

**REARING FRUIT BORERS ON NATURAL HOSTS AND
ARTIFICIAL MEDIUM DIETS: 1-ZEUZERA PYRINA L.
(LEPIDOPTERA: COSSIDAE)**

TADROS, A. W.¹, A. M. ABDEL RAHMAN² AND R.M. ABDEL-MOATY¹

¹ Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Egypt.

² Faculty of Science, Cairo University, Giza, Egypt.

(Manuscript received July 2002)

Abstract

In Egypt, *Z. pyrina* is a serious polyphagous pest in fruit and wood trees. Larvae were reared on its natural hosts (apple, pear, pomegranate and olive) as well as on artificial medium diets, each containing saw dust of one of the previously mentioned hosts. Number of larvae and pupae completed their development, percentage of pupation, larval and pupal durations, rate of moth emergence, mating, oviposition, longevity, incubation period and percentage of hatchability were studied in details on natural hosts and artificial medium diets. The approximated life cycles were 336.7 (318 - 370), 344.8 (337 - 367), 328.7 (321 - 360) and 377.3 (366 - 398) days on natural hosts and 126.0 (121 - 137), 132.8 (123 - 146), 136.3 (126 - 158) and 144.1 (141 - 162) days on artificial medium diets when reared on apple, pear, pomegranate and olive, respectively. Out of 100 eggs each reared on their natural hosts (apple, pear, pomegranate or olive) were 20, 24, 18 and 20% completed their development to adult moths. The percentage recovery when reared on the respective artificial diets were 68, 58, 64 and 61%. Rearing *Z. pyrina* on artificial diets reduced the total period of the life cycle with about 2/3 than rearing on their natural hosts.

INTRODUCTION

Cossid borers are harmful insect pests in fruit orchards as well as on wood and ornamental trees. In Egypt, *Zeuzera pyrina* (Lepidoptera: Cossidae) was not reared on artificial medium diets before. However, Mokhtar (1978) and Tadros and Abd-Allah (1987) reared *Z. pyrina* on some of its natural hosts. Abroad, few attempts were made to rear the pest on artificial diets (Moore and Navon, 1966; Navon, 1977 in Israel; Tsourgianni, 1995 in Greece; Garcia delpino *et al.*, 1989 in Spain).

Owing to the great difficulties in rearing these borers on alive tissues to study their behavior and so many other investigations, there was a significant need to develop an artificial diet. The rearing of phytophagous insects on media is advantageous in

studying insect pathogens, plant resistant factors, effect of insecticides, essentiality of certain dietary components in insect nutrition and study of radiation on fertility and growth. The present investigation, therefore, was conducted to develop a standard method for rearing *Z. pyrina* in large numbers on artificial diet compared to natural host to fulfill the requirements of such researches.

MATERIAL AND METHODS

During winter (1996/97), branches infested with *Z. pyrina* were transferred from apple, pear, pomegranate and olive orchards at Qalubia Governorate to the laboratory at Dokki, Cairo Governorate. Infested branches were dissected and the prepupae and pupae were collected, while older larvae were left in their tunnels inside the infested branches until pupation. Pupae were wrapped in toilet paper, fixed in place, kept in small specimen tubes (1 x 4 cm) and placed into another larger ones (2 x 7.5 cm) lined with blotting paper to give moths a grasp when struggling during their emergence from pupal exuvia. Pupae, then, were kept in an incubator at 25 °C and 55% relative humidity (Mokhtar, 1978).

Soon after emergence, moths were released in pairs (one male and one female) in small cylindrical wire gauze cage (10 cm diameter and 15cm high) lined with rough paper to provide a suitable site for egg-laying, top and bottom were covered with Petri dishes. Eggs were daily collected and kept in an incubator at 25°C and 55% relative humidity (Mokhtar, 1978) until hatching.

