POPULATION DYNAMICS OF THE GREEN SHIELD SCALE, *PULVINARIA PSIDII* (HEMIPTERA : COCCIDAE) ON GUAVA TREES AT SHIBIN EL-QANATER DISTRICT, QALUBIYA GOVERNORATE, EGYPT

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Abstract

The population dynamics of the green shield scale, *Pulvinaria psidii* (Mask.) (Hemiptera - Coccidae) was studied for two successive years (2008-2009) on guava trees at Shibin El-Qanater district, Qalubiya Governorate. The obtained results revealed that, *P. psidii* occurred on guava trees all the year round and has two overlapping generations a year. The 1st generation started from early March to early August/mid-August, peaked in mid-May (early summer) with duration of 5.0 - 5.5 months at field conditions of 20.7 - 21.3°C and 70.7 - 71.9%R.H. The 2nd generation occurred from early May to mid-November, peaked in mid-August (late summer) with duration of 6.0 - 6.5 months at 24.2 - 25.0°C and 69.4 - 70.4%R.H., respectively. The favorable time for abundance of *P. psidii* occurred in early and late summer during both high temperature and relative humidity. The adult population was relatively higher than nymphal population one in winter months and this may be due to the cold weather and most of the nymphs attained to the adult stage which sheltered on stems bark or in the stem cracks.

Daily mean temperature and %R.H. were effective on both nymph and adult populations in 1st and 2nd generations in the two studied years, the population was correlated with the increase of temperature. The combined effect of the daily mean temperature and %R.H. on both nymph and adult populations was high on the both generations. The changes in the half monthly counts of nymph and adult populations referred to the effect of the tested weather factors on the 1st generation ranged 83.8 - 87.3% & 55.8 - 75.9% and 55.7 - 69.1% & 51.4 - 56.6% for the 2nd generation in the two studied years, respectively.

INTRODUCTION

The green shield scale, *Pulvinaria psidii* (Mask.) (Hemiptera - Coccidae) has a wide range of host plants, it attacks fruit trees, ornamental plants and woody trees (Quayle, 1941, Hamon & Williams, 1984) and occurs in many countries: India, Pakistan, Philippines (Reddy, 1965), Egypt (Salama & Saleh, 1970, El-Minshawy *et al,* 1974 *,* Elwan, 2000, Shahein *et al.*, 2004 and Radwan & Hassan, 2009), Asia, Africa, Australia , Pacific Islands, North America, Central America, West India and South America (Anonymous, 1994). *P. psidii* consider as one of the main insect pests attack guava trees in Egypt, it causes severe damage to infested leaves and fruits by sucking the cell sap and excreting large amounts of honeydew that encourages the growth of sooty mould which blackens the leaves, decreases photosynthesis activity, and

decreases vegetative growth of the infested trees. When the sooty mold occurs on fruit, it often becomes unmarketable or of a lower grade, because the fungus affects the appearance of the fruit and is difficult to wash off (Elmer and Brawner, 1975).

The present study was conducted to study the seasonal activity, duration and number of generations of *P. psidii* under the field conditions as well as the effect of daily means of air temperature and relative humidity on its activity to select an effective program for its control.

MATERIALS AND METHODS

The present work was carried out on guava (*Psidium guajava*) at Shibin El-Qanater district, Qalubiya Governorate for two years extending from early January, 2008 until late December, 2009. The selected orchard received the normal agricultural practices without application any control measures before and during the period of study.

The seasonal abundance of the green shield scale, *Pulvinaria psidii* (Mask.) was carried out on four guava trees similar in size, age and vegetative growth. Regular half-monthly samples were picked up at random from the cardinal directions and the center core of each tree with rate of 25 leaves per tree. The collected samples were preserved in paper bags and transferred to the laboratory for inspection with stereoscopic-microscope and the insect population was counted and sorted to nymph and adults.

The meteorological data, mainly daily means of air temperature (°C) and relative humidity (%R.H.) was obtained from the Central Laboratory for Agricultural Meteorology, Agricultural Research Center, Ministry of Agriculture. The effect of the tested weather factors on the insect activity in the both studied years were statistically analyzed with MSTATC Program to determine the preferable time for the insect activity and the proper time for its control.

RESULTS AND DISCUSSION

1- Seasonal abundance

A- The 1st year

1- Nymphal population

The obtained results (Fig.,1) showed that, the nymphal population in the 1st year gradually decreased in January and February from 55 to 18.7 nymphs/leaf under field conditions at 12.8-14.2°C and 70.0-71.5%R.H. In March the nymphal population starts to increase and reached 24.4 nymphs/leaf by mid-March at 14.6°C and 74.5%R.H. A continuous increase was observed in the nymphal population during

April, where the population reached to 55.1 nymphs/leaf by mid-April at 16.9°C and 73% R.H.

