

SEASONAL ABUNDANCE OF *Hemiberlesia lataniae* (SIGN.) (HEMIPTERA: DIASPIDIDAE) ON GRAPEVINE IN QALUBYA GOVERNORATE, EGYPT

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ABSTRACT

Seasonal abundance of Latania scale, *Hemiberlesia lataniae* (Sign.) (Hemiptera: Diaspididae) was conducted during two successive years (2010/2011 and 2011/2012) in vineyard orchard at El-Khanka district, Qalubya Governorate. The obtained results revealed three overlapping generations a year on both grapevine leaves and branches, the shortest generation occurred on grapevine leaves and branches from early or mid-August to mid-October (2.5 - 3 months) whereas the longest one appeared from early or mid-October and continued until grapevine leaves fall down or extend on grapevine branches to early February (3 - 4 months). The intermediate generation started from mid-May or early June to August or early September (3 - 3.5 months). The distribution of *H. lataniae* population on the grapevine leaves are varied in the year seasons, the autumn season received the highest number of insect population (61.5-63.7%) followed by summer (28.6-29.0%) and winter seasons (5.9 - 8.3%) whereas spring season received the lesser number (1.4 - 1.6%). The same trend was found on the grapevine branches, the autumn season received the highest portion of insect population (33.6 - 47.2%) followed by summer (26.1%) and winter seasons (15.2 - 33.3%) whereas spring season received the lower portion (6.9-11.5%). The seasonal abundance of *H. lataniae* on grapevine affected greatly with the daily mean temperature and %R.H. the combined effect of both factors contributed with 60.4 and 57.4% of the total population changes in the first and second years.

INTRODUCTION

Grapevine, *Vitis vinifera* L. is considered one of the most important fruit crops in Egypt, not only as a popular fruit but also for using in many agricultural industries. It occupied the second place among fruit crops and exportation after citrus. The total cultivated areas in Egypt has been rapidly increased and reached about 171973 feddans in 2011, producing yearly about 1320801 tons (Economic Affairs Sector, Ministry of Agriculture, Egypt). Grapes contain a high percent of sugar, vitamins such as vitamin C, A, K and good source for micronutrient minerals like copper, iron and manganese. Grapes are rich in polyphenolic phytochemical compound resveratrol which has been found to play a protective role against cancers of colon and prostate, coronary heart disease, degenerative nerve disease and Alzheimer's disease. (Clarke, (2001).

In Egypt, grapevine is attacked with many pests causing several types of damage (Mohammad and Nada, 1995; Hassn and El-Sahn, 2012;

Helmy and El-Sahn, 2012; Ebrahim *et al.*, 2012). *Latania* scale, *Hemiberlesia lataniae* (Sign.) (Hemiptera: Diaspididae) is one of the most economic insect pests in the world, it has a wide range of host plant belonging to 280 genera in 80 plant families (Davidson and Miller, 1990) and distributed in many areas of the world (Danzig and Pellizzari, 1998).

The presence of *H. lataniae* on grapevine can be detected by abnormal coloring and some distortion of leaves, twigs, and pitting the bark of stems (Daneel, 1998). Heavy infestation can cause dieback of twigs and branches (Kosztarab, 1996). Field observations showed that, it injures the grapevine leaves, specially the older ones causing yellowish spots and loss of leaves.

For success the integrated pest management program (IPMP) for control any pest, it required more information concerning the ecology of the target pest. So, the present work aims to study the seasonal abundance of *H. lataniae* on grapevine under field conditions to supply the required data for design an effective management program for its control.

MATERIALS AND METHODS

The present work was carried out for two years (early March 2010 to mid-February 2012) in heavily infested vineyard with *Hemiberlesia lataniae* (Sign.) at El-Khanka district, Qalubya Governorate. The vineyard planted in clay soil at 3m space and supported above a pergola at height of 3.5 m from the land and about 15 years old. Fertilizers were added through surface irrigation. The vineyard received the normal agricultural practices without using any chemical control and pruning.

The seasonal fluctuation of *H. lataniae* population was carried out on six grapevines (cultivar Balady) has the same size, shape and vegetation. Half-monthly samples of 30 branches (20 cm. long) were cut (5 branches/grapevine) as well as 30 leaves were picked up at random (five 5 leaves/grapevine) from the different sides of each grape.