A. Rearing on Natural Hosts: After hatching, larvae were introduced into fresh cuttings of apple, pear, pomegranate and olive trees (about 1 cm diameter and 20 cm length) sterilized with 0.25% formaldehyde tap water, soaked from the two ends with wax and kept in glass jar (5 liters) containing moistened sand. Enclosed larvae were shifted into new thicker fresh cuttings as needed (about 2 – 3 week intervals) until completed their development (in prepupal stage). The larvae, pupa, adult (mating, oviposition and longevity), eggs stage and the total life cycle were studied under mean laboratory conditions of 26.9 ± 1 °C and $61 \pm 2\%$ R.H.

B. Rearing on Artificial Medium Diets: The artificial medium diet contained the following components:

Sugar	200 g
Wheat germ bran	100 g
Ascorbic acid	15 g
Dried yeast	158.5 g
Soybean	53 g
Agar	200 g
Weson's salt	11 g
Baby Powder Milk (Nursoy)	316 g
[Contains: Protein (43 g); Fat (87 g); carbohydrate (165 g); Linoleic acid (14 g); Vitamins: B ₁ , B ₂ , B ₆ , B ₁₂ , K, Niacin, Folic acid, Pantothenic acid & Biotin (29745 Mcg); A, D & E (707 IU); C & Inositol (232 mg); Minerals: Ca, P, Mg, Fe, Zn, Na, K, Cl (6247 mg) and Mn, Cu & I (2118 mg)]	
Apple, pear, pomegranate or olive sawdust.	1000 g
Methyl parahydroxy benzoate	17.5 g
Formaldehyde 25%	3.6 cc
E-Mox (a semi-synthetic broad spectrum penicillin) (250 mg)	0.4 g
Distilled water	3000 cc

Dry ingredients were mixed together, then added to the agar solution in distilled hot water. The liquid ingredients, except ascorbic acid, were then added. The mixture was stirred until became homogenous. The ascorbic acid was added afterwards then stirring was resumed.

The medium then was stored under refrigeration until used. Newly hatched larvae were introduced into Petri dishes loaded with 25gms of the diet at the rate of 10 larvae per each. Grown larvae were distributed singly in Petri dishes.

The larvae, pupa, adult (mating, oviposition and longevity), egg stages were studied under mean laboratory conditions of $31.5 \pm 1^\circ\text{C}$ and $69 \pm 2\%$ R.H.

Analysis of variance (F test), T-test and Duncan Multiple Range Test (SAS) methods were used according to Snedecor and Cochran (1990).

RESULTS AND DISCUSSION

A. Rearing *Z. Pyrina* on Natural Host Plants: During the period from May, 1997 until July, 1998; *Z. Pyrina* was reared on its major natural hosts (apple, pear, pomegranate and olive) under mean laboratory conditions.

1. Larval and pupal stages: Newly hatched larvae started boring their tunnels under the bark. Data in Table 1 showed that 22, 26, 18 and 20% of larvae could complete their development and pupate in apple, pear, pomegranate and olive, respectively. The same Table also showed that the shortest larval duration was noticed when reared on pomegranate 294 – 324 (average of 302.2 ± 9.55 days) was noticed when reared on pomegranate. The larval duration was 292- 336 (average of 307.6 ± 6.79 days) when reared on apple 311 – 329 (average of 319.8 ± 5.85 days) on pear. The longest larval duration was 340 – 361 (average 348.3 ± 6.13 days) on olive. There were insignificant differences between the larval duration reared on apple and pomegranate, but significant between these hosts and olive or pear.

The shortest pupal duration, Table 1 was recorded for pupae from larvae reared on pomegranate 17 – 21 days, with an average of (17.9 ± 1.19 days). The longest was 16 – 23 (average 18.7 ± 2.4 days) on pear. Larvae reared on apple and olive needed 16 – 20 (average 18.3 ± 1.3 days) and 16 – 22, with an average of 18.2 ± 1.8 days to reach adult stage, respectively. Statistically, there were insignificant differences between the four pupal durations.

2. Adult stage: Pupae reared on apple, pear, pomegranate and olive branches complete their development and emerged successfully were 22, 26, 18, and 20%, respectively, Table 1.

The rate of emergence was 100, 100%, 92.31 and 90.91% in pupae reared on olive, pomegranate, pear and apple branches, respectively, Table 1.

