

BIOLOGICAL, ECOLOGICAL AND SURVEY STUDIES ON TREE INSECT BORERS IN BURG EL-ARAB

By

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ABSTRACT

Survey on tree insect borers had been done to throw light on the widespread serious borers in Burg El-Arab. Biological and ecological investigations on two harmful borers, *Paropta paradoxa* on grapevine and *Hesperophanes griseus* on fig trees were carried out during 1997-1999. Eight injurious insect borers were recorded on seven fruit and wood tree hosts. Rate and degree of borers infestation on their different tree hosts were estimated. External and internal damage caused by *P. paradoxa* and *H. griseus* were determined.

Larval and pupal duration of *P. paradoxa* and *H. griseus* lasted for 338.5 ± 4.0 days (at 20.8°C and 63.5% R.H.) and 325.3 ± 3.8 days (at 20.6°C and 61.3% R.H.), respectively.

A single larva of *P. paradoxa* and *H. griseus* which survived (291-335) and (277-323) days consumed 94.8 and 45.5 cm in length of wooden tissues of grapevine and fig branches, respectively.

Moths of *P. paradoxa* started to appear from grapevine trees during late May or early June and continued to October. Two peaks of moths emergence were recorded during the 2nd half of July or the 1st half of August and the 1st half of September. Beetles of *H. griseus* began

to appear from fig trees during April and resumed to late October or early November. Two peaks of beetles emergence were existed in the 1st half of June and the 1st or the 2nd half of August.

Reinfestation one year later raised the adult population of *P. paradoxa* and *H. griseus* by 26.0 moths and 108.2 beetles per tree, respectively.

INTRODUCTION

Burg El-Arab is one of the new constructed cities located at the west of Alexandria, Egypt. Numerous various types of wood, fruit and ornamental trees, as well as, other plantations are cultivated in Burg El-Arab.

The present work is directed to exploration of fruit and wood trees to determine the infestation status with insect borers. Trees undergo severe borer infestation may be doomed to fail, weakness and finally death. Hence, some ecological and biological main aspects were monitored on *P. paradoxa* in grapevine and *H. griseus* in fig orchards to get information about their injuriousness, behaviour, duration of immature stages and seasonal abundance under dominant ecological factors.

Survey and/or ecology and/or biology previous studies on widespread serious borers; *Zeuzera pyrina*, *Paropta paradoxa*, *Synanthedon myopaeformis* and *Hesperophanes griseus* were investigated by Mokhtar (1977), Kinawy (1977 and 1981), Tadros (1977 and 1982), Khattab *et al.* (1982), El-Sherif *et al.* (1985), ~~Shehata~~ (1990), Mesbaah *et al.* (1994) and others in Egypt.

The present work comprised the following main points :

1. Evaluation of wood borers infestation on their tree hosts in Burg El-Arab.

2. Estimation of the period of *P. paradoxa* and *H. griseus* immature stages under laboratory and field conditions.
3. Determining the perfect time of adult emergence and peaks of *P. paradoxa* in grapevine and *H. griseus* in fig orchards during 1998-1999.

MATERIALS AND METHODS

The present work on wood borers had been done under prevailing environmental factors in Burg El-Arab district during 1997-1999.

1. Status of Tree Borers Infestation :

In January 1997, three areas cultivated with different fruit and wood trees were selected. Fifty randomly trees/species/area were chosen. Age of trees was recorded. Borer infestation was determined. Old adult exit holes were marked with paint. In January 1998, the newly adult exit holes were calculated. Rate and degree of each borer infestation were estimated according to the following equations :

Rate of infestation (percent of infested trees) = No. of infested trees / No. of examined trees x 100

Degree of infestation (mean no. of adult exit holes) = Total no. of holes / total no. of examined trees

In case of bark beetles, the degree of infestation was measured based on the mean number of adult exit holes/cut of branch (15 cm long and 2 cm thickness).