The collected samples were put in paper bags and transferred to the laboratory for inspection with stereo-microscope. The population of *H. lataniae* per each sample was sorted into their developmental aspects (nymphs, adult females and gravid females). The Meteorological data of the half monthly means of the tested factors (daily mean temperature and R.H.%) were correlated with the insect population and the simultaneous effect (Fisher, 1950) of the two weather factors on the variability within the insect population was done by computer (MSTATC Program) to determine their effect on the insect activity in the two years.

RESULTS AND DISCUSSION

- **Seasonal abundance of *H. lataniae* on grapevine leaves and branches**

The seasonal abundance of *H. lataniae* population on both grapevine leaves and branches were graphically illustrated in Figs. (1&2) in the two years and discussed as follows:

A- On the leaves

The obtained results showed that, the seasonal activity of *H. lataniae* on grapevine leaves started to appear from early May to mid-December in the two studied years. The grapevine leaves started to fall down gradually by early December and the insect population showed gradual decrease until grape leaves dropped and grapevines entrance in the dormancy stage in winter.

As shown in Figs. (1 & 2) *H. lataniae* population exhibited three annual peaks in both years. The 1st peak of insect activity appeared on the 1st week of August for nymph and adult female populations with mean numbers ranged 8.0 - 9.2 nymphs/leaf, 6.6 - 6.7 adult females/leaf at field conditions ranged 24.8 - 27.5 °C and 62.1-65%R.H. in the two years. While the 2nd peak occurred in mid-September with mean counts ranged 10.6 - 12.5 nymphs/leaf, 6.5 - 7.2 adult females/leaf at 25.5 - 27.5°C and 62.2 - 62.6%R.H.in the two years.

The gravid females showed the first peak on the 1st week of August in the 1st year (5.1 gravid females/ leaf) and mid-August (3.7 gravid females/leaf) in the 2nd year at 24.8 - 27°C and 62.1 - 64%R.H. The second peak of gravid females was recorded in mid-September (4.0 gravid females/leaf) in the 1st year and early October in the 2nd ones (4.8 gravid females/leaf) at 25.5 - 24.9°C and 62.0 - 62.8%R.H., respectively.

The 3rd peak of insect activity observed in early November for nymphs, adult females and gravid females with mean counts ranged 14.3 - 19.5 nymphs, 11.2 - 11.5 adult females and 5.3 - 6.6 gravid females/leaf at 20.0 - 24.7 °C and 62.2-72.0%R.H. in the two years.

The obtained results were closely related with those obtained by El-Minshawy *et al.* (1972) in Alexandria Governorate, who found that, the nymphal stage of *H. lataniae* started to increase gradually on fig leaves from July until September and the adult females occurred in October and November and appeared again in June with small numbers whereas the occurrence of the gravid females on leaves were coincided with the presence of the crawlers. Mohamed (1999) recorded three peaks of abundance for *H. lataniae* on olive trees at Ismailia Governorate occurred on the 1st April, 2nd June, 3rd August and the lowest population observed on February whereas Tawfik and Mohamed (2001) reported four peaks on *Morus alba* a year at Giza Governorate and the highest abundance peak occurred during mid-July.

B- On the branches

The obtained results in Figs., (1&2) demonstrated regular occurrence for *H. lataniae* population on the grapevine branches all over the year round. The general trend of the population activity on the branches was similar to those on leaves in the two years.

In the 1st year (2010-2011), the population of nymphs, adult females and gravid females showed the same trend and have three annual peaks of activity a year. The 1st peak was found in mid-July with mean population of 10.4, 8.8 and 7.5 insects / branch for nymphs, adult females and gravid females at field conditions of 22.8°C and 63.4%R.H., respectively. The 2nd peak for nymphs, adult females and gravid females occurred in mid-September with mean population of 20.5, 15.9 and 12.7 for nymphs, adult females and gravid females/ branch at prevailing field conditions 25.5°C and 62%R.H., respectively. The 3rd peak for insect activity was recorded in mid-November with mean number of 16.8 nymphs, 12.8 adult females and 10.2 gravid females/branch at field conditions of 23.5°C and 60%R.H.

In the 2nd year (2011-2012), the insect activity has the same trend and three annual peaks were recorded on grapevine branches. The 1st peak of abundance was found on the 1st week of July for nymph, adult female and gravid female populations with mean numbers of 7.2 nymph, 6.5 adult female and 5.8 gravid female/branch at field conditions of 25.6°C and 65.2%R.H. The 2nd peak occurred on the 1st week of September for nymph, adult female and gravid female populations with mean counts of 18.8 nymph, 13.7adult female and 9.2 gravid female/branch at 27.7°C and 66.9%R.H., respectively. The 3rd peak of abundance observed in mid-November for nymph, adult female and gravid female with mean counts of 15.6 nymph, 11.3 adult female and 7.2 gravid female/branch at 17.0°C and 70%R.H. The insect population was recorded with minimum numbers on grapevines branches during winter and early spring in the two studied years, respectively .

