SEASONAL FLUCTUATION OF THE LATANIA SCALE INSECT *HEMIBERLESIA LATANIAE* (SIGNORET) (HOMOPTERA: DIASPIDIDAE) ON FIG TREES IN NEWLEY RECLAIMED AREAS

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Abstract

Field experiments at Sharkia governorate (El-Khattara region) carried out to study the ecology of *Hemiberlesia lataniae* (Signoret) Homoptera: Diaspididae) on fig trees during two successive seasons 1994 and 1995. Obtained data showed that three peaks were recorded in January, April and November during the two seasons. The highest one was in January for both seasons, with more number in the first season. The main parasitoids on *Hemiberlesia lataniae* were *Aphytis* sp. and *Aspidiotiphagus* sp. Percentage of parasitism during 1994, had two peaks of activity in July and September, while one peak only in June was recorded in 1995. Parasitism was more higher in spring and summer than in autumn and winter. Three overlapping generations were recorded in both seasons, the first, required about three months, the second generation required about seven months, and the third was about two months. The second generation was the weakest one, compared with other generations. Combined effect of temperature and sunny shine had a positive highly significant effect, while R.H. % and sunny shine showed a negatively significant effect on all stages.

INTRODUCTION

Fig trees, (*Ficus carica*) is considered one of the most important fruit crop in newly reclaimed areas. A lot of efforts and attempts were done to obtain crop with high quality which will be acceptable for the foreign export market. According to the journal of Agriculture Economic (Minstry of Agriculture), 1986 and 1996, the total cultivated area of fig trees in Egypt has been rapidly increased and reached to about 3624 feddans producing a yield of approximately 10032 tons fig fruits. These areas increased during few year and reached about 63554 fiddans in (1996) producing a yield of approximately 202697 tons.

Latania scale insect, *H. lataniae* is usually considered as the most important pest of fig trees. The super family Coccoidea includes the greatest numbers of insect species, which attack this crop, causing serious damage, distortion of foliage, fruit, blossoms, tummer formation and reduction in the general plant vigors. Moreover, physiological disturbances are expected to occur, such as plasmolysis, secretional, honeydew which provides a suitable media for the growth of sooty mould.

Hall, (1923 and 1924), Brimblecombe, (1968) noticed the crawlers of *H. lataniae* during March to April and from July to August on infested fruit trees in Alexandria. Also, they added that females increased during summer months towards a peak occurred at the beginning of August. El- Minshawy *et al.,* (1972) stated that *Hemiberlesia latania* (sign) has three generations a year when reared in laboratory on Pumpkin, the crawlers being present in September- October, March- April and July-August, reproduction was parthenogenic. He added that *Hemiberlesia lataniae* (sign.) had two generations a year in the field, reached maximum abundance in September. Salama and Hamdy, (1974) recorded that the crawlers of this insect were found during March to April and from July to August on infested fruit trees in Alexandria-while adult females increased in summer months towards a peak existing at the beginning of August.

Fawzia, Hassanin and Hamed (1985) mentioned that *Hemiberlesia lataniae* has four peaks on *Ficus nitida* trees throughout the year, which occurred at the second week from each, April, Jun and December and the first week of August. Mean temperature, was 20.3 C°, 28.5 C° and 14.5 C° during these periods, respectively. Medina - Gaud *et al,* - (1987) in Puerto Rico reported that the coccids *Astendecanium pustuians* (ckll.) and the Diaspidides. *Hemiberlesia Latania* (Sign.) were collected from heavily infested twiges and leaves of Nispero. Mansour *et al* (1991) noticed that the population dynamics of *H. Lataniae* and its parasite in Sharkia Govemorate during two seasons (1987-1988). The population density in the first year was higher with about two times more than that in the second year, and it has 2-8 times more in the inner zone of trees (guava trees) than in the peripheral one.

The aim of the present work is to study the occurrence and seasonal fluctuation of all stages and its associated parasitoids on fig trees in newly reclaimed areas.

MATERIALS AND METHODS

The present work was carried out at El-Khattara region, El-Sharkia Governorate, during two successive years, (1994 and 1995).

