



P-ISSN: 2349-8528

E-ISSN: 2321-4902

www.chemijournal.com

IJCS 2020; 8(6): 1800-1802

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Received: 18-09-2020

Accepted: 05-11-2020

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Biological study of jasmine leaf webworm, *Palpita unionalis* (Hubner) (Pyralidae: Lepidoptera)

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DOI: <https://doi.org/10.22271/chemi.2020.v8.i6z.11027>

Abstract

The leaf webworm, *Palpita unionalis* (Hubner) is one of the major pests of jasmine (*Jasminum sambac*). The biology of leaf webworm, *P. unionalis*, depicts an incubation period of 4.90 ± 0.73 days. The total larval and pupal periods are 19.50 ± 2.54 and 9.40 ± 1.17 days, respectively. The longevity of male and female moths is found to be 11.80 ± 1.68 and 7.20 ± 1.13 days, respectively. The recorded total life cycle for male and female moths is 45.62 ± 6.12 and 41.00 ± 5.57 days, respectively. It was also observed that the longevity of male moth is higher as compared to that of the female.

Keywords: *Jasminum sambac*, Biology, *Palpita unionalis*

Introduction

Jasmine (*Jasminum sambac* Aiton.) is one of the most important fragrant flower crops. Jasmine buds are used for making garlands, bouquets, decorating women's hair, for religious offerings. It has a significant scope in the production of perfumed oils and attars. The flowers and other parts of the plant have found significant place in beneficial medicines (Ramadas *et al.*, 1985)^[9]. The term jasmine is derived from the Arabic Persian word "Yasmin" which means "a gift from God". In Tamil Nadu, *J. sambac* is cultivated in the districts of Madurai, Ramanathapuram, Kanyakumari, Tirunelveli, Dindugal, Coimbatore and Salem (Jayachandran, 2001)^[3]. There are about 50 different insect pest species belonging to more than eight orders harbour the varied microhabitats of the jasmine plants. The most devastating among them are the bud worm, *Hendecasis duplifascialis* (Hampson.). The budworm, *H. duplifascialis*, was first reported in 1896 by Hampson in West Africa, India, Ceylon while David (1958)^[1] reported the same in South India and Delhi. Lanfang *et al.*, (2007)^[6] reported that the jasmine budworm, *H. duplifascialis* has been widely distributed in all jasmine planting areas in Yuanjiang, with jasmine as the only host species. Its occurrence ranges from April to October, with the ovipositional peaks in July, August and September.

Materials and Methods

The larvae collected from the field on *Jasminum sambac* were introduced on potted plants of *J. sambac* under greenhouse conditions and cultured for the experiment at a temperature ($25 \pm 0.5^\circ\text{C}$), humidity ($65 \pm 5\%$) and 12:12 L:D. The pupae were collected and kept in petri plates inside the adult emergence/oviposition cage ($60 \times 45 \times 45$ cm). Ten per cent sugar solution with cotton swab was provided in penicillin vials as food to the adults. Branches of *J. sambac* having four to five leaves were placed in a 250 ml conical flasks filled with water with a cotton swab near the neck of the flask so as to maintain the leaves fresh and placed inside the oviposition cage. The moths on emergence were allowed for oviposition on the leaves. After hatching, the larvae were transferred to fresh branches with leaves and the culture was utilized for further studies (Figure 1). Twelve pairs of moths were released inside a rearing cage ($60 \times 45 \times 45$ cm) and allowed for mating and oviposition. These moths were carefully observed at frequent intervals. The time interval between emergence and first oviposition elucidates the pre-oviposition period and the time between the first and last oviposition depicts the oviposition period.

A pair of male and female moths was confined in a 5 liter plastic container (diameter 10 cm) soon after the emergence. Inside the plastic container, branches of *J. sambac* were placed in a 100 ml conical flask filled with water and plugged with cotton.

Ten per cent sugar solution was provided as a feed and the container was covered with a muslin cloth. Similar conditions were created for all the twelve pairs of adults under study. After 48 h, the leaves were removed and the number of eggs laid was counted. The percentage hatchability was worked out from the total number of eggs laid and the number of larvae hatched. The neonate larvae were closely observed from

hatching to pupation. Twelve neonate larvae were observed and the number of days was recorded to find the larval and pupal periods. The moths on hatching from ten pupae were observed closely by maintaining them in a rearing cage with ten per cent sugar solution as a feed and the adult longevity was worked out in days (Suganthi *et al.*, 2006)^[11].