The present results are in agreement with the findings of Wang and Su (1989) who mentioned that, the crawlers of *H. lataniae* on grapevines in Taiwan increased with increasing daytime temperature and reached its maximum at 29°C. In Egypt, El-Minshawy *et al.* (1972) found that, the population of *H. lataniae* adult females on fig twigs decreased in January and February and sharply increased from March to July and they increased again in August and September.

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2- Seasonal distribution of *H. lataniae* population on grapevine leaves and branches

Data in Table (1) showed the seasonal distribution of *H. lataniae* population on grapevine leaves and branches in the two studied years as follows:

- **On leaves**

The distribution of *H. lataniae* population on the grapevine leaves was significantly varied (F values = 15.9 & 29.4) in the four seasons during the two years. The autumn season received the highest number of insect population (20.7 - 21.0 insect/leaf) in the two years and came in the 1st order followed by summer season (9.43 - 9.77 insect/leaf) in the 2nd order. Winter and spring seasons came in the last order without difference means (1.93 - 2.83 & 0.45 - 0.55 insect/leaf) in the two years, respectively.

Table (1): Seasonal distribution of *Hemiberlesia lataniae* population on grapevine leaves and branches at El-Khanka district, Qalubya Governorate in the two years (2010/2011 & 2011/2012).

Season	Mean number of insect population/leaf				Mean number of insect population/branch			
	1 st year (2010-2011)		2 nd year (2011-2012)		1 st year (2010-2011)		2 nd year (2011-2012)	
	population	%	population	%	population	%	population	%
Spring	0.55 c	1.61	0.45 c	1.38	8.09 c	11.53	4.03 b	6.92
Summer	9.77 b	28.61	9.43 b	29.01	18.35 b	26.14	15.21 a	26.13
Autumn	21.0 a	61.49	20.70 a	63.67	33.09 a	47.14	19.57 a	33.63
Winter	2.83 bc	8.29	1.93 c	5.94	10.66 bc	15.19	19.39 a	33.32
Total	34.15	100	32.51	100	70.19	100	58.2	100
F value	15.9**		29.4**		13.2**		4.4**	
LSD value	7.0		5.1		9.3		10.4	

The above results revealed that, the distribution of *H. lataniae* population on the grapevine leaves was varied in the four seasons, The autumn season received the highest number of insect population (61.49 - 63.67% insect/leaf) followed by summer (28.61-29.01% insect/leaf) and winter seasons (5.94-8.29% insect /leaf) whereas spring season received the lesser number of insect population (1.38 - 1.61% insect/leaf) in the two years.

- **On branches**

The distribution of *H. lataniae* population on the grapevine branches showed the same trend (Table, 1). The population was varied and distributed significantly (F values = 13.2 & 4.4) in the four seasons during the two years. In the 1st year, the autumn season received the highest portion of insect population (33.09 insect/branch) and came in the 1st order followed by

summer season in the 2nd order (18.35 insect/branch) whereas winter season came in the 3rd order (10.66 insect/branch) without difference means with the summer season. Spring season came in the last order (8.09 insect/branch) without difference means with the winter season.

In the 2nd year, the insect population showed the same manner in the four seasons, the autumn season received the highest population (19.57 insect/branch) followed by winter season (19.39 insect/branch) and summer seasons (15.21 insect/branch) without difference means between each other whereas spring season came in the last order (4.03 insect/branch).

The obtained results revealed that, the distribution of *H. lataniae* population in the four seasons was varied during the two years. During the 1st year, the autumn season received the highest portion of insect population (47.17%) followed by summer (26.14%) and winter seasons (15.19%) whereas spring season received the lowest portion of insect population (11.53%). In the 2nd year, the autumn and winter seasons received the highest portion of insect population (33.32 - 33.63%) followed by summer season (26.13%) where spring season received the lowest portion (6.92%) of insect population.