Coitus lasted 15 – 50 (mean of 34.17 ± 12.72), 20 – 55 (mean of 35.00 ± 12.75), 25 – 55 (a mean of 36.25 ± 11.39), and 20 – 45 (a mean of 32.00 ± 9.27) minutes for moths reared on apple, pear, pomegranate and olive branches, respectively, Table 2.

Eggs were laid in small chains of 2 – 12 eggs each or in masses of 30 – 140 eggs. Fertile eggs were laid after mating within the same day or mostly the next day .

Oviposition period lasted 3 to 6 days with an average of 3.6 days. Females died at the last day of oviposition or one day after oviposition period.

Fertile females reared on apple, pear, pomegranate and olive branches laid 427 – 1318 eggs with an average 882 eggs, 553 – 1172 eggs with an average 863 eggs, 469 – 1034 eggs with an average of 715 eggs and 368 – 989 eggs with an average 694 eggs, respectively. The respective number of eggs remained in the ovaries were 68 (45 - 214), 94 (72 - 264), 159 (91 - 365) and 127 (86 - 308) eggs. Thus, the fecundity approximated 950, 957, 874 and 821 eggs, respectively. The respective pre-oviposition periods were 0.4 (0 - 1), 0.6 (0 - 1), 0 and 0.7 (0 - 1) days, while the oviposition periods were 4.8 (4 - 6), 4.1 (3 - 5), 3.2 (3 - 4) and 3.4 (3 - 4) days. The post-oviposition periods were 0.2 (0 - 1), 0, 0.5 (0 - 1) and 0.3 (0 - 1) days, respectively, Table 2.

Females *Z. pyrina* reared on apple, pear, pomegranate and olive branches lived 4 – 6 days with an average of 5.4 days, 3 – 5 days with an average of 4.7 days, 3- 4 days with an average of 3.7 and 3 – 5 days with an average of 4.4 days, respectively. The respective longevity of males lived 4.6 (4 - 5), 4.2(4-5) 3.9 (4 -5) and 4.7 (5 - 6) days, Table 2.

3. The egg stage: Data in Table 3 indicated that under mean laboratory conditions 30 ± 1 °C and 54 ± 1 R.H.), the incubation period reached 10.6 ± 0.8 (10 - 13) days, 10.8 ± 0.9 (10 - 14), 11.4 ± 1.0 (10 - 15) and 11.1 ± 1.1 (10 -14) days for eggs laid by females reared on natural hosts of apple, pear, pomegranate and olive branches, respectively. Under the same temperature and R.H., the respective percentage hatchability was 92 (90 - 100), 88 (80 - 100), 82 (80-100) and 84 (80 - 100)%.

4. Approximated life cycle: Table 3, approximated the life cycle of *Z. pyrina* reared on its natural hosts (apple, pear, pomegranate and olive branches) under mean laboratory conditions of 26.9 ± 1 °C and 61 ± 1 % R.H. The respective durations of total life cycle were 336.7 (318 - 370), 344.8 (337 - 367), 328.7 (321 - 360) and 377.3 (366 - 398) days.

Table 1. Effect of natural host plant and artificial diets on larval and pupal durations of *Z. pyrina* reared under laboratory conditions.

	Natural host			Artificial diets			
	Apple	Pear	Pomegranate	Apple	Pear	Pomegranate	Olive
No. of larvae used	50	50	50	100	100	100	100
No. of larvae pupated	11	13	9	74	65	70	68
% pupation	22	26	18	74	65	70	68
Larval duration (in days)							
Average	307.6 ± 6.79	319.8 ± 5.85	302.2 ± 9.55	98.4 ± 2.44	103.8 ± 4.89	110.7 ± 7.24	119.9 ± 5.32
Range	292 - 336	311 - 329	294 - 324	101 - 126	98 - 113	101 - 126	114 - 131
No. of pupae completed their development	10	12	9	69	58	64	61
Pupal duration (in days)							
Average	18.3 ± 1.3	18.7 ± 2.4	17.9 ± 1.19	17.1 ± 1.05	17.6 ± 1.21	16.4 ± 1.08	17.5 ± 0.65
Range	16 - 20	16 - 23	17 - 21	16 - 19	16 - 19	15 - 18	17 - 19
% moth emergence	90.91	92.31	100	93.24	89.23	91.43	89.71

Means with the same letter are not significantly different ($P < 0.05$) using Duncan's Multiple Range Test (SAS).

