

Population dynamics of the purple scale, *Lepidosaphes beckii* (Hemiptera: Diaspididae) and its parasitoid *Aphytis lepidosaphes* (Hymenoptera: Aphelinidae) as a new threat pest on mango trees in Egypt

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ABSTRACT

The purple scale, *Lepidosaphes beckii* (Newman) (Hemiptera: Diaspididae) is one of the most important pests attacking mango. The present paper includes population dynamics of the purple scale, *L. beckii* and its parasitoid. Dynamics of *L. beckii* and its parasitoid on mango trees was carried out in Giza, governorate, during 2009 and 2010. Only one parasitoid recorded in this work was *Aphytis lepidosaphes* Compere (Hymenoptera: Aphelinidae). Statistical analysis of the effect of weather factors on the population of *L. beckii* and its parasitoid during the two years under consideration was explained. The results indicated that maximum and minimum temperatures was significant on the population of *L. beckii* and its parasitoid, *A. lepidosaphes* while percent of relative humidity it is nonsignificant. As well as obtained results over both years indicated the occurrence of three generations per year for *L. beckii* on mango in Giza.

Keywords: Population dynamics, *Lepidosaphes beckii*, *Aphytis lepidosaphes*, mango trees, Egypt

INTRODUCTION

The purple scale, *Lepidosaphes beckii* (Newman) (Hemiptera : Diaspididae) is one of the most important pests of mango. *L. beckii* is regarded as a serious pest in different parts of the world (Hafez *et al.*, 1987 a and b, Danzig and Pellizzari, 1998, Claps *et al.*, 2001 and Foldi, 2001).

It is a polyphagous species that has been recorded from hosts belonging to 45 genera in 11 plant families including, mango, *Mangifera indica*. It attacks leaves, turnk and fruit (Davidson and Miller, 1990). Development time in females varies from 20 days at 27°C to 40 days at 20°C (Hafez and Salama, 1970).

There are one to four generations depending on climatic conditions (Zuniga, 1971, Bénassy *et al.*, 1975, Davidson and Miller, 1990 and Gill, 1997). It is widely distributed throughout the tropical and subtropical regions of the world (Davidson and Miller, 1990; DeBach and Rosen, 1991 and Danzig and Pellizzari, 1998).

Heavy infestation causes chlorosis of the leaves, defoliation, discolouration and poor maturation of the fruit and desiccation, weakening and dieback of the branches or even entire trees (Cohic, 1955 and Gill, 1997). Damage to fruit occurs in heavy infestations, where spotting and often deformity of fruits affects market value. Areas surrounding scales on fruit remain green long after the rest of the fruit ripens. The areas surrounding the scale insects on leaves turn yellow and when severely infested the entire leaf may be discoloured prematurely and be shed.

Aphytis lepidosaphes Compere (Hymenoptera: Aphelinidae) one of the most important bioagent for controlling the purple scale in different parts of the world (Dean, 1961, Abdel-Fattah and El-Saadany, 1978 and Hafez *et al.*, 1987 a and b).

The aim of the present work is to study population dynamics of the purple scale, *L. beckii* and its parasitoid, *A. lepidosaphes* on mango trees in Egypt.

MATERIALS AND METHODS

Dynamics of *L. beckii* on mango trees was carried out in Giza, governorate, during 2009 and 2010. The selected orchard did not receive any chemical control for two years before starting these studies and within studying period. All trees received the same horticultural practices. Twenty trees were selected at each groves infested with this scale insects. Selected trees were similar in size, shape, height and vegetation. Samples were picked up at two-week intervals throughout the study. Samples random size was 60 leaves presenting from all directions. The samples were packed in polyethylene bags with minute holes and transferred to the laboratory for examination, using stereoscopic microscope binocular. All alive insects found on each leaf surface was assorted and recorded as: nymphs and adults. Obtained data was pooled for each inspection, direction and leaf surface.