3- Number and duration of annual field generations

Number and duration of annual field generations of *H. lataniae* were determined by integration the population curves in each generation. The obtained results revealed (Tables, 2&3 and Figs. 3&4) three overlapping generations a year on both grapevine leaves and branches at El-Khanka district, Qalubya Governorate as follows:

Table (2): Number and duration of annual field generations of *Hemiberlesia lataniae* on grapevine leaves at El-Khanka district, Qalubya Governorate in the two years (2010/2011&2011/2012).

Generation	1 st year (2010 – 2011)					2 nd year (2011 – 2012)				
	Generation duration		Duration (month)	Mean Temp. °C	Mean % R.H.	Generation duration		Duration (month)	Mean °C	Mean % R.H.
	From	To				From	To			
1st Generation	Early Jun.	Early Sep.	3.5	24.2	61.7	Early Jun.	Early Sep.	3.5	25.8	64.7
2nd Generation	Mid Aug.	Mid Oct.	2.5	25.7	61.8	Mid Aug.	Mid Oct.	2.5	26.0	65.0
3rd Generation	Early Oct.	Mid Dec.	3	22.8	61.3	Early Oct.	Mid Dec.	3	19.5	68.2

- On leaves
- The 1st generation

In both years, the 1st generation started from early June, peaked in early August and extended to early September. The generation period lasted for 3.5 months at field conditions ranged 24.2 - 25.8°C & 61.7 - 64.7%R.H. in the both years , respectively.

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- **The 2nd generation**

The 2nd generation in the two years occurred between mid-August and mid-October, peaked in mid-September. The generation period lasted for 2.5 months under field conditions ranged 25.7-26.0°C & 61.8 - 65.0%R.H (in the two years) respectively.

- **The 3rd generation**

The 3rd generation: lasted for 3 months and started from early October to mid-December at 19.5 - 22.8 °C & 61.3 - 68.2%R.H in the two years, respectively.

The obtained results showed that, the generation duration of *H. lataniae* on grapevine leaves was varied in the two studied years (Table, 4 and Fig. 3). The shortest generation occurred from mid-August to mid-October whereas the longest one occurred in early June and extended to early September. While, the 3rd generation appeared from early October until grapevine leaves fall down by mid-December.

- **On branches**

Data presented in Table (3) and Fig. (4) showed three annual field generations for *H. lataniae* on grapevine branches at El-Khanka district, Qalubya Governorate as follows:

- **The 1st generation**

The 1st generation started from mid-May in the two years until early August in the 2nd year (3 months) or mid-August (3.5 months) in the 1st year at field conditions ranged 23.9 - 24.5°C and 60.7 - 63.9% R.H., in the first and second year, respectively.

- **The 2nd generation**

The 2nd generation started from mid-August to mid-October and lasted for 2.5 - 3.0 months at 25.7 - 26.2°C and 61.8 - 65.0%R.H. in the first and second years, respectively.

The 3rd generation

The 3rd generation started from mid-October to early February in the two years under field conditions ranged 17.1-20.5°C and 61.2-67.5% R.H.in the first and second year, respectively.

Table (3): Number and duration of annual field generations of *Hemiberlesia lataniae* on grapevine branches at El-Khanka district, Qalubya Governorate in the two years (2010/2011&20111/ /2012).

Generation	1 st year (2010 – 2011)					2 nd year (2011 – 2012)				
	Generation duration		Duration (month)	Mean Temp. °C	Mean % R.H.	Generation duration		Duration (month)	Mean °C	Mean %R.H.
	From	To				From	To			
1 st Generation	Mid May	Mid Aug.	3.5	23.9	60.7	Mid May	Early Aug.	3	24.5	63.9
2 nd Generation	Mid Aug.	Mid Oct.	2.5	25.7	61.8	Early Aug.	Mid Oct.	3	26.2	65.0
3 rd Generation	Mid Oct.	Early Feb.	4	20.5	61.2	Mid Oct.	Early Feb.	4	17.1	67.5

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The obtained results revealed that, *H. lataniae* has three overlapping generations a year. The longest generation (4 months) occurred on grapevine branches from mid-October to early February whereas the shorted one occurred from early or mid-August to mid-October. The summer generation was intermediate (3-3.5 months) and occurred from mid-May to early or mid-August.

The obtained results in agreement with El-Minshawy *et al.* (1972) who found three generations a year for *H. lataniae* on pumpkin fruit under laboratory conditions. Also, Moustafa (1998) and Mohamed (1999) recorded three overlapping generation on fig and olive trees in Sharqya and Ismailia Governorates, respectively. On the contrary, the present results disagreement with Tawfik and Mohammad (2001) who found four generations a year for *H. lataniae* on *Morus alba* at Giza Governorate.