In May, the population highly increased to reach the 1st peak by mid-May (212.2 nymphs/leaf) at 20.3°C and 73%R.H., then the population decreased again during June (145.1- 141.7 nymphs/leaf). In July, the population gradually increased and reached the 2nd peak by early August (432.5 nymphs/leaf) at environmental conditions of 27.5°C and 74%R.H. Gradual decrease was observed in the nymphal population during September and October whereas in November and December, the population greatly decreased to 60 nymphs/leaf by mid-December at 15.8°C and 69.3%R.H.

2- Adult population

The seasonal abundance of the adult population (Fig., 1) has the same trend as the nymphal population. The population gradually decreased in January, February and mid-March from 87.0 to 36.9 adults/leaf under field conditions of 12.8-14.6°C and 70.0 - 74.5%R.H. Gradual increase was observed in the adult population during April and by mid-May, the population highly increased recording the 1st peak (107.7 adults/leaf) at 20.3°C and 73.0%R.H.

The population decreased again during June (60.4 - 53.9 adults/leaf) whereas in July, the population highly increased and reached to the 2nd peak by early August (212.3 adults/leaf) then decreased again during September from 75.1 to 56.1 adults/leaf. The adult population slowly increased during October, November and December (75.0-107 adults/leaf).

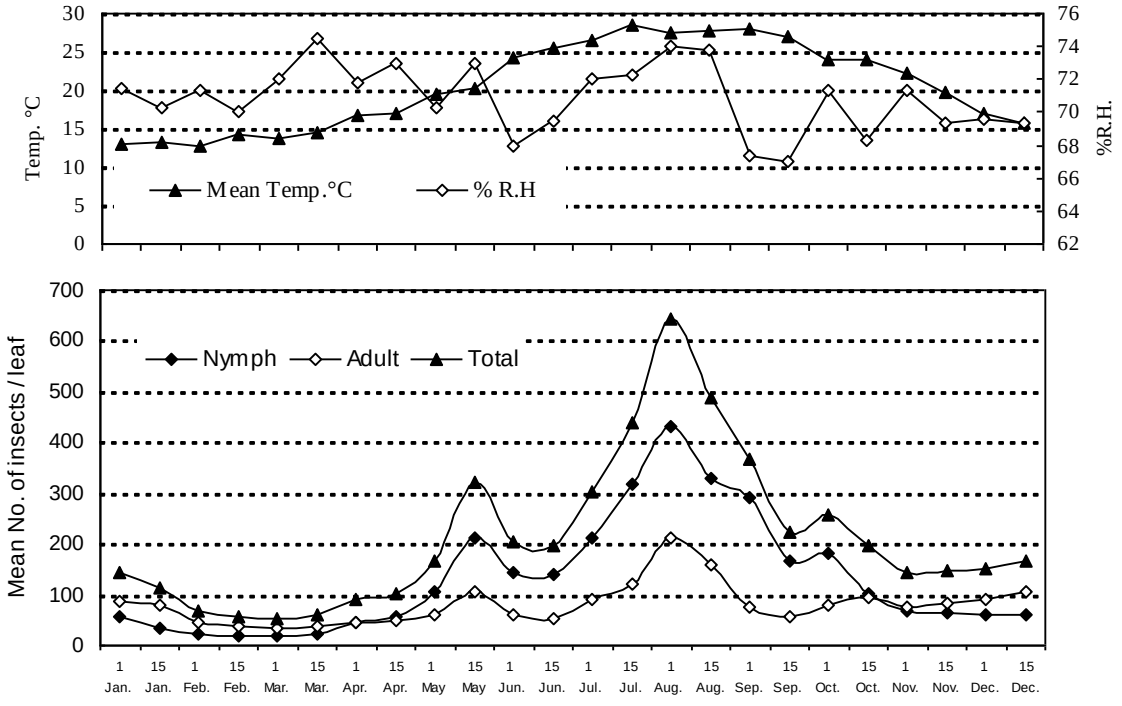

Fig. 1. Seasonal abundance of *P. psidii* on guava trees with corresponding half-monthly means of temperature and % R.H. at Shibin El-Qanater district, Qalubiya Governorate in the 1st year (2008).

B- The 2nd year

1- Nymphal population

In the 2nd year (Fig., 2) the nymphal population gradually decreased during January, February and March (63.0 - 36.7 nymphs/leaf) at environmental conditions of 11.4 - 14.5°C and 67.8 - 72.8%R.H. In April, the population starts to increase gradually and highly increased during May recording the 1st peak by mid-May (174.6 nymphs/leaf) at 21.9°C and 70.3%R.H. then the population decreased again during June (128.2 - 81.2 nymphs/leaf).

