THE LIFE-CYCLE OF THE SHOT-HOLE BARK-BEETLE, *SCOLYTUS AMYGDALI* GUER. (COLEOPTERA : SCOLYTIDAE) ON PEACH IN EGYPT

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Abstract

Scolytus amygdali Guer. under laboratory conditions had five generations per year, its life-cycle ranged from 39 to 172 days. The egg, larval, pupal and adult stages lasted 4 -11 , 22-130, 5-15 and 12-44 days, respectively. The pre-oviposition, ovipsition and post- oviposition periods were 6-18, 10-28 and 0-4 days. respectively, and the female deposited 29-65 eggs. The sex ratio was about 1:1.

INTRODUCTION

In Egypt, *S. amygdali* Guer. is a major pest of peach trees (*Prunus persica*). The insect infests also almond , plum, apricot, apple , pear (Willcocks, 1924), quince, nectarin, pecan, loquat, olive, pomegranate, annonas, sweet orange, carob, jujube and persimmon. This insect was reported as a pest of peach from many different parts of the world .

Beetles burrow several holes in the bark of the stem and branches. Injury is caused mainly by the larvae which bore their tunnels under the bark, leading to relatively quick weakness and death of branches, then the whole tree.

The available biological information on *S. amygdali* in Egypt is that of Abd-Allah (1978) on almond trees. The importance of the present work is realized from the expansion of peach cultivation (80 000 feddans) , especially in Sinai, and the

wide spread of *S. amygdali* infestation in peach orchards. The present investigation is a further addition to the biology of that pest including behaviour, duration of each stage, total life-cycle and the number of generations per year on peach trees.This fundamental study would help planning successful control programmes for this pest in peach orchards.

MATERIALS AND METHODS

During the pruning period (December, 1987 and January, 1988), pruned peach branches infested with *S. amygdali* were collected from Meet-Ghamr, Dakahlia governorate. Branches were transferred to the laboratory at Dokki (Giza governorate) and kept in wire - screen wooden cages (60 x 60 x 100cm). Daily inspection was carried out from February, 1988 and each pair of newly emerged beetles (one female and one male) was isolated in a glass jar (18 cm in diameter and 25 cm high) together with a peach cutting about 2 cm thick and 20 cm long as an oviposition site. Ends of cuttings were soaked in melted wax to eliminate evaporation and dryness. By means of a needle , cuttings were pierced to make galleries nearly equal to the female size in order to facilitate its starting entry for oviposition.

Mating, pre-ovipostition, oviposition and post-oviposition periods, the number of deposited eggs, the life span and the sex ratio were observed and recorded daily. The egg, larval , pupal and adult durations were also determined . The total life- cycle during the successive annual generations were studied under laboratory conditions.

RESULTS AND DISCUSSION

Egg Stage

Eggs of *S. amygdali* are deposited on the two sides of the oviposition gallery in a cup-shaped niche covered with sawdust.

As shown in Table 1, the incubation period significantly and negatively varied

according to temperature during the successive annual generations, but was insignificantly positive with relative humidity. The incubation period ranged from 4 to 11 days. The mean shortest period (4.58 ± 0.11 days) was recorded in the 3rd generation (June-August), while the mean longest period (8.36 ± 0.10 days) occurred in the 5th generation (October-April) .

Hatching occurs through an irregular hole in the contact area adjacenbt to the substratum. The percentage of egg hatchability varied from 100% in the 4th generation (8-10/88) to 88% in the 5 th (10/88-4/89).

Larval Stage

Hatched larvae bore their tunnels under rthe bark almost at a right angle to the parent gallery (egg gallery). During its duration, only one larva was observed in each separate tunnel. As the larva grows older and larger in size, the larvel tunnel diverges gradually outwards from the parent gallery. Because the larva is apodus, it compacts it excreta with the boring sawdust backwards in the tunnel to move and feed freely.

Table 1 shows that the larval duration of *S. amygdali* varied according to the time of the year (22-130days). The mean larval period including the pre - pupa ranged from 26.40 ± 0.35 (range, 22-33) days during the 3rd generation at the mean temperature 30.6°C and 69% R.H. to 110.92 ± 1.47 (range, 87-130) days during the 5th generation at 20.3°C and 87% R.H. There were insignificant negative and positive correlations between the larval duration and the mean temperature 30.6oC and 69% R.H. to 110.92 ± 1.47 (range, 87-130) days during the 5th generation at 20.3°C and 87% R. H. There were insignificant negative and positive correlations between the larval duration and the mean temperature and relative humidity, respectively.

Pupal Stage

At the far diverged end of the larval tunnel, the full grown larva constructs a vertical, oval and elongate pupal cell covered with boring sawdust in which it transforms into a pre-pupa and pupa afterwards.

Data in Table 1 reveal that the mean minimum pupal duration (5.84 ± 0.11, range 5-8 days), was recorded during the 3rd generation (June - August) , whereas, the mean maximum duration (12.58 ± 0.12, range 11 - 15 days) was during the 5th generation (October-April). Statistical analysis showed significant negative and insignificant positive relationship between pupal duration and mean temperature and relative humidity, respectively.

Table 1. Life-cycle of *S. amygdali* on peach tree cuttings during the successive annual generations under laboratory conditions.