Five fig trees of similar size, age and vegetation were chosen to study this insect fluctuations. Samples of 12 terminal branches cuttings 30 cm long diameter 0.8 cm each for every tree.

Sample size was 60 cuttings representing 5 trees 12 terminal cutting branch. These samples were chosen randomly from different heights and directions and kept in polyethelene bags, then samples were transferred into the laboratory and examined by the aid of sterio-microscope bionocular. Alive and dead stages of *H. Lataniae* and

its parasitoids were recorded. Recorded weather factors prevailing during the experiment period were obtained from the meterorological station, also light intensity measured by luxmetr in the field when the sun was perpendicular on the earth 12 a.m.

Obtained data were statistically analyzed by using simple correlation and partial regression (Fisher 1950).

RESULTS AND DISCUSSION

Hemiberlesia lataniae (Signoret)

Hemiberlesia lataniae is considered as one of the most important armored scale insect infesting fig trees in Egypt. The seasonal fluctuation of different stages and peaks of activity for each stage and its parasites were also counted and recorded.

I. Female population:

During the first season 1994, data given in (Table 1) indicated that females of *H. Lataniae* had three peaks of activity in January (6601), April (5500) and November (871 female). On the other hand, in the second season 1995 peaks only two were recorded in February (2248 female) and November (1211 female). The total number of *H. Lataniae* females were higher in the first season in comparison with the second one with approximately ratio of 3:1.

2. Nymphs population,

Population density of nymphs (Tables 1 &2), indicated that there were three peaks of activity for both season, 1994 and 1995, in January (12958 & 14258 nymphs), April (7283 & 4216 nymphs) and November (10337 & 15147 nymphs). On the other hand, the total number of nymphs in the first season, 1994 was higher than in the second one.

3. Total alive stages:

Data tabulated in (Tables 1&2) showed that the total alive stages of *H. Lataniae* on Fig trees has the same behaviour in which three peaks in January (19509 & 15292 scales), April (12783 & 4646 scales) and November (11208 & 16358 scales) during the two seasons 1994 & 1995 were found. The highest one was recorded in January for both seasons. According to the total numbers of insects, it could be noticed that the infestation during the first season was higher than that in the second one, which numbers were recorded (72402 scales) (53624 scales) in the first and second season, respectively.

The above maintained results were in agreement with the studies by Shahein *et al.*, (1987), recorded that two periods of abundance with three peaks on Guava, the

first peak in June, the second and highest in October and the third in December. Mansour *et al.,* (1991), stated that *H. Lataniae* has three peaks of infestation on Guava trees during two seasons 1987 & 1988. The main period of activity occurred during winter and early spring in the first season and during the whole period of the second season except in summer months.

4. Total of non alive insects and Percentage of total mortality:

Two peaks of total non alive insects were recorded during the first season 1994 in January (3095 individual) and April (5906 individual), where the highest one occurred in April (5906 individual), while in the second season 1995, four peaks of dead insects were recorded in January (6514 individual), March (5794 individual), July (1507 individual) and November (885 individual). On the other hand the total numbers of non alive insects in the first season 1994 was higher than in the second one (Tables, 1 and 2).

Also, four peaks of total percentage mortality during the first season, 1994 were recorded in January (13.7%), March (40%), June (72.3%) and September (34.5%), while in the second season 1995 three peaks were recorded in January (29.9%), March (70.5%) and July (85.6%).

5. Percentage of parasitism:

Data given in (Tables, 1&2), cleared that in the first season, 1994, two peaks of activity were recorded in July (10.7%) and September (9.9%). While in the second season, 1995 only one weak peak was recorded in June (3.8%).