In July, the population gradually increased and reached to 2nd peak by mid-August (382.3 nymphs/leaf) at environmental conditions of 26.2°C and 73.3%R.H. Gradual decrease was observed in the nymphal population during September and October (278.5 - 103.9 nymphs/leaf) whereas in November and December, the population greatly decreased and reached to 54.3 nymphs/leaf by mid-December at 16.8°C and 69.3%R.H.

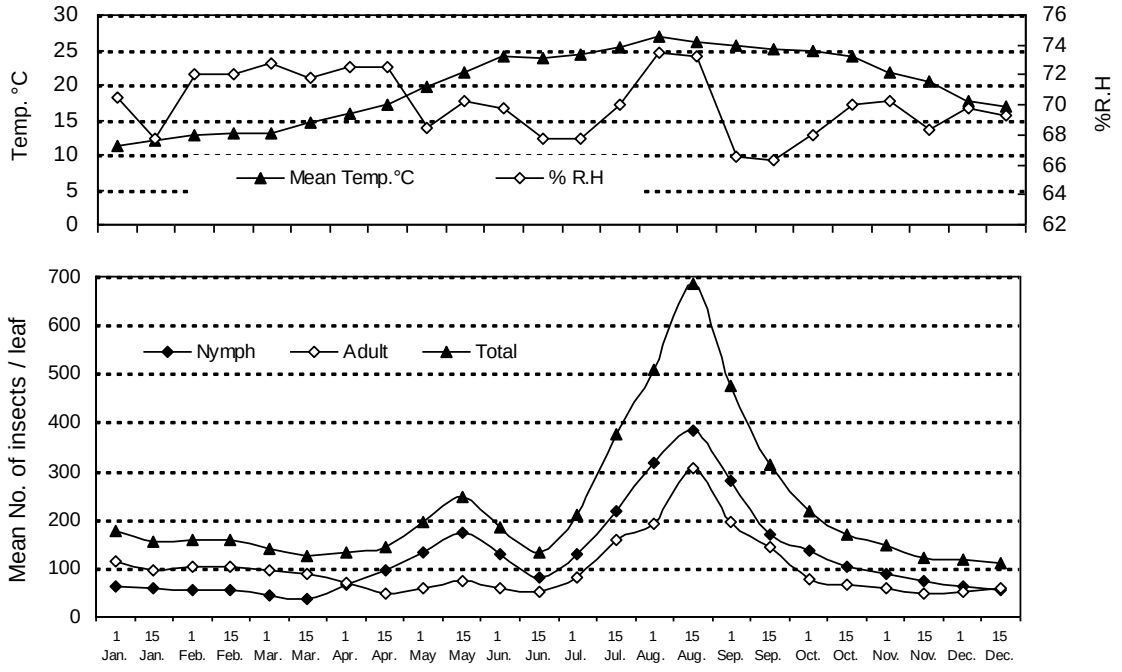

Fig. 2. Seasonal abundance of *P. psidii* on guava trees with corresponding half-monthly means of temperature and % R.H. at Shibin El-Qanater district, Qalubiya Governorate in the 2nd year (2009).

2-Adult population

The adult population (Fig., 2) has the same trend as the nymphal population. The population gradually decreased from January until mid-April (115.0 - 47.9 adults /leaf) under field conditions ranged 11.4 - 17.2°C and 67.8 -72.5%R.H.

In early May, the population highly increased recording the 1st peak in mid-May (74.1adults/leaf) at 21.9°C and 70.3 %R.H. The population decreased again during June (57.6 - 52.7 adults/leaf) whereas in July, the population quickly increased recording 2nd peak by mid-August (304.5 adults/leaf) at 26.2 °C and 73.3 %R.H., then decrease occurred during September (195.1 - 144.0 adults/leaf). A continues decrease was observed in the adult population during November and December (58.0 - 48.8 adults/leaf).

The above-mentioned results revealed that, the green shield scale, *P. psidii* occurred on guava trees all the year round and abundant in mid-May and mid-August. So, the proper time for its abundance occurred in early and late summer during both temperature and %R.H. were suitable. The adult population was relatively higher than the nymphal population in winter months and this may be referred to the cold weather and most of the nymphs attained to the adult stage which sheltered on stems bark or in the stem cracks.

