

Ecological studies on the common white mealybug, *Icerya seychellarum seychellarum* (Hemiptera : Monophlebidae) associated with *Dodonia viscosa* in Alexandria, Egypt.

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ABSTRACT

The data showed that the common white mealybug *Icerya seychellarum seychellarum* (West.) (Hemiptera : Monophlebidae) infests *Dodonia viscosa* Jacq in Montazah garden during two successive years (2005-2006 and 2006-2007). The results showed that the weak significant positive relationship between daily mean temperature, relative humidity and dew point and estimated population density of *I. seychellarum seychellarum* individuals. But on the other hand this relationship was significantly negative with wind speed.

Keywords: Ecological studies, mealybug, *Dodonia viscosa*, Egypt.

INTRODUCTION

The common white mealybug, *Icerya seychellarum seychellarum* (West.) (Hemiptera: Monophlebidae) is highly polyphagous and widespread throughout the tropics and it is common in many pacific territories, (Ben-Dov, 2005). It distributes in five regions in the world. They are Australasian; Afrotropical; Oriental; Palaearctic just in Japan (Kuwana, 1907, CABI, 1955 and Kawai, 1980) and Neotropical. It is recorded in Egypt in coccid list of Ezzat and Nada (1986). Varnish- leaf, *Dodonaea viscosa* Jacq is a popular medicinal plant. Its leaf used as anti-inflammatory, anti-ulcer and anti-bacterial fungal agents and in the treatment of fractures (Venkatesh *et al.*, 2008).

The present article aimed to discuss the effect of some weather factors on population density of the common white mealybug on important ornamental plants.

MATERIALS AND METHODS

Survey and inspection of varnish-leaf shrubs were started from March 2005 till February 2007 in Montazha public gardens in Alexandria governorate. The shrubs were not exposed to any pesticides treatments during the period of study. Five shrubs were randomly chosen to the study. Ten leaves were monthly picked out at random, from each direction of inspected tree. Leaves were put in cloth bags; transported immediately to the laboratory for classifying and counting the existing individuals of detected species using a stereoscopic binocular microscope. The upper and lower surfaces of the leaves were carefully examined. The rate of increase/decrease in population densities was calculated by dividing the mean number of insects found in the sample over that found in preceding one (Bodenheimer, 1951).

Weather factors of daily mean temperature, mean relative humidity, wind-speed and dew point, were used in this study to determine their effects on the population density of *I. seychellarum seychellarum*. Monthly means records of these weather factors in Alexandria Governorate were obtained from the general Authority for Metreology at Kobri El-Kobba, Cairo according to the precise period of sampling dates. Simple correlation (r) and partial regression (b) values were calculated to obtain information about the relationship between the mean number of individuals/ tree and the mean records of four tested weather factors. In an effort to estimate the distribution and population densities of the detected mealy bugs, the obtained results were statistically analyzed according to (Snedecor, 1970).

RESULTS AND DISCUSSION

During the period of study, no scale insects were observed infesting *D. viscosa* ornamental plant species in Montazah garden due to the negligible palatability of *D. viscosa* ornamental plant species to most of prevailing mealy bugs species in this garden, with an exception of recorded more or less lowered numbers of the common white mealybug, *I. seychellarum seychellarum* all over the months of performed inspection.

Considering the total count of inspected insects per 5 trees, the lowest average number was recorded during early summer (June), where it was 29 and 24 individuals/5 trees for the two successive years in respect, gradually increased to reach 100 and 92 individuals/ 5trees during October, then decreased in a more or a less extent throughout the next months to reach a minimum of 14 individuals/ 5trees in February in the first year; 7 individuals/5trees in January in the second year. While, the highest value of observed *I. seychellarum seychellarum* on *D. viscosa* leaves was recorded in May in both successive years and reached 376 and 268 individuals/ 5 trees, representing 36.6 and 34.1% of total count/year, in respect (Table, 1). Noticeably in April month these values decreased up to 2.5 – 2.3 individuals/ 5trees resembling 0.3% of total counted individuals per year. That may be attributed to the prevailing unfavourable climatic conditions, in particular, the hot Khamasin wind in April.