Generation From To	Incubation Period (days)	Larval duration (days)	Pupal duration (days)	Pre- oviposition period (days)	Total life cycle (days)	Temp. °C	R.H. (%)
I 20.2 5.5 1988	7.38 ± 0.08 (7 - 9)	41.96 + 0.50 (35 - 49)	7.78 + 0.11 (7 - 10)	9.24 + 0.16 (8 - 11)	66.36 + 0.52 (60 - 76)	24.9	63
II 4.5 2.7 1988	6.02 ± 0.10 (5 - 7)	33.86 + 0.41 (27 - 40)	6.32 + 0.12 (5 - 8)	7.04 + 0.10 (6 - 8)	53.24 + 0.49 (45 - 59)	30.1	59
III 27.6 16.8 1988	4.58 ± 0.11 (4 - 7)	26.40 + 0.35 (22 - 33)	5.84 + 0.11 (5 - 8)	6.90 + 0.14 (6 - 10)	42.72 + 0.31 (39 - 51)	30.6	69
IV 13.8 20.10 1988	5.92 ± 0.12 (5 - 8)	28.90 + 0.37 (25 - 36)	8.38 + 0.09 (8 - 11)	1048 + 0.54 (10 - 15)	53.68 + 0.56 (48 - 69)	26.2	75
V 5.10 4.4 1988	8.36 ± 0.10 (8 - 11)	110.92 + 1.47 (87 - 130)	12.58 + 0.12 (11-12)	15.30 + 0.17 (13 - 18)	147.16 + 1.54 (123 - 172)	20.3	87
Temp (r) R. H. (r)	* -0.1936 +0.4673	-0.8615 +0.7651	* -0.9569 +0.8641	* -0.9568 +0.8894*	* -0.8909 +0.7835		

* = Significant

Adult Stage

1. Beetle emergence

Pupa transforms into adult in the pupal cell. Newly emerged beetle is creamy in colour, feeble and standstill. The beetle, therefore, stays in the pupal cell for a period of 3-10 days until the body cuticle hardens and the colour turns dark brown.

The rate of beetle emergence varied from 82% in the 4th generation (8-10/88) to 98% in the 1st (2-5/88).

2. Sex ratio

The sex ratio of *S. amygdali* beetles which emerged during the five successive annual generations was 1.1, 0.9, 1.3, 1.0 and 0.9 females to one male , respectively. The gerneral sex ratio was about 1:1.

3 . Mating and oviposition

Immediately after emergence, beetles of both sexes become sexually active. The female bores an oviposition tunnel and waits at its entrance for mating. Mating mostly occurs during daytime and the two sexes can copulate more than once. Coitus period lasted 2-8 minutes, with a mean of 5.18 minutes.

The pre-oviposition period lasted 6-18 days according to the time of the year (Table 1) . The mean minimum per-oviposition period (6.90 $\pm$ 0.17 days) was recorded during the 3rd generation, while the mean maximum period (15.30 $\pm$ 0.17 days) was observed during the 5th generation at the mean temperature and R.H. 30.3 and 20.3^{o}C and 69 and 87%, respectively.

At the average temperature 30.1^{o}C and 59% R.H., fertilized female continued to lay eggs for a period of 10-28 days (mean, 20.20 $\pm$ 0.65 days). The total number of eggs laid per female during its life - span was 29 - 65 (average 47.20 eggs).

The post-oviposition period ranged from 0 to 4 days (mean 1.98$\pm$ 0.14 days).

4 . Adult longevity

In captivity , male beetles lived shorter than females. The life-span of males and females were 12-25 (mean 18.30 $\pm$ 0.72 days) and 17-44 (mean 31.32 $\pm$ 0.79 days), respectively.

Total Life-Cycle and Annual Generations

Table 1 shows that under laboratory conditions, five overlapping annual generations could be reared successfully starting from late February, 1988 until early April, 1989.

The total life-cycle of *S.amygdali* varied from 39 to 172 days according to the time of the year. The mean shortest life- cycle 42.72±0.31 (range 39-51 days) occurred in the 3rd generation (June - August) when the mean temprature and R.H. were 30.6°C and 69%, respectively. The mean longest life -cycle 147316 ± 1.54 (range 123- 172 days) was in the 5th generation (October - April) at the mean temperature 20.3°C and 87% R. H.

During the 1 st (February - May) , 2 nd (May - July) and 4th (August - October) generations, the mean total life - cycles were 66.36 ± 0.52 days (range 60-76), 53.24 ± 0.49 days (range 45 - 59) and 53.68 + 0.56 days (range 48 - 69), respectively. The respective temperature and R.H. were 24.9, 30.1 and 26.2°C and 63, 59 and 75% .

The simple correlation between the total life-cycle and the mean temperature and R. H. during the five successive annual generations indicated that there were significant negative and isignifcant positive correlations, respectively.

The forementioned results are similar to the findings of Abd - Allah (1978) who found that *S. amygdali* had six annual generations on almond trees. Tadros and Abd-Allah (1987) and Girgis (1987) recorded 4 and 5 overlapping generations per year on apricot and plum trees, respectively.

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دورة حياة خنافس قلف الحلويات
Scolytus amygdali
علي أشجار الخوخ في مصر

انطون ولسن تادرس

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقي

تسبب خنافس قلف الحلويات أضراراً بالغة لأشجار الخوخ في مصر. وجد أن لهذه الآفة خمسة أجيال في العام عندما ربيت تحت الظروف المعملية ، وتراوحت دورة الحياة ما بين ٣٩، ١٧٢ يوما. استغرقت أطوار البيضة ، واليرقة ، والعذراء ، والحشرة الكاملة ٤ –١١ ، ٢٢–١٣٠، ٥–١٥، ١٢ – ٤٤ يوما ، علي التوالي.

بلغت فترات ما قبل وضع البيض ، وضع البيض، ما بعد وضعالبيض ٦–١٨، ١٠–٢٨ ، صفر –٤ يوما علي الترتيب ، ووضعت الأنثي الملقحة ٢٩–٦٥ بيضة وكانت النسبة الجنسية حوالي ١:١.