2- Number and duration of annual generations

Data in Tables (1&2) and Figs. (3) showed that, *P. psidii* has two overlapping generations a year under field conditions as follows:

I- 1st Generation

The 1st generation started at the beginning of March in the both years and extended until early August in the 1st year and mid-August in the 2nd one. The duration of the 1st generation lasted 5.0 - 5.5 months at 20.7 - 21.3°C and 70.7 - 71.9 %R.H in both years, respectively. The 1st generation peaked in mid-May in the two years with total population ranged 217.8 - 234.8 insects/leaf at 20.7 - 21.3°C and 70.7 - 71.9 %R.H, respectively.

The generation density was relatively higher in the 1st year than in the 2nd one. In the 1st year the generation density was 155.5 nymphs/leaf, 79.3 adults/leaf with total population of 234.8 insects/leaf at 21.3°C and 71.9% R.H. compared with 129.0 nymphs/leaf, 88.8 adults/leaf and total population of 217.8 insects/leaf at 20.7°C and 70.7% R.H. in the 2nd year.

II- 2nd Generation

The 2nd generation started at early May in the both years and lasted to mid-November in the two years, respectively. The duration of the 2nd generation lasted for 6.0 - 6.5 months under field conditions of 24.2 - 25.0°C and 69.4 - 70.4%R.H in both years. The 2nd generation peaked in early August in the 1st year and mid-August in the 2nd one with total population ranged 296.9 - 304.0 insects/leaf at 24.2 - 25.0°C and 69.4 - 70.4%R.H in both years, respectively.

The density of the 2nd generation was relatively similar in the both years and higher than the 1st generation. In the 1st year the generation density was 208.2 nymphs/leaf, 95.8 adults/leaf with total population of 304.0 insects/leaf at 25.0°C and 70.4% R.H. compared with 179.7 nymphs/leaf, 117.2 adults/leaf and total population of 296.9 insects/leaf at 24.2°C and 69.3% R.H. in the 2nd year.

Table 1. Number and duration of annual generations of *P. psidii* on guava trees at Shibin El-Qanater district, Qalubiya Governorate in the 1st year (2008)

Generation	Insect stage	Generation period			Generation size			Mean °C	R.H %
		From	To	Duration / month	Nymphs /leaf	Adults /leaf	Total population		
1st Generation	Nymph	1st Mar.	1st Aug.	5	155.5	79.3	234.8	21.3	71.9
	Adult	1st Mar.	1st Aug.						
2nd Generation	Nymph	1st May	1st Nov.	6	208.2	95.8	304.0	25.0	70.4
	Adult	1st May	1st Nov.						

Table 2. Number and duration of annual generations of *P. psidii* on guava trees at Shibin El-Qanater district, Qalubiya Governorate in the 2nd year (2009).

Generation	Insect stage	Generation period			Generation size			Mean °C	R.H %
		From	To	Duration / month	Nymphs /leaf	Adults /leaf	Total population		
1st Generation	Nymph	1st Mar.	Mid-Aug.	5.5	129.0	88.8	217.8	20.7	70.7
	Adult	1st Mar.	Mid-Aug.						
2nd Generation	Nymph	1st May	Mid-Nov.	6.5	179.7	117.2	296.9	24.2	69.4
	Adult	1st May	Mid-Nov.						

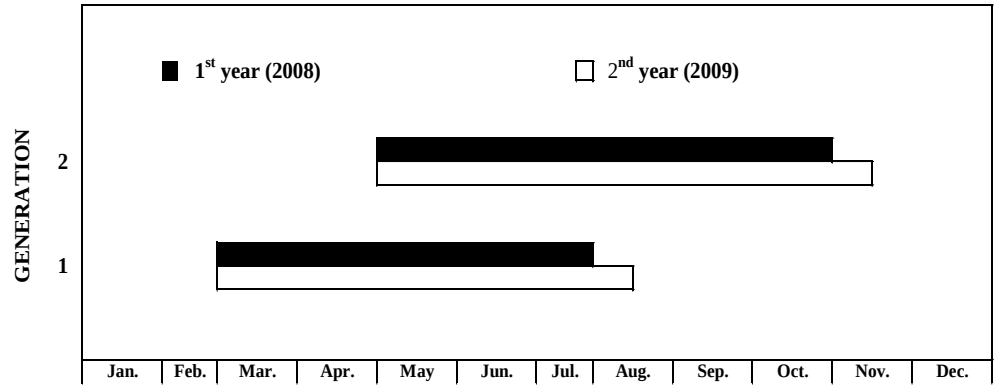

Fig. 3. Number and duration of annual generations of *P. psidii* on guava trees at Shibin El-Qanater district, Qalubiya Governorate in the both years (2008 & 2009).