Table 1: Monthly variations in population count of *Icerya seychellarum seychellarum* associated with *Dodonaea viscosa* in Montazah garden during two successive years.

Months	2005 – 2006			2006 – 2007		
	Total count/5trees	Quotient of increase	% of grand total count	Total count/5trees	Quotient of increase	% of grand total count
June	29	-	2.8	24	-	3.0
July	39	1.34	3.8	28	1.2	3.6
August	79	2.02	7.7	80	2.86	10.2
September	87	1.10	8.5	68	0.85	8.6
October	100	1.15	9.7	92	1.35	11.7
November	80	0.8	7.8	78	0.85	9.9
December	92	1.15	9.0	51	0.65	6.5
January	19	0.21	1.8	7	0.14	0.9
February	14	0.74	1.4	11	1.57	1.4
March	86	6.2	8.4	61	5.54	7.8
April	26	0.30	2.5	18	0.30	2.3
May	376	14.46	36.6	268	14.50	34.1
June	29	-	2.8	24	-	3.0
Grand total/ year	1026			786		

Also, the estimated values of quotient of increase indicated that the favorable monthly periods of insect's increase occurred during summer months (July and August); early autumn (September & October); spring (March and May) and amounted

to 1.37, 2.02, 1.10, 1.15, 6.2 and 14.46 for the first year in respect. While, in the second year the favorable monthly periods of increase occurred during July, August, October, February, March; May and comprised 1.20, 2.86, 1.35, 1.57, 5.54 and 14.50, respectively (Table1).

Generally, the detected individuals of this mealy bug species on *D. viscosa*, the calculated infestation rates of *seychellarum* mealybug's were relatively low in summer and winter months, versus their high rates in spring and autumn months during the study (2005 – 2006 and 2006 – 2007). The data shown in (Table2) revealed that during spring months the calculated individuals comprised 488 and 347 individuals/5trees; represented 47.5 and 44.2% of the total collected ones in both the years of 2005 – 2006 and 2006 - 2007, in respect. The lowest population density was observed during winter months 125 and 69 individuals/5 trees, resembling 12.2 & 8.8% of the total counted insect/year, in respect (Table 2).

Table 2: Seasonal variations in population count detected of *Icerya seychellarum seychellarum* on *Dodonaea viscosa* during (2005 – 2007) in Alexandria governorate.

Seasons	2005 - 2006		Seasons	2006 – 2007	
	<i>Icerya seychellarum</i>			<i>Icerya seychellarum</i>	
	Total year	% of total		Total year	% of total
Summer	147	14.3	Summer	132	16.8
Autumn	267	26.0	Autumn	238	30.2
Winter	125	12.2	Winter	69	8.8
Spring	488	47.5	Spring	347	44.2

The deduced results of the correlated monthly mean values of certain weather factors, i.e., daily mean temperature (°C), relative humidity (%), dew point (°C) and wind speed (Km/h) with the monthly total counts of *I. seychellarum seychellarum* individuals on *D. viscosa* during the elapsed period from June, 2005 -March, 2007 is exhibited in Table (3) and Fig.(1 a-d).

Table 3: Simple correlation (r) values of four abiotic factors with their significance levels on total count of *Icerya seychellarum seychellarum* on *Dodonaea viscosa* shrubs in Alexandria governorate (June, 2005- March, 2007).

Values	Daily mean Temperature (C)	R.H. (%)	Dew point (C)	Wind speed Km/h
Regression coefficient (b)	0.141	0.107	0.153	-0.081
Simple correlation (r)	0.375	0.326	0.392	-0.284
Degrees of freedom(n-2)	20.000	20.000	20.000	20.000
Calculated $t_{0.05}$	12.030*	3.175*	12.870	7.946

The results show the significant weak positive relationship ($r=0.375$) between daily mean temperature and estimated population density of *I. seychellarum seychellarum* individuals. In other word, when daily mean temperature increase or/and decrease by one unit, the population density in parallel increase or/and decrease by 0.141. (Table, 3 and Fig.1 a). Also, the assessed simple correlation values between the estimated monthly means of either relative humidity or dew point with the mean values of population counts of seychellarum mealybug/month, showed also the weak significant positive relationship during the period of study, where (r) values comprised 0.326 and 0.392, respectively (Table, 3 and Fig. 1 b and c).