The abundance of parasitoid of purple scale was carried out 2009 and 2010 on mango trees in Giza. The location was heavily infested by the purple scale, *L. beckii* was selected to achieve investigations and was sampled monthly. During the study, no chemical control for the pest was performed on these trees. In the location 20 trees were selected randomly for sampling. Units of sampling consisted of 60 leaves. These were detached off and brought to the laboratory for inspection. Each leaf was stored in a well-ventilated emergence glass tube and monitored daily for parasitoid emergence. Rate of parasitism was determined by dividing the number of emerging parasitoid from each by the number of hosts scale existing.

Simple correlation and regression values were calculated to obtain information about the relationships between the three tested weather factors and the population of the purple scale and its parasitoid.

To calculate the age structure per sample, the mean number of each stage was divided by the total and multiplied by 100. This way gave each stage a percent proportion of the total per sample regardless the total number of insects presents (i.e. population density). The number of generations was determined using the obtained data throughout the two successive years using the age-structure technique per sample over the year. Generation is defined, as the time required for an insect to complete its life cycle. In the case of diaspidids, eggs are oviposited under the female shield until they hatch and crawl out. The only way to detect oviposition is by removal of the female shield. Gravid females are defined as females that have their eggs under their shields. The presence of gravid females is considered under this study as presence of the egg stage. This phenomenon was used to determine the end of each generation and the beginning of the next one.

RESULTS AND DISCUSSION

The results of *L. beckii* population dynamics on mango trees in Giza over 2009 and 2010 years are presented in Tables (1 and 2). The mean number of individuals were 588.2 and 330.2 individuals for nymphs and adults of *L. beckii*, respectively. Nymphs density reached its maximum on September 15th, 2009, showing 1385 Nymphs/sample. Lowest Nymphs density occurred during the period of January 1st showing 103 Nymphs/sample. Adults density was highest on September 15th, 2009 as 790 Adults/sample. Lowest population of adult was observed during Jan. 1st, 2009 with 68 Adults/sample (Table 1). The mean number of individuals were 1107.5 and 495.1 individuals for nymphs and adults of *L. beckii*, respectively. Nymphs density

reached its maximum on October 15th, 2010, showing 3610 Nymphs/sample. Lowest Nymphs density occurred during the period of January 15th showing 137 Nymphs/sample. Adults density was highest on October 15th, 1621 Adults/sample. Lowest population of adult was observed during January. 1st, 2010 with 81 Adults/sample (Table 2). The parasitoid recorded in this work was *A. lepidosaphes*.

Table (1): Population dynamics of the purple scale, *Lepidosaphes beckii* on mango trees in Giza Governorate) during 2009 season.

Inception date	Average no. of Individuals		Temp.		R.H. %	
	Nymphs	Adults	Max. Temp.	Min. Temp.	Max. R.H. %	Min. R.H. %
1/1/2009	103	68	26.5	17.0	65.1	42.3
15/1.	128	70	25.3	16.5	66.1	38.3
1/2.	135	82	24.2	16.2	65.1	36.5
15/2.	170	94	22.1	13.7	59.4	34
1/3.	191	122	26.0	16.4	54.4	27.2
15/3.	232	142	22	15.3	53.1	21
1/4.	271	155	27.3	15.4	54.3	25.9
15/4.	295	186	26.0	14.0	59.1	29.3
1/5.	301	197	34.2	21.3	55.6	24.3
15/5.	394	218	36.3	21.5	56.6	23.7
1/6.	427	255	37.2	25.1	58.1	26.2
15/6.	482	297	38.5	26.1	57.1	27.9
1/7.	503	334	37.4	26.5	63.6	34.6
15/7.	622	362	38.3	28.0	62.8	36.9
1/8.	933	451	38.2	26.3	62.9	41.7
15/8.	1001	578	38.2	27.0	64.5	43.2
1/9.	1320	687	37.5	26.2	60.1	28.7
15/9.	1385	790	37.2	26.0	63.9	33.6
1/10.	1376	682	38.3	26.2	62.6	34.1
15/10.	1289	609	34	23.3	61.5	34.5
1/11.	878	522	34.0	24.1	62.4	34.8
15/11.	723	439	33.0	23.1	63.3	37.6
1/12.	512	315	26.2	16.3	63.2	38.5
15/12.	450	270	27.0	15.4	62.4	34.5

Table 2: Population dynamics of the purple scale, *Lepidosaphes beckii* on mango trees in Giza Governorate) during 2010 season.

