

Abundance of Green Shield Scale, *CHLOROPULVINARIA PSIDII* (MASKELL) on Some Ornamental Plants in Alexandria Governorate

Moursi Khadiga, S.*; Mesbah , H.A.**; Abo-Shanab, A.S.***; and Abdel Razak, S.I.*

*Plant protection institute, Agriculture research center; **Faculty of Agriculture, Saba Basha, Alexandria university; ***Pesticide Central Lab., Agricultural Research Center

ABSTRACT

This study was carried out to investigate and compare the abundance, infestation rate, number of generation and biological and ecological agents affected green shield scale *Chloropulvinaria psidii* on four ornamental plants, (*Ficus benghalensis*, *Ficus nitida*, *Pittosporum tobira* and *Schinus terebinthifolius*). This work was carried out in three public gardens, located in East, Mid and West of Alexandria Governorate (Shallalat, Antoniades, and Montazaha) during the period of April 1998 to April 1999. On *Ficus nitida* the infestation reached its maximum rate during November in Shallalat and Antoniades gardens and during July in Montazaha. On *Ficus benghalensis* the maximal infestation rate was 76.7 % during August and there were three peaks of infestation during June, August and January. The favorable times for annual increase on *F. benghalensis* were June, September and January. The green shield scale *Ch. psidii* infests *Sch. terebinthifolius* leaves all over the year and reaches the maximum infestation rate during the elapsing period from September 1998 till February, 1999 in Shallalat garden. In Montazaha garden the green shield scale was observed as a main pest of *P.tobira* and it caused highest rate of infestation during June and July. The nymphal stage of *Ch.psidii* was observed parasitized with the parasitoid *Metaphycus flavus*.

INTRODUCTION

The green shield scale, *Chloropulvinaria psidii* (Maskell) was firstly described from Cylon by Green (1892) who stated that males are not known. It was observed as a main pest of guava trees in many countries (Moursi, 1974 and Moursi, *et al.*, 1991). It attacks also many ornamental plants as *Arlia longifolia*, *A.papyrifera*, *Schinus terebinthifolius*, *Meryta sinclairii*, *Jasminium humila*, *Anthurium sp.*, *Acalypha wilkesiana*, *Dolichos lablab*, *F.nitida*, *F.benghalensis*, *Hibiscus mutabilis*, *Nerium oleander* (Moursi, 1974, Osman *et al.*, 1982; Hamon and Williams, 1984; El-Borollosy *et al.*, 1990, and Abdel Razak, 2000).

MATERIALS AND METHODS

The study was carried out in three Alexandrian public gardens located in East, Mid and West of the Governorate (Shallalat, Antoniades and Montazaha) from April 1998 till April 1999. The ornamental plants chosen for study were

Ficus benghalensis, *Ficus nitida*, *Pittosporum tobira* and *Schinus terebinthifolius* (which are a good host for the green shield scale *Chloropulvinaria psidii*).

The trees were not exposed to any chemical material except in Montazaha garden where they were applied with the precedent year recommended Ministry of Agriculture programme. From each plant species five trees or shrubs were chosen to study the population density of *Ch. psidii* in each garden. Ten leaves and five small branches (15 cm. long) were picked out randomly every two weeks intervals, from all directions of each tree. Leaves and branches were put in cloth bags and transported to the laboratory for counting using a stereoscopic binocular microscope. Upper and lower surfaces of the leaves were examined. Pre-adult, adult and parasitized stages of the inspected insect were counted and recorded.

Daily mean temperature, mean relative humidity, wind speed and day light were the weather factors studied to determine their effects on the populations of green shield scale infested *Sch. terebinthifolius*. Daily records of these weather factors in Alexandria Governorate were obtained from the General Authority for Meteorology at Kobri El-Koba, Cairo.

Simple correlation (r) and partial regression (b) values were calculated to obtain information of the relationship between the mean number of individuals/tree and the mean records of four tested weather factors.

The densities increase was calculated by quotient of dividing the infestation mean number recorded for every host sample over its preceding one (Bodenheimer, 1951). The obtained results were statistically analyzed according to Snedecor (1970).

