SEASONAL ACTIVITY OF FIORINIA DATE SCALE, *FIORINIA PHOENICIS* BALACHOWSKY (HEMIPTERA - DIASPIDIDAE) ON DATE PALM AT GIZA GOVERNORATE, EGYPT

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Abstract

The seasonal activity of fiorinia date scale, *Fiorinia phoenicis* Balachowsky, 1967 (Hemiptera - Diaspididae) was studied for two years (March, 2008 until mid-February, 2010) on date palm at Giza governorate. The obtained results revealed that *F. phoenicis* has three overlapping generations under field conditions. The 1st generation (early summer generation) peaked in early June and the 2nd generation (late summer generation) peaked around August/September whereas the 3rd generation (autumn generation) peaked in October/November. The shortest generation was the late summer generation (2.5 - 3.0 months) at 27.9 - 28.6ºC and 63.5 - 64.8%R.H.whereas the longest one was autumn generation (4.5 months) at 21.6 - 22.0ºC and 65.9 - 66.3 %R.H. The early summer generation had intermediate duration (4.0 - 4.5 months) at 20.9 - 21.2ºC and 62.5 - 63.0%R.H in the two years, respectively. The population density was varied in the three generations, the autumn generation was the largest one with total population ranged 944.7 - 1016.0 insects/leaflet with mean of 980.4 insects/leaflet followed by late summer generation 829.0 - 1025.7 insects/leaflet with mean of 927.4 insects/leaflet whereas the smallest one was the early summer generation (422.4 - 575.7 insects/leaflet with mean of 499.1 insects/leaflet). The insect population occurred on date palm fronds all the year round and decreased to lower numbers during winter season and this referred to the cold weather. The basal stratum of date palm leaflets received the highest infestation (37.4 - 38.3%) than middle (34.4 - 35.3%) and apical ones (26.4 - 28.2%).

On the other hand, the insect activity affected significantly with daily mean temperature and %R.H. in the both years. The combined effect of daily mean temperature and %R.H on nymph and adult populations showed 66.1 - 69% & 48.1 - 49.2% in the 1st generation, 65.4 - 74.0% & 63.8 - 78.4% in the 2nd generation and 60.9 - 77.4% & 48.6 - 63.5% in the 3rd generation in the both years, respectively.

INTRODUCTION

Date palm (*Phoenix dactylifera* L.) is economic important tree in many countries and many industries have been initiated on the dates as well as on many parts of date palm trees. The insect pests of date palm were studied by many researchers such as Martin, (1958), Hussain (1974), El-Haidari (1980), El-Haidari & Al-Hafidh (1986), Elwan (2000) and Abdel-Rahman & Amro (2007).

In last few years, scale insect was observed with high numbers on date palm fronds and dates in some Governorates in Egypt causing yellowish of the pinnae and dryness of the fronds as well as the infested dates becomes unmarketable and has a lower grade. The scale insect was collected and identified in the Department of Scale insects and Mealy bugs, Plant Protection Research Institute as Fiorinia date scale, *Fiorinia phoenicis* Balachowsky, 1967 (Hemiptera: Diaspididae) a new pest on date palm in Egypt (Ghabbour and Mohammad, 2010). Fiorinia date scale, *F. phoenicis* was recorded in Iraq (Hussain, 1974), Saudi Arabia (Matile, 1984), Oman (Ghabbour *et al.,* 1996) and Iran (Takagi & Moghaddam, 2005).

F. phoenicis infests the date palm fronds, specially the older ones as well as the dates. When the insect population increases , the scales move to the older fronds and date bunches then the younger fronds. The severe infestation affected greatly on the growth of date palm trees specially the offshoots and the quality of the infested dates become less marketable.

The present investigation was directed to *F. phoenicis* to study the seasonal activity, number and duration of generations, distribution of populations on date palm leaflets as well as effect of main weather factors on the insect activity.

MATERIALS AND METHODS

The present study was conducted on date palm trees cultivated in Agricultural Research Center, Giza Governorate for two years starting from March, 2008 until mid-February, 2010. The selected date palm trees received the normal agricultural practices without pruning the fronds and application any chemical control measures before and during the period of investigation.

Four date palm trees similar in age, vegetation and height were randomly selected and sampling was practiced at half monthly intervals. A random sample of 20 leaflets was taken from the cardinal directions of each date palm at a rate of 5 leaflets per each direction *i.e.* North, South, East and West, respectively. The collected Leaflets were divided into three equal stratum (basal, middle and apical) then preserved in paper bags and transferred to the laboratory for inspection with stereoscopic-microscope, the insect population was counted and sorted to nymphs and adults. The half-monthly means of nymphs and adults per/leaflet were graphically illustrated.

Number and duration of annual generations under field conditions were determined by integration of the population curves in these figures. Distribution of *F. phoenicis* population on the date palm leaflets was determined. The Meteorological data were obtained from Giza Meteorological Station and the half monthly means of

temperature and %R.H. were estimated. The statistical analyses of the present work were carried out with Computer (MSTATC Program).