2. Biological and Ecological Studies :

Some ecological and biological aspects were practiced on serious widespread borers, *P. paradoxa* on grapevine and *H. griseus* on fig under laboratory and field conditions.

2.1. Biological studies :

2.1.1. The insect borer *P. paradoxa* :

In April 1997, pruned branches infested with *P. paradoxa* were collected. Branches were dissected in the laboratory to collect twenty full grown larvae which were individually kept in wooden rearing cages (15x10x8 cm) provided with the branches sawdust as a substrate for pupation. Soon after pupation, the pupae were individually wrapped in tender paper and gently kept in small specimen tubes (1x4 cm). Each tube was introduced to a glass jar (7x12 cm) lined with muslin to give the emerging moth a suitable grasp. Each newly emerged pair of moths (one female and one male) was transferred into oviposition cage (5 cm in diameter and 15 cm high) provided with a cut of grapevine branch which was injured to encourage oviposition. Cages were daily inspected to renew cut branches. Cut branches contain recent eggs were kept individually in rearing larval boxes and daily examined to observe the newly hatched larvae. The newly hatched larvae gently transferred with thin brush into small tubes provided with very few branch sawdust, and immediately used to perform artificial infestation. Thirty healthy trees (4-5 years old) were artificially infested (one larva/tree). Selected branches were artificially injured to facilitate entrance of tiny larvae. Starting from February 1998, trees were weekly inspected to determine time of adult emergence (presence of the empty pupal skins).

2.1.2. The insect borer *H. griseus* :

In August 1997, samples branches infested with *H. griseus* were collected. Twenty full grown larvae were obtained from these samples and kept individually in larval rearing boxes provided with larval boring sawdust to encourage pupation. Boxes were daily inspected to observe pupation. Pupae were kept individually in petri-dishes and daily checked untill beetle emergence. Each pair (♂, ♀) of beetles was introduced into wooden rearing cage (15x10x8 cm) together with small artificial injured fig cutting to serve as an oviposition site. Cages were daily examined to renew cuttings and notice egg occurrence. Fig cuttings with recent eggs were kept individually into larval rearing cages and daily checked to notice the newly hatched larvae. Out of 30 newly hatched larvae were

gently transferred into small tubes containing branch sawdust, and immediately taken to a healthy fig orchard (about 5 years old) for making artificial infestation (one larva/tree). Starting of early April 1988, weekly inspections were carried out to determine time of adult emergence (presence of adult exit holes).

The above rearing technique of each of *P. paradoxa* and *H. griseus* was practiced to record the duration of pupal stage under laboratory conditions, the period of larval together with pupal stages and the approximate larval duration under field conditions.

After adult emergence, artificial infested branches were carefully examined and dissected to give information on the external and internal symptoms of infestation as well as to measure size of damage caused by a larva/tree (wooden tissues consumed / larva).

2.2. Ecological studies :

The seasonal fluctuations in *P. paradoxa* and *H. griseus* population were conducted in grapevine and fig orchards, respectively, under the prevailing ecological factors in Burg El-Arab district during 1998-1999.

2.2.1. The insect borer *P. paradoxa* :

Twenty randomly grapevine trees (*Vitis vinifera*) of about 18 years old, heavily infested with *P. paradoxa* were selected. The old pupal skins protruding from all selected trees (indicating moth emergence) were removed. Starting from January 1998 untill December 1999, counts of new pupal skins were regularly practiced twice a month. On each inspection, the counted pupal skins were removed to avoid double counting later.

2.2.2. The insect borer *H. griseus* :

Another experimental work had been done on *H. griseus* in fig orchard. Twenty randomly heavily infested fig trees (*Ficus carice*) of about 17 years old were marked. The old exit holes of beetles were

painted. During the period from early January 1998 to late December 1999, half-monthly inspections were carried to count new adult exit holes occurred on the trunk and branches of selected trees. After each inspection, exit holes were painted to prevent repeating count.

The above ecological studies on *p. paradoxa* and *H. griseus* aimed to generate knowledge about the seasonal abundance, peaks of adult emergence and cumulation of infestation.

