

ECOLOGICAL STUDIES ON DATE PALM SCALE INSECT, *Parlatoria blanchardi* Targ., ON TWO DATE PALM VARIETIES AT KAFR EL-SHEIKH GOVERNORATE

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ABSTRACT

Certain ecological studies on scale insect, *Parlatoria blanchardi* Targ. were conducted at Baltim region, Kafr El-Sheikh Governorate on two varieties of date palm, Hayany and Sammany. Hayany variety was found more susceptible to *P. blanchardi*. The apical part and the middle part of the leaflets captured few number of insects than those of the basal part for Hayany and Sammany varieties and insect preferred the upper surface of leaves than the lower one. Insect had three distinct peaks during the year of study, the highest peak was found in October, the second in March and the smallest third one in June. Results indicate a significant decrease of total chlorophyll content in infested leaflets by *P. blanchardi* compared with uninfested ones. The obtained information could be help in controlling this insect pest.

INTRODUCTION

The scale insect *Parlatoria blanchardi* Targ. (Diaspididae: Homoptera) is one of the major pests on date palm trees in Egypt and other parts of the world, Saudi Arabia (Hamad *et al.*, 1982 and Basalah, 1987), Libya (Bitaw and Saad, 1990), Tunisia (Khoualdia *et al.*, 1993), Niger (Stansly, 1984), and collectively, Africa, Asia Minor, India, Australia and South America (Hill, 1983). It causes considerable damage to palm trees (Ezz *et al.*, 1984) where it infested foliage and fruits (Hill, 1983), that weakens the whole tree by covering so quickly infested leaflets, then affecting both normal transpiration and photosynthesis (Bindra and Varma, 1972; Gharib, 1973, Carpenter and Elmer, 1978). Few studies on the population ecology and bionomics of this insect pest were carried out in Egypt (Gabr, 1997, Abd El-Kareim and Awadalla, 1998; Mourad and Zanuncio, 1998).

Therefore, the present work was carried out to study the susceptibility of the two high cultivated date palm varieties, Hayany and Sammany, to the infestation by *P. blanchardi*, insect distribution on the leaves and their leaflets, the population fluctuation and the host preference of *P. blanchardi* and its effect on population and the effect of infestation on the total chlorophyll content in leaves. This study would be a contribution to its ecology which is necessary to help implementing a better management of the insect.

MATERIALS AND METHODS

This work was carried out in an orchard of date palm trees 11 years old at Baltim, Kafr El-Sheikh Governorate. Control measures were not used on date palm during the previous two years and throughout the period of investigation.

Three Hayany and three sammany date palm trees were randomly selected for this study. during a period extended from August 2000 to July 2001. Biweekly, five different leaves from each palm tree were also randomly selected, four of them are orthogonal to each other, and the fifth one was from the center of the crown. From each leaf, three leaflets were sampled at random from the basal, medial and apical parts of the leaf. Such leaflets were put into labeled paper sacs, transferred to laboratory and examined under steriomicroscope. Insect was counted on both surfaces of the leaflets and sorted into nymphal and adult stages. The count of the insect, therefore was conducted on 15 leaflets per tree (3 leaflets x 5 leaves per tree). The average counts of scale of 5 leaflets at the basal medial and apical sections of the five leaves in each tree are calculated as mean numbers of scale insect.

To investigate the effect of *P. blanchardi* infestation on the total chlorophyll contents in the date palm leaves: Samples of 200 leaflets were randomly taken from each of infested and uninfested leaves which selected from trees of Hayany variety. Leaflets were put into paper sacs and transferred to laboratory where number of insect (adult and nymph) was computed of such infested leaflets, then, total chlorophyll content was determined in both infested and uninfested leaflets by SPAD-502, a portable leaf chlorophyll meter according to Moron (1982). Statistical analysis was done according to Duncan (1955) and related weather conditions were kindly supplied from Sakha Exp. Station.