RESULTS AND DISCUSSION

1- Seasonal activity of *F. phoenicis* on date palm trees

Data illustrated in Figs. (1&2) showed the half-monthly variation in the seasonal activity of the nymphs and adults of *F. phoenicis* at Giza Governorate for two years (March, 2008 until Mid-February, 2010). The trends of fluctuation in nymph and adult populations were almost similar. Accordingly, it's better to discuss the seasonal activity on the basis of average number of nymphs and adults counts at the successive sampling dates.

A- Seasonal activity of *F. phoenicis* in the 1st year

The initial mean count of nymph and adult populations in March (Fig. 1) ranged 120-150 and 130 - 192 insects/leaflet for nymph and adult populations, respectively. This count gradually increased in April and May. In early June, the population of nymphs and adults increased recording the 1st peak with mean population of 670 and 510 insects/leaflet for nymphs and adults under field conditions of 24.7ºC and 61.3%R.H., respectively. In July, the population gradually decreased and increased again through August with relatively high population.

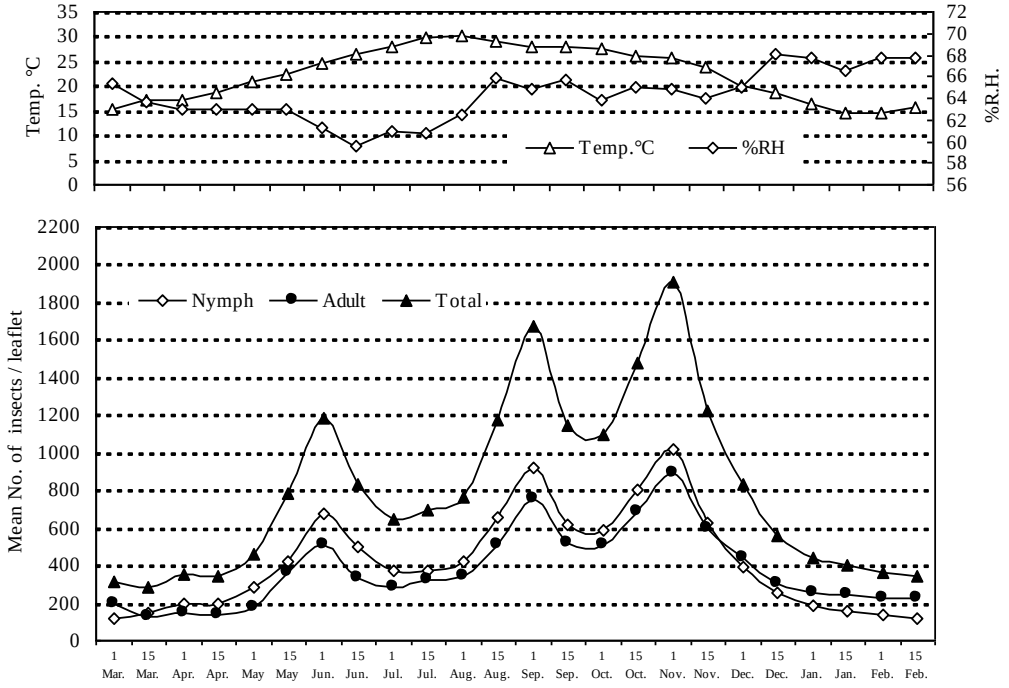

Fig. 1. Half-monthly means of *F. phoenicis* population/leaflet on date palm trees with corresponding half-monthly means of temperature and %R.H. at Giza Governorate in the 1st year (2008/2009).

In early September, the insect population increased and reached the 2nd peak with mean population of 920 and 750 insects / leaflet for nymph and adult at 28.0ºC and 64.8%R.H., respectively. The nymph and adult populations gradually decreased during mid-September and early October. In mid-October, the population of nymphs and adults gradually increased and reached to highest numbers by early November recording the 3rd peak for insect activity with mean population of 1240 and 890 insects/leaflet at 25.8ºC and 64.9%R.H., respectively. This peak was followed by a quick decline in insect population during December. Continues decrease occurred in insect population during January and February, the nymph and adult populations decreased to 160 - 115 and 254 - 225 insects/ leaflet, respectively.

B- Seasonal activity of *F. phoenicis* in the 2nd year

The population of nymphs and adults was relatively low in March and April. In early May, the population gradually increased and reached to the 1st peak by early June with mean population of 471 and 386 for nymphs and adults at 23.5ºC and 61.9%R.H., respectively. Gradual decrease in the insect population was observed in July followed by gradual increase in early August. In mid-August, the insect population highly increased recording the 2nd peak with mean population of 726 and 600 insects/leaflet for both nymph and adult populations at 28.6ºC and 65.8%R.H., respectively.