RESULTS AND DISCUSSION

1. Status of Tree Boring Insects Infestation in Burg El-Arab District During 1998 :

Data in Table (1) show rates and degress of boring insects infestation on different hosts of fruit and wood trees throughout one year of study. It was obvious that eight insect borers, i.e., *Zeuzera pyrina* L., *Paropta paradoxa* H.-Schaeff, *Synanthedon myopaeformis* Borkh., *Hesperophanes griseus* F., *Chlorophorus varius* Mull., *Stromatium fulvum* Willers, *Scolytus amygdali* Guer. and *Stephanoderes vulgaris* Schauff. were recorded on seven fruit and wood tree hosts, i.e., apple (5-15 years), pear (7-15 years), olive (6-27 years), almond (9-20 years), fig (5-17 years), grapevine (7-18 years) and casuarina (12-40 years). Apple showed the highest rate and degree of *Z. pyrina* infestation (57.3%, 12.8 adults /tree) followed by pear (52.1%, 11.2 adults/tree) then olive (21.5%, 7.4 adults/tree) while almond was the least infestation (8.2%, 3.5 adults/tree). *P. paradoxa* was recorded on grapevine and fig trees resulting percent and degree of infestation by (32.5%, 9.8 adults/ tree) and (14.4%, 6.1 adults/tree), respectively. Rates and degrees of infestation resulted by *S. myopaeformis* on apple, *H. griseus* on fig, *C.varius* on grapevine and *S.fulvum* on casuarina were (63.4%, 20.5 adults/tree), (37.2%, 15.4 adults/tree), (7.5%, 3.3 adults/tree) and (3.2%, 8.0 adults/tree), respectively. In case of bark beetles infestation, it was found that *S.amygdali* injured both olive and almond trees, recordering rates and degrees of infestation by (12.0%, 38.4 adults/cut of branch) and

(9.3%, 40.2 adults/cut of branch), respectively, whereas, *S. vulgaris* was recorded only on fig trees resulting (16.2%, 51.2 adults/cut of branch).

Table (1): Percentages and degrees of wood borers infestation on different tree hosts in Burg El-Arab district during 1998.

Borer	Host	Age of tree host (years)	Percent of infestation (%)	Degree of infestation ¹
<i>Zeuzera pyrina</i>	apple	5-15	57.3	12.8 (4-22)
	pear	7-15	52.1	11.2 (7-18)
	olive	6-27	21.5	7.4 (5-13)
	almond	9-20	8.2	3.5 (0-9)
<i>Paropta paradoxa</i>	grapevine	7-18	32.5	9.8 (2-14)
	fig	5-17	14.4	6.1 (1-12)
<i>Synanthedon myopaeformis</i>	apple	5-15	63.4	20.5 (12-48)
<i>Hesperophanes griseus</i>	fig	5-17	37.2	15.4 (9-30)
<i>Chlorophorus varius</i>	grapevine	7-18	7.5	3.3 (0-7)
<i>Stromatium fulvum</i>	casuarina	12-40	3.2	8.0 (0-16)
<i>Scolytus amygdali</i>	olive	6-27	12.0	* 38.4 (25-53)
	almond	9-20	9.3	40.2 (31-64)
<i>Stephanoderes vulgaris</i>	fig	5-17	16.2	* 51.2 (35-72)

(1) (No. of adult exit holes per tree * or cut of branch

In conclusion, four out of the eight insects were considered the most serious widespread borer in Burg El-Arab district, representing, the polyphagous *Z. pyrina* on apple, pear, olive and almond and *P. paradoxa* on grapevine and fig trees as well as the monophagous *S. myopaeformis* on apple and *H. griseus* on fig trees.

2. Biological Studies :

Biological studies on *P. paradoxa* and *H. griseus* were directed to estimate the duration of pupal stage in addition to produce the newly hatched larvae in the laboratory. The newly hatched larvae were used to make an artificial infestation in nature in order to measure both larval together with pupal duration and to calculate the approximate larval period under field conditions. Type of damage resulted by *P. paradoxa* on grapevine and *H. griseus* on fig were described.