Inception date	Average no. of Individuals		Temp.		R.H. %	
	Nymphs	Adults	Max. Temp.	Min. Temp.	Max. R.H. %	Min. R.H. %
1/1/2010	137	81	Max. Temp.	Min. Temp.	Max. R.H. %	Min. R.H. %
15/1.	180	87	27.3	18.2	64.8	42.5
1/2.	199	90	26.1	18.5	67.3	37.4
15/2.	202	120	25.0	17.2	67.5	35.4
1/3.	218	134	23.0	14.7	60.7	35.1
15/3.	320	140	27.0	17.1	55.5	28.8
1/4.	355	155	22.9	16	54.1	22.1
15/4.	417	162	28.5	15.9	55.3	26.5
1/5.	490	204	27.0	15.0	60.3	27.2
15/5.	534	260	38.2	25.9	57.8	23.1
1/6.	610	281	37.3	24.7	57.4	24.5
15/6.	672	305	38.4	29.9	57.4	25.0
1/7.	755	346	39.0	26.5	55.9	25.5
15/7.	813	414	38.1	27.3	61.6	33.2
1/8.	1215	450	38.9	28.9	60.4	35.6
15/8.	1620	637	39.2	26.9	62.0	42.4
1/9.	2466	866	39.2	27.8	63.4	44.0
15/9.	2710	900	38.6	26.9	62.0	29.1
1/10.	3415	1400	38.0	26.8	64.0	34.2
15/10.	3610	1621	39.0	27.3	61.4	33.0
1/11.	2520	1305	36	24.0	60.9	33.4
15/11.	1788	902	35.2	24.5	60.2	33.5
1/12.	734	613	34.0	24.2	62.4	36.4
15/12.	599	410	27.4	17.1	62.8	37.0

During the first year (2009) no occurrence of parasitism was noticed during January and February Presence of parasitism continued low numbers until late Summer and increase gradually till early of Autumn reaching to maximum numbers of individuals 25 individuals per 60 leaves (Table 3).

Table 3: Population dynamics of parasitoid, *Aphytis lepidosaphes* associated with the purple scale, *Lepidosaphes beckii* on mango trees in Giza Governorate during 2009 season.

Inception date	Average no. of Individuals	Temp.		R.H.%	
	<i>Aphytis lepidosaphes</i>	Max. Temp.	Min. Temp.	Max. R.H.%	Min. R.H.%
1/1/2009	0	25.50	14.95	66.10	41.30
1/2.	0	22.45	14.10	60.25	34.25
1/3.	1	24.55	14.85	53.75	23.15
1/4.	2	25.60	13.80	56.70	29.10
1/5.	4	34.35	21.10	57.10	23.00
1/6.	9	37.40	24.50	58.60	26.55
1/7.	10	37.20	26.45	62.70	35.75
1/8.	12	37.45	26.00	65.20	40.95
1/9.	14	36.55	25.65	60.50	32.15
1/10.	25	35.80	24.25	62.05	35.15
1/11.	18	32.80	22.65	63.90	37.30
1/12.	2	25.50	14.95	63.70	37.60

During the second year (2010) no occurrence of parasitism was noticed during January, February and March. Presence of parasitism continued low numbers till late Summer and increase gradually till early of Autumn reaching to maximum numbers of individuals 31 individuals per 60 leaves (Table 4).