RESULTS AND DISCUSSION

Susceptibility of the two high cultivated date palm varieties to infestation by *P. blanchardi*

Results of the ecological studies revealed that Hayany variety was found more susceptible to *P. blanchardi* infestation where the grand mean was 54.6 scale insects/5 leaflets compared with 48.8 insects/5 leaflets of Sammany variety (Tables 1 & 2 and Fig. 1 & 2). Moreover leaflets of the basal part of Hayany leaf were occupied by the highest number of insects (69.8 insects/5 leaflets) followed by those of medial part (49.3 insects/5 leaflets) and the lowest number (42.7 insects/5 leaflets) on leaflets of the apical part (Table 1). Whereas, the comparable figures of Sammany variety showed the same trend of Hayany variety as the leaflets of the basal part captured high number of insects than those of the middle part of 58.8 and 47.5 insects/5 leaflets, respectively, where those of the apical part received also the lowest number (39.7 individuals) (Table 2). In Egypt, Mourad and Zanuncio (1998) mentioned that *P. blanchardi* attacking date trees (Zaghloul and Sammany varieties) in El-Beheira Governorate, leaves of Zaghloul and Sammany at Idko were more susceptible to *P. blanchardi* infestation than at Rashid. Khoualdia et al. (1993) in Tunisia mentioned that the cultivar Kentichi was significantly more resistant to *P. blanchardi* than Deglet Nour.

Table (1): Mean number of scale insect *P. blanchardi* per leaflet (basal, medial and apical parts) of five leaves in Hayany variety of date palm from Aug. 2000 to July 2001

Months	Basal leaflets			Medial leaflets			Apical leaflets			Average / 5 leaflets			Av. Temp and R.H.	
	A	N	T	A	N	T	A	N	T	A	N	T	Tem p. °C	R.H.
Aug.	33.1	25.9	59.0	25.8	18.0	43.8	20.0	19.4	39.4	26.3	21.1	47.4	26.9	66.6
Sep.	52.7	29.5	82.2	48.6*	23.0	71.6	25.4	27.6	53.0	42.2	26.7	68.9	24.8	77.3
Oct.	84.6*	56.7	141.3	36.2	51.4*	87.6	47.7	34.2	81.9	56.2	47.4	103.6	20.5	58.2
Nov.	38.1	22.9	61.0	32.6	18.1	50.7	26.0	16.9	42.9	32.2	19.3	51.5	19.5	65.8
Dec.	28.5	16.5	45.0	25.7	13.3	39.0	16.1	13.8	29.9	23.4	14.5	37.9	12.1	59.0
Jan.	25.2	12.4	37.6	22.4	9.1	31.5	14.0	11.2	25.2	20.5	10.9	31.4	11.8	58.0
Feb.	28.3	22.0	50.3	23.1	11.2	34.3	21.2	8.6	29.8	24.2	13.9	38.1	10.5	59.0
Mar.	91.0*	29.8	120.8	45.9*	24.8	70.7	42.4	22.1*	64.5	59.8	25.6	85.4	14.2	68.0
Apr.	34.3	15.5	49.8	26.1	15.8	41.9	23.8	11.1	34.9	28.1	14.1	42.2	18.3	65.2
May.	34.5	17.4	51.9	21.3	12.8	34.1	24.8	10.9	35.7	26.9	13.7	40.6	23.8	62.1
Jun.	72.2	30.2	102.4	23.1	30.0	53.1	17.6	27.7*	45.3	45.7	29.3	75.3	26.2	68.0
July	24.0	13.3	37.3	20.7	12.1	32.8	21.2	8.2	29.4	22.0	11.2	33.2	26.6	69.1
Total	546.5	292.1	838.6	351.5	239.6	591.1	300.2	211.7	511.9	407.3	247.7	655.5		
Mean	45.5	24.3	69.8	29.3	20.0	49.3	25.0	17.6	42.7	33.9	20.6	54.6		

* Significant at 1% level. A = Adult, N = Nymph, T = Total.