Rearing *Z. pyrina* on apple branches was almost in agreement with Mokhtar in Egypt (1978) who recorded 270 – 317 days with an average of 298.6 days for larval duration. He further recorded 9 – 24 for incubation period, 16 – 34 days for pupal duration, 4 – 15 days for adult longevity and 298 – 351 (average, 330.1) days for the total life – cycle. Garcia Del Pino (1986) in Spain also reported 10 – 11 months for the larval duration of *Z. pyrina*.

B. Rearing of *Z. pyrina* on Artificial Medium Diets: During the period from May, 1997 until October, 1997; *Z. pyrina* was reared on artificial medium diets each containing saw dust of apple, pear, pomegranate or olive under mean laboratory conditions.

1. Larval and pupal stages: After hatching, the tiny larvae settled on the diet, excreted the silken threads around themselves, started boring in the media and penetrated inside to live and feed. Table 1, indicated larvae succeeded to complete their development and pupate were 74, 65, 70 and 68% for apple, pear, pomegranate and olive diets, respectively. The same Table showed that the shortest larval duration was 96 – 105 (average, 98.4 ± 2.44) days when larvae reared on diet containing apple sawdust. Diet containing pear sawdust recorded 98 – 113 (average, 103.8 ± 4.89) days, for larval duration. Pomegranate sawdust with an average of 110.7 ± 7.24 days.

The longest larval duration was reported from the diet containing olive sawdust 114 – 131 (average, 119.9 ± 5.32) days. Statistically, there were significant differences between the larval duration reared on different diets.

Full grown larvae reached maturity crawled close to the glass of the vials or Petri dishes and constructed pupal cells made of silken threads and the particles of the medium near the surface of the medium to facilitate their moth emergence.

Table 1, showed that the shortest pupal duration was those resulted from larvae on pomegranate diet (15 – 18 (average , 16.4 ± 1.08 days). The longest pupal duration (16 – 19 (average , 17.6 ± 1.21 days) was recorded from those on pear diet. Pupae lasted 16 –19 (average , 17.1 ± 1.05) days and 17 – 19 (average , 17.5 ± 0.65 days) on apple and olive diets, respectively .Statistically, there were significant differences between the pupal duration reared on different diets.

Table 2. Mating, oviposition, longevity periods and number of eggs laid by female *Z. pyrina* reared on their natural hosts and artificial diets under laboratory conditions.

Host	Natural Host					Artificial diets				
	Apple	Pear	Pomegranate	Olive		Apple	Pear	Pomegranate	Olive	
Oviposition										
Coitus (in minutes)	34.17± (15-50)	35.00± 12.75 A (20 - 55)	36.25±11.39 A (25-55)	32.00±9.27 A (20-45)		36.50± 4.50 B (30-45)	35.50±7.57 B (25-50)	46.00±8.08 A (35-65)	41.00±7.00 AB (30-55)	
pre-oviposition	0.4 (0-1)	0.6 (0-1)	0.0 -	0.7 (0-1)		0.3 (0-1)	0.8 (0-1)	0.5 (0-1)	0.0 -	
Oviposition	4.8 (4-6)	4.1 (3-5)	3.2 (3-4)	3.4 (3-4)		4.0 (3-5)	3.4 (3-4)	3.6 (3-5)	3.4 (4-4)	
Post-oviposition	0.2 (0-1)	0.0 -	0.5 (0-1)	0.3 (0-1)		0.5 0-1	0.0 -	0.0 -	0.4 (0-1)	
No. of eggs laid	882 (427-1318)	863 (553-1172)	715 (469-1034)	694 (368-989)		705 (318-947)	691 (325-894)	586 (294-827)	642 (341-926)	
No. of eggs in ovaries	68 (45-214)	94 (72-264)	159 (91-365)	127 (86-308)		81 (63-194)	123 (89-274)	244 (113-408)	182 (95-355)	
Fecundity	950	957	874	821		786	814	830	824	
Longevity	Female	4.7 (3-5)	3.7 (3-4)	4.4 (3-5)		4.8 (3-5)	4.2 (3-5)	4.1 (3-5)	3.8 (3-4)	
	Male	4.6 (4-5)	4.2 (4-5)	3.9 (4-5)	4.7 (5-6)		3.9 (3-5)	4.4 (4-5)	3.8 (3-4)	