Table 4: Population dynamics of the parasitoid, *Aphytis lepidosaphes* associated with the purple scale, *Lepidosaphes beckii*, on mango trees in Giza Governorate) during 2010 season.

Inception date	Average no. of Individuals	Temp.		R.H.%	
	<i>Aphytis lepidosaphes</i>	Max. Temp.	Min. Temp.	Max. R.H.%	Min. R.H.%
1/1/2010	0	26.60	15.65	65.70	42.00
1/2.	0	23.55	14.80	59.85	34.95
1/3.	0	25.65	15.55	53.35	23.85
1/4.	1	26.70	14.50	56.30	29.80
1/5.	2	35.45	21.80	55.20	23.70
1/6.	7	38.50	25.20	58.20	27.25
1/7.	11	38.30	27.15	62.30	36.45
1/8.	15	38.55	26.70	64.80	41.65
1/9.	23	37.65	26.35	60.10	32.85
1/10.	31	36.90	24.95	61.65	35.85
1/11.	9	33.90	23.35	63.50	38.00
1/12.	5	26.60	15.65	63.30	38.30

Calculated means for obtained weather factors data over the fourteen days previous to each sampling date for the study period are presented in Tables (1 and 2). Temperature reaches its minimum around the year about Mid-Feb. (i.e. daily max. as 22.1C and min. as 13.7°C). It reaches its maximal around Mid-June (i.e. daily max. as 38.5C and min. as 26.1C). The general temperature pattern over the year for Giza can be characterized by mild Winter and hot Summer. Temperature reaches its minimum

around the second year about Mid-Feb. (i.e. daily max. as 22.1C and min. as 16.2°C). It reaches its maximal around First-Oct. (i.e. daily max. as 38.3C and min. as 28.0C).

Statistical analysis of the effect of weather factors on the population of *L. beckii* and its parasitoid during the two years under consideration was explained in Tables (5&6). It is concluded that maximum and minimum temperatures was significant on the population of *L. beckii* and its parasitoid, *A. lepidosaphes* while percent of relative humidity was nonsignificant.

Table 5: Simple correlation and regression values of the population dynamics of the purple scale, *Lepidosaphes beckii* and its parasitoid *Aphytis lepidosaphes* on mango trees in Giza Governorate during 2009 season.

Variable	Insect	Simple correlation "r"	Probability "P"	Regression	Probability "P"
Max. Temp.	Nymphs	0.91	***	0.41	Ns
Min. Temp.	Nymphs	0.92	***	0.29	Ns
Max. R.H. %	Nymphs	0.39	Ns	0.31	Ns
Min. R.H. %	Nymphs	0.22	Ns	0.21	Ns
Max. Temp.	Adults	0.90	***	0.23	Ns
Min. Temp.	Adults	0.91	***	0.45	Ns
Max. R.H. %	Adults	0.42	Ns	0.34	Ns
Min. R.H. %	Adults	0.39	Ns	0.27	Ns
Max. Temp.	<i>Aphytis lepidosaphes</i>	0.89	***	0.88	***
Min. Temp.	<i>Aphytis lepidosaphes</i>	0.94	***	0.85	***
Max. R.H. %	<i>Aphytis lepidosaphes</i>	0.46	Ns	0.36	Ns
Min. R.H. %	<i>Aphytis lepidosaphes</i>	0.31	Ns	0.33	Ns

***= Highly significant differences NS= No significant differences

Table 6: Simple correlation and regression values of the population dynamics of the purple scale, *Lepidosaphes beckii* and its parasitoid *Aphytis lepidosaphes* on mango trees in Giza Governorate during 2010 season.