In early September, the population gradually decreased and increased again by mid-September whereas in October the nymph and adult populations increased highly recording the 3rd peak in mid-October with mean population of 1160 and 970 insects/leaflet at 25.8ºC and 65.1%R.H. This peak was followed by gradual decline in nymph and adult populations during November and December. A continuous decrease was observed in insect population during January and February, ranged 195-150 and 250-210 insects/ leaflet, respectively.

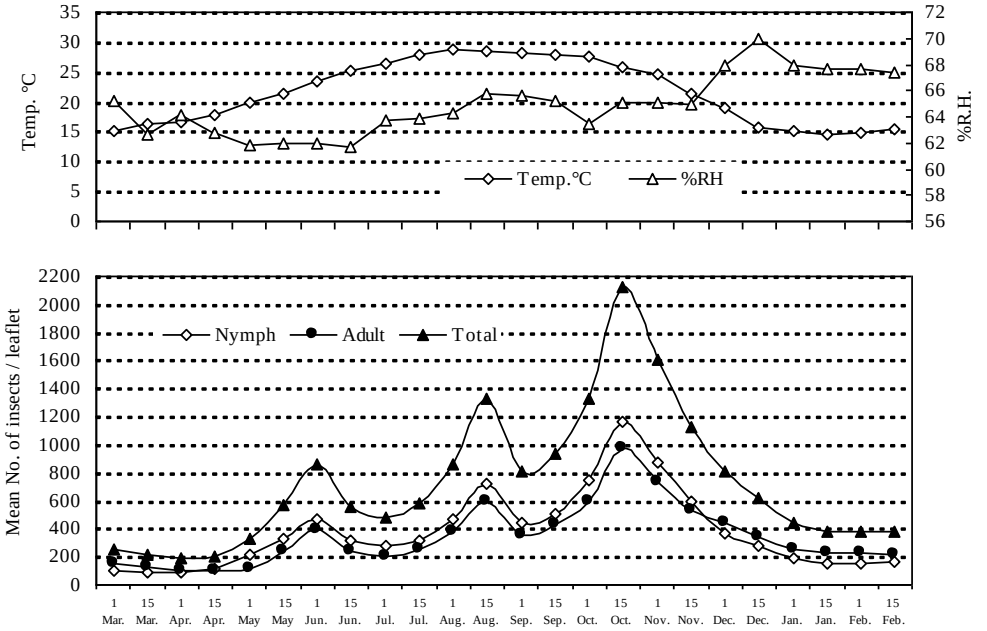

Fig. 2. Half-monthly means of F. phoenicis population/leaflet on date palm trees with corresponding half-monthly means of temperature and %R.H. at Giza Governorate in the 2nd year (2009/2010).

The afore-mentioned results showed that fiorinia date scale, *F. phoenicis* has three overlapping generations under field conditions at Giza Governorate. The 1st generation (early summer) peaked in early June and the 2nd generation (late summer) peaked around August/September whereas the 3rd generation (autumn generation) peaked in October/November. Also, the obtained results showed that, the insect population occurred on date palm fronds with lower numbers during winter season and this referred to the cold weather.

In this respect, parlatoria date scale *Parlatoria blanchardii* has similar activity on date palm. In Morocco, Smirnoff (1957) stated that, the development of *P. blanchardii* on date palm is continuous all the year round except for the period of winter diapause (January - February). The same results were observed in Pakistan (Sharif & Wajih, 1982) and the infestation with *P. blanchardii* on date palm is vigorous through the year with some reduction in activity during winter months.

11- Number and duration of annual generations of *F. phoenicis* under field conditions

Data in Tables (1 & 2) and Figs. (3 & 4) indicated that *F. phoenicis* has three overlapping generations a year. These generations occurred in early summer, late summer, and autumn as follows:

1- The 1st generation (early summer generation)

The 1st generation started from early March in the both years until early July in the 1st year and mid-July in the 2nd one. The generation peaked in early June in the two studied years and lasted for 4.0 - 4.5 months at 20.9 - 21.2 ºC and 62.5 - 63.0%R.H, in the both years, respectively. The generation density ranged 323.3 - 230.8 nymphs/leaflet with average of 277.1 nymphs/leaflet and 191.6 - 252.4 adults/leaflet with average of 222.0 adults/leaflet, respectively.

2- The 2nd generation (late summer generation)

The 2nd generation started in early July in the both years and continued until mid-September in the 2nd year and lasted for early October in the 1st year. The generation peaked in mid-August in the both years. The 2nd generation ranged 2.5 – 3.0 months at 27.9 - 28.6ºC and 63.5 - 64.8%R.H in the two years, respectively. The generation density ranged 457.2 - 564.3 nymphs/leaflet with average of 510.8 nymphs/leaflet and 3371.8 - 461.4 adults/leaflet with average of 416.6 adults/leaflet, respectively.

