i> Linnaeus	* Aug., 1998	* Oct., 1999	* Jul., 1999	* Aug., 1999	* Nov., 1998	* Mar., 2000	* May, 1999	* Sep., 1998	* Oct., 1998	* Jun., 1999	10
		8) – Green shield scale <i>Pulvinaria psidii</i> Maskell	* Sep., 1999	* Feb., 2000	* Jul., 1998	* Aug., 1998	* Dec., 1999	* Nov., 1999	* Aug., 1999	* May, 2000	* Nov., 1999	* Oct., 1998	10
		9) – Black scale <i>Saissetia oleae</i> (Oilver)		* Aug., 1998	* Sep., 1998	* Oct., 1999	* May, 2000	* Nov., 1998	* Jul., 1999	-	-	-	6
Homoptera	Coccidae	10) – Hemispherical scale <i>Saissetia coffeae</i> Walker	* Sep., 1999	* Apr., 2000	* Aug., 1998	-	-	-	* Jul., 1999	* May, 2000	-	-	5
	Margarodidae	11) – Seychelles fluted scale <i>Icerya seychellarum</i> (Westwood)	* Jun., 1998	* May, 2000	* Aug., 1999	* Sep., 1998	* Oct., 1999	* Nov., 1999	* Jul., 1999	* May, 2000	* Apr., 1999	* Dec., 1999	10
Homoptera	Pseudococcidae	13) – white mealy bug <i>Ferrisia virgata</i> (Cockerell)	* Nov., 1998	* Jun., 1999	* Aug., 1999	* Sep., 1998	* Oct., 1999	-	-	* Nov., 1999	* Jun., 2000	* Apr., 2000	8
		14) – Hibiscus (Pink) mealy bug <i>Maconellicoccus hirsutus</i> (Green)	* Aug., 1999	* Jun., 1999	* May, 2000	* Jul., 1999	* Oct., 1998	* Nov., 1998	-	* Aug., 1999	* Apr., 2000	* Sep., 1999	9
No. of species			13	14	14	13	13	8	8	13	11	12	

* Recorded

- Not recorded

It appears from this Table that *H. lataniae*, *A. pustulans*, *C. floridensis*, *C. hesperidum*, *P. psidii*, and *I. seychellarum* were the most dominant species and were distributed all over the 10 Governorates. *M. hirsutus* came in the second order where it was found in 9 Governorates. *A. aurantii*, *A. citriena*, *I. aegyptiaca* and *F. virgata* representing the third group where they were found in 8 Governorates, followed by *P. pentagona* (7 Governorates) then *S. oleae* (6 Governorates). Finally *S. coffeae*, was recorded in 5 Governorates.

On the other hand, the considered 10 Governorates could be arranged into five descending orders according to the distribution of insect species, Qalyobia and Sharkia (14 species), Cairo, Menofia, Gharbia and Giza (13 species), Beni-Sweaf (12 species), Fayoum (11 species), Kafr-El Sheikh and Northern Coast (8 species).

These results indicated that temperature may be playing a role in the distribution of insect species. Most of them may need moderate temperature, since it distributed in Cairo and Middle Delta Governorates (Qalyobia, Sharkia, Menofia and Gharbia) as well as Giza. High temperatures in both Governorates of Upper Egypt (Beni-Sweaf and Fayoum) may be affecting the distribution of these species where low distribution occurred. As for Kafr-El-Sheikh and Northern Coast, the distribution was lower. These results are in agreement with Hall (1922) and (1923) in Egypt, recorded some scale insects species attacking mulberry trees *Morus alba*, (Kikuchi, 1976) recorded that 200 species of insects, attack mulberry trees and (Sengonca *et al* 1998) reported that mulberry attack of a vast pests complex belonging to a large number of insect orders.

It could be conclude that *H. lataniae*, *A. pustulans*, *C. floridensis*, *C. hesperidum*, *P. psidii*, and *I. seychellarum* were five major insects belonging to Super-Family Coccoidea that infest Mulberry trees in the 10 studied Governorates. It is clear that they can survive under different climatic conditions suitable to Mulberry.

H. lataniae, *C. floridensis* and *I. seychellarum* were abundant in all Governorates and were able to survive under its variable weather conditions.

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حصر للحشرات القشرية التابعة لفوق فصيلة كوكوايديا رتبه متشابهه الأجنحة على أشجار التوت فى مصر

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تُشكّل كل من أشجار التوت (خاصة أشجار التوت الأبيض *Morus alba* L. ودود القز *Bombyx mori* L. المادة الأساسية لإنتاج الحرير.

وتتعرض أشجار التوت مثل أغلب المزروعات الإقتصادية ومحاصيل الحقل للإصابة بمجموعة واسعة من الحشرات التي تنتمي إلى العديد من الرُتب الحشرية. فمن حوالي 200 نوعاً من الحشرات تُهاجم أشجار الثوت في أنحاء العالم، تُعتبر الحشرات القشرية (المُسلحة armored scales من فصيلة Diaspididae، الحشرات القشرية الرخوة أو الشمعية soft or wax scales من فصيلة Coccidae والبق الدقيقى mealy bugs من فصيلتي Margarodidae و Pseudococcidae) التابعة لفوق فصيلة Coccoidea من رتبة مُتشابهة الأجنحة Homoptera من أهم هذه الآفات في جمهورية مصر العربية.

وقد إستهدف البحث الحالي حصر الحشرات التابعة لفوق فصيلة Coccoidea على اشجار التوت فى مصر.

أُجريت هذه الدراسة على مدار سنتين مُتتاليتين من أوائل يونيو 1998 إلى مُنتصف مايو 2000 في عشرة مُحافظات (القاهرة، القليوبية، الشرقية، المنوفية، الغربية، كفر الشيخ، الساحل الشمالي، الجيزة، الفيوم وبني سويف). وأوضحت نتائج الحصر ما يلي:

(١) أن أشجار التوت كانت عُرضة للإصابة بأربعة عشر نوعاً من الحشرات القشرية تتبع أحد عشر جنساً تنتمي إلى ست فصائل من فوق فصيلة Coccoidea.

(٢) كانت حشرة اللاتانيا القشرية *H. lataniae*، حشرة *Asterolicanium pustulans*

(Cockerell)، حشرة الموالح الشمعية *C. floridensis*، حشرة *Coccus hesperidum*

Linnaeus، حشرة *Pulvinaria psidii* Maskell، بق السيشيلارم الدقيقى *I. seychellarum*

هي الحشرات الست الرئيسية الأكثر إنتشاراً حيث سُجلت في المُحافظات العشر.

(٣) ومن الناحية الأخرى، كانت مُحافظتا القليوبية والشرقية من أكثر المُحافظات أهمية من حيث إنتشار الحشرات حيث سُجلت الأربعة عشر نوعاً حشرياً بهما.