Variable	Insect	Simple correlation "r"	Probability "P"	Regression	Probability "P"
Max. Temp.	Nymphs	0.88	***	0.38	Ns
Min. Temp.	Nymphs	0.85	***	0.31	Ns
Max. R.H. %	Nymphs	0.49	Ns	0.29	Ns
Min. R.H. %	Nymphs	0.37	Ns	0.24	Ns
Max. Temp.	Adults	0.86	***	0.26	Ns
Min. Temp.	Adults	0.83	***	0.38	Ns
Max. R.H. %	Adults	0.48	Ns	0.31	Ns
Min. R.H. %	Adults	0.41	Ns	0.25	Ns
Max. Temp.	<i>Aphytis lepidosaphes</i>	0.90	***	0.89	***
Min. Temp.	<i>Aphytis lepidosaphes</i>	0.87	***	0.87	***
Max. R.H. %	<i>Aphytis lepidosaphes</i>	0.41	Ns	0.42	Ns
Min. R.H. %	<i>Aphytis lepidosaphes</i>	0.27	Ns	0.27	Ns

***= Highly significant differences NS= No significant differences

The results of applying the age-structure technique to the seasonal abundance data of *L. beckii* obtained from the Giza location over the two years are tabulated in tables (7& 8) and figs (1&2). Obtained trend over both years indicated the occurrence of three generations per year for *L. beckii* on mango in this location. These three generations can be nominated as Autumn-Winter, Spring and Summer generations.

Over the first year the Autumn Winter generation continued up to March with percentages of occurrence 1.420 where part of them started to oviposit by March, 1.696. Therefore this generation was determined to end by March, 1.580. The Spring generation started from this point up till May 2.776. The date of June 3.534 was considered as the terminal time for the Spring generation. The Summer generation started there after and continued up till on September 9.866. Therefore the date of September was considered as the start point for the next Autumn Winter generation (Table7).

Table 7: Half monthly count of different stages of the purple scale, *Lepidosaphes beckii* arranged according formula suggested by Audemard & Millaire (1975) and Iacob (1977) during 2009 season.

Inception date	Average no. of Individuals		Total	Percentage of occurances		%
	Nymphs	Adults		Nymphs	Adults	
1/1/2009	103	68	171	0.729	0.858	0.776
15/1.	128	70	198	0.906	0.883	0.898
1/2.	135	82	217	0.956	1.035	0.984
15/2.	170	94	264	1.204	1.186	1.197
1/3.	191	122	313	1.353	1.539	1.420
15/3.	232	142	374	1.643	1.792	1.696
1/4.	271	155	426	1.919	1.956	1.932
15/4.	295	186	481	2.089	2.347	2.182
1/5.	301	197	498	2.132	2.486	2.259
15/5.	394	218	612	2.790	2.751	2.776
1/6.	427	255	682	3.024	3.218	3.094
15/6.	482	297	779	3.413	3.748	3.534
1/7.	503	334	837	3.562	4.215	3.797
15/7.	622	362	984	4.405	4.568	4.463
1/8.	933	451	1384	6.607	5.691	6.278
15/8.	1001	578	1579	7.089	7.293	7.162
1/9.	1320	687	2007	9.348	8.669	9.104
15/9.	1385	790	2175	9.808	9.968	9.866
1/10.	1376	682	2058	9.744	8.606	9.335
15/10.	1289	609	1898	9.128	7.685	8.609
1/11.	878	522	1400	6.218	6.587	6.350
15/11.	723	439	1162	5.120	5.539	5.271
1/12.	512	315	827	3.626	3.975	3.751
15/12.	450	270	720	3.187	3.407	3.266
Total	14121	7925	22046	100	100	100

Over the second year of study similar results were obtained. The Autumn Winter generation continued up to March with percentages of occurrence 0.915 where part of them started to oviposit by March, 1.196. The generation was determined to end by March, 1.550. The Spring generation started from this point up till May 2.064. The date of June 2.540 was considered as the terminal time for the Spring generation. The Summer generation started there after and continued up till on October 13.600. Therefore the date of October was considered as the start point for the next Autumn Winter generation (Table 8).