The afore-mentioned results showed that, *P. psidii* has two overlapping generations per year, the 1st generation started from early March to early August/mid-August, peaked in mid-May (early summer) with duration of 5.0 - 5.5 months at field conditions ranged 20.7 - 21.3°C and 70.7 - 71.9%R.H. whereas the 2nd generation occurred from early May to mid-November peaked in mid-August (late summer) with duration of 6.5 - 6.5 months under environmental conditions ranged 24.2 - 25.0°C and 69.4 - 70.4%R.H., respectively.

The obtained results in agreement with Salama and Saleh (1970) they revealed that, *P. psidii* passes through two annual generations on guava trees in Alexandria district and has a high peak of seasonal abundance in August. El-Minshawy *et al.* (1974) showed that, *P. psidii* has two generations per annum on guava trees in Alexandria, the 1st generation begins in October and ends in April whereas the 2nd one begins in late May and lasted to October.

Hendawy (1999) showed that *P. psidii* has two peaks on guava trees in Kafr El-Sheikh Governorate, the 1st peak appeared at the beginning of November whereas the 2nd one appeared in the beginning of August. Shahein, *et al.* (2004) indicated that, *P. psidii* has two generations annually in inner or outer zones of the guava trees in Sharkia Governorate, the 1st generation occurred from the beginning of January till the end of June , while the 2nd one founded from the beginning of July till the end of December.

On the other hand, *Chloropulvinaria psidii* has three overlapping generations a year on mango trees occurred in spring, summer and autumn in Qalubiya Governorate (Elwan, 2000). On the ornamental plants, *Chloropulvinaria psidii* has three overlapping broods per season on the rice paper, *Aralia papyrifera* at the Botanic Garden at El-Qanatir El- Khairiya, Qalubiya Governorate. The 1st brood appeared from mid-March to

the end of July and the 2nd brood from August until later October whereas the 3rd brood took place from the beginning of November and continued until the beginning March (El-Borollosy *et al.*, 1990).

Moursi *et al.* (2003) showed that, the seasonal abundance of *Chloropulvinaria psidii* was varied on four ornamental plants (*Ficus benghallensis*, *F. nitida*, *Pittsporum tobira* and *Schinus terebinthifolius*) cultivated at public gardens (Shallalat, Antoniadis and Montazaha) in Alexandria governorate.The infestation reached its maximum rate during November on *Ficus nitida* in Shallalate and Antoniadis gardens and during July in Montazaha whereas on *F. benghallensis*, the insect recorded three peaks of abundance during June, August and January. On *Schinus terebinthifolius*, the insect reached its maximum rate of infestation from September until February in Shallalat garden while in Montazaha garden, the insect was observed as a main pest on *P. tobira* with highest rate of infestation during June and July. On mulberry trees, *P. psidii* has two main periods of seasonal activity occurred in autumn (one generation) and summer (two generation) in Qalubiya Governorate (Radwan & Hassan, 2009).

4- Effect of main weather factors on the annual generations

I- The 1st generation

A: Nymphal population

1-Effect of daily mean temperature

Data in Tables (3&4) showed positive relation, highly significant (r =0.849 & 0.786) for the daily mean temperature on the nymphal activity during the 1st generation in the both studied years. The real effect of this factor on the nymphal activity in the 1st generation appeared from the partial regression value which was highly significant in the both years (t value = 7.3 & 6.4) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature was under the optimum range of the nymphal activity in the 1st generation during both studied years, respectively.

2- Effect of daily mean relative humidity

Daily mean relative humidity (Tables, 3 & 4) showed positive relation and insignificant (r =0.164 & 0.071) on the nymphal population in the 1st generation in the two years. The real effect of this factor on the nymphal activity appeared from the partial regression value which was significant in the both years (t value = 3.1 & 3.3) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity was under the optimum range of the nymphal activity in the 1st generation in the both years, respectively.

3- The combined effect of the daily mean temperature and relative humidity

The combined effect (Tables, 3 & 4) of both daily mean temperature and relative humidity were highly significant (F=27.5 & 20.8) on the nymphal population in the 1st generation in the two years. The changes in the half monthly counts of the nymphal population referred to the effect of the tested weather factors ranged 83.8 - 87.3% in both years, respectively.

B: Adult population

1-Effect of daily mean temperature

Daily mean temperature (Tables, 3 & 4) showed positive relation on the adult activity in the 1st generation, significant in the 1st year and insignificant in the 2nd one (r = 0.688 & 0.400), respectively. The exact effect of this factor on the adult activity was highly significant in the 1st year (t value = 4.6) and significant in the 2nd one (t=2.7) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature was under the optimum range of the adult activity in both years, respectively.