2.1. Duration of immature stages :

Table (2) indicates the larval and pupal durations of *P. paradoxa* and *H. griseus* under laboratory and field conditions.

2.1.1. Larval and pupal *P. paradoxa* durations :

Newly hatched *P. paradoxa* larvae which were used to make an artificial infestation on grapevine trees in April 1997, turned into adult moths in March-April 1998, indicating that, the larval together with pupal stages lasted for 338.5 ± 4.0 (323-359) days (at 20.8°C and 63.5% R.H.).

In 98-1999, that period was 327.1 ± 3.9 (311-344) days (at 21.5°C and 63.2% R.H.).

Under laboratory conditions, pupal duration completed in 20.7 ± 0.2 - 21.5 ± 0.3 (18-23) days (at 24.3-24.5°C and 65.1-65.3% R.H.).

Hence, the approximate larval period was 300.4 ± 3.6 - 317.2 ± 3.7 (291 - 335) days under field conditions (at 20.8 - 21.5°C and 63.2 - 63.5% R.H.).

These results nearly in agreement with data of Tadros (1982) in Egypt. He recorded (278-315) days for the developmental period of *P. paradoxa* larvae and (17-23) days for pupal duration on grapevine trees.

Table (2): Larval and pupal durations of *P. paradoxa* on grapevine and *H. griseus* on fig under field and laboratory conditions.

Year	Stage	Borer									
		<i>P. paradoxa</i>					<i>H. griseus</i>				
		Field			Laboratory		Field			Laboratory	
		Duration / days	T.	M.W.F.	Duration / days	T.	Duration / days	T.	M.W.F.	Duration / days	T.
97-98	L. + P	338.5±4.0 (323-359)	20.8	63.5	—	—	325.3±3.8 (296-345)	20.6	61.3	—	—
	L.	317.2±3.7 *	20.8	63.5	—	—	295.1±3.7 *	20.6	61.3	—	—
	P.	—	—	—	21.5±0.3 (18-23)	24.3	—	—	—	16.4±0.2 (15-17)	23.3
98-99	L. + P	327.5±3.9 (311-344)	21.5	63.2	—	—	302.4±3.7 (282-330)	21.8	62.1	—	—
	L.	300.4±3.6 *	21.5	63.2	—	—	283.1±3.5 *	21.8	62.1	—	—
	P.	—	—	—	20.7±0.2 (18-22)	24.5	—	—	—	16.1±0.2 (15-17)	24.1
											64.5

L. Larva ; P. Pupa ; T. Temperature (°C) ; R.H. Relative humidity (%) ; M.W.F. Mean weather factors and
 * Approximate larval duration under field conditions.

2.1.2. Larval and pupal *H. griseus* durations :

In August 1997, newly hatched larvae artificially injured fig trees; developed to newly adult beetles during May-July 1998, referring that larvae together with pupae durated 325.3 ± 3.8 (296-345) days (at 20.6°C and 61.3% R.H.)

In 98-1999, that period decreased to 302.4 ± 3.7 (282-330) days (at 21.8°C and 62.1% R.H.). Under laboratory conditions, pupal stage lasted for 16.1 ± 0.2 - 16.4 ± 0.2 (15-17) days (at 23.3 - 24.1°C and 64.5 - 65.1% R.H.).

Consequently, the approximate larval stage developed through 283.1 ± 3.5 - 295.1 ± 3.7 (261-323) days (at 20.6 - 21.8°C and 61.3 - 62.1% R.H.)

Kinawy (1977) in Egypt, mentioned that the larval duration of *H. griseus* reared on fig branches elapsed 268 ± 4.4 days and the pupal duration lasted for 14.1 days under laboratory conditions.