3- The 3rd generation (autumn generation)

The 3rd generation occurred between mid-September and early February in the 1st year and from early September to mid-January in the 2nd year. This generation peaked in mid-October or early November in the two years. The generation duration lasted for 4.5 months in the both years under field conditions ranged 21.6 - 22.0 ºC and 65.9 - 66.3 %R.H in the two years. The generation density ranged 478.4 - 528.8 nymphs/leaflet with average of 503.6 nymphs / leaflet and 466.3 - 487.2 adults/leaflet with average of 476.8 adults / leaflet in the both years, respectively.

Table 1. Number and duration of annual generations of *F. phoenicis* on date palm trees at Giza, Governorate in the 1st year (2008/2009).

Generation	Insect stage	Generation duration				Generation density			Mean °C	R.H %
		From	To	Peak	Duration / month	Nymph	Adult	Total		
1st Generation	Nymph	Early Mar.	Early Jul.	Early Jun.	4	323.3	252.4	575.7	21.2	62.5
	Adult	Early Mar.	Early Jul.	Early Jun	4					
2nd Generation	Nymph	Early Jul.	Early Oct.	Mid-Aug.	3	564.3	461.4	1025.7	28.6	63.5
	Adult	Early Jul.	Early Oct.	Mid-Aug.	3					
3rd Generation	Nymph	Mid-Sep.	Early Feb.	Early Nov.	4.5	478.4	466.3	944.7	21.6	65.9
	Adult	Mid-Sep.	Early Feb.	Early Nov.	4.5					

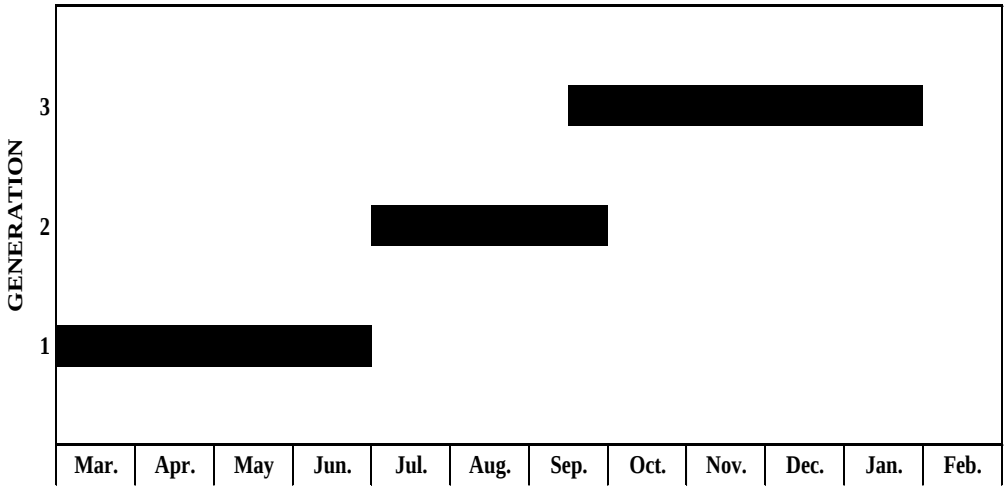

Fig. 3. Number and duration of annual generations of *F. phoenicis* on date palm trees at Giza, Governorate during the 1st year (2008/2009).

Table 2. Number and duration of annual generations of *F. phoenicis* on date palm trees at Giza Governorate in the 2nd year (2009/2010).

Generation	Insect stage	Generation period				Generation density			Mean °C	R.H %
		From	To	Peak	Duration / month	Nymph	Adult	Total		
1st Generation	Nymph	Early Mar.	Mid-Jul.	Early Jun.	4.5	230.8	191.6	422.4	20.9	63.0
	Adult	Early Mar.	Mid-Jul.	Early Jun.	4.5					
2nd Generation	Nymph	Early Jul.	Mid-Sep.	Mid-Aug.	2.5	457.2	371.8	829.0	27.9	64.8
	Adult	Early Jul.	Mid-Sep.	Mid-Aug.	2.5					
3rd Generation	Nymph	Early Sep.	Mid-Jan.	Mid-Oct.	4.5	528.8	487.2	1016.0	22.0	66.3
	Adult	Early Sep.	Mid-Jan.	Mid-Oct.	4.5					

