

Biology of Jasmine Bud Worm, *Hendecasis duplifascialis* Hampson (Lepidoptera : Crambidae) on Star Jasmine, *Jasminum multiflorum*

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ABSTRACT

The bud worm *Hendecasis duplifascialis* is the major pest of jasmine, *Jasminum multiflorum* and pose serious threat for its cultivation. The biology of bud worm on *J. multiflorum* revealed that the female moth prefers to lay eggs singly into each bud either on the salk or around the petals of unopened bud. The incubation period ranged from 3.0 to 4.0 days with a mean of 3.25 ± 0.5 days. There were five larval instars with a total mean larval duration of 11 ± 0.57 days. The mean pupal duration was 5.5 ± 0.57 days. The average female and male moths longevity was 3.5 ± 0.57 and 3.0 ± 0.00 days, respectively. The over all total life cycle duration of bud worm was 27 ± 1.83 days.

Keywords: Bud worm, Biology, *Hendecasis duplifascialis* and *Jasminum multiflorum*

JASMINE is a highly valued commercial flower crop native to the tropical and subtropical regions of the world. It was introduced to South Asia in the mid sixteenth century. Jasmine belongs to family Oleaceae of the order Oleals and genus *Jasminum*. The genus *Jasminum* contains more than 200 species comprising both fragrant and non-fragrant flowers.

The *J. multiflorum* commonly called as star jasmine is an evergreen shrub with branching vine of 10 ft tall and just as wide that can be trained. In Karnataka state, many small and marginal farmers grow jasmine for livelihood. Since from last one decade farmers are experiencing difficulty in cultivating jasmine due to few insect and mite pests. In recent years, the bud worm *H. duplifascialis* is known to pose a serious threat for jasmine cultivation.

The caterpillar makes a hole on the flower bud and feeds on the inner floral structures during the initial stage and later make a circular hole on the bud and comes out for attacking the adjacent buds in the same cymose. During severe infestation, the larva makes a web like structure in the cymose and feeds on the buds. Most of the times infested flowers dry up and drop off (Kamala and Kennedy, 2016). The damage caused by bud worm ranges from 40 to 50 per cent, affecting the quality of the flowers and attributed for 30 to 70 per cent yield loss (Jasmine growers personal

communication, 2018). The knowledge about the biology of insect pests is a pre-requisite for effective pest management. Especially IPM practices requires information about species biology to manage it successfully and to reduce yield losses.

MATERIAL AND METHODS

The larvae collected during the field surveys were reared separately in the insect rearing cages by providing fresh flower buds collected from jasmine gardens at Chandurayanahalli village, Magadi taluk, Ramangara district. These branches were kept in the 250 ml conical flask with 20 per cent sugar solution and were replaced as and when required. The bud worm pupae obtained from lab culture and as well as pupae collected from the field were placed in petri plates and kept in adult emergence cage. Five pairs of adults emerged from pupae on the same day were released into the oviposition cage. The cotton swab with 10 per cent sugar solution in petri plate was kept in the oviposition cage as food for adult moths.

In oviposition cage (30 cm x 30 cm x 30 cm), fresh healthy jasmine branches with approximately 50 to 75 unopened buds placed in 20 per cent sugar solution in 250 ml conical flask and plugged with cotton were placed for females to oviposit on the buds (Fig. 1). After 48 hrs, the branches with buds were taken out

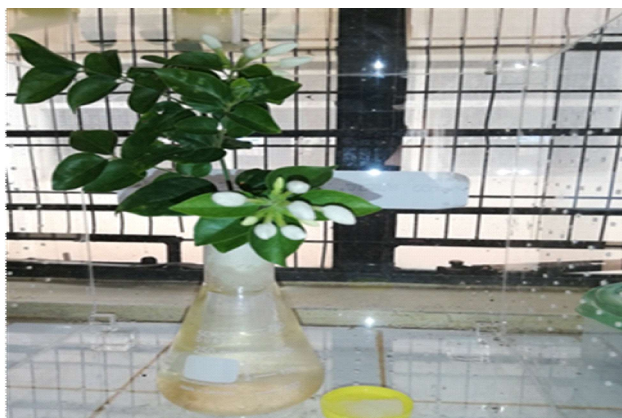


Fig. 1: The biology of *H. duplifascialis* under laboratory

from the oviposition cage and closely observed under the microscope to record number of eggs laid on buds. The larvae were reared in the rearing cage till the completion of first instar. Later the first instar larvae were released on the cymoses of *J. multiflorum* plants



Fig. 2: Biology of bud worm on plants raised in pots under greenhouse conditions

raised in pots under greenhouse conditions to study the duration of different larval instars (Fig. 2).

Each cymose of *J. multiflorum* plants had 4-7 buds. One or two larvae were released on each cymose based on the number of unopened buds present. The observations were recorded during morning and evening on a daily basis to find out larval duration by destructive sampling method and number of days taken for pupation were also recorded of each instar. The pupation of bud worm occurs in silken cocoon on leaves or cymoses. The pupae collected along with the leaves / cymoses were placed in petri plates and

kept in rearing cage to know the pupal duration. Later observations were recorded on number of days taken for adult emergence. The cotton swab with 10 per cent sugar solution was placed in petri plate kept in the cage to provide food for adults. The male and female adult duration was recorded separately.