Table 3. The approximated life cycle of *Z. pyrina* reared on apple, pear, pomegranate and olive branches and artificial diets under laboratory conditions.

	Natural host				Artificial diets			
	Apple	Pear	Pomegranate	Olive	Apple	Pear	Pomegranate	Olive
Larva	307.4 (292 - 336)	314.9 (311 - 329)	299.6 (294 - 324)	347.1 (340 - 361)	98.5 (96-105)	103.9 (98 - 113)	108.2 (101-126)	116.3 (114-131)
Pupa	18.3 (16 - 20)	18.7 (16 - 23)	18.00 (17 - 21)	18.5 (16 - 22)	17.1 (16 -19)	17.6 (16-19)	16.8 (15-18)	17.4 (17-19)
Pre-oviposition	0.4 (0 - 1)	0.6 (0 - 1)	0 -	0.7 (0 - 1)	0.3 (0 -1)	0.8 (0 -1)	0.5 (0 -1)	0 -
Egg	10.6 (10 - 13)	10.8 (10 - 14)	11.4 (10 - 15)	11.1 (10 - 14)	10.1 (9 -12)	10.5 (9 -13)	10.9 (10-13)	10.4 (10-12)
Total life cycle	336.7 (318 - 370)	344.9 (337 - 367)	328.8 (321 - 360)	377.4 (366 - 398)	126 (121-137)	132.8 (123-146)	136.3 (126-158)	144.1 (141-162)

2. Adult stage: The highest rate of moth emergence (93.24%) was from pupae reared on apple diet, while those reared on pear showed the least rate (89.23%). The pupae reared on olive and pomegranate were in between resulting in (89.71 and 91.43%) respectively, Table 1.

Mating lasted 30 – 45 (mean of 36.50 ± 4.50), 25 – 50 (mean of 35.50 ± 7.57), 35 – 65 (mean of 46.00 ± 8.08) and 30 – 55 (mean of 41.00 ± 7.00) minutes for moths resulted from artificial diets containing mainly apple, pear, pomegranate and olive sawdust, respectively, Table 2.

Females started to lay their fertilized eggs soon after mating and searching for the suitable oviposition sites. Eggs were laid in small chains of 2 – 7 eggs each or in masses of 23 – 115 eggs.

Oviposition period lasted 3-5 days with an average of 3.6 days. Females died the last day of oviposition. Fertile females reared on apple, pear, pomegranate and olive diets laid 318 - 947 (average 705), 325 - 894 (average 691) eggs, (294 - 827) (average 586) eggs and (341 - 926) (average 642) eggs, respectively. The respective numbers of eggs remained in the ovaries were 81 (63 - 194), 123 (89 - 274), 244 (113 - 408) and 182 (95 - 355) eggs. Thus, the fecundity approximated 786, 814, 830 and 824 eggs, respectively.

The respective pre-oviposition periods were 0.3 (0 - 1), 0.8 (0 - 1), 0.5 (0 - 1) and 0.0 day. While the oviposition periods were 4.0 (3 - 5), 3.4 (3 - 4), 3.6 (3 - 5) and 3.4 (4 - 4) days. The post-oviposition periods were 0.5 (0 - 1), 0, 0 and 0.4 (0 - 1) day, respectively, (Table, 2). Females *Z.pyrina* reared on artificial diets containing apple, pear, pomegranate and olive sawdust lived 3 – 5 days (average, 4.8 days), 3 – 5 days (average, 4.2 days), 3 – 5 days (average 4.1 days) and 3 – 4 days (average, 3.8 days), respectively.