RESULTS AND DISCUSSION

The performed observations during this work, revealed that the green shield scale, *Chloropulvinaria psidii* (Maskell) infests some ornamental trees and shrubs in Alexandria Governorate. It was recorded in a considerable number on each of *F.nitida*, *F.benghalensis*, *P.tobira* and *Sch.terebinthifolius*. *F.nitida* was highly infested in the three public gardens but *F.benghalensis* and *Sch.terebinthifolius* highly infested in Shallalat and *P.tobira* highly infested in Montazaha. The obtained data proved the following findings during the study period (April 1998 – April 1999) :

- ***Ch.psidi* Infested *F.nitida* in the three gardens :**

Data presented in Fig. (1) showed the comparison of infestation percentages of *Ch.psidi* on *F.nitida* during the period of observations (April 1998 – April, 1999) in the selected public gardens.

From the exhibited data, it could be indicated that the infestation rate reached its maximum during November in Antoniades and Shallalat gardens (45% and 36.7%, respectively) while it's maximum infestation rate was (55%) during July in Montazaha. It is worth to mention here that the insect had been

recorded on *F. nitida* all over the year in Antoniades garden, while it completely disappeared from the beginning of November in Montazaha. The total number of insect per tree reached the maximum during October in Antoniades; during November in Shallalat and during July in Montazaha (30.2, 7.0 and 16.0 individuals/tree in respect) (Fig 1).

• ***Ch.psidii* Infested *F. benghalensis* in Shallalat garden :**

In Shallalat garden *F.benghalensis* was observed infested with *Ch.psidii* in a considerable number. The included data in Fig. (2) showed that the maximal infestation percentage reached 76.7% during August 1998 while the minimal was 10% during April 1998. There were three peaks of infestation on *F.benghalensis* during June, August 1998 and January 1999 (66.7, 76.7 and 31.7% respectively).

Regarding the total number of insect/tree, the highest number was recorded 56.7 insect/tree in July 1998, while the lowest one was 1.3 individuals/tree in April 1998. Three peaks of fluctuated population density were took place during the periods June–July, September and January–February.

The measured quotient of increase indicated that the favorable times for annual increase on *F. benghalensis* were June, September and January with rates of 9.33, 1.17 and 2.19, respectively (Fig. 2).

The highest population density of nymphs was recorded in April and May 1998 and April 1999 with a percentage of 100% of the total population. Adult stage reached its maximum numbers during September 1998 and February 1999 (52.7% for both months) and it was completely disappeared during April and May 1998. The parasitized individuals with the hymenopterous parasitoid, *Metaphycus flavus* were detected on *F. benghalensis* during the extended period from June 1998 till February 1999. The highest percentage of parasitism 19.4% of total counted was recorded during January 1999 (Fig. 2).

• ***Ch.psidii* Infested *Sch.terebinthifolius* in Shallalat garden :**

The elucidated data in Fig. (2) show that the green shield scale, *Ch.psidii* infests *Sch.terebinthifolius* leaves all over the year. The infestation rate reached its maximum (100 %) during the period from September 1998 till February 1999. During May 1998, the infestation rate was the lowest (2.8%).

Considering the total number per tree, the lowest number was recorded in May 1998 (1.7 individuals/tree), increased to reach the maximum (612.5 individuals/tree) during October 1998.

The estimated value of quotient of increase indicated that the favorable periods of annual increase occurred during the summer months (June, July and August), early autumn 1998 (September and October) and in January 1999 (2.52, 8.18, 4.97, 1.85, 1.90 and 1.39, respectively).

The highest population densities of nymphal stage were recorded during May, June, July 1998, January, February and April 1999 representing (100%, 83.8%, 86.8%, 93.1%, 89.2% and 98.3% of the total count, respectively). The minimal densities of nymphs occurred during October while it completely disappeared during September (Fig. 2).

Population of adult females was higher during the Autumn months where it reached 98.8%, 93.6% and 67.9% in September, October and November, respectively. Their lower percentage occurred in July 1998, and January and April 1999 but the insect was completely disappeared during May and June 1998.

The parasitized nymphs with *Mytaphychus flavus* reached its higher percentage of the total count during June and July 1998 (16.2% and 8.5%, respectively). It was in low rate during August, September, October, November 1998 January and February 1999. The parasitoid disappeared during May and December 1998 and March and April 1999.

The obtained data are in agreement with the results obtained by Salama and Salem (1970); Moursi (1974); El-Borollosy *et al.*, (1990) and Moursi *et al.*, (1991).