3. Type of Damage :

Data in Table (3) show type of damage resulted by *P. paradoxa* on grapevine and *H. griseus* on fig trees. After adult emergence, artificially infested branches and trunks were accurately examined to determine the external and internal infested parts, shape + size of adult exit holes and length + thickness of larval tunnel (wooden tissues consumed / larva).

3.1. Damage of *P. paradoxa* :

Tiny larvae of *P. paradoxa* bore small narrow tunnel just beneath the bark of branches. Old larvae bore deep cylindrical tunnels inside soft and heart wood of main branches and/or trunks. Moth exit hole is roundish and its measuring (0.76 - 0.83 cm). A larva survived (291-335) days consumed 94.8 (83.4-107.5) cm in length and (0.1x0.1 - 0.8x0.9 cm) in diameter of branch tissues.

3.2. Damage of *H. griseus* :

The newly hatched larvae of *H. griseus* burrow longitudinal small tunnels under the bark of fig trees. Bigger larvae bore flat irregular tunnels into sapwood of branches and/or trunks. An exit beetle hole is elliptical and measuring (0.42x0.58 - 0.51x0.72 cm).

A larva stayed (277-323) days consumed 45.5 (40.8-52.3 cm) in length and (0.1x0.2 - 0.7x1.8 cm) in diameter of branch tissues.

Table (3): Injuriousness resulted by *P. paradoxa* on grapevine and *H.griseus* on fig trees.

State	<i>P. paradoxa</i>	<i>H. griseus</i>
Harmful stage	larva	Larva
External infested parts	main branches + trunks	twigs + branches + trunks
Internal infested parts	sapwood + heartwood	sapwood
Adult exit hole :		
1. Shape	roundish	elliptical
2. Size	0.76 - 0.83 cm	0.42x0.58 - 0.51x0.72 cm
Larval tunnel	cylindrical + regular	flattened + irregular
Consumed wooden parts / larva :		
1. Length	94.8 (83.4 - 107.5) cm	45.5 (40.8 - 52.3) cm
2. Thickness	0.1x0.1 - 0.8x0.9 cm	0.1x0.2 - 0.7x1.8 cm

4. Ecological Studies :

Table (4) in addition to Figure (1) show dates of adult occurrence, peaks and cumulative numbers of *P. paradoxa* on grapevine and *H. griseus* on fig trees in Burg El-Arab throughout 1998 and 1999.

Table (4): Adult population of *P. paradoxa* emerged from grapevine and *H. griseus* emerged from fig trees in Burg El-Arab district during 1998 -1999.

Insert borer	Year	Date of adult emergence	Mean no. of adult emerged /tree		Mean weather Factors	
			Act ual	Cumulativ e	Temp . °C	R.H. %
<i>P. paradoxa</i>	1998	First : 1 st half of June	0.5	0.5	23.2	66.5
		Peak 1 : 1 st half of August	2.8	6.9	28.7	72.5
		Peak2:1 st half of September	2.6	10.9	26.8	71.0
		Last : 2 nd half of October	0.2	12.7	23.3	65.5
	1999	First : 2 nd half of May	0.2	12.9	22.6	67.3
		Peak 1: 2 nd half of July	3.0	19.3	26.1	74.0
		Peak2:1 st half of September	2.1	24.4	27.2	72.8
		Last : 1 st half of October	0.1	26.0	23.0	65.2
<i>H. griseus</i>	1998	First : 2 nd half of April	0.9	0.9	21.8	63.0
		Peak 1 : 1 st half of June	7.9	14.8	23.2	66.5
		Peak 2 : 1 st half of August	12.4	43.2	28.7	72.5
		Last : 2 nd half of October	0.6	58.2	23.3	65.5
	1999	First : 2 nd half of April	0.5	58.7	20.2	65.5
		Peak 1 : 1 st half of June	9.0	73.9	23.9	67.5
		Peak 2 : 2 nd half of August	10.5	98.1	28.0	74.5
		Last : 1 st half of November	0.2	108.2	19.8	66.4

