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BIOLOGY OF CIGARETTE BEETLE *LASIODERMA SERRICORNE* (F.) (COLEOPTERA : ANOBIIDAE) ON BAKER'S YEAST *SACCHAROMYCES CEREVISIAE*

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Abstract

The biology of cigarette beetle *Lasioderma serricorne* (F.) (Coleoptera: Anobiidae) was studied on Baker's Yeast *Saccharomyces cerevisiae* in 2018 in Iraq. Incubation period varied between 6 and 10 days .The insect has a six larval instar and the total larval stage was 43-55 days, pupal period total duration was 7-13 days, the males and females emergence from cocoons and mating after 2-3 days from emergence, with fecundity of 185 eggs. The mean longevity of male and female adults was 21.66 days and 16.66 days, respectively, and the sex ratio of adults is about 1:1. The baker's yeast appears to be an optimal laboratory diet for mass rearing of *Lasioderma serricorne* (F.) at 28 ± 2ºC and 60-70% RH based on the speed of development of immature stages and number of eggs laid by mated females.

Key words: Biology, Cigarette Beetle, *Lasioderma serricorne*, *Saccharomyces cerevisiae*

Introduction

Cigarette Beetle *Lasioderma serricorne* (F.) (Coleoptera : Anobiidae) is a major pest of dried tobacco leaves and cigars and develops on many stored products such as dry fruit, grain, cereal flour, yeast and animal food in tropical and subtropical areas (Howe 1957, Papadopoulou and Buchelos 2002, Arbogast *et al.,* 2003, Rees 2004, Cabrera 2007, Boateng *et al.,* 2017).

The natural enemy complex consists of many predators and parasitoids. The parasitoid *Anisopteromalus calandrae* (Howard) was recorded associated with this insect on baker's yeast *Saccharomyces cerevisiae* (Al-Obaidy *et al.,* 2019).

The yeasts can provide the insects with many benefits, which include acting as a nutrition source, detoxifying harmful substances, protection from biotic stresses and can aid in chemical communication (Janson *et al.,* 2008, Gibson and Hunter 2010), yeast cells are sources of B vitamins, proteins, trace metals and amino acids that could by easily assimilated through simple digestion (Vega and Dowd 2005, Gibson and Hunter 2010).

On the other hand the presence of yeast has been found in at least 143 insect species from many different orders, demonstrating that yeasts have produced highly diverse association with insects (Suh *et al.,* 2005, Vega and Dowd 2005). therefore, the objectives of this study was to determine the effect of yeast *Saccharomyces cerevisiae* on the development of Cigarette Beetle *Lasioderma serricorne*.

Materials and methods

Lasioderma serricorne was reared on baker's yeast *Saccharomyces cerevisiae* in the Entomology Laboratory of Agricultural Engineering Sciences College - University of Baghdad , Baghdad in July 2018 to study the life cycle and some biological parameters . Sixteen male and female were added to 0.5 liter jars with 20g of the yeast , five jars were placed on incubator (28 ± 2ºC, 60-70% RH, 10:14 L: D period).

The jars were covered with muslin cloth which was tightly held in place with rubber bands. after 1-2 day eggs were gently removed from the food using a camel's hair brush into 9 cm glass petri dishes using digital microscope (40-1000 X magnification). a total of 100 eggs were

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individually placed in small petri dishes with 2g of yeast ,then placed in the incubator, daily observation were thereafter made until emergence of adults to record the incubation period and the duration and survival of immature stages. when adults emerged from pupae, one male and one female were paired and placed in a small petri dishes with 2g of yeast, five dishes checked daily to counting number of eggs laid by the female until the adults were dead. Pre-oviposition, oviposition, post oviposition period were recorded, female fecundity ,female and male longevity and sex ratio also recorded (Yu 2008, Al-Obaidy *et al.*, 2017).

Results and Discussion

The eggs were white in color and covered with a waxy shell to protection figure (1- H), Incubation period varied between 6 and 10 days, the newly emerged larvae were yellowish white , covered with fine hairs Fig. (1-F, G) ,the larvae eats the egg shell at the time of hatching (Ashworth 1993). The mean duration of first, second, third, fourth, fifth and sixth larval instar ranged between 8-10, 6-7, 7-8, 9-13, 7-10, 6-7 days. The larvae are white and hairy, The total larval duration was between 43-55 days. Mahroof and Phillips (2008) also found the mean larval stage duration of *Lasioderma serricorne* on dry tobacco leaf was 53 days. The larvae stop feeding and build cell when they are fully grown Fig. (1-C, D, E), the formation of this cell is influenced by the food substrate disturbance may cause old larvae to give up a partly made cell and build new cells or even cause to form naked