- **The relationship between the tested weather factors and the population of *Ch.psidii* on *Sch.terebinthifolius***

Through the deduced relationship between tested weather factors, (daily mean temperature, daily mean relative humidity, wind speed and day light) and population of *Ch.psidii* on *Sch.terebinthifolius* during the period of study (May 1998 till April 1999) shown in Table (1). The results show the significant weak negative relationship ($r = -0.14$) between the daily mean temperature and the estimated population density of *Ch.psidii* individuals. In other words, when the daily temperatures increases by one unit, the population density decreased by 4.75 and vice versa when the temperature decreased. The simple correlation for the population of green shield scale and the daily relative humidity was significantly positive ($r = +0.63$ and $b = 0.1$). The regression coefficient gave the same trend. It was positive, which means that the increase of R.H. by 1% increases the population 0.1. The simple correlation of the population of *Ch.psidii* and wind speed was significantly negative ($r = -0.59$ and $b = 84.4$), which means that when the wind speed increases by one meter/sec, the population of the insect decreases by 84.4. This is due to the transfer of the crawlers and early nymphal instars by the wind to another places. The simple correlation for the population for the soft scale and the daylight (hrs.) was significantly negative ($r = -0.69$). The regression coefficient gave the same trend of the previous factor where $b = 84.2$. These findings are in agreement with those obtained by El-Borollosy *et al.*, (1990)

- ***Ch.psidii* Infested *Pittosporum tobira* in Montazaha garden :**

During the period of study, *Ch.psidii* was observed as a main pest of *P.tobira* in Montazaha garden. The lowest rate of infestation and counted individuals/tree were recorded during June 1998 (3.3% and 0.3 insect/tree) but the highest rates of infestation and individuals/tree were occurred in July (61.7% and 41.7 insect/tree) while the incidence of infestation in the other months ranged in between (Fig. 2).

The calculated values of quotient of increase indicated that the utmost favorable time for annual increase was July (139.0), while it was the least in June (0.13). Concerning the age structure of insect population, the higher rate of the immature stage was reached during May, June, November 1998 and March and April 1999 (100% of the total count). Rate of immature density was decreased in other months where it reached 67% in August. The highest population density of adult females was observed during December (29.9%) and the lowest percentage was occurred in September (4%) while it was completely disappeared in May, June, November, 1998 and March and April 1999. The parasitized nymphs with *M. flavus* were detected in July, August 1998 and April, 1999 with rates of 1.2, 4.4 and 10.0%, respectively (Fig. 2).

In general, the population density of *Ch.psidii* was considerably low on *F.nitida*, *F.benghalensis* and *P.tobira* compared with its population on *Sch.terebinthifolius* leaves.

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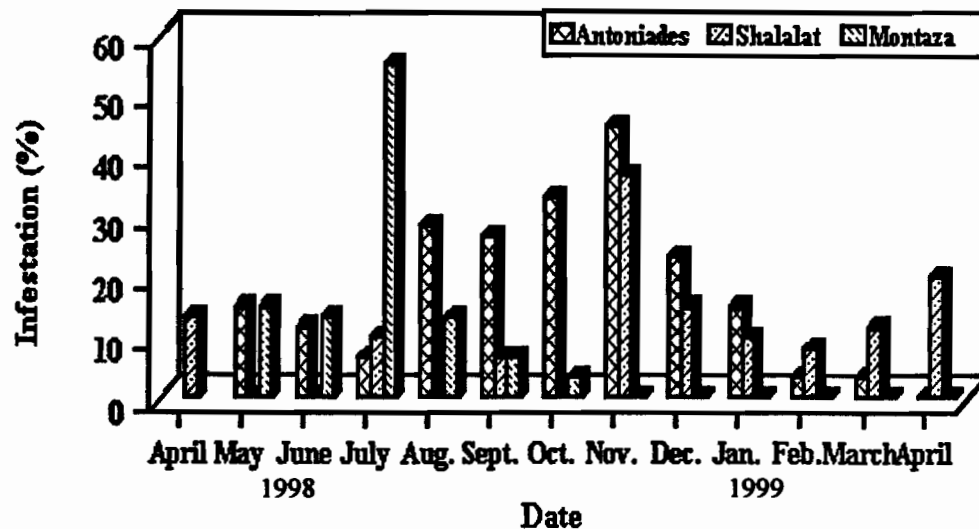


Fig. (1) : Monthly variations of infestation rate (%), of *Chloropulvinaria psidii* infested *Ficus nitida* leaves at three public gardens in Alexandria (April 1998 - April 1999).