The respective longevity of males were 3.9 (3 - 5), 4.4 (4 - 5), 3.8 (3 - 4) and 3.5 (3 – 4) days, Table 2.

3. The Egg stage: Under mean laboratory conditions, the incubation period was 10.0 ± 0.7 (9 - 12), 10.5 ± 0.97 (9 - 13), 10.9 ± 0.7 (10 - 13) and 10.4 ± 0.6 (10 - 12) days for eggs laid by females reared on artificial diets containing apple, pear, pom-

egranate and olive sawdust, respectively. The percentage of hatchability was 81 (60 - 90), 83 (70 - 90), 67 (50 - 80) and 75 (60 - 90)%, in case of apple, pear, pomegranate and olive sawdust, respectively, Table 3.

4. Approximated life cycle: Table 3, approximated of life cycle of *Z. pyrina* reared on artificial diet containing apple, pear, pomegranate or olive sawdust, under mean temperature $31.5 \pm 1^\circ\text{C}$ and $69 \pm 1\%$ relative humidity. The total life cycle were 126.0 (121 - 137), 132.8 (123 - 146), 136.3 (126 - 158) and 144.1 (141 - 162) days, respectively.

Results of rearing *Z. pyrina* on artificial diets are somewhat in agreement and sometimes disagreement with Moor and Navon (1966) who found that larval survival 80%, larval period 100 days, pupal period 18.6 days, pupation 62%, adult emergence 37%, fecundity 400 - 900 eggs/female and incubation period 14 days. Navon (1977) recorded that the larval period lasted 3 - 4 months which one third the period on the tree. The larval and pupal durations were 126 and 21 days, respectively (Garcia Del Pino *et al.*, 1986).

DISCUSSION

The forementioned results concluded that the percentage recovery of *Z. pyrina* from egg to adults reached 20, 24, 18 and 20 % when reared on their natural hosts (apple, pear, pomegranate and olive, respectively.) These percentages increased to 69, 58, 64 and 61% when the pest was reared on its respective artificial diets. Rearing larvae on artificial diets was successful 3.4, 2.5, 3.9 and 3.4 times than those reared on the respective natural diets. Pupation was much successful when larvae reared on the artificial diets than on the natural hosts (3.4, 2.5, 3.9 and 3.4 times in the respective hosts). Two third reduction in the larval duration was noticed when they reared on the artificial diets than on the natural hosts (66.3, 65.4, 60.3 and 69.9 % reduction, respectively). However, pupal duration was almost equal when reared on artificial diets (89.2 - 93.2) or on natural hosts (90.3 - 100%). Coitus, pre-oviposition, oviposition and post-oviposition periods were almost equal in adults reared on artificial diets or on natural hosts. Yet, number of eggs laid was less in female reared on artificial diets (694 - 705 eggs) than those reared on natural hosts (694-882 eggs). However, females

and males reared on artificial diets and natural hosts lived almost equally (3.8 - 4.8 and 3.7 - 5.4 days for female and 3.5 - 4.4 and 3.9 - 4.7 days for males, respectively). The total life cycle was almost 2/3 reduced when the pest was reared on artificial diets than rearing on their natural hosts (62.6, 61.5, 58.6 and 61.8 %, respectively). Because rearing *Z. pyrina* on alive tissues is very difficult, these findings on rearing on artificial diets are of significant importance in applying advanced studies in relatively easier way and shorter time .