Table 3. Effect of daily mean temperature and %R.H. on *P. psidii* generations on guava trees at Shibin El-Qanater district, Qalubiya Governorate in the 1st year (2008).

Generation	Insect stage	Generation duration		Generation Duration / month	Weather factors		Simple Correlation	Multi-regression values		ANOVA Table	
		From	To		Factor	Mean	r Value	*P. reg. ± s.e	t value	F value	E.V. %
1st Generation	Nymph	1st Mar.	1st Aug.	5	Mean temp. C	21.3°C	0.849**	23.0±3.2	7.3**	27.5**	87.3
					Mean %R.H.	71.9%	0.164	27.2±8.8	3.1*		
	Adult	1st Mar.	1st Aug.	5	Mean temp. C	21.3°C	0.688*	8.1±1.8	4.6**	12.6**	75.9
					Mean %R.H.	71.9%	0.344	15.1±4.9	3.1*		
2nd Generation	Nymph	1st May	1st Nov.	6	Mean temp. C	25.0°C	0.667*	24.6±6.4	3.9**	11.2**	69.1
					Mean %R.H.	70.4%	0.464	17.7±6.3	2.8*		
	Adult	1st May	1st Nov.	6	Mean temp. C	25.0°C	0.384	6.2±3.5	1.8	5.3*	51.4
					Mean %R.H.	70.4%	0.598*	9.3±3.4	2.8*		

*P. reg. = Partial regression coefficient

Table 4. Effect of daily mean temperature and %R.H. on *P. psidii* generations on guava trees at Shibin El-Qanater district, Qalubiya Governorate in the 2nd year (2009).

Generation	Insect stage	Generation duration		Generation Duration / month	Weather factors		Simple correlation	Multi-regression values		ANOVA Table	
		From	To		Factor	Mean	r value	P. reg. * ± s.e	t value	F value	E.V. %
1st Generation	Nymph	1st Mar.	Mid-Aug.	5.5	Mean temp. C	20.7°C	0.786**	17.8±2.8	6.4**	20.8**	83.8
					Mean %R.H.	70.7%	0.071	20.8±6.3	3.3*		
	Adult	1st Mar.	Mid-Aug.	5.5	Mean temp. C	20.7°C	0.400	6.9±2.5	2.7*	5.1*	55.8
					Mean %R.H.	70.7%	0.388	15.6± 5.8	2.7*		
2nd Generation	Nymph	1st May	Mid-Nov.	6.5	Mean temp. C	24.2°C	0.629*	25.9±10.2	2.5*	6.3*	55.7
					Mean %R.H.	69.4%	0.522*	17.0±8.9	1.9		
	Adult	1st May	Mid-Nov.	6.5	Mean temp. C	24.2°C	0.696*	24.9±8.3	3.0*	6.5*	56.6
					Mean %R.H.	69.4%	0.422	10.0±7.3	1.4		

***P. reg. = Partial regression coefficient**

2- Effect of daily mean relative humidity

Daily mean relative humidity (Tables, 3&4) was positive and insignificant (r =0.344 & 0.388) on the adult population in the both studied years. This factor showed significant effect on the adult activity in the both years (t value = 3.1 & 2.7) when daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity was under the optimum range of the adult activity in the 1st generation in the both years, respectively.

3-The combined effect of the daily mean temperature and relative humidity

The combined effect (Tables, 3&4) of both daily mean temperature and relative humidity on the adult activity in the 1st generation was highly significant in the 1st year (F=12.6) and significant in the 2nd one (F=5.1). The changes in the half monthly counts of the adult population referred to the effect of the two tested weather factors ranged 55.8-75.9%, in the two years, respectively.

II- The 2nd generation

A: Nymphal population

1- Effect of daily mean temperature

Daily mean temperature (Tables, 3&4) showed significant positive relation (r =0.667 & 0.629) on the nymphal activity during the 2nd generation in the both years. The effect of this factor on the nymphal activity in the 2nd generation was highly

significant in the 1st year (t value = 3.9) and significant in the 2nd year one (t value = 2.5) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature was under the optimum range of nymphal activity in the 2nd generation in the both years, respectively.

2- Effect of daily mean relative humidity

Daily mean relative humidity (Tables, 3&4) showed positive relation on the nymphal population in the 2nd generation, insignificant in the 1st year (r =0.464) and significant in the 2nd one (r =0.522). The effect of this factor on the nymphal activity was significant in the 1st year (t value = 2.8) and insignificant effect in the 2nd one (t value = 1.9) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity was under the optimum range of the nymphal activity in the 1st year and within the optimum range in the 2nd one, respectively.