Table 8: Half monthly count of different stages of the purple scale, *Lepidosaphes beckii* arranged according formula suggested by Audemard & Millaire (1975) and Iacob (1977) during 2010 season.

Inception date	Average no. of Individuals		Total	Percentage of occurances		%
	Nymphs	Adults		Nymphs	Adults	
1/1/2010	137	81	218	0.515	0.682	0.567
15/1.	180	87	267	0.677	0.732	0.694
1/2.	199	90	289	0.749	0.757	0.751
15/2.	202	120	322	0.760	1.010	0.837
1/3.	218	134	352	0.820	1.128	0.915
15/3.	320	140	460	1.204	1.178	1.196
1/4.	355	155	510	1.336	1.304	1.326
15/4.	417	162	579	1.569	1.363	1.505
1/5.	490	204	694	1.844	1.717	1.804
15/5.	534	260	794	2.009	2.188	2.064
1/6.	610	281	891	2.295	2.365	2.317
15/6.	672	305	977	2.528	2.567	2.540
1/7.	755	346	1101	2.841	2.912	2.863
15/7.	813	414	1227	3.059	3.484	3.190
1/8.	1215	450	1665	4.571	3.787	4.329
15/8.	1620	637	2257	6.095	5.361	5.868
1/9.	2466	866	3332	9.278	7.288	8.663
15/9.	2710	900	3610	10.196	7.574	9.386
1/10.	3415	1400	4815	12.848	11.782	12.519
15/10.	3610	1621	5231	13.582	13.641	13.600
1/11.	2520	1305	3825	9.481	10.982	9.945
15/11.	1788	902	2690	6.727	7.591	6.994
1/12.	734	613	1347	2.762	5.159	3.502
15/12.	599	410	1009	2.254	3.450	2.623
Total	26579	11883	38462	100	100	100

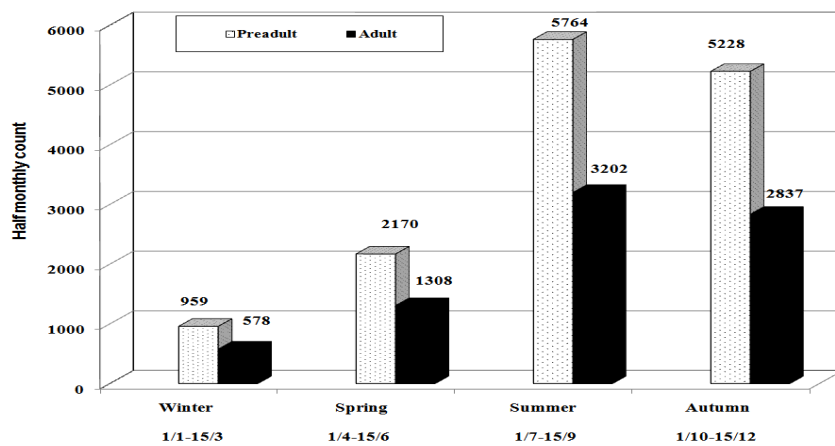


Fig. 1: Occurrence percent of the different stages of the purple scale, *Lepidosaphes beckii* on mango trees during 2009 season, at Giza Governorate.