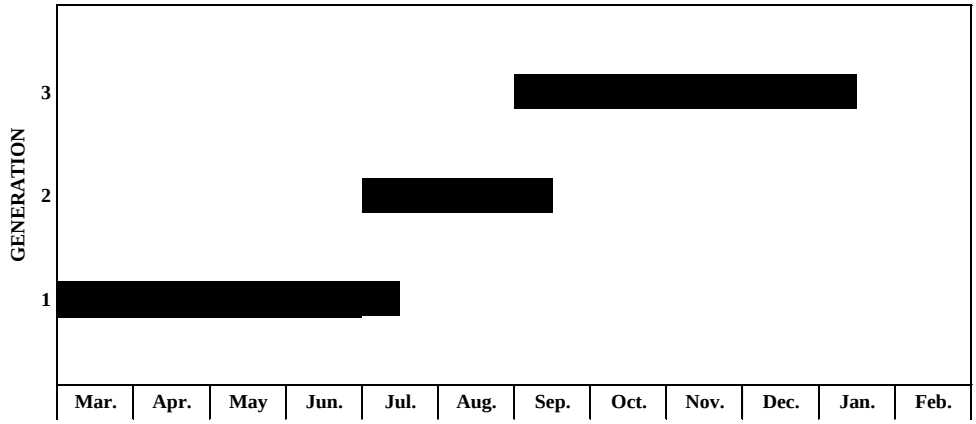

Fig. 4. Number and duration of annual generations of *F. phoenicis* on date palm trees at Giza Governorate in the 2nd year (2009/2010).

The obtained results revealed that, the generation duration of *F. phoenicis* were varied in the both years. The shortest generation (late summer generation) occurred in summer (2.5 – 3.0 months) at 27.9 - 28.6ºC and 63.5 - 64.8%R.H. whereas the longest one (autumn generation) occurred in autumn (4.5 months) at 21.6 - 22.0ºC and 65.9 - 66.3 %R.H. The early summer generation has intermediate duration (4.0 - 4.5 months) at 20.9 - 21.2 ºC and 62.5 - 63.0%R.H in the two years, respectively.

On the other hand, the population density was varied in the generations, the autumn generation was the largest one with total population ranged 944.7 - 1016.0 insects/leaflet with mean of 980.4 insects/leaflet followed by late summer generation (829.0 - 1025.7 insects/leaflet with mean of 927.4 insects/leaflet) whereas the smallest density occurred in the early summer generation (422.4 - 575.7 insects/leaflet with mean of 499.1 insects/leaflet), respectively.

The above mentioned results showed that, fiorinia date scale, *F. phoenicis* has three overlapping generations a year under environmental conditions of Giza Governorate. In this respect, Talhouk (1982) mentioned that, under optimal conditions, *P. blanchardii* had three full generations and a partial fourth one may be produced annually in humid and protected micro-environments. In Egypt, Hussain (1996) showed that, the population density of *P. blanchardii* on date palms at Bahria Oases has three distinct peaks in October, March and July.

111- Distribution of insect population on the date palm leaflets

The distribution of *F. phoenicis* on the different stratum of the date palm leaflets (Table, 3 & Fig., 3) was varied in both studied years from one stratum to another. The basal stratum of the date palm leaflets received the highest infestation (37.4 - 38.3%) and the apical stratum received the least infestation (26.4 - 28.2%) whereas the middle stratum received intermediate infestation (34.4 - 35.3%) for the 1st and 2nd

year, respectively. The aforementioned results emphasize that, *F. phoenicis* prefers the basal stratum of date palm leaflets than middle or apical ones. In Iraq, Al-Hafidh *et al.* (1981) came to similar results.

Table 3. Distribution of *F. phoenicis* population on the different stratum of the date palm leaflets at Giza Governorate in the two years (2008/2009 & 2009/2010).

Stratum	Mean number of insect population			
	1st year	%	2nd year	%
Apical stratum	217.29 (c)	28.23%	166.54 (c)	26.43%
Middle stratum	265.00 (b)	34.43%	222.79 (b)	35.34%
Lower stratum	287.50 (a)	37.35%	240.88 (a)	38.26%
Total population	769.79	-	630.21	-
F value	22.7**		37.4**	
LSD at 5%	21.43		18.04	

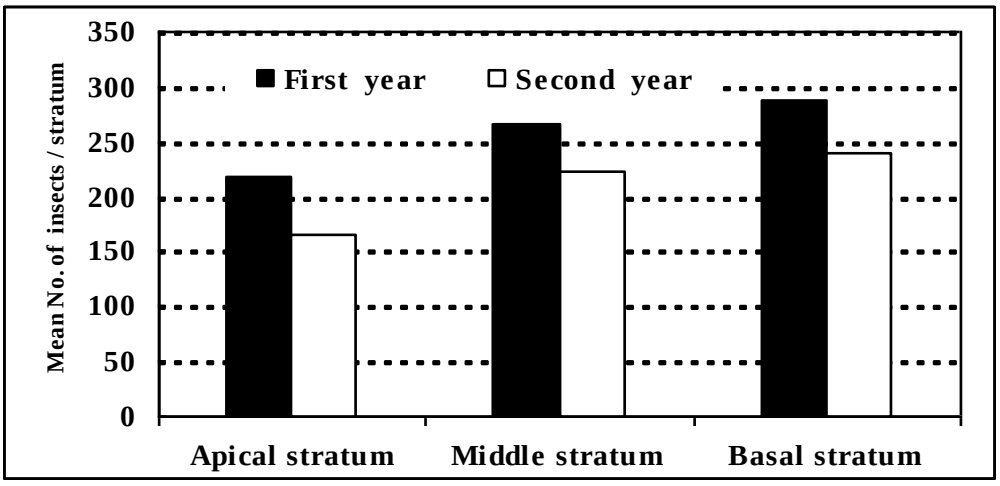

Fig. 5. Distribution of *F. phoenicis* population on the different stratum of the date palm leaflets at Giza Governorate in the two years (2008/2009 & 2009/2010).