Table 1 : The relationship between the four weather factors and the green shield scale *Chloropulvinaria psidii* infested *Schinus terebinthifolius* at Shallalat garden, Alexandria, (April 1998 - April 1999).

Weather factor	Degree of freedom	Simple correlation (r)	Regression coefficient (b)	$t_{0.05}$
Daily mean temperature (°C)	10	-0.14	4.75	3.5*
Daily relative humidity (%)	10	0.63	0.10	2.6*
Wind speed	10	-0.59	84.4	2.3*
Day light (hrs.)	10	-0.69	84.2	3.01*

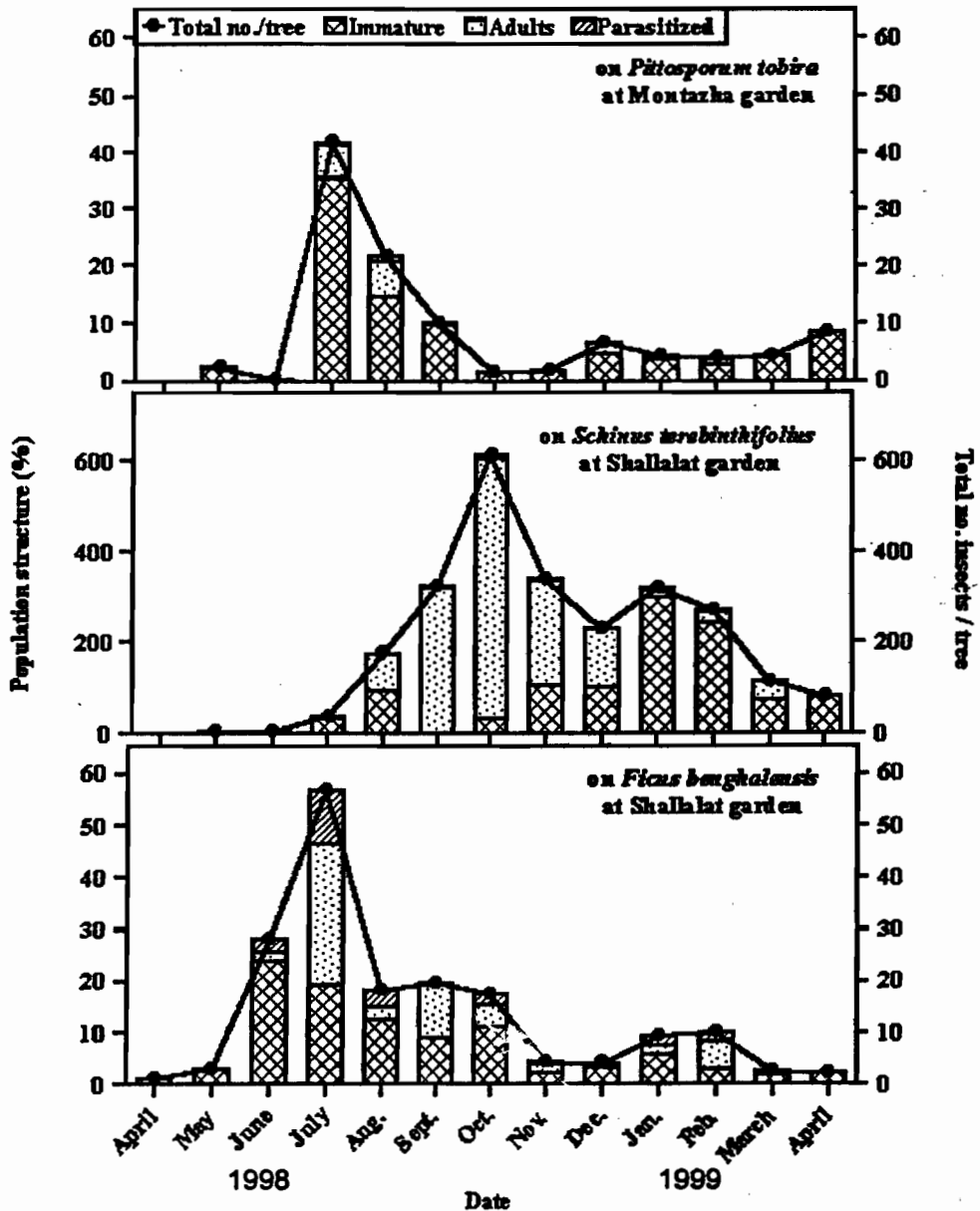


Fig. (2) : Monthly variations in total number and population age structure (%) of *Chloropulvinaria psidii* infesting certain hosts leaves at Alexandrian public gardens (April, 1998 - April, 1999).

المخلص العربى

التوزيع الفصلى لحشرة الجوافة الشمعية *Chloropulvinaria psidii* (Maskell) على بعض نباتات الزينة فى محافظة الاسكندرية

خديجة سيد مرسى^١، حسن مصباح^٢، احمد صالح ابو شنب^٣، سعاد عبد الرزق^٤
^١معهد بحوث وقاية النباتات، ^٢المعمل المركزى للمبيدات-مركز البحوث الزراعية، ^٣كلية الزراعة-
 جامعة الاسكندرية

تم دراسة معدل الإصابة بحشرة الجوافة الشمعية لنباتات الزينة بالحدائق العامة بالإسكندرية وقد تم تسجيلها على العديد من أشجار وشجيرات الزينة كان أكثرها إصابة نباتات الفيكس العادى فى حدائق انطونيداس والمنترزة والشلالات والتين البنغالى والفلل نو الورق العريض فى الشلالات والبتيبورم فى المنترزة خلال الفترة من مايو ١٩٩٨ حتى مايو ١٩٩٩. كما تم دراسة التركيب العمرى للحشرة على هذه النباتات ونسبة التطفل بالطيفيل *Metaphycus flavus* وكذا تم دراسة علاقة بعض العوامل الجوية وهى متوسط درجة الحرارة اليومية ونسبة الرطوبة وسرعة الرياح وطول النهار على تعداد هذه الحشرة على نباتات الفلنل نو الورق العريض.