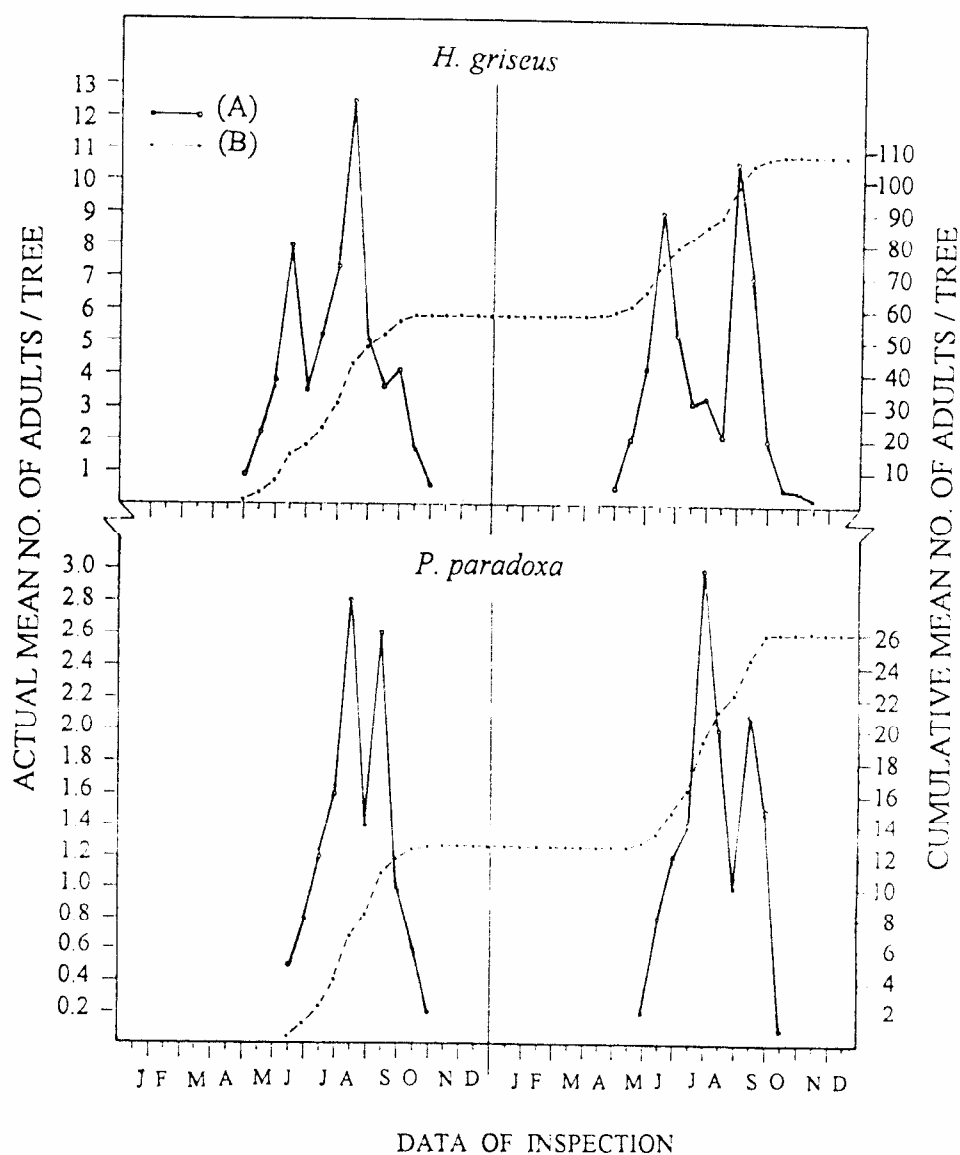


Figure (1): Half-monthly actual (A) and cumulative (B) mean numbers of *Hesperophanes griseus* beetles emerged from fig and *Paropta paradoxa* moths emerged from grapevine in Burg El-Arab during 1998 and 1999.