On the other hand, considering parasitism percentage during the four seasons (spring, summer, autumn and winter) it could be noticed that in both season parasitism was higher in spring and summer in comparison with autumn and winter. Also, parasitism percentage during the first season was higher than in the second one. These results were in agreement with the studies by Taraboulsi, (1969), in Lebanon recorded, *Aphytis maculicornis* on *H. Lataniae.* Mansour *et al.,* (1991), who mentioned that *Aphytis* sp was found as effective parasite on *H. Lataniae,* with 2-3 peaks of parasitism during the two seasons

6. Effect of climatic factors:

* **On Female:** Results obtained in (Tables, 3&4) indicated that in the first season, 1994 both temperature and sunny shine had a negatively significant effects (r <= -0.6287* & -0.6091 *), while in the second season, 1995,a negatively highly significant effect for these factors (r = -0.8287** and -0.7213**) were found.
* **On Nymphs:** Data given in (Table, 3) showed that in the first season 1994 both of temperature and sunny shine have a negatively highly significant effects on nymphs where, (r =-0.8191** and-0.8624**), Table (3), while light intensity

has less significantly effect, where (r = -0.6648*).

In the second season 1995 sunny shine and temperature had a negatively significant effect on nymphs r = -0.7292** and -0.6375*, respectively (Table 4).

* **On total alive stages:** Data given in Tables (3 & 4), indicated that in, a negatively highly significant effect for both temperature and sunny shine were recorded in the first season 1994 where r = -0.7965**&-0.8194**, respectively, also light intensity had a less negatively significant effect where r = -0.6251*.

In the second season 1995 sunny shine had a negatively highly significant effect on total alive insects (r =-0.7780**), while temperature had less negatively significant influence (r = -0.6988*).

* **On Total of non alive and on mortality** %: Data given in (Tables, 3&4) indicated that there is no significant effect for the tested climatic factors on non alive insects during the two seasons.

However sunny shine had positively significant effect on percentage of mortality in both seasons (r = -0.7168* & -0.7526**), respctively.

* **Percentage of parasitism:** Data given in Table (3) showed, that in the first season 1994, temperature and sunny shine had a positively highly significant effect on percentage of parasitism where (r = -0.7564** and 0.6473*) for both factors, respectively. On the other hand in the second season 1995, R.H % had a negatively highly significant effect on percentage of parasitism (r = -0.8456**), while sunny shine had a positively significant effect, where (r = 0.6611 *).

7. Combined effect of climatic factors:

The statistical analysis of the combined effect of all tested climatic factors on all previously mentioned aspects was giving in (Tables 3&4). In the first season 1994 it was clearly noticed that the combined effect between temperature and both of sunny shine and light intensity had a highly positively significant effect where (r = 0.8123** and 0.7488**), respectively, while R.H % in relation with the same factors had a negatively significantly effect where (r= -0.5866* and-0.7451**) for both factors respectively. A positively highly significantly effect was obtained between sunny shine and light intensity, (r = 0.7555*).

In the second season, 1995 the combined effect between all tested climatic factors was less than in the first one. Temperature effect was a positively highly significantly with sunny shine, where (r = 0.9115**), while R.H% had a negatively significantly effect with sunny shine (r = -0.6299*).

Generally in both seasons the combined effect between temperature and sunny shine indicated that a positively highly significantly effect on all stages, while between RH% and sunny shine had a negatively significantly effect.

These results were in agreement with, the studies of Mansour *et al.,* (1991), who mentioned that the effect of abiotic factors showed that there was a strongly correlated between temperature and both of insect population and its parasites, and the combined effect between temperature and peripheral light intensity during both seasons, which showed positive highly significant effects, and between R.H % and inner light intensity, revealing a negative significantly effect. Negative significantly combined effects were also recorded between temperature and R.H %.

8. Number of generations

Results in tabulated (Table 5) and (Fig 3) indicated three overlapping generations for both seasons, 1994 and 1995 by using method of Audemerd and Millairel, (1975), and emended by Jacob (1977). The first generation took about three months in both season, from the beginning of January till the end March. The second lasted about seven months in both seasons, beginning of April till the end of October. The third for both season, 1994 and 1995 took about two months from the beginning of October till the end of December.

Generally three overlapping generations were recorded in both seasons. The first and the third overlapping generations for both seasons 1994 and 1995 was the highest one, while the second generation was the weakest one, for both generations as it lasted for about 7 months.