1V- Effect of main weather factors on the annual generations

I- The 1st generation (Early summer generation)

A: Nymphal population

1-Effect of daily mean temperature

Data in Tables (3&4) showed a positive relation, highly significant (r =0.807 & 0.793) for the daily mean temperature on the nymphal activity during the 1st generation in the both studied years. The partial regression coefficient showed insignificant effect for this factor on the nymphal activity in the 1st generation in the

two years (t value = 1.10 & 1.19) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature within the optimum range of the nymphal activity in the 1st generation in the both years, respectively.

2- Effect of daily mean relative humidity (%)

Tables (3&4) showed negative relation for daily mean relative humidity on the nymphal population in the both years, significant (r = -0.770) in the 1st year and highly significant (r = -0.792) in the 2nd one. The partial regression coefficient showed insignificant effect for this factor on the nymphal activity in the 1st generation in the both years (t value = -0.43 & -1.18) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity around the optimum range of nymphal activity in the 1st generation in the both years, respectively.

Table 4. Effect of daily mean temperature and %R.H. on *F. phoenicis* generations on date palm at Giza Governorate in the 1st year (2008/2009).

Generation	Insect stage	Generation period		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	Early Mar.	Early Jul.	4	Mean temp. °C	21.2°C	0.807**	24.4±7.2	1.10	5.9*	66.1
					Mean %R.H.	61.7%	-0.770*	-25.3±8.7	-0.43		
	Adult	Early Mar.	Early Jul.	4	Mean temp. °C	21.2°C	0.692*	26.6±9.1	1.40	2.9	49.2
					Mean %R.H.	61.7%	-0.573	19.7±5.1	0.39		
2nd Generation	Nymph	Early Jul.	Early Oct.	3	Mean temp. °C	28.6°C	-0.484	-38.7±6.8	-0.63	3.8	65.4
					Mean %R.H.	63.5%	0.787*	65.2±19.6	2.20		
	Adult	Early Jul.	Early Oct.	3	Mean temp. °C	28.6°C	-0.499	-35.7±5.9	-0.69	3.5	63.8
					Mean %R.H.	63.5%	0.771*	51.6±10.9	2.07		
3rd Generation	Nymph	Mid-Sep.	Early Feb.	4.5	Mean temp. °C	21.6°C	0.876**	45.5±8.6	2.7*	12.0**	77.4
					Mean %R.H.	65.9%	-0.732*	-26.9±5.7	-0.48		
	Adult	Mid-Sep.	Early Feb.	4.5	Mean temp. °C	21.6°C	0.796**	31.9±5.5	2.10	6.1*	63.5
					Mean %R.H.	65.9%	-0.643	-9.7±2.5	-0.19		

*P. reg. = Partial regression coefficient.

Table 5. Effect of daily mean temperature and %R.H. on F. phoenicis generations on date palm at Giza Governorate in the 2nd year (2009/2010).

Generation	Insect stage	Generation period		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	Early Mar.	Mid-Jul.	4.5	Mean temp. °C	20.9°C	0.793**	12.6±4.6	1.19	7.8*	69
					Mean %R.H.	63.0%	-0.792**	-28.4±6.1	-1.18		
	Adult	Early Mar.	Mid-Jul.	4.5	Mean temp. °C	20.9°C	0.679*	94.7±19.5	1.00	3.2	48.1
					Mean %R.H.	63.0%	-0.638*	-12.6±3.6	-0.52		
2nd Generation	Nymph	Early Jul.	Mid-Sep.	2.5	Mean temp. °C	27.9°C	0.720	36.5±8.6	0.45	4.3	74
					Mean %R.H.	64.8%	0.850*	39.0±8.3	1.60		
	Adult	Early Jul.	Mid-Sep.	2.5	Mean temp. °C	27.9°C	0.750	37.0±7.4	0.58	5.5	78.4
					Mean %R.H.	64.8%	0.872*	34.1±9.4	1.75		
3rd Generation	Nymph	Early Sep.	Mid-Jan.	4.5	Mean temp. °C	22.0°C	0.769*	23.9±5.5	1.45	5.5*	60.9
					Mean %R.H.	66.3%	-0.702*	-23.9± 4.0	-0.56		
	Adult	Early Sep.	Mid-Jan.	4.5	Mean temp. °C	22.0°C	0.562	14.6±3.5	0.97	3.6	48.6
					Mean %R.H.	66.3%	-0.473	-3.7±1.6	-0.10		

* P. reg. = Partial regression coefficient

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 showed significant effect (F=5.9 & 7.8) on the nymphal population in the 1st generation in the two years, respectively. The changes in the half monthly counts of the nymphal population referred to the effect of the tested weather factors ranged 66.1 - 69% in both years, respectively.