4.1. Adult abundance and progress of *P. paradoxa* infestation:

Frequent observations revealed that *P. paradoxa* moths (0.2-0.5 moth/ tree) started to appear in grapevine orchards during the 2nd half of May or the 1st half of June (at 22.6-23.2°C and 66.5-67.3% R.H.). The population fluctuated sharply from July-September and dropped (0.1-0.2 moth/tree) in October (at 23.0-23.3°C and 65.2-65.5% R.H.).

Two peaks were noticed annually. The 1st peak (2.8-3.0 moths/tree) took place in the 2nd half of July or the 1st half of August (at 26.1-28.7°C and 72.5-74.0% R.H.) and the 2nd one (2.1-2.6 moths/tree) occurred in the 1st half of September (at 26.8-27.2°C and 71.0-72.8% R.H.).

Adult emergence entirely stopped from the 2nd half of October or the 1st half of November to early or late May. After one season of adult activity in 1998, the cumulative mean numbers of *P. paradoxa* reached 12.7 moths/tree, one year later, raised the adult population by 26.0 moths/tree, showing an increase by 2.1 times.

Tadros (1982) mentioned that moths emergence of *P. paradoxa* took-place between March and October.

4.2. Adult abundance and progress of *H. griseus* infestation :

Periodical inspections were practiced in fig orchards showed that *H. griseus* beetles (0.5-0.9 beetle/tree) started to appear in the 2nd half of April (at 20.2-21.8°C and 63.0-65.5% R.H.). Adult population hesitated strongly between mid-May and mid-October and reached minimum level (0.2-0.6 beetle/tree) in the 2nd half of October or the 1st half of November (at 19.8-23.3°C and 65.5-66.4% R.H.). Two peaks were observed yearly, the 1st peak (7.9-9.0 beetles/tree) existed in the 1st half of June (at 23.2-23.9°C and 66.5-67.5% R.H.), and the 2nd one (10.5-12.4 beetles/tree) occurred throughout August (at 28.0-28.7°C and 72.5-74.5% R.H.). Adult emergence disappeared from November to early April.

In late season of adult emergence of 1998, the cumulative mean number of *H. griseus* amounted 58.2 beetles/tree. After another season, the population raised 108.2 beetles/tree, resulting an increase by 1.9 times.

Kinawy (1977), found that emergence of *H. griseus* beetles started in late April or early May and stopped during the 1st half of November.

REFERENCES

- El-Sherif, S.I.; Tadros, A.W.; Afifi, F.M. and Abd-Alla, F.F. (1985). Monitoring *Zeuzera pyrina* L. population in apple, pear and olive orchards. Bull. Of Fac. Of Agric., Univ. of Cairo, 36 (2): 1293-1304.
- Khattab, A.A.; El-Sadany, G. and Helal, H.H. (1982). The abundance of the leopard moth, *Zeuzera pyrina* L. in Giza area as indicated by catches in a light trap. Agric. Res. Review, 56 (1): 65-70.
- Kinawy, M.M. (1977). Studies on the longicorn beetle, *Hesperophanes griseus* F. and its control, M.Sc. Thesis, Fac. of Agric., Cairo Univ., Egypt.
- Kinawy, M.M. (1981). Studies on certain fig tree borers in A.R.E. Ph.D. Thesis, Fac. of Agric., Cairo Univ., Egypt.
- Mesbah, H.A.; Tadros, A.W. and Shehata, W.A. (1994). Seasonal fluctuation of *Zeuzera pyrina* L. population on apple, pomegranate, pear, guava, pecan and olive trees in Alexandria governorate. Egypt J. Agric. Res., 72 (1): 117-128.
- Mokhtar, A.M. (1977). Studies on the leopard moth *Zeuzera pyrina* L. and its control. M.Sc. Thesis, Fac. of Agric., Cairo Univ., Egypt.