These results were in agreement with Mansour *et al,* (1991) who mentioned that *H. Lataniae* had three generations on Guava trees in Sharkia Governorate. On the other hand, EL- Minshawy *et al (1912Y* recorded two only generations for *H. Lataniae* in field. Fawzia Hassanien and Hamed, (1985) found four peaks for *H. Lataniae* on *Ficus nitida* trees.

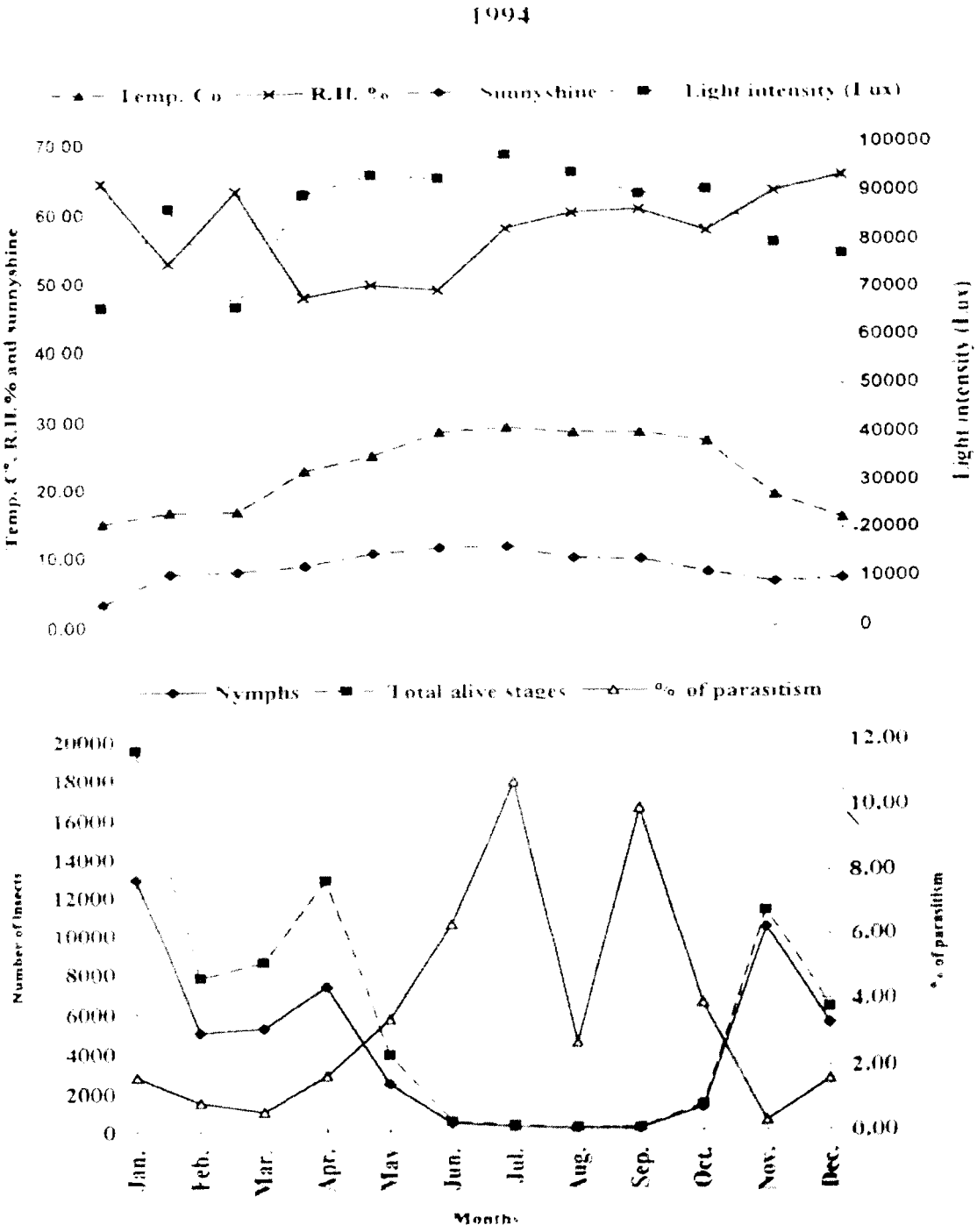
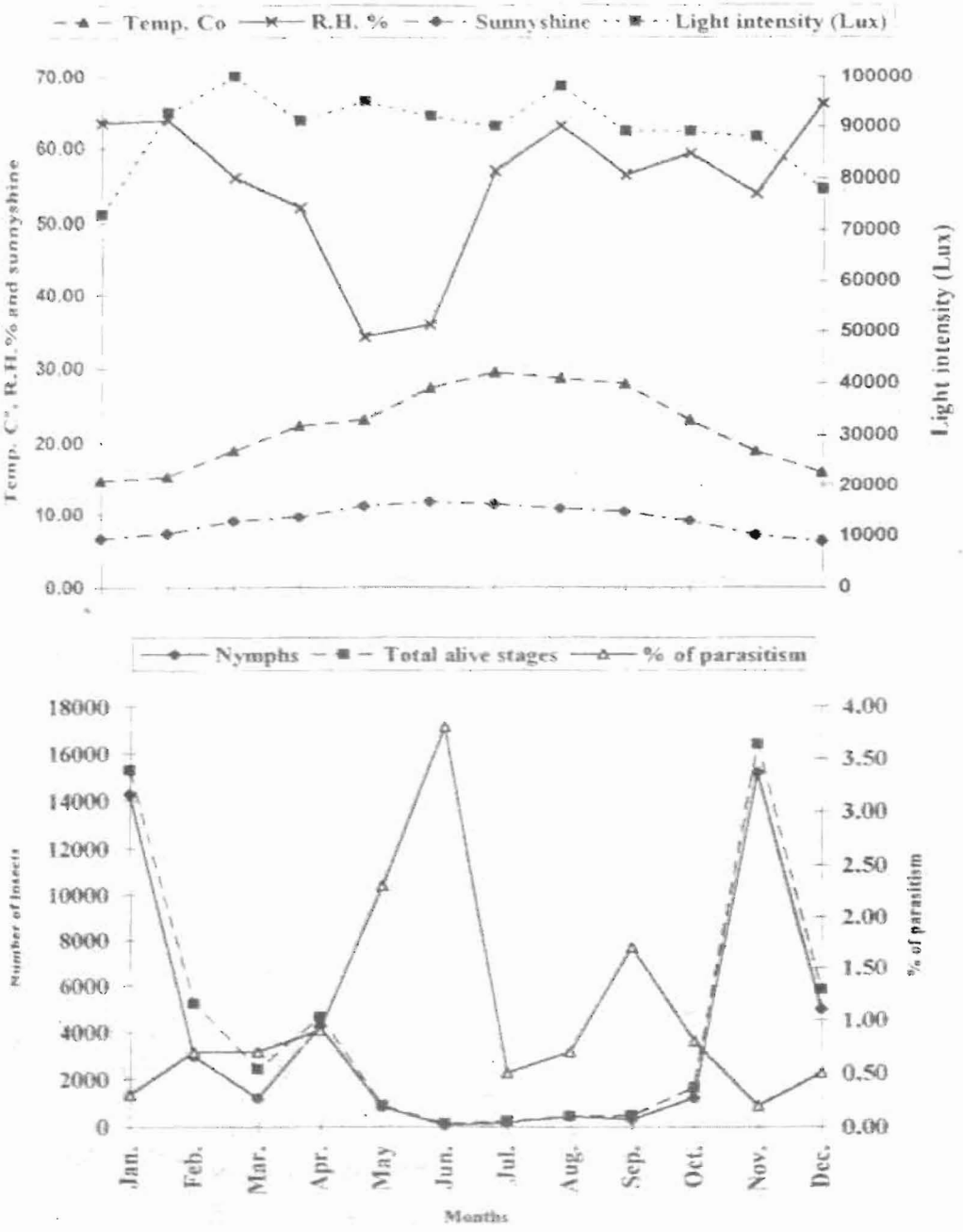


Fig. 1. Seasonal abundance of *H. lataniae* and percentage of parasitism on fig trees during the first season 1994.



the second season 1995.