B: Adult population

1-Effect of daily mean temperature

Daily mean temperature (Tables, 3&4) showed positive relation, significant on the adult activity in the 1st generation in the both years (r = 0.692 & 0.679), respectively. Partial regression coefficient showed insignificant effect for this factor on the adult activity in the both years (t =1.40 & 1.00) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature within the optimum range of adult activity in both years, respectively.

2- Effect of daily mean relative humidity

Daily mean relative humidity (Tables, 3&4) had negative relation, insignificant (r = -0.573) on the adult population in the 1st year and significant (r = -0.638) in the 2nd one. Partial regression coefficient showed insignificant effect for this factor on the adult activity in the both years (t value = 0.39 & -0.52) when daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity under the optimum range of adult activity in the 1st year and around the optimum range in the 2nd one.

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 insignificant in the both years (F= 2.9 &3.2). The changes in the half monthly counts of the adult population referred to the effect of the two tested weather factors ranged 48.1- 49.2% in the two years.

II- The 2nd generation (Late summer generation)

A: Nymphal population

1- Effect of daily mean temperature

Daily mean temperature (Tables, 3&4) showed insignificant relation on the nymphal activity in the 2nd generation, negative (r =-0.484) in the 1st year and positive (r = 0.720) in the second one. Partial regression coefficient showed insignificant effect for this factor on the nymphal activity in the 2nd generation in the both years (t value = -0.63 & 0.45) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature become around the optimum range of nymphal activity in the 1st year and under the optimum range in the 2nd year, respectively.

2- Effect of daily mean relative humidity

Daily mean relative humidity (Tables, 3&4) showed significant positive relation (r =0.787 & 0.850) on the nymphal population in the 2nd generation in the two studied years. Partial regression coefficient showed insignificant effect for this factor on the nymphal activity in the 2nd generation in the both years (t value = 2.20 & 1.60) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity within the optimum range of the nymphal activity in the two 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 showed insignificant effect (F= 3.8 & 4.3), on the nymphal population the 2nd

generation in the both years respectively. The changes in the half monthly counts of the nymphal population referred to the effect of the tested weather factors ranged 65.4 - 74.0% in both years, respectively.

B: Adult population

1- Effect of daily mean temperature

Daily mean temperature (Tables, 3&4) showed negative relation on the adult activity, insignificant in the 1st year (r = -0.484) and positive relation insignificant in the 2nd one (r =0.720). Partial regression coefficient showed insignificant effect for this factor on the adult activity in the 2nd generation in the both years (t value = -0.69 & 0.58) when the daily mean relative humidity become around its mean. The obtained results revealed that, daily mean temperature was around the optimum range of the adult activity 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 had positive relation and significant on the adult population in the both years (r =0.771 & 0.872). Partial regression coefficient showed insignificant effect for this factor on the adult activity in the 2nd generation in the both years (t value = 2.07 & 1.75) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity proved to be within the optimum range of adult activity in the both studied 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 showed insignificant effect (F=3.5 & 5.5) on the adult activity 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 ranged 63.8 - 78.4% for both years, respectively.

III- The 3rd generation (autumn generation)

A: Nymphal population

1- Effect of daily mean temperature

Daily mean temperature (Tables, 3&4) showed positive relation on the nymphal activity in the 3rd generation, highly significant in the 1st year (r = 0.876) and significant (r = 0.769) in the 2nd one. Partial regression coefficient showed significant effect for this factor on the nymphal activity in the 3rd generation (t value = 2.7) in the 1st year and insignificant effect (t value = 1.45) in the 2nd one when the daily mean relative humidity become around its mean. The obtained results revealed that, daily

mean temperature under the optimum range of nymphal activity in the 1st year and within the optimum range in the 2nd year.

2- Effect of daily mean relative humidity

Daily mean relative humidity (Tables, 3&4) showed negative relation, significant effect (r = -0.732 & -0.702) on the nymphal population in the 3rd generation in the two years, respectively. However, partial regression coefficient showed insignificant effect for this factor on the nymphal activity in the 3rd generation in the both years (t value = -0.48 & -0.56) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity around the optimum range of the nymphal activity in the two 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 nymphal population in the 3rd generation was highly significant (F= 12.0) in the 1st year and significant (F= 5.5) in the 2nd one, respectively. The changes in the half monthly counts of the nymphal population referred to the effect of the tested weather factors ranged 60.9 - 77.4% in the 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 3rd generation, highly significant (r = 0.796) in the 1st year and significant (r = 0.562) in the 2nd one. However, partial regression coefficient showed insignificant effect for this factor on the adult activity in the 3rd generation in the both years (t value = 2.10 & 0.97) 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 both years, respectively.

