

REARING OF THE LEOPARD MOTH, *ZEUZERA PYRINA* L.
(LEPIDOPTERA: COSSIDAE) ON CASUARINA TREES,
CASUARINA SP.: CASUARINACEAE IN EGYPT

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ABSTRACT: *Casuarina* trees is one of the most important wood furniture as well as the most windbreak in fruit orchards In Egypt. *Zeuzera pyrina* (Lepidoptera: Cossidae) is a destructive polyphagous pest to fruit, wood and ornamental trees. Larvae of *Z. pyrina* were reared on casuarina branches in the laboratory. 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 casuarina branches under laboratory conditions. The pre-oviposition period was only one day, the incubation period averaged 11.7 (10 – 16 days), and the pupal duration averaged 16.2 (14 – 17) days. Approximated total life cycles were 281.5 (244 – 298) days when reared on casuarina. The relatively long period of larval period of infestation ranged between 219 – 264 days with an average of 252.6 days. It could be concluded that, further studies must be done on the control of this pest to eliminate its damage on casuarina trees and the neighboring fruit orchards.

Key words: wood leopard moth, biology, hosts, life cycle, *Zeuzera* spp

INTRODUCTION

Casuarina trees (*Casuarina* sp.) (Casuarinaceae) is widely spread all over the Egyptian farms especially in all the newly reclaimed lands. Wood and ornamental trees are used also as wind breaks especially around fruit plantations. *Zeuzera pyrina* L. (Lepidoptera: Cossidae) is a serious polyphagous pest attacking several wood trees such as poplar and casuarina, fruit trees especially apple, pear, pomegranate, olive, fig, pecan, as well as some ornamental tree (Tadros and Abd-Allah, 1987). Larvae bore destructive tunnels inside the tree branches and stems, consume large amount of wood, causing weakness, reducing the wood production, and finally death of trees. Infested casuarina trees are renewable source of *Z. pyrina* infestation to fruit and other wood trees in fruit orchards Azmy *et.al.* (1978).

Zeuzera pyrina was reared on several fruit tree branches such as olive

(Mokhtar,1978; Tadros, and Abd-Allah, 1987), Tadros, *et al.*, (2003) on apple, pear, pomegranate, olive, Abdel-moaty, *et al.*, (2009) on fig. (El-Sherif, *et al.* (1985) in apple, pear and olive, Mesbah, *et al.* (1994) in apple, pomegranate, pear, guava, pecan and olive and Tadros, *et al.* (2007) on pear.

Moreover Abdel-moaty (2001) in Egypt and Moore and Navon (1966), Navon (1977) in Israel, Tsourgianni (1995) in Greece and Garcia and Haro (1986) in Spain reared *Z. pyrina* on artificial medium diet.

Mansour and Tadros (2001) monitored *Z. pyrina* on the wood of poplar trees during three successive years (2003, 2004 and 2005) in two ecologically different localities the old valley lands and new reclaimed lands.

The rearing of phytophagous insects is advantageous in studying insect pathogens, plant resistant factors, effect of insecticides and study of radiation on

fertility and growth. In an attempt to contribute to such a gap in the knowledge, the present biological studies are aimed. The broad objective of investigation is to add new information that may help in planning of rather effective "Integrated Control Programs" for the management of *Z. pyrina* in casuarina trees.

MATERIALS AND METHODS

During winter (2016 / 2017), casuarina branches infested with *Z. pyrina* were transferred from the newly reclaimed lands in Noubaria district, Behera governorate to the laboratory at Plant Protection Research Institute, Dokki, Giza. Infested branches were dissected and the pre-pupae 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 × 4 cm) and placed into another larger ones (2× 7.5 cm) lined with blotting paper to give moths a grasp when struggling during their emergence from pupal exuvia. Then, pupae 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 15 cm 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 until hatching.

After hatching, larvae were introduced into fresh cuttings of casuarina 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 3 week intervals) until completed their development (in prepupal stage). The larva, pupa, adult (mating, oviposition and longevity), eggs stage and the total life cycle were studied under mean laboratory conditions of 26.2 ± 1 °C and 60 ± 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 DISCUSION

During the period from May, 2017 until July, 2018; *Z. Pyrina* was reared on its natural host of casuarina branches under mean laboratory conditions (26.2 ± 1 °C and 60 ± 2% R.H.).

1. Larval and pupal stages:

Newly hatched larvae started boring their tunnels under the bark. Data in Table (1) showed that 31% of larvae could complete their development and started pupation in casuarina branches. The same Table also showed that the larval duration ranged 219-264 with an average of 252.6 ± 6.31 days) when reared on casuarina branches.

Out of 31 larvae that completed their development, 26 pupae completed their developments to adults and emerged, recording 83.9% success of pupal development (recovery). (Table, 1).

The pupal duration (Table 1) was recorded from larvae reared on casuarina branches ranged 14 – 17 days, with an average of 16.2 ± 1.28 days to reach adult stage.

2. Adult stage:

The rate of moth emergence from pupae reared on casuarina branches was 83.9 % (Table 1).

Coitus lasted 17-39 (mean of 26.8 ± 9.42) minutes for moths reared on casuarina branches (Table 2).

Rearing of the leopard moth, *zeuzera pyrina* L. (Lepidoptera: cossidae)

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

No. of larvae used		100
No. of larvae pupated		31
% pupation		31
Larval duration (in days)	Average	252.6 ± 6.31
	Range	219 – 264
No. of pupae completed their development		26
Pupal duration (in days)	Average	16.2 ± 1.28
	Range	14 – 17
% moth emergence		83.9

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

Table (2): Mating, oviposition, longevity periods and number of eggs laid by female *Z. pyrina* reared on casuarina branches under mean laboratory conditions.