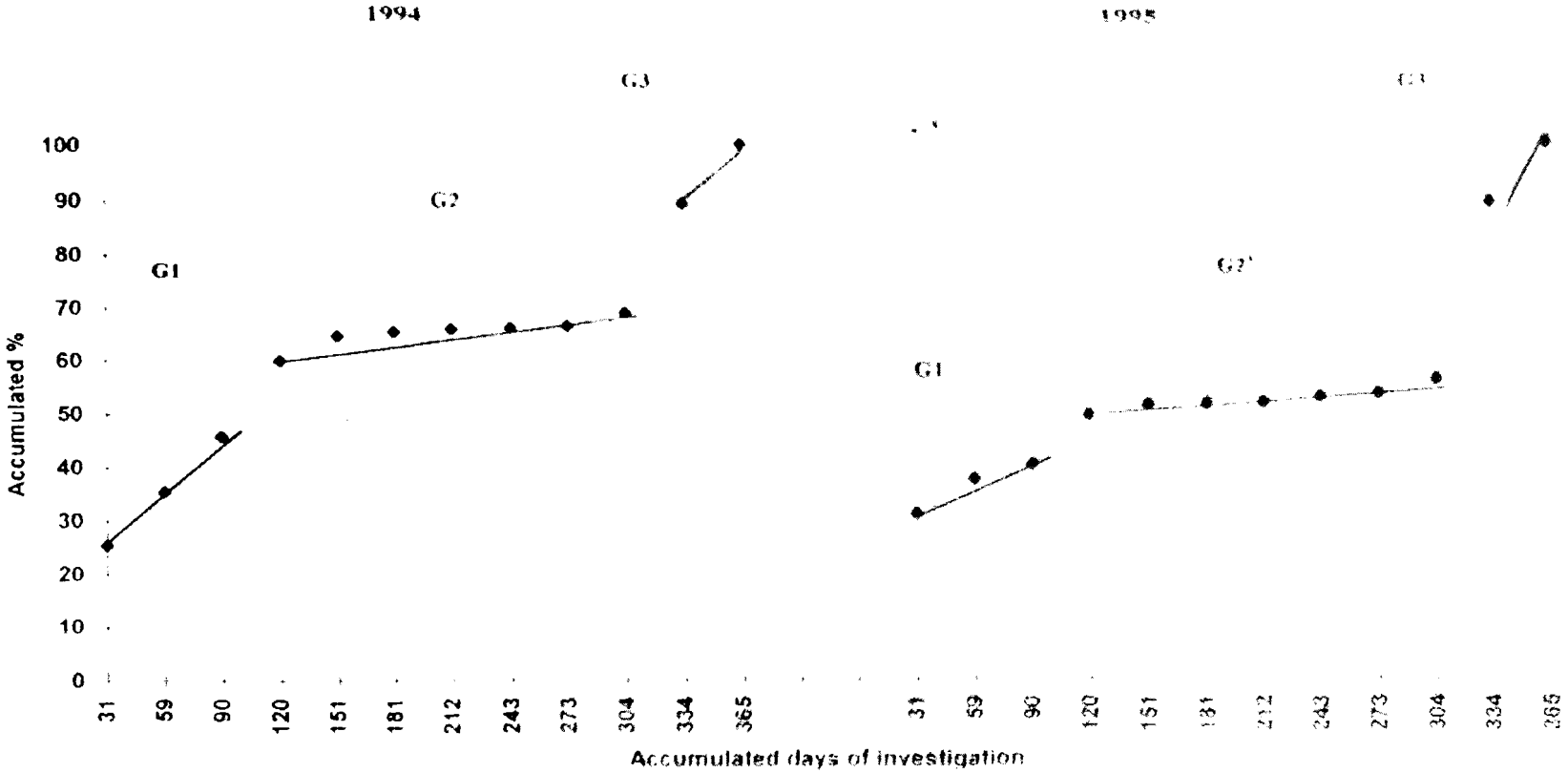


Fig. 3. Annual generations and duration of *Hemibelasia Lantaniure latcmiae* under field condition on fig trees during the two seasonsl994 and 1995.