2- Effect of daily mean relative humidity

Data in Tables (3&4) showed that, daily mean relative humidity had negative relation and insignificant on the adult population in the both years (r =-0.643 & -0.473), respectively. Partial regression coefficient showed insignificant effect for this factor on the adult activity in the 3rd generation in the both years (t value = -0.19 & -0.10) when the daily mean temperature become around its mean. The obtained results revealed that, daily mean relative humidity around the optimum range of adult activity 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 3rd generation was significant (F= 6.1) in the 1st year and insignificant effect (F=3.6) in the 2nd one, respectively. The changes in the half monthly counts of the adult population referred to the effect of the two tested weather factors ranged 48.6 - 63.5% for both years, respectively.

Laudeho & Benassy (1969) stated that the density and severity of infestation with *P. blanchardii* is affected by microclimate conditions. High temperature combined with wind and low humidity was very effective for the survival of the crawlers.

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النشاط الموسمي لحشرة النخيل القشرية البنية المبططة *Fiorinia phoenicis* على نخيل البلح في محافظة الجيزة

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تعتبر الحشرات القشرية من الافات الحشرية الهامة التى تصيب نخيل البلح فى مصر. سجلت حشرة النخيل القشرية البنية المبططة Fiorinia phoenicis Balachowsky فى السنوات الاخيرة بأعداد كثيرة على سعف وثمار نخيل البلح فى بعض محافظات مصر. تسبب الاصابة الشديدة بالحشرة اصفرار وجفاف السعف وتشوة الثمار. أجريت الدراسة الحالية على نخيل البلح بمركز البحوث الزراعية – محافظة الجيزة لمدة عامين متتاليين (مارس 2008 – فبراير 2010) بغرض دراسة النشاط الموسمى للحشرة على مدار العام وعدد الاجيال ومدة كل جيل ودراسة تأثيرعوامل الطقس السائدة فى منطقة الدراسة على نشاط الحشرة بغرض وضع برنامج متكامل لمكافحتها والحد من انتشارها.

اتضح من نتائج الدراسة وجود ثلاثة اجيال متداخلة للحشرة على مدار العام ، ظهر الجيل الاول فى اوائل الصيف وكانت ذروة نشاطه فى اوائل يونيو فى كلا العامين ، و ظهر الجيل الثانى فى نهاية الصيف وكانت ذروة نشاطه فى اغسطس/سبتمبر من العامين ، وظهر الجيل الثالث فى الخريف وكانت ذروة نشاطه فى اكتوبر/ نوفمبر. كان جيل الصيف المتأخر اقصر الاجيال مدة (2.5 - 3.0 شهر) على درجة حرارة 27.9– 28.6م° ورطوبة نسبية 63.5– 64.8% وجيل الخريف اطولها مدة (4.5 شهر) على درجة حرارة 21.6– 22.0م° ورطوبة نسبية 65.9– 66.3% بينما كانت مدة جيل الصيف المبكر متوسطة (4.0 – 4.5 شهر) على درجة حرارة 20.9– 21.2م° ورطوبة نسبية 62.5– 63.0%. كان جيل الخريف اقوى الاجيال (944.7 - 1016.0 حشرة/خوصة بمتوسط قدرة 980.4 حشرة/خوصة) ثم جيل الصيف المتأخر (829.0 –1025.7 حشرة/خوصة بمتوسط قدره 927.4 حشرة/خوصة) واخيرا جيل الصيف المبكر (422.4 - 575.7 حشرة/خوصة بمتوسط قدرة 499.1 حشرة/خوصة).

وتبين من الدراسة وجود الحشرة على سعف النخيل على مدار العام وانخفض تعدادها بدرجة كبيرة فى فصل الشتاء نظرا لبرودة الجو وموت اعداد كثيرة منها . كما وجد تباين واضح فى درجة انتشار الحشرة على الخوص حيث وجدت اعداد كثيرة من اطوار الحشرة على الثلث السفلى من الخوصة (37.4 – 38.3%) ثم انخفض التعداد على الثلث الوسطى (34.4 – 35.3%) وقل بدرجة كبيرة على الثلث الطرفى من الخوصة (26.4 – 28.2%) فى كلا العامين على التوالى. كما تأثر نشاط الحشرة فى الاجيال الثلاثة بدرجة الحرارة والرطوبة النسبية السائدة فى منطقة الدراسة ، كان التاثير المشترك للعاملين (متوسط درجة الحرارة والرطوبة النسبية) متباينا على نشاط الحورية والحشرة الكاملة فى الاجيال الثلاثة فى عامى الدراسة حيث كان فى الجيل الاول 66.1– 69% & 48.1 – 49.2% وفى الجيل الثانى 65.4 – 74.0% & 63.8 – 78.4% وفى الجيل الثالث 60.9 – 77.4% & 48.6 – 63.5% على التوالى.