- Shehata, W.A. (1990). Ecological studies on some fruit tree borers. A Thesis, Ph.D. Fac. of Agric., Alexandria Univ., Egypt.
- Tadros, A.W. (1977). Biological and ecological studies on the clearwing moth, *Synanthedon myopaeformis*, Borkh. and its control. M.Sc. Thesis, Fac. of Agric., Cairo Univ., Egypt.
- Tadros, A.W. (1982). Biological, ecological and control studies on *Paropta paradoxa* H.-Scheaff. (Lep., Cossidae) and *Chlorophorus varius* Mull. (Col., Cerambycidae) on grapevine trees in Egypt. Ph.D. Thesis, Fac. of Agric., Cairo Univ., Egypt.

الملخص العربى

دراسات إيكولوجية وبيولوجية وحصر لناخرات الأخشاب فى منطقة برج العرب

وجيه أيوب شحاته ، هدى هلال ، جورج نسيم جرجس

معهد بحوث وقاية النباتات ، مركز البحوث الزراعية ، وزارة الزراعة

الدقى (١٢٣١١١) ، الجيزة ، مصر

تهدف الدراسة الحالية (٩٧-١٩٩٩) إلى حصر للأفات الحشرية الناقرة على الأشجار الخشبية وأشجار الفاكهة فى منطقة برج العرب ، وكذلك إجراء بعض الدراسات البيولوجية والإيكولوجية على إثنين من أهم هذه النواخرات لبيان الأضرار والخسائر الناتجة عنها ولتحديد التوقيت الدقيق والإجراءات المناسبة عند مكافحتها .

وقد أوضحت بيانات الحصر وجود ثمانية أنواع من ناخرات الأخشاب على سبعة عوائل من أشجار الفاكهة والأشجار الخشبية ، وقد سجلت نسب ودرجات الإصابة بها .

كذلك تم إيضاح الأضرار والخسائر الناتجة عن أهم هذه النواخرات وهى حفار ساق العنب *P. paradoxa* على أشجار العنب وحفار ساق التين *H. griseus* على أشجار التين .

بينت نتائج الدراسات البيولوجية تحت الظروف الحقلية أن طورى اليرقة والعذراء معاً لحفار ساق العنب ، وحفار ساق التين قد إستغرقت 40.0 ± 238.5 يوم (عند 20.8°C ، 63.5% رطوبة نسبية) ، و 3.8 ± 250.3 يوم (عند 20.6°C ، 61.3% رطوبة نسبية) ، على الترتيب .

وقد وجد أن اليرقة الواحدة من حفار ساق العنب ، وحفار ساق التين التى أتمت نموها فى (٢٩١-٣٣٥) ، و (٢٧٧-٣٢٣) يوم أسستهلكت ٩٤.٨ ، و ٤٥.٥ سم من الأنسجة الخشبية لأفرع العنب ، والتين ، على الترتيب .

أظهرت نتائج الدراسات الإيكولوجية أن فراشات حفار ساق العنب يبدأ خروجها فى حدائق العنب فى أواخر مايو أو أوائل يونيو ويستمر حتى أكتوبر ، وقد سجلت

قمتين للخروج أثناء النصف الثاني من يوليو أو النصف الأول من أغسطس ، وفي النصف الأول من سبتمبر .

كما تبين أن خنافس حفار ساق التين يبدأ ظهورها في حدائق التين خلال إبريل ويستمر حتى أواخر أكتوبر أو أوائل نوفمبر ، وقد سجلت قمتين للخروج في النصف الأول من يونيو والنصف الأول أو الثاني من أغسطس .

وجد أيضا أن تكرار الإصابة لمدة عام آخر أدى إلى إرتفاع تعداد فراشات حفار ساق العنب ، وخنافس حفار ساق التين بمعدل ٢٦,٠ فراشة / الشجرة ، و ١٠٨,٠ خنفساء / الشجرة ، على الترتيب . وهذا يوضح مدى خطورة هذه النواخرات على عوائلها وضرورة التدخل السريع للحد من إنتشارها في حدائق الفاكهة بمنطقة برج العرب .