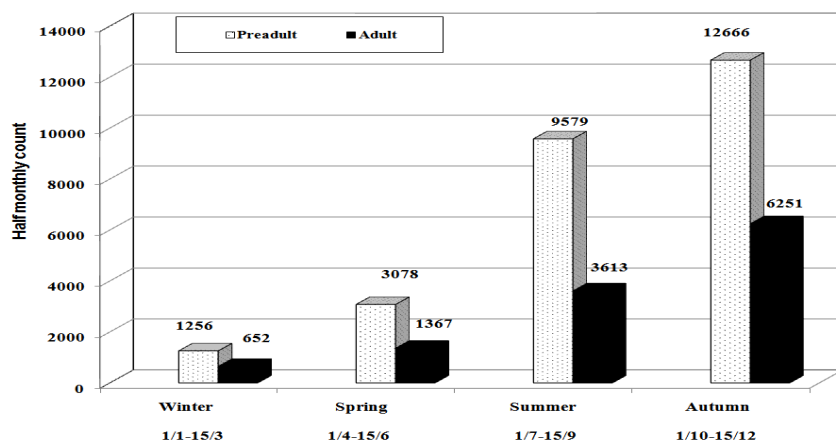


Fig. 2: Occurrence percent of the different stages of the purple scale, *Lepidosaphes beckii* on mango trees during 2010 season, at Giza Governorate.

The summary of applying cumulative heat units to determine *L. beckii* generations and its parasitoids are presented in Tables (9&11) for the first year while, Tables (10&12) for the second year.

Table 9: Half monthly counts of adult females of the purple scale, *Lepidosaphes beckii* arranged according formula suggested by Audemard & Millaire (1975) and Iacob (1977) during 2009 season.

Inception date	Accumulated days	Half monthly count	Accumulated half monthly count	Accumulated %
1/1/2009	1	68	68	0.858
15/1.	15	70	138	1.74
1/2.	30	82	220	2.78
15/2.	45	94	314	3.96
1/3.	60	122	436	5.50
15/3.	75	142	578	7.29
1/4.	90	155	733	9.25
15/4.	105	186	919	11.60
1/5.	120	197	1116	14.08
15/5.	135	218	1334	16.83
1/6.	150	255	1589	20.05
15/6.	165	297	1886	23.80
1/7.	180	334	2220	28.01
15/7.	195	362	2582	32.58
1/8.	210	451	3033	38.27
15/8.	225	578	3611	45.56
1/9.	240	687	4298	54.23
15/9.	255	790	5088	64.20
1/10.	270	682	5770	72.81
15/10.	285	609	6379	80.49
1/11.	300	522	6901	87.08
15/11.	315	439	7340	92.62
1/12.	330	315	7655	96.59
15/12.	345	270	7925	100
Total	345 days	7925	72133	100%

Table 10: Half monthly counts of adult females of the purple scale, *Lepidosaphes beckii* arranged according formula suggested by Audemard & Millaire (1975) and Iacob (1977) during 2010 season.

Inception date	Accumulated days	Half monthly count	Accumulated half monthly count	Accumulated %
1/1/2010	1	81	81	0.682
15/1.	15	87	168	1.41
1/2.	30	90	258	2.17
15/2.	45	120	378	3.18
1/3.	60	134	512	4.31
15/3.	75	140	652	5.49
1/4.	90	155	807	6.79
15/4.	105	162	969	8.15
1/5.	120	204	1173	9.87
15/5.	135	260	1433	12.06
1/6.	150	281	1714	14.42
15/6.	165	305	2019	16.99
1/7.	180	346	2365	19.90
15/7.	195	414	2779	23.39
1/8.	210	450	3229	27.17
15/8.	225	637	3866	32.53
1/9.	240	866	4732	39.82
15/9.	255	900	5632	47.40
1/10.	270	1400	7032	59.18
15/10.	285	1621	8653	72.82
1/11.	300	1305	9958	83.80
15/11.	315	902	10860	91.39
1/12.	330	613	11473	96.55
15/12.	345	410	11883	100
Total	345 days	11883	92626	100%

Table (11): Half monthly counts of the parasitoid, *Aphytis lepidosaphes* attacking the purple scale, *Lepidosaphes beckii* arranged according formula suggested by Audemard & Millaire (1975) and Iacob (1977) during 2009 season.