Table (2): Mean number of scale insect *P. blanchardi* per leaflet (basal, medial and apical parts) of five leaves in Sammany variety of date palm from Aug. 2000 to July 2001

Months	Basal leaflets			Medial leaflets			Apical leaflets			Average / 5 leaflets		
	A	N	T	A	N	T	A	N	T	A	N	T
Aug.	31.7	23.2	54.9	23.1	13.2	36.3	18.4	15.4	33.8	24.4	17.3	41.7
Sep.	54.1	25.5	79.6	33.9	24.2	58.1	32.0	15.3	47.3	40.0	21.7	61.7
Oct.	51.5	51.7	103.2	49.1	39.7	88.8	40.4	35.0	75.4	47.0	42.1	89.1
Nov.	64.3*	31.8	96.1	42.4	23.9	66.3	39.9*	17.3*	57.2	48.9	24.3	73.2
Dec.	47.1*	14.6	61.7	30.6	16.5	47.1	29.0	12.4	41.4	35.6	14.5	50.1
Jan.	31.0	9.3	40.3	23.9	9.9	33.8	23.9	8.2	32.1	26.3	9.1	35.4
Feb.	22.9	8.5	31.4	21.1	8.7	29.8	17.7	7.6	25.3	20.6	8.3	28.9
Mar.	37.3	20.2	57.5	35.4	17.1	52.5	30.4	14.3	44.7	34.4	17.2	51.6
Apr.	33.9	12.8	46.7	25.3	14.4	39.7	29.2	5.5	34.7	29.5	10.9	40.4
May.	31.2	11.5	42.7	30.0	7.5	37.5	18.8	8.9	27.7	26.7	9.3	36.0
Jun.	30.4	28.8	59.2	21.3	28.2	49.5	23.3	15.5	38.8	25.0	24.2	49.2
July	21.1	11.6	32.7	13.1	18.0	31.1	12.0	5.7	17.5	15.4	11.8	27.2
Total	456.5	249.5	706.0	349.2	221.3	570.5	315.0	161.1	476.1	373.8	210.7	584.5
Mean	38.0	20.8	58.8	29.1	18.4	47.5	26.3	13.4	39.7	31.2	17.6	48.8

* Significant at 1% level. A = Adult, N = Nymph, T = Total.

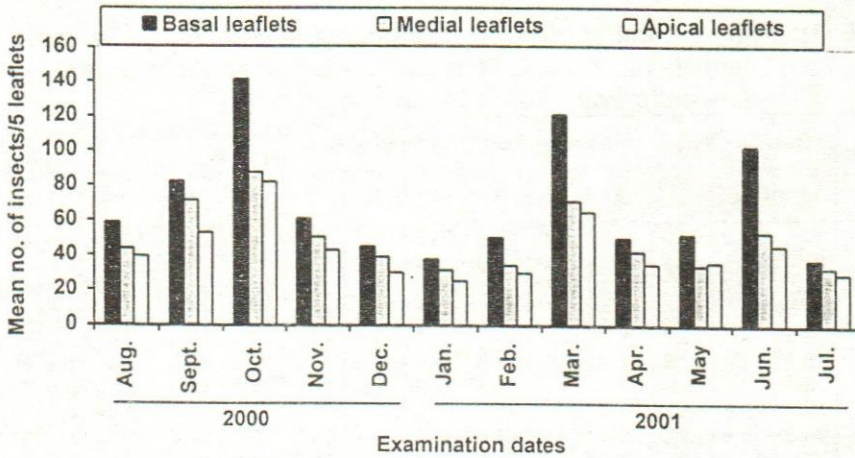


Fig. (1): Seasonal abundance of scale insect (*P. blanchardi*) (Adult and Nymph) on basal, medial, and apical leaflets of Hayany date palm trees.

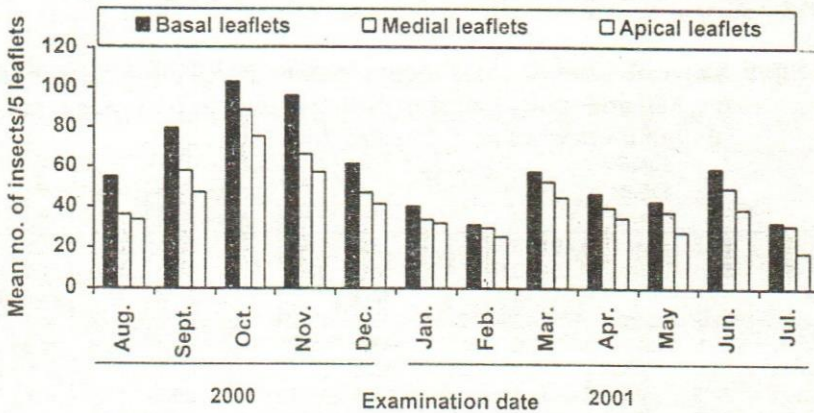


Fig. (2): Seasonal abundance of scale insect (*P. blanchardi*) (Adult and Nymph) on basal, medial, and apical leaflets of Sammany date palm trees.