Coitus (in minutes)		26.8 ± 9.42 (17 – 39)
Pre-oviposition period (in days)		1
Oviposition period (in days)		6.1 (5 – 8)
Post-oviposition period (in days)		0.6 (0 – 1)
No. of laid eggs		852 (655 – 1109)
No. of eggs in ovaries		41 (22 - 116)
Fecundity		893
Incubation period (in days)		11.7 (10 – 16)
Hatchability (%)		92% (80 – 97%)
Longevity (in days)	Female	7.3 (6 – 8)
	Male	6.9 (5 - 9)

Eggs were laid in small chains of 5-14 eggs each or in masses of 33 -118 eggs. Fertile eggs were laid (pre-oviposition period) after mating mostly the next day.

Oviposition period lasted 5 to 8 days with an average of 6.1 days. Females died at the last day of oviposition or one day after oviposition period (post-oviposition period).

Fertile females reared on casuarina branches laid 655 – 1109 eggs with an average 852 eggs. The number of eggs remained in the ovaries after death of females were 41 (22 - 116) eggs. Thus, the fecundity approximated 893 eggs. The respective pre-oviposition period was 1 days, while the oviposition period was 6.1 (5 - 8) days. The post-oviposition period was 0.6 (0 - 1) days (Table 2).

Females *Z. pyrina* reared on casuarina branches lived 6-8 days with an average of 7.3 days. The respective longevity of males lived for 6.9 (5 - 9) days (Table 2).

3. The egg stage:

Table (3) indicated that under mean laboratory conditions of 29 ± 1 °C and 56 ± 1 R.H.), the incubation period reached 11.7 ± 0.8 (10 -16) days for laid eggs by females reared on natural hosts of casuarina branches. Under the same temperature and R.H., the respective

percentage hatchability was 92 (80 – 97%).

4. Approximated life cycle:

Table (3) approximated the life cycle of *Z. pyrina* reared on its natural host of casuarina branches under mean laboratory conditions of 26.9 ± 1 °C and 61 ± 1 % R.H. The respective durations of total life cycle were 281.5 (244 – 298) days.

Discussion:

Rearing larvae of *Z. pyrina* on alive tissues is very difficult. Rearing *Z. pyrina* on natural host (casuarina branches) was carried out for the first time in this research. In Egypt results of rearing *Z. pyrina* on casuarina branches was almost disagreed with Mokhtar (1978) reared *Z. pyrina* on apple branches and recorded 270 – 317 days with an average of 298.6 days for larval duration. He further recorded 9 – 24 days 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. Moreover, Tadros, *et al.*, (2003) reared *Z. pyrina* on apple, pear, pomegranate and olive branches and recorded respective total life cycles of 336.7, 334.9, 328.8 and 377.4, respectively (range, 318 – 398 days) . In Spain Garcia and Haro (1986) reported 10 –11 months for larval duration of *Z. pyrina*.

Table (3): The approximated life cycle of *Z. pyrina* reared on casuarina branches under mean laboratory conditions

Stages	Duration (in days)
Larva	252.6 (219 – 264)
Pupa	16.2 (14 – 17)
Pre- oviposition	1
Egg	11.7 ± 0.8 (10 - 16)
Total life cycle	281.5 (244 – 298)

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تربية حفار ساق التفاح *Zeuzera pyrina* (رتبة حرشفية الأجنحة: عائلة كوسيدي)
علي أشجار الكازورينا (الفصيلة الكازورينية) في مصر

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الملخص العربي

تعتبر أشجار الكازورينا من الفصيلة الكازورينية من الأشجار الخشبية والتي تستعمل في صناعة الأثاث والقوائم واللوازم الخشبية في مصر ، كما أنه يستخدم كمصدات للرياح في حدائق الفاكهة. ويعتبر حفار ساق التفاح من الآفات المدمرة شديدة الخطورة للعديد من أشجار الفاكهة والأشجار الخشبية في مصر. تم تربية يرقات الحفار علي أفرع الكازورينا وتم تسجيل عدد اليرقات والعذارى التي أكملت نموها، ونسبة التعذر، ومدة طوري اليرقة والعذراء، ومعدل خروج الفراشات، ومدة التلقيح، ومدة وضع البيض، ومدة حياة الحشرات الكاملة، وفترة حضانة البيض، ونسبة الفقس علي العائل الطبيعي (الكازورينا) عند متوسط درجات الحرارة والرطوبة النسبية في المعمل (26.2 ± 1 درجة مئوية ، 60 ± 2 % رطوبة نسبية) . بلغت فترة ما قبل وضع البيض يوما واحدا فقط ، في حين بلغت فترة حضانة البيض 10 – 16 يوما، بمتوسط 11.7 أيام، وبلغت فترة طور العذراء 16.2 (14 – 17) يوما. استغرقت دورة الحياة 281.5 يوما (244 – 298) يوما عند التربية علي العائل الطبيعي (الكازورينا) . أستغرق طور اليرقة أكبر مدة في دورة الحياة حيث بلغت 219 – 264 بمتوسط 252.6 يوما. يوصى البحث بضرورة مكافحة الحفار علي أشجار الكازورينا لتلافي أضرارها علي الكازورينا والعوائل المحيطة بها من أشجار الفاكهة واجراء دراسات اخرى علي مكافحة هذه الآفة الخطيرة.

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