4- Effect of daily mean temperature and %R.H. on the insect population

Data in Table (4) showed the effect of daily mean temperature and %R.H. on *H. lataniae* population on grapevine (leaves and branches) during the first and second years. The obtained results indicated the following:

Daily mean temperature has highly significant positive effect on the activity of *H. lataniae* population in the first and second years (*r* values = 0.692 & 0.635). The daily mean relative humidity had a positive effect on the *H. lataniae* population in the both years of study. This effect was significant (*r* value = 0.508) in the first year and insignificant (*r* value = 0.342) in the second year. Multiregression analysis obviously indicated that, the weather factors (mean temperature and relative humidity) contributed with 60.4 and 57.4% of the total population changes in the first and second years.

Table (4): Effect of daily mean temperature and %R.H. on *Hemiberlesia lataniae* population on grapevine (leaves and branches) at El-Khanka district, Qalubya Governorate in the two years (2010/2011 & 2011/2012).

Year	Weather Factors	Simple correlation	Multiregression analysis		ANOVA TABLE	
		<i>r</i> value	P. reg. ± s.e	<i>t</i> value	F value	E.V. %
1 st year (2010/2011)	Mean Temp.	0.692**	3.7 ± 0.87	4.3**	16.1**	60.4
	Mean %R.H.	0.508*	2.6 ± 1.00	2.6**		
2 nd year (2011/2012)	Mean Temp.	0.635**	2.3 ± 0.49	4.7**	14.1**	57.4
	Mean %R.H.	0.342	1.9 ± 0.66	2.9**		

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الوفرة الموسمية لحشرة اللاتانيا القشرية على كورمات العنب في محافظة القليوبية - مصر

سوسن جاب الله رضوان
معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - الجيزة

- اجريت الدراسة الحالية لمدة عامين متتاليين (2010-2011/2011-2012) فى بستان عنب بناحية مركز الخانكة بمحافظة القليوبية بغرض دراسة نشاط حشرة اللاتانيا القشرية على الاوراق والافرع وعدد اجيالها فى كل عام والتوزيع النسبى لاطوارها على الاوراق والافرع فى فصول السنة المختلفة (الربيع، الصيف، الخريف والشتاء) ودراسة تأثير درجة الحرارة والرطوبة النسبية على نشاطها واتضح من نتائج الدراسة مايلى:
- وجود ثلاثة اجيال متداخلة لحشرة اللاتانيا القشرية على كل من اوراق وافرغ كورمات العنب على مدار العام ، ظهر الجيل الاول فى بداية مايو أو فى اوائل يونيو واستمر حتى بداية سبتمبر (3 - 3.5 شهور) والجيل الثانى من بداية أو منتصف اغسطس وحتى منتصف اكتوبر (2.5 - 3.0 شهور) والجيل الثالث ظهر فى اوائل أو منتصف اكتوبر واستمر على الاوراق حتى سقوطها فى ديسمبر وامتد نشاطه على الافرغ حتى اوائل فبراير (3 - 4 شهور) وكان اطول الاجيال الثلاثة .
 - وجد تباين واضح فى توزيع تعداد حشرة اللاتانيا القشرية فى فصول السنة المختلفة على الاوراق حيث سجل فصل الخريف اعلى نسبة تعداد بلغت 61.5 - 63.7% من تعداد الحشرة فى العام ثم فصل الصيف (28.6- 29.0%) وفصل الشتاء (5.9 - 8.3%) واخيرا فصل الربيع (1.4-1.6%) . وكان توزيع تعداد الحشرة على الافرغ فى فصول السنة فى نفس الاتجاه حيث حصل فصل الخريف 33.6 - 47.2% من تعداد الحشرة فى العام ثم فصل الصيف (26.1%) وفصل الشتاء (15.2 - 33.6%) وفصل الربيع (6.9 - 11.5%) على التوالى.
 - اتضح من الدراسة ان الوفرة الموسمية للحشرة تأثرت بكل من متوسط درجة الحرارة والرطوبة النسبية السائدة فى منطقة الدراسة ، وقد ساهم التأثير المشترك لكلا العاملين بـ 60.4 ، 57.4% من اجمالى التغيرات الكلية فى تعداد الحشرة .

قام بتحكيم البحث

كلية الزراعة - جامعة المنصورة
مركز البحوث الزراعية

أ.د/ عبدالستار ابراهيم عبد الكريم
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