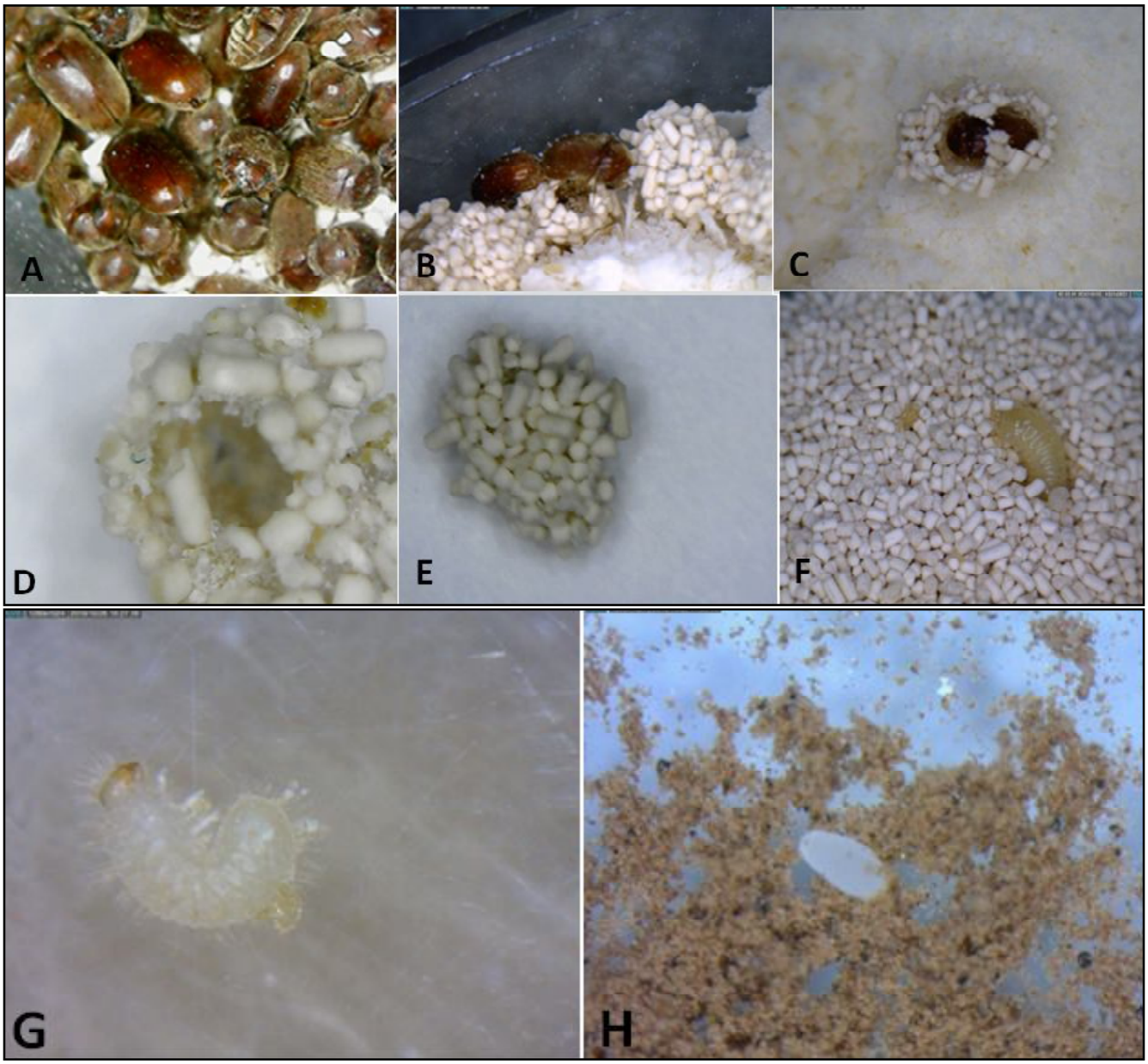

Fig. 1: Insect life stage **(A)** Insect colony (**B)** Female and male mating (**C, D, E)** Cocoon, pupation cell **(F, G)** Larva **(H)** Egg.

Table 1: Development of Cigarette Beetle *Lasioderma serricorne* (F.) (Coleoptera : Anobiidae) immature stages on baker's yeast *Saccharomyces cerevisiae*.

Life Stage	Duration Range(days)	Mean ±	SD
-Incubation period	6-10	8.33	0.57
-Larval stages	43-55	50.33	0.73
First instar	8-10	9	1
Second instar	6-7	6.66	0.57
Third instar	7-8	7.33	0.57
Fourth instar	9-13	9.88	4
Five instar	7-10	9	1.73
Six instar	6-7	6.66	0.57
-Pupal stage	7-13	10.66	3.21

Table 2: Development of Cigarette Beetle *Lasioderma serricorne* adult stages on baker's yeast.

Life Stage	Duration Range (days)	Mean	SD
Pre-Oviposition period	1-2	1	0.52
Oviposition period	8-15	7.66	0.73
Post-Oviposition period	3-5	2.66	1.57
Fecundity	120-185 eggs	8.4	0.72
Female longevity	12-22	16.66	4.72
Male longevity	15-26	21.66	3.21
Sex ratio	1:1	-----	-----

pupae. The pupal duration was 7-13 days, pupa was white in color.

The males and females emergence from cocoons and mating after 2-3 days from emergence Fig. (1-B), females started laying eggs after 1-2 days from mating and continued to lay eggs for 8-15 days. The females lay maximum number of eggs on the fourth days after mating with a mean 15 eggs, and female fecundity was 120-185 eggs and leaves a sticky material on the oviposition site to safe the eggs. The mean longevity of male and female adults was 21.66 days and 16.66 days, respectively.

Yu (2008) reported that the mated females started laying eggs on the third day after emergence and oviposition period of six to eight days, and fecundity of 105 eggs. The longevity of male and female adults was 12-22 days and 15-26 days, respectively, and the sex ratio of adults (male : female) is about 1 : 1.

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