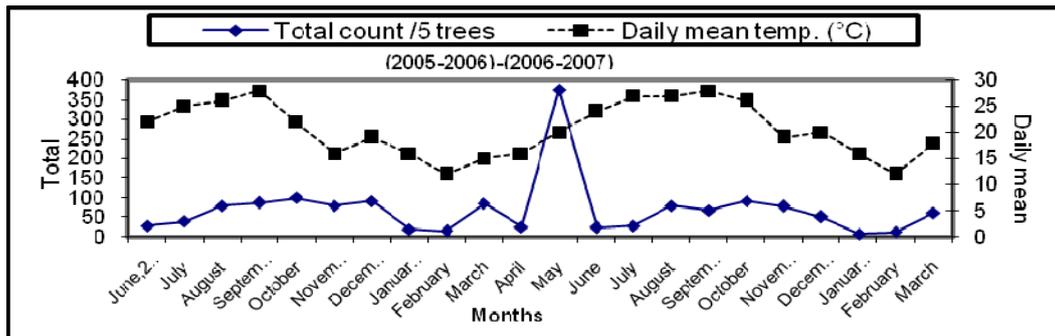


Fig. (1 a): Monthly variations of *Icerya seychellarum seychellarum* total count/5trees in relation to Daily mean temperature (°C) in El Montazah garden (June, 2005-March, 2007).

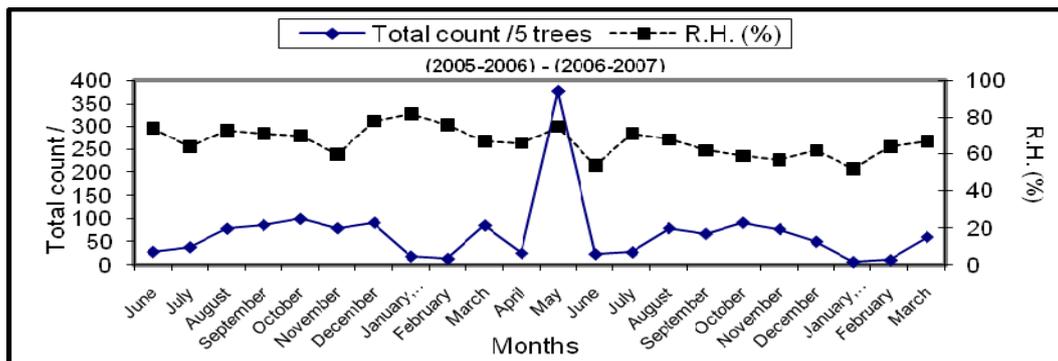


Fig. (1 b): Monthly variations of *Icerya seychellarum seychellarum* total count/5trees in relation to R.H. (%) in El Montazah garden (June, 2005-March, 2007).