3-The combined effect of the daily mean temperature and relative humidity

The combined effect (Tables, 3&4) of both daily mean temperature and relative humidity was highly significant on the nymphal population in the 1st year (F=11.2) and significant in the 2nd one (F=6.3), respectively. The changes in the half monthly counts of the nymphal population referred to the effect of the tested weather factors ranged 55.7- 69.1% in both years, respectively.

B: Adult population

1-Effect of daily mean temperature

Daily mean temperature (Tables, 3&4) showed positive relation on the adult activity in the 2nd generation, insignificant in the 1st year and significant in the 2nd one (r =0.384 & 0.696), respectively. The effect of this factor on the adult activity in the 2nd generation was insignificant in the 1st year (t value = 1.8) and significant in the 2nd one (t value = 3.0) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature within the optimum range of the adult activity in the 2nd generation in the 1st year and under the optimum range in the 2nd one, respectively.

2- Effect of daily mean relative humidity

Data in Tables (3&4) showed that, daily mean relative humidity was positive, significant (r =0.598) on the adult population in the 1st year and insignificant in the 2nd one (r= 0.422). This factor showed significant effect on the adult activity in the 1st year (t value = 2.8) and insignificant in the 2nd year (t= 1.4) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean

relative humidity was under the optimum range of adult activity in the 2nd generation in the 1st year and within the optimum range in the 2nd year, respectively.

3-The combined effect of the daily mean temperature and relative humidity

The combined effect (Tables, 3&4) of both daily mean temperature and relative humidity on the adult activity was significant (F=5.3 & 6.5) in the 2nd generation in the two years, respectively. The changes in the half monthly counts of the adult population referred to the effect of the two tested weather factors showing 51.4% and 56.6% for both years, respectively.

The present results proved that, daily mean temperature and relative humidity were effective on both nymph and adult populations in the two generations in both studied years and the population increase with increase of temperature. The changes in the half monthly counts of nymph and adult populations referred to the effect of the tested weather factors ranged 83.8 - 87.3% & 55.8 - 75.9% in the 1st generation and 55.7- 69.1% & 51.4% - 56.6% in 2nd generation, respectively.

REFERENCES

1- Anonymous.1994. International Institute of Entomology. Distribution Maps of Pests No. 59 (1st rev.), 56 Queen's Gate, London, Sw7, 5IR, UK.

2- El-Borollosy, F. M. , M. M. El-Bolok , A. I. Ezz and Shadia M. Assem .1990. Ecological studies on the soft scale insect, *Chloropulvinaria psidii* (Maskell) (Coccidae - Homoptera) on the rice paper ornamental plant, *Aralia papyrifera* (Hook) (Aralliaceae). Bull. Soc. ent. Egypte, 69:267-275.

3- Elmer, H. S. and O. L. Brawner . 1975. Control of Brown Soft Scale in Central Valley. Citrograph. 60(11): 402-403.

4- El-Minshawy, A. M., S. M. Hammad and K. S. Moursi.1974. Seasonal abundance of the scale insects and mealy bugs attacking guava trees in Alexandria district. 2nd Egypt. Pest Cont. Cong. Alexandria: 571-586.

5- Elwan, A. E. 2000. Ecological studies on the green shield scale, *Chloropulvinaria psidii* (Mask.) (Homoptera – Coccoidea - Coccidae) on mango trees, Qalubiya Governorate, Egypt. Egypt. J. Appl. Sci., 15(7): 603-617.

6- Hamon, A. B. and M. L. Williams.1984. The soft scale insects of Florida (Homoptera – Coccoidea – Coccidae). In "Arthropods of Florida and Neighboring Land Areas". Florida Dep. Agric. & Consumer Serv. Div. Plant Industry, II:102-105.

7- Hendawy, A. S. A. 1999. Studies on certain natural enemies of scale insects attacking guava trees at Kafr El-Sheikh Governorate. Ph.D. Thesis, Fac. Agric. Tanta Univ., 145 pp.

8- Moursi, K. S., H. A. Mesbah, A. S. Abo-Shanab and S. I. Abdel-Razak. 2003. Abundance of green shield scale, *Chloropulvinaria psidii* (Maskell) on some ornamental plants in Alexandria Governorate. J. Adv. Agic. Res., 8(4): 785-792.

9- Quayle, H. J. 1941. Insects of citrus and other subtropical fruits. Ithaca, New York, Comstock Publishing Company, Inc. (Textbook), 583 pp.