Distribution of *P. blanchardi* on both leaflet surfaces:

In both varieties, insects preferred the upper surface (41.9, 38.8 insects/5 leaflets) than the lower one (15.1, 9.8 insect/5 leaflets) in Hayany and Sammany, respectively (Table 3 and Fig. 3). Mourad and Zanucio (1998) in Egypt, reported that, the scale preferred the upper surface of leaves. Smoothness of the upper surface of the leaf and light could be responsible for the preference.

Table 3: Average monthly numbers of *P. blanchardi* (Adult and nymph) on the upper and lower leaflet surfaces of date palm Haynay and Sammany varieties from Aug. 2000 to July 2001.

Month	Basal leaflets		Medial leaflets		Apical leaflets		Mean	
	U	L	U	L	U	L	U	L
Hayany								
Aug.	48.0	11.0	33.5	10.3	20.3	19.1	33.9	13.5
Sept.	70.0	12.2	60.1	11.5	40.0*	13.0	56.7	12.2
Oct.	105.3*	36.0*	70.3	17.3	60.6	21.3	78.7	24.8
Nov.	51.0	10.0	41.4	9.3	32.7	10.2	41.7	29.3
Dec.	38.0	7.0	29.0	10.0	20.6	9.3	29.2	26.3
Jan.	30.3	7.3	23.0	8.5	15.2	10.1	22.8	8.6
Feb.	40.2	10.1	30.0	4.3	21.5	8.3	30.6	7.6
Mar.	90.4	30.4	60.4*	10.3	50.2*	14.3	67.0	18.3
Apr.	40.3	9.5	30.6*	11.3	26.4	8.5	32.4	9.8
May	35.3	16.6	30.1	4.0	30.1	5.6	31.8	8.7
Jun.	85.1*	17.3	40.0	13.1*	35.0	10.3	53.4	13.6
Jul.	27.2	10.1	25.5	7.3	20.1	9.3	24.3	8.9
Total	661.1	177.5	474.0	117.2	372.7	139.3	502.5	181.7
Mean	55.1	14.8	39.5	9.8	31.1	11.6	41.9	15.1
Sammany								
Aug.	50.6	4.3	29.1	7.2	26.6	7.2	35.4	6.2
Sept.	69.2	10.4	50.0	8.1	39.0	8.3	52.7	8.9
Oct.	80.0	23.2	70.5	18.3	60.1	15.3	70.2	18.9
Nov.	82.0	14.1	50.2*	16.1*	50.0*	7.2	60.8	12.5
Dec.	50.4	11.3	37.0	10.1	31.2	10.2	39.5	10.5
Jan.	31.2	9.1	27.5	6.3	25.1	7.0	28.6	7.5
Feb.	20.3	11.1	20.4	9.4	19.0	6.3	17.9	8.9
Mar.	40.3	17.2	38.3	14.2	36.4	8.3	38.3	13.2
Apr.	40.4	6.3	30.4	9.3	28.5	6.2	33.1	7.3
May	33.0	9.7	29.2	8.3	20.6	7.1	27.6	8.4
Jun.	49.1	10.1	40.3	9.2	31.3	7.5	40.2	8.9
Jul.	24.5	8.2	26.0	5.1	12.3	5.2	20.9	6.2
Total	571.0	135.0	448.9	121.6	380.1	95.8	465.2	117.4
Mean	47.6	11.3	37.4	10.1	31.7	8.0	38.8	9.8

* Significant at 1% level. U = Upper, L = Lower.