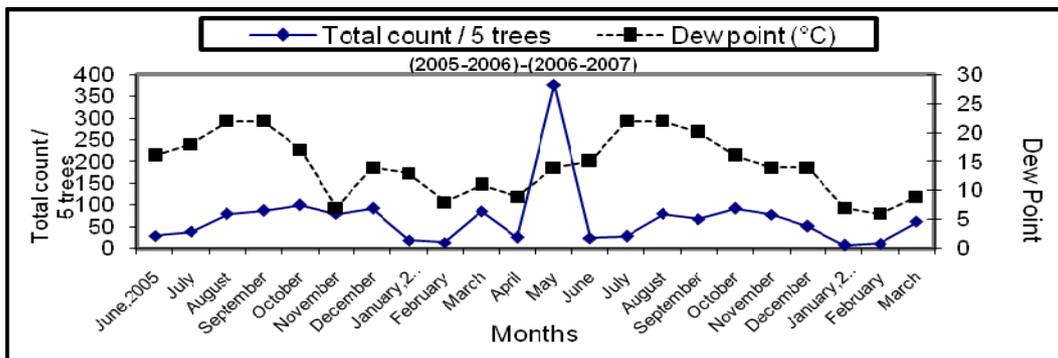


Fig. (1 c): Monthly variations of *Icerya seychellarum seychellarum* total count/5trees in relation to Dew point (°C) in El Montazah garden (June, 2005-March, 2007).

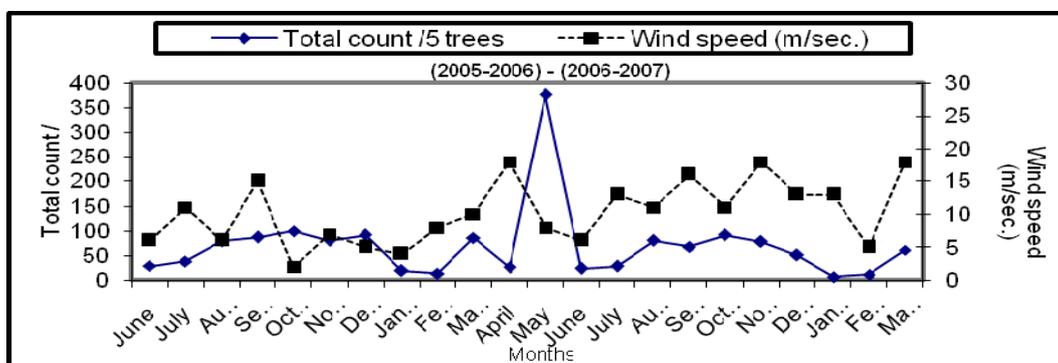


Fig. (1 d): Monthly variations of *Icerya seychellarum seychellarum* total count/5trees in relation to Wind speed (m/sec) in El Montazah garden (June, 2005-March, 2007).

On the other hand, the data in Table (3) showed also that the simple correlation of the counts of the common white mealy bug population with wind speed was significantly negative weak. Its value (r) was -0.284 and regression coefficient (b) was -0.081; indicating that the increase of wind speed by one unit decrease the population of the insect by 0.08 individuals. That is due to the transference of the crawlers and early nymphal instars by the wind to another plants and/or places. (Fig. 1d).

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ARABIC SUMMARY

بعض الدراسات الأيكولوجية علي بق التوت الأبيض *Icerya seychellarum seychellarum* الذي يصيب نبات الدودونيا *Dodonaea viscosa* في منطقته الإسكندرية

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بق التوت الأبيض من الآفات الهامة التي تصيب العديد من المحاصيل الأقتصادية . و في هذا العمل تم عمل دراسات أيكولوجية علي بق التوت الأبيض علي نبات الدودونيا. في خلال عامين من الدراسة لم يسجل علي هذا النبات سوي بق التوت الدقيقي وكان تعداد الحشره أقل مايمكن خلال فبراير في العام الأول ويناير في العام الثاني وسجل أعلي تعداد للحشره خلال شهر مايو في عامين متتاليين. وبدراسة التوزيع الفصلي لحشرة بق التوت الدقيقي علي نبات الدودونيا وجد أن تعداد الحشره يكون عادة أقل مايمكن في فصلي الصيف والشتاء ويزداد خلال أشهر الربيع والخريف وأوضحت النتائج أن هناك علاقة موجبه معنويه ضعيفه بين كلا من متوسط درجة الحراره والرطوبه النسبيه ونقطة الندى وتعداد البق الدقيقي علي نبات الدودونيا ومن ناحية أخرى كانت العلاقة بين تعداد الحشره وسرعه الرياح علاقته معنويه سالبه بمعني أنه كلما زادت سرعة الرياح إنخفض تعداد الحشره علي النبات.