10- Radwan, S. G. and N. A. Hassan . 2009. Ecological studies on the green shield scale, *Pulvinaria psidii* (Mask.) (Hemiptera - Coccidae) infesting mulberry trees in Qalubiya Governorate, Egypt. J. Agric. Sci. Mansoura Univ., 34(2): 1329 - 1338.

11- Reddy, D. B. 1965. Insects, other pests and diseases recorded in the Southeast Asia and Pacific region, mango (*Mangifera indica*) FAO, Technical Document No. 96:1-16

12- Salama, H. S. and M. R. Saleh. 1970. Distribution of the scale insect, *Pulvinaria psidii* Mask. (Coccoidea) on orchard trees in relation to environmental factors. Z. ang. Ent., 66 (4):380-385.

13- Shahein, A. A., K. A. A. Hammad, A. SH. Hassan and H. A. Nabil. 2004. Seasonal variation in the population of *Pulvinaria psidii* Maskell and its associated parasitoid on guava trees at Sharkia Governorate. Egypt. J. Appl. Sci.,19(1): 242-260.

دراسات بيئية لحشرة الجوافة القشرية الرخوة(Mask.) *Pulvinaria psidii* على أشجار الجوافة بناحية شبين القناطر – محافظة القليوبيـــــة

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تشتهر محافظة القليوبية بزراعة الجوافة (3404 فدان ومعدل الانتاج 7.5 طن/ فدان) حيث تعتبر مصدر دخل لكثير من المزارعين وذلك لسهولة تسويقها وقربها من محافظة القاهرة ، كما ان ثمار الجوافة من الفاكهة الشعبية المحببة لكثير من المواطنين نظرا لتواجدها على مدار العام تقريبا مع انخفاض سعرها مقارنة بأسعار الفاكهة الاخرى. وأشجار الجوافة من العوائل المفضلة للاصابة بحشرة الجوافة القشرية الرخوة حيث تنتشر الأصابة بها على الأوراق والثمار مما يؤثرعلى انتاجية الاشجار من الثمار وانخفاض جودتها.

أجريت الدراسة الحالية على أشجار جوافة بناحية شبين القناطر بمحافظة القليوبية لمدة عامين متتاليين 2009/2008م بغرض دراسة النشاط الموسمى للحشرة على مدار العام وعدد الاجيال ومدة كل جيل، ودراسة تأثيرعوامل الطقس السائدة فى تلك المنطقة على نشاط الحشرة بغرض وضع برنامج مكافحة متكامل لها.

اتضح من نتائج الدراسة ان حشرة الجوافة القشرية الرخوة تتواجد على اشجار الجوافة على مدار العام ، ولها جيلين متداخلين فى العام ، يبدأ الجيل الاول فى اوائل مارس ويمتد حتى منتصف اغسطس وكانت ذروه نشاطه فى منتصف مايو وتراوحت مدة الجيل من 5.0 – 5.5 شهر وكان متوسط درجة الحرارة والرطوبة النسبية فى فترة الجيل 20.7 – 21.3م° ورطوبة نسبية 70.7– 71.9% فى العامين . ويبدأ الجيل الثانى من اوائل مايو وحتى منتصف نوفمبر وكانت ذروه نشاطه فى منتصف اغسطس وتراوحت مدة الجيل من 6.0– 6.5 شهر وكان متوسط درجة الحرارة والرطوبة النسبية خلال مدة الجيل 24.2 – 25.0م° ورطوبة نسبية 69.4– 70.4% فى العامين.

وتبين من الدراسة ان ذروه نشاط الحشرة تكون فى بداية الصيف ونهايته حيث تكون درجة الحرارة والرطوبة النسبية عالية ، كما اتضح ان تعداد الحشرات الكاملة كان أعلى من تعداد الحوريات فى موسم الشتاء وهذا راجع الى انخفاض درجة الحرارة فى تلك الفترة ووصول اعداد كثيرة من طور الحورية الى طور الحشرة الكاملة التى تقضى فترة الشتاء على قلف الاشجار .

اتضح من نتائج التحليل الاحصائى ان درجة الحرارة والرطوبة النسبية لهما تأثير معنوى على نشاط طورى الحورية والحشرة الكاملة فى كلا الجيلين وعلى مدار العامين حيث كان مقدار التغير فى تعداد طورى الحورية والحشرة الكاملة الراجع الى تأثير درجة الحرارة والرطوبة النسبية فى الجيل الاول 83.8 – 87.3% لطور الحورية ، 55.8 – 75.9% لطور الحشرة الكاملة فى كلا العامين ، وكان مقدار التغير فى الجيل الثانى 55.7 – 69.1% لطور الحورية ، 51.4 – 56.6% لطور الحشرة الكاملة فى العامين على التوالى.