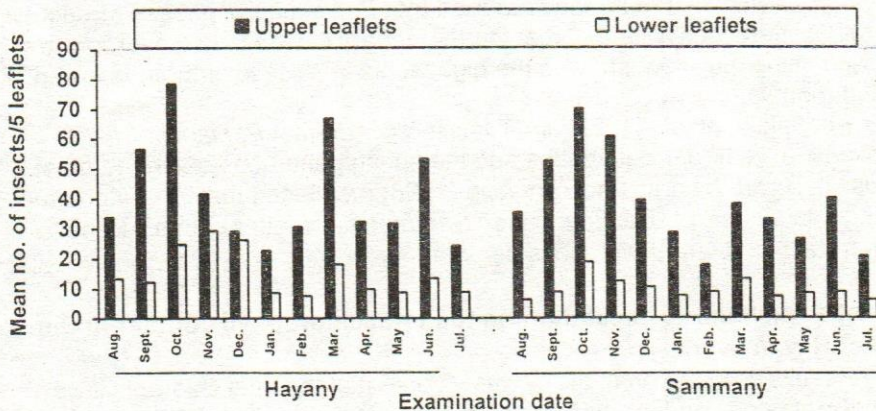


Fig. (3): Average monthly numbers of *P. blanchardi* (Adult and Nymph) on upper and lower leaflets surfaces of date palm Hayany variety from Aug. 2000 to July 2001.

Population fluctuation of *P. blanchardi* on two date palm varieties:

Data illustrated in Fig. (4) show that the population of *P. blanchardi* fluctuation demonstrated three activity peaks on Hayany and Sammany varieties. The first peak was found in October and represented by 103.6 and, 89.1 individuals/5 leaflets, while the second was recorded in March and represented by 85.4 and 51.6 individuals. The third smallest peak was recorded during June, when the population reached 75.3 and 49.2 individuals/5 leaflets on both Hayany and Sammany variety, respectively.

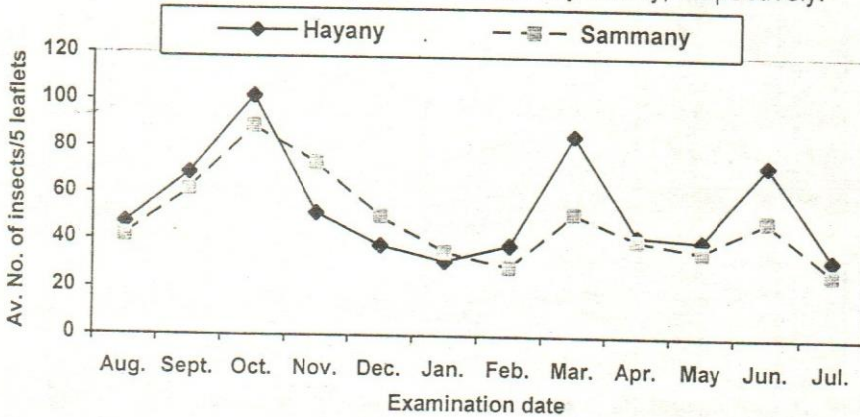


Fig. (4): Population fluctuation of *P. blanchardi* (Adult and Nymph) on the two date palm varieties Hayany and Sammany in season 2000/2001

The present results are in agreement with the findings of Abd El-Kareim and Awadalla (1998) they reported that *P. blanchardi* passes through three full generations, with a partial fourth annually in Damietta Governorate, Egypt and its population showed the highest occurrence in autumn followed by spring months.

Khoualdia *et al.* (1993) in Tunisia reported that *P. blanchardi* had 4 generations a year on date palms and the spring generation being the most injurious. In Egypt, Mourad and Zanuncio (1998) mentioned that *P. blanchardi* attacking date trees (Zaghloul and Sammany varieties) in El-Beheira Governorate, it had four generations per year.

Effect of *P. blanchardi* infestation on the total chlorophyll content in the leaves of Hayany variety:

Results indicate that the lowest content of the total chlorophyll was 15.2 mg/g/infested leaflet when mean number of insects was 88.2 insects/5 leaflet (Table 4). However, average of total chlorophyll content in infested leaflets ranged 15.2-25.8 mg/g/leaflet and the grand mean of 16.5 mg/g/infested leaflet; whereas, the comparable data of uninfested leaflets ranged 52.3-69.4 mg/g/leaflet and the grand mean of 49.4 mg/g/leaflet. Later results indicate a significant decrease of total chlorophyll content in infested leaflets by *P. blanchardi* compared with uninfested ones and the differences

of decreasing amount of chlorophyll in infested leaflets clearly related to mean number of scale insects. These results agree with that obtained by Al-Wahaibi (1997), where a significant decrease of total chlorophyll contents in yellowing leaflets showing either infection by the green scale insect *Asterolecanium phoenix* or unknown pathogen(s) compared with healthy green leaflets. On the other hand, *P. blanchardi* infestation affected the kinds of soluble sugar with increasing the glycerol content and a significant increase of soluble protein (Basalah, 1987).