Inception date	Accumulated days	Half monthly count	Accumulated half monthly count	Accumulated%
1/1/2009.	1	0	0	0.000
1/2.	30	0	0	0.000
1/3.	60	1	1	1.031
1/4.	90	2	3	3.093
1/5.	120	4	7	7.22
1/6.	150	9	16	16.49
1/7.	180	10	26	26.80
1/8.	210	12	38	39.18
1/9.	240	14	52	53.61
1/10.	270	25	77	79.38
1/11.	300	18	95	97.94
1/12.	330	2	97	100
Total	345 days	97	412	100%

Table 12: Half monthly counts of the parasitoid, *Aphytis lepidosaphes* attacking the purple scale, *Lepidosaphes beckii* arranged according formula suggested by Audemard & Millaire (1975) and Iacob (1977) during 2010 season.

Inception date	Accumulated days	Half monthly count	Accumulated half monthly count	Accumulated%
1/1/2010	1	0	0	0.000
1/2.	30	0	0	0.000
1/3.	60	0	0	0.000
1/4.	90	1	1	0.962
1/5.	120	2	3	2.88
1/6.	150	7	10	9.62
1/7.	180	11	21	20.19
1/8.	210	15	36	34.62
1/9.	240	23	59	56.73
1/10.	270	31	90	86.54
1/11.	300	9	99	95.19
1/12.	330	5	104	100
Total	345 days	104	423	100%

In the present work the results indicated that the occurrence of three generations per year for *L. beckii* on mango in Giza. There are one to four generations depending on climatic conditions. In USA, California, there are 3-4 overlapping generations per year, (Gill, 1997), in Chile there is one generation annually (Zuniga,1971), and two in France (Bénassy *et al.*,1975). Later In Alabama Satsuma (USA), Fadamiro *et al.* (2008) stated that all stages of the purple scale were present in the orchards year-round, indicative of overlapping generations; however, the highest densities were recorded during the early season.

A. lepidosaphes was the most common parasitoid on *L. beckii* (Abdel-Fattah and El-Saadany, 1978 and Hafez *et al.*, 1987a). During the present work no occurrence of parasitism was noticed during January, February and March. Presence of parasitism continued low numbers until late Summer and increase gradually till early of Autumn. These results was contradicting with the data observed by Hafez *et al.*, (1987b). They stated that the large number of *L. beckii* parasitized by the immature stages of *Aphytis* spp. were associated with the increase of living scales during January and February. The highest percentage of parasitism with the immature stages of *Aphytis* spp. was observed during the Winter season, and the lowest percentage occurred during Spring, Summer and Autumn. Emerging of adults of *Aphytis* spp. was high from March to August and dropped during the period from September to February (Hafez *et al.*, 1987b). On the other hand the results of the present work agree with the results of Abdel-Fattah and El-Saadany (1978). They stated that the two periods of high activity of this parasitoid were found to occur throughout the year of study, the first from middle of August until the middle of December, whereas the second period lasted between the middle of March until the middle of June. The rate of parasitism reaches 58.5% in April, 66.5% in June and a peak of 84% in October.

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ARABIC SUMMARY

التوزيع الجغرافى على الحشرة الأرجوانية القشرية و الطفيل المتخصص عليها أفيتس لبيدوسافس كحشرة جديدة على المانجو فى مصر

نادية على

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى- جيزة-مصر

الحشرة الأرجوانية القشرية من أهم الآفات التى تصيب المانجو فى مصر. هذا العمل تضمن دراسات موسمية على الحشرة القشرية و الطفيل المتخصص عليها. الدراسة تم تنفيذها على اشجار المانجو فى محافظة الجيزة فى 2009-2010 وقد تم تسجيل نوع واحد من الطفيليات وهو أفيتس لبيدوسافس. وقد أتضح من التحليل الأحصائى للنتائج أن درجات الحرارة العليا و الدنيا كان لها تأثير معنوى على الحشرة الأرجوانية القشرية و طفيل أفيتس لبيدوسافس. بينما تأثير الرطوبة النسبية غير معنوى. وقد أتضح من النتائج أيضا أن هذه الآفة لها ثلاث أجيال فى محافظة الجيزة عندما تصيب المانجو.