أوضحت النتائج أن أعلى نسبة إصابة لنبات الفيكس العادى كانت خلال نوفمبر فى حدائق انطونيداس والشلالات ويوليو فى المنترزة وتستمر الإصابة طوال العام فى انطونيداس بينما تختفى الإصابة فى بداية نوفمبر وحتى نهاية ابريل من العام التالى على الفيكس فى حديقة المنترزة.

وسجلت اعلى معدلات إصابة التين البنغالى فى الشلالات خلال اغسطس واقلها خلال ابريل ١٩٩٨ وظهرت اعلى تعداد للأطوار الغير كاملة فى التركيب العمرى لها خلال ابريل ومايو حيث كانت ١٠٠% وأعلى معدل الطور الكامل كان خلال سبتمبر وفبراير وظهر التطفل واضحاً خلال يونيو ١٩٩٨ وفبراير ١٩٩٩.

وقد وجد أن الحشرة تصيب اوراق الفلنل نو الورق العريض طوال العام فى الشلالات وأن اعلى معدل للإصابة خلال سبتمبر حتى فبراير واقلها خلال مايو. تم تسجيل اعلى معدل للأطوار الغير كاملة خلال مايو ١٩٩٨ حتى يناير ١٩٩٩ ويناير - ابريل ١٩٩٩ ولخفضت تماماً خلال سبتمبر. وبدراسة تأثير العوامل الجوية على نسبة الإصابة أتضح ان العلاقة بين متوسط درجة الحرارة وسرعة الرياح وطول فترة الإضاءة مع تعداد الحشرة كانت سلبية بينما كانت العلاقة بين نسبة الرطوبة وتعداد الحشرة علاقة موجبة.

كانت حشرة الجوافة الشمعية تمثل الآفة الرئيسية على نباتات البتيبورم فى حديقة المنترزة وظهرت اعلى إصابة خلال يوليو بينما اقلها كان فى يونيو ١٩٩٨.

عامه نسبة إصابة حشرة الجوافة الشمعية كانت منخفضة على الفيكس العادى والتين البنغالى والبتيبورم مقارنة بإصابة اوراق الفلنل نو الورق العريض.