Table 1. Seasonal abundance of *Hemiberlesiae lataniae* on fig trees in El-Khattara region, Sharkia Governorate during the first season 1994.

Months	Number of insects/60 twigs						Monthly average of climatic factors			
	Alive			Total of non alive insects	Mortality (%)	Parasitism (%)	Temp. (°C)	R.H. (%)	Sunny shine (hr.)	Light intensity (Lux)
	Females	Nymphs	Total							
Jan.	6601	12908	19509	3095	13.7	1.7	15.0	64.5	3.4	66400
Feb.	2715	5058	7773	1178	13.2	0.9	16.6	53.0	7.6	78000
Mar.	3292	5243	8535	5680	40.0	0.6	16.7	63.3	7.9	66400
Apr.	5500	7283	12783	5906	31.6	1.7	22.7	47.7	8.7	89600
May	1452	2443	3895	3456	47.0	3.4	24.9	49.6	10.4	93600
Jun.	107	387	494	1288	72.3	6.3	28.3	48.8	11.3	92800
Jul.	61	214	275	168	37.9	10.7	29.0	57.9	11.4	97600
Aug.	31	107	138	55	28.5	2.7	28.3	60.1	9.7	94000
Sep.	37	126	163	86	34.5	9.9	28.2	60.5	9.6	89600
Oct.	154	1208	1362	182	11.8	3.9	26.9	57.5	7.7	90400
Nov.	871	10337	11208	782	6.5	0.3	19.0	63.0	6.3	79600
Dec.	798	5469	6267	1454	18.8	1.6	15.6	65.3	6.8	77200
Total	21619	50783	72402	23330	24.4	3.6				

Table 2. Seasonal abundance of *Hemiberlesiae lataniae* on fig trees in El-Khattara region, Sharkia Governorate during the second season, 1995.

Months	Number of insects/60 twigs						Monthly average of climatic factors			
	Alive			Total of non alive insects	Mortality (%)	Parasitism (%)	Temp. (°C)	R.H. (%)	Sunny shine (hr.)	Light intensity (Lux)
	Females	Nymphs	Total							
Jan.	1034	14258	15292	6514	29.9	0.3	14.7	63.4	6.6	73000
Feb.	2248	2954	5202	1376	20.9	0.7	15.3	63.8	7.3	92.667
Mar.	1222	1200	2422	5794	70.5	0.7	18.9	56.0	9.0	100000
Apr.	430	4216	4646	1304	21.9	0.9	22.3	52.0	9.6	91000
May	54	852	906	552	37.9	2.3	23.1	34.2	11.1	95000
Jun.	82	62	144	222	60.7	3.8	27.3	35.8	11.7	92000
Jul.	83	171	254	1507	85.6	0.5	29.4	56.9	11.4	90000
Aug.	25	436	461	1196	72.2	0.7	28.6	63.1	10.8	98000
Sep.	179	302	481	407	45.8	1.7	27.9	56.4	10.3	89000
Oct.	424	1229	1653	179	9.8	0.8	23.1	59.3	9.1	89000
Nov.	1211	15147	16358	885	5.1	0.2	18.8	54.0	7.1	88000
Dec.	853	4952	5805	405	6.5	0.5	15.9	66.2	6.2	78000
Total	7845	45779	53624	20341	27.5	1.1				

Table 3. Statistical analysis based on correlation coefficient (r) indicated the effect of climatic factors on different stages of *H. lataniae* on fig trees in El-Khattra region, Sharkia Governorate during First season 1994 season.

	Temp. (°C)	R.H. (%)	Sunny shine (hr.	Light intensity (Lux)	Combined effect			
						R.H. (%)	Sunny Shine (hr.)	Light intensity (Lux)
Female	-0.6283*	-0.0261	-0.6091*	-0.4632	Temp. (°C)	-0.4287	0.8123**	0.7488**
Nymphs	-0.8191**	0.3308	-0.8624**	-0.6648*	R.H. (%)		-0.5866**	-0.7451**
Total number of alive	-0.7965**	0.2192	-0.8194**	-0.6251*	Sunny shine			0.7555**
Total of non alive insects	-0.4454	-0.2254	-0.1921	-0.1808				
% of total mortality	0.5159	-0.5389	0.7526**	0.3501				
% of parasitism	0.7564**	-0.1471	0.6473*	0.3562				

Table 4. Statistical analysis based on correlation coefficient (r) indicated the effect of climatic factors on different stages of *H. lataniae* on fig trees in El-Khattra region, Sharkia Governorate during second season 1995 season.