DISCUSSION

REFERENCES

1. Garcia-del-pino., Hero- A- de., Del- pino-F- Garcia.,pino- F Garcia. and A. Haro. 1989. Laboratory culture of *Z. pyrina* on artificial diet. Boletin de- Sanidad- Vegetal- Plags 12(2): 281 – 289.
2. Mokhtar, A. 1978. Studies on the leopard moth, *Zeuzera pyrina*, L. and its control. M. Sc. Thesis, Facutly of Agriculture, Cairo university. Egypt.
3. Moore, I.and A. Navon. 1966. The rearing and some bionomics of the leopard moth *Z. pyrina* L. on an artificial medium. Entomophaga 11: 285 – 286.
4. Navon , A. 1977. Rearing the leopard moth *Z. pyrina* L. on an improved diet. Phyto- parasitica 5 (1): 38 – 40.
5. Snedecor, W. and A. Cochran. 1990. Statistical methods. The Iwa state Univ., press Ames. Iwa, USA.
6. Taderos A. W. and F. F. Abdel-Allah. 1987. Studies on the biology of the leopard moth, *Z. pyrina* L. (Lep. : Cossidae) on olive trees in Egypt. Zagazig J. Agric. Res., Zagazig, Egypt, accepted Jan. 1987.
7. Tsourgianni, A. 1995. Rearing of *Z. pyrina* L. on artificial medium. Annales – de - L'Institut. Phytopathogique Benaki. 14 (2): 111-115.

تربية الحفارات علي عوائلها الطبيعية و البيئات
الغذائية المصنعة: ١- حفار ساق التفاح *ZEUZERA PYRINA*
(رتبة حرشفية الاحنحة : عائلة كوسيدي)

انطون ولسن تادرس^١ ، أمينة محمد عبدالرحمن^٢ ، راضي محمدي عبدالمعطي^١

١ معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة - مصر .
٢ كلية العلوم - جامعة القاهرة - الجيزة - مصر .

يعتبر حفار ساق التفاح من الآفات شديدة الخطورة للعديد من أشجار الفاكهة والأشجار الخشبية في مصر . تم تربية يرقات الحفار علي عوائلها الطبيعية (التفاح ، والكمثري ، والرمان ، والزيتون) وأيضا علي بيئات غذائية مصنعة كل منها يحتوي علي نشارة خشب لأحد العوائل السابق ذكرها . تم دراسة عدد اليرقات والعذارى التي أكملت نموها ، ونسبة التعذر ، و مدة طوري اليرقة والعذارى ، و معدل خروج الفراشات ، والتلقيح ، ووضع البيض ، و مدة حياة الحشرات الكاملة ، و فترة حضانة البيض ، ونسبة الفقس علي العوائل الطبيعية والبيئات الغذائية المصنعة السابق ذكرها . بلغ عدد اليرقات التي أكملت عمرها وتعذرت ٢٢ ، ٢٦ ، ١٨ ، ٢٠٪ عند التربية علي العائل الطبيعي بينما كانت ٧٤ ، ٦٥ ، ٧٠ ، ٦٨٪ عند التربية علي البيئة الغذائية المصنعة ، في العوائل الأربعة ، علي الترتيب . بلغت فترة دورة الحياة ٣٣٦.٧ (٣١٨-٣٧٠) ، و ٣٤٤.٨ (٣٢٧-٣٦٧) ، و ٣٢٨.٧ (٣٢١-٣٣٦) ، و ٣٧٧.٣ (٣٦٦-٣٩٨) يوماً عند التربية علي العوائل الطبيعية السابقة ، علي الترتيب . بينما بلغت دورة الحياة ١٢٦.٠ (١٢١-١٣٧) ، و ١٣٢.٨ (١٢٣-١٤٦) ، و ١٣٦.٣ (١٢٦-١٥٨) ، و ١٤٤.١ (١٤١-١٦٢) يوماً عند التربية علي البيئات المصنعة السابقة ، علي الترتيب . بلغت النسبة المئوية للفراشات التي أكملت دورة حياتها من ١٠٠٪ بيضة تم تربيتها علي عوائلها الطبيعية (التفاح ، والكمثري ، والرمان ، والزيتون) ٢٠ ، ٢٤ ، ١٨ ، و ٢٠٪ ، علي الترتيب ، بينما بلغت هذه النسبة ٦٩ ، ٥٨ ، و ٦٤ ، و ٦١٪ عند التربية علي البيئة المصنعة . كذلك نتج عند تربية حفار ساق التفاح علي بيئات مصنعة تقليل في اجمالي دورة الحياة بمقدار الثلثين بالمقارنة بالتربية علي البيئات الطبيعية .