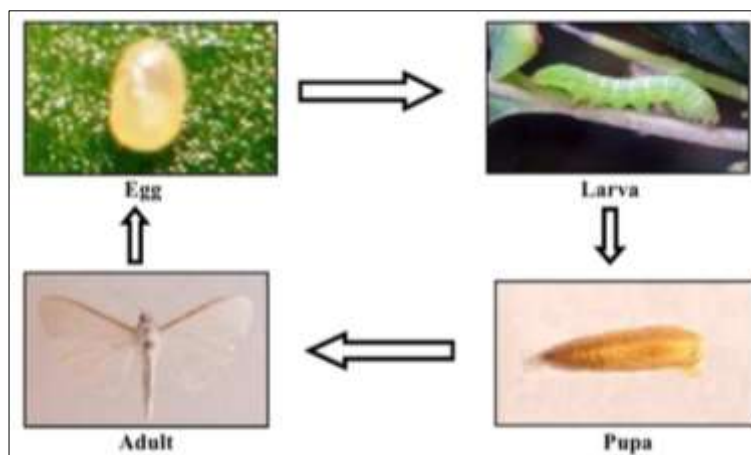


Fig 1: Biology of jasmine leaf webworm, *Palpita unionalis* (Hubner)

Results and Discussion

The results on the biology of leaf webworm, *P. unionalis* are as given in Table 1. It was found that the eggs are laid singly on the under surface of the leaves. The egg was white in colour and the incubation period was found to be 4.90 ± 0.73 days. After hatching, the larvae were pale yellow upto second instar and later turned into green colour. There were five larval instars with mean duration of the 1st, 2nd, 3rd, 4th and 5th instars of 2.51 ± 0.51 , 5.55 ± 0.52 , 3.60 ± 0.50 , 3.41 ± 0.50 and 4.52 ± 0.51 days, respectively. The total larval period was

19.50 ± 2.54 days. The larvae pupate by spinning a silken cocoon inside the leaf webbings. The average pupal period was 9.40 ± 1.17 days. The adult moths were active and fed with 10 per cent sugar solution for laying the eggs. The longevity of the male and female moths was 11.80 ± 1.68 and 7.20 ± 1.13 days, respectively. The total life cycle for male and female moths was 45.62 ± 6.12 and 41.00 ± 5.57 days, respectively and found that the longevity of male moth was higher compared to the female.

Table 1: Biology of leaf webworm, *Palpita unionalis* (Hubner) under laboratory condition

S. No.	Stages of <i>Palpita unionalis</i>	Mean No. of Days \pm SE (Mean of 2 replications)
1.	Incubation period	4.90 ± 0.73
2.	Larval period (instar wise)	
A	I instar	2.51 ± 0.51
b	II instar	5.55 ± 0.52
c	III instar	3.60 ± 0.50
d	IV instar	3.41 ± 0.50
e	V instar	4.52 ± 0.51
	Total larval period	19.50 ± 2.54
3.	Pupal period	9.40 ± 1.17
4.	Adult longevity	
a	Male	11.80 ± 1.68
b	Female	7.20 ± 1.13
5.	Total duration of the life cycle	
a	Male	45.62 ± 6.12
b	Female	41.00 ± 5.57

The biology of jasmine leaf webworm, *P. unionalis* was studied under the laboratory conditions and is presented in Table 1. The incubation period, total larval and pupal period of leaf webworm, *P. unionalis* was found to be 4.90 ± 0.73 , 19.50 ± 2.54 and 9.40 ± 1.17 days, respectively. The total life cycle for male and female moths was found to be 45.62 ± 6.12 and 41.00 ± 5.57 days respectively. It was also observed that the longevity of male moth was higher compared to the female (Table, 1). Khaganinia and Pourabad (2009)^[4] reported that the mean developmental time, from the egg through the adult stages for *P. unionalis* lasted for 38 days and

it could produce nine generations per year. It was also indicated that the mean longevity of male and female moths was 14.1 and 12.3 days, respectively. Similar findings were also expressed by Loi (1990)^[7]. Noori and Shirazi (2012)^[8] reported that the embryonic developmental time, whole larval stages, pupal duration, female and male longevity were 5.80 ± 1.08 , 21.6 ± 0.33 , 8.33 ± 1.0 , 12.6 ± 1.3 and 13.5 ± 1.1 days respectively. Yilmaz and Genc (2012)^[12] reported that the longevity of *P. unionalis* male was higher than the female. Similar results were also stated by Shehata *et al.*, (2003)^[10] on olive and Kumral *et al.*, (2007)^[5] on jasmine.

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