	Temp. (°C)	R.H. (%)	Sunny shine (hr.	Light intensity (Lux)	Combined effect			
						R.H. (%)	Sunny Shine (hr.)	Light intensity (Lux)
Female	-0.8287**	0.4621	-0.7213**	-0.2979	Temp. (°C)	-0.3816	0.9115**	0.3171
Nymphs	-0.6375*	0.2655	-0.7292**	-0.1465	R.H. (%)		-0.6299*	-0.2323
Total number of alive	-0.6988*	0.3051	-0.7780**	-0.1735	Sunny shine			0.2802
Total of non alive insects	-0.4612	0.3689	-0.3388	-0.4339				
% of total mortality	-0.2778	0.1606	0.7168*	0.2501				
% of parasitism	-0.0498	-0.8456**	0.6611*	0.1313				

Table 5. Number of generations and duration of *H. lataniae* on fig trees in El-Khattara region, Sharkia Governorate during the seasons, first and second 1994 and 1995.

Months	Accumulated days of investigation	1994			1995		
		Monthly counts of nymphs	Accumulated monthly counts	Accumulative (%)	Monthly counts of nymphs	Accumulated monthly counts	Accumulative (%)
Jan.	31	12908	12908	25.42	14258	14258	31.15
Feb.	59	5058	17966	35.38	2954	17212	37.60
Mar.	90	5243	23209	45.71	1200	18412	40.22
Apr.	120	7283	30492	60.04	4216	22628	49.43
May	151	2443	32935	64.86	852	23480	51.29
Jun.	181	387	33322	65.62	62	23542	51.42
Jul.	212	214	33563	66.04	171	23713	51.80
Aug.	243	107	33643	66.25	436	24149	52.75
Sep.	273	126	33769	66.50	302	24451	53.41
Oct.	304	1208	34977	68.88	1229	25680	56.10
Nov.	334	10337	45314	89.23	14147	40827	89.18
Dec.	365	5469	50783	100	4952	45779	100

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التقلبات الموسمية لحشرة اللاتانيا القشرية على أشجار التين فى المناطق المستصلحة حديثا

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أجريت التجارب بمزرعة كلية الزراعة – جامعة الزقازيق بمنطقة الخطارة محافظة الشرقية عامي ١٩٩٤، ١٩٩٥ على أشجار التين وكانت النتائج المتحصل عليها كالاتى:

شوهد لحشرة اللاتانيا القشرية على التين ثلاث ذروات خلال عامي الدراسة سجلت في يناير وابريل ونوفمبر عامى ١٩٩٤ و ١٩٩٥. وان أعلى ذروة سجلت في يناير خلال عامي الدراسة .

سجلت الطفيليات *Aphytis* sp ، *Aspidiatiphagus* sp. على حشرة اللاتانيا القشرية خلال عامي الدراسة ولوحظ أن لها ذروتين فى يوليه وسبتمبر فى عام ١٩٩٤ بينما شوهد لها ذروة واحدة فى يونيه عام ١٩٩٥.، كما لوحظ أن مجموع نسب التطفل كانت أعلا في الربيع والصيف مقارنة بفصلي الخريف والشتاء خلال عامي الدراسة.

سجل للحشرة ثلاث أجيال خلال عامي الدراسة ١٩٩٥،١٩٩٤ الجيل الأول مدته ثلاث شهور والثاني سبعة شهور بينما اخذ الجيل الثالث شهرين وان الجيل الثاني كان الأضعف.

كذلك وجد ارتباط معنوي موجب بين كل من درجات الحرارة وعدد ساعات النهار بينما كان الارتباط معنوي سالب بين كل من الرطوبة النسبية وعدد ساعات النهار على جميع الأطوار خلال عامي الدراسة.