Table (4): Mean of total chlorophyll contents in infested leaflets by *P. blanchardi* compared with those in uninfested ones of Hayany date variety.

Replicates (each 5 leaflets)	Mean No. of insects/5 leaflets	Average of total chlorophyll contents mg/g/leaflet	
		Infested leaflets	Un-infested leaflets
1	33.9	21.2	57.5
2	56.2	19.4	60.8
3	49.3	23.2	66.9
4	51.1	25.6	63.2
5	85.3	18.2	60.2
6	69.3	22.3	59.6
7	71.3	25.8	57.3
8	66.7	24.8	62.8
9	48.1	19.2	65.7
10	68.9	18.0	68.2
11	54.3	21.8	69.4*
12	72.2	15.6	52.3*
13	42.3	20.2	55.8
14	67.4	18.1	61.9*
15	48.5	19.3	64.6
16	88.2	15.2	60.8
17	64.2	22.8	59.3
18	45.3	20.9	63.7
19	55.6	18.7	61.8
20	75.8	15.8	68.9*
Mean	48.7	16.5	49.4

* Significant at 1% level

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دراسات ايكولوجية على حشرة النخيل القشرية على صنفين من نخيل البلح فى محافظة كفر الشيخ

اسمهان السعيد يوسف

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أجريت هذه الدراسة الحقلية فى مزرعة نخيل لم تتعرض للرش بالمبيدات الحشرية لمدة سنتين قبل إجراء الدراسة وأيضاً طوال فترة الدراسة التى تمت من أغسطس ٢٠٠٠م وحتى نهاية يوليو ٢٠٠١م. الهدف من الدراسة:

الحصول على مزيد من المعلومات الايكولوجية التى تساعد فى وضع برنامج لمكافحة هذه الآفة الحشرية والتى تسبب خسارة فى محصول البلح فى مصر. قد تم الحصول على النتائج التالية:

- ١- وجد أعلى تعداد للحشرة على الأجزاء القاعدية من الأوراق يليها الأجزاء الوسطية ثم الطرفية لكلا الصنفين الحيانئ والسمانئ كذلك استقبل السطح العلوى للورقات أعلى عدداً من الحشرة عن السطح السفلى فى كلا الصنفين.
- ٢- استقبل الصنف الحيانئ أعلى اصابة نسبياً من الصنف السمانئ وكان توزيع الاصابة كما يلى ٦٩,٨ ، ٤٩,٣ ، ٤٢,٧ حشرة/٥ وريقات فى حين كان التعداد على الصنف السمانئ ٥٨,٨ ، ٤٧,٥ ، ٣٩,٧ فردا/٥ وريقات للأجزاء القاعدية والوسطية والطرفية على التوالئ.
- ٣- كان للحشرة ثلاث ذروات نشاط فى السنة اعلاها فى أكتوبر (١٠٣,٦ ، ٩٨,١) تليها ذروة مارس (٨٥,٤ ، ٥١,٦) وأقلها ذروة يونيو (٧٥,٣ ، ٤٩,٢) فردا/٥ وريقات) فى كل من الصنفين الحيانئ والسمانئ على التوالئ.
- ٤- وجد أن الاصابة بالحشرة القشرية للنخيل قد أدت الى خفض واضح فى محتوى الاوراق من الكلوروفيل حيث كان متوسط محتوى الوريقات المصابة من الكلوروفيل هو ١٦,٥ ملئ جرام/جرام وريقة خضراء فى حين كان محتوى الوريقات الغير مصابة بالحشرة هو ٤٩,٤ ملئ جرام/جرام وريقة خضراء كما وجد أن اقل محتوى للاوراق المصابة بالحشرة من الكلوروفيل ١٥,٢ ملئ جرام/جرام وريقة خضراء قد ارتبط باعلى اصابة حشرية ٨٨,٢ فردا/٥ وريقات وهذا يؤثر على الانتاج بسبب ضعف الاشجار.