RESULTS AND DISCUSSION

The biology of budworm, *H. duplifascialis* was studied for four generations (Table 1) at laboratory conditions at Zonal Agricultural Research Station, University of Agricultural Sciences, GKVK, Bengaluru. The results of the pooled data on duration of different developmental stages of bud worm are given in

TABLE 1

The biology of *H. duplifascialis* under laboratory conditions in four replications

Developmental stages of bud worm	Duration (in days)			
	Gener-1	Gener-2	Gener-3	Gener-4
Egg	3	4	3	3
I Instar	3	3	2	3
II Instar	2	3	1	3
III Instar	1	2	1	2
IV Instar	2	2	2	2
V Instar	3	4	3	4
Pupa	5	6	6	5
Female moth	3	2	3	3
Male moth	4	3	4	3
Total life cycle duration	26	29	25	28

Table 2. It was found that the female moth inserted only one egg into the single bud, around the petals or bud stalk (Fig. 3). The eggs of the bud worm were small and white in colour and later turned to creamish colour with estimated incubation period of 3.25 ± 0.5 days.

The larvae were pale green in colour with black head prothoracic shield and had five instars with total duration of 11.0 ± 0.57 days (Fig. 4).

TABLE 2
The biology of *H. duplifascialis* under laboratory conditions

Developmental stage	Sample size (n)	Duration (days)			
		Min.	Max.	Avg.	
Egg	Estimated incubation period	20	3	4	3.25 ± 0.5
Larva	I	20	2	3	2.75 ± 0.5
	II	20	1	3	2.25 ± 0.95
	III	20	1	2	1.50 ± 0.57
	IV	20	2	2	2.00 ± 0.00
	V	20	3	4	3.50 ± 0.57
Pupa	Pupa	20	5	6	5.50 ± 0.57
Adult	Male	20	3	3	3.00 ± 0.00
	Female longevity	20	3	4	3.50 ± 0.57
Total life cycle		20	25	29	27.00 ± 1.82



Fig. 3: Damage symptom due to egg laying by bud worm on jasmine buds

First Instar

The first instar larva was around 2 mm in length with pale green body and black head. The larva soon after hatching from the egg made a small pinhole into the bud and started feeding inside the bud. The first instar mean larval duration was 2.75 ± 0.5 days.

Second Instar

The second instar larva measured 2.5 - 3.5 mm with light green colour body, black head and prothoracic shield with mean larval duration of 2.25 ± 0.95 days.

Third Instar

The third instar larva measured 3.5 - 4.5 mm with light green coloured body, black head and prothoracic shield with a mean duration of 1.50 ± 0.57 days.



Fig. 4: Different larval stages of jasmine bud worm

Fouth Instar

The fourth instar larva measured 4.5 - 6.0 mm with a light green coloured body, black head and prothoracic shield with a mean duration of 2.0 ± 0.00 days.

Fifth Instar

The fifth instar larva measured 6.5 - 8.0 mm with dark green colour body, black head and well developed prothoracic shield and with few hairs on the body. The mean fifth instar duration was 3.50 ± 0.57 days. The fifth instar larva cause severe damage to the buds by making holes, feeding inside and depositing excreta. The bud worm larva requires 4-6 buds to complete its entire larval duration and thus reducing the quality of the buds.

Pupa

Pupa measured about 2.5 - 3.0 mm in length and 0.6 - 0.7 mm in width. The pupation occurs inside the brown coloured cocoon and is attached to the leaves with the silken frassy material. The mean pupal duration was about 5.50 ± 0.57 days (Fig. 5)

Adults

The adult male moths are small with pale creamy markings on the wings and with a mean longevity of 3.00 ± 0.00 days (Fig. 6).



Fig. 5: Pre pupa (5a) and pupa (5b) of jasmine bud worm

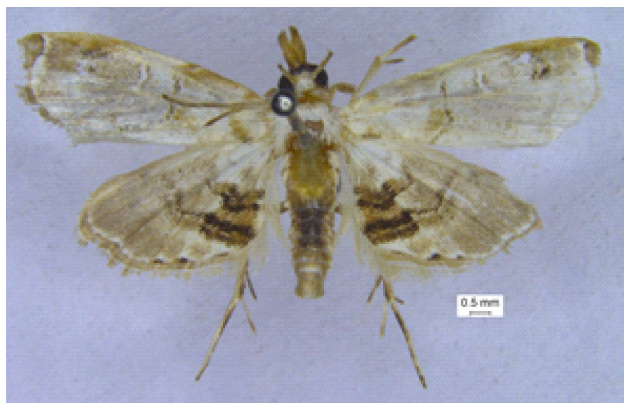


Fig. 6: Adult male moth of jasmine bud worm *H. duplifascialis*

The female moths are also small with the pointed ovipositor and similar markings like males on their wings. The mean longevity of female moth was 3.5 ± 0.57 days (Fig. 7).



Fig.7: Adult female moth of jasmine bud worm *H. duplifascialis*

In present study it was found that the female moth inserted only one egg into the single bud, around the petals or bud stalk. Our present findings were supported by Krishna Chaitanya and Kumar (2018) who reported that the eggs of the bud worm were small and white in colour and later turned to creamish

colour. The morphological characters of different stages of bud worm reared on *J. multifloram* in the present study were similar with that of colouration and morphology of eggs, larvae, pupae and adults as described by Krishna Chaitanya and Kumar (2018) when reared on *Jasminum sambac*. The incubation period, larval duration and pupal duration were 3.25 ± 0.5 , 11.0 ± 0.57 and 5.5 ± 0.57 days, respectively. Further, the total duration for male and female moths were found to be 3.00 ± 0.00 and 3.5 ± 0.57 , respectively. The total life cycle of bud worm on *J. multifloram* was found to be 27 ± 1.82 days. These findings with respect to the life cycle of bud worm of different stages were almost similar to that reported by Krishna Chaitanya and Kumar (2018). The bud worm was found to be a highly voracious feeder by causing huge amount of damage to the buds and the cymoses. During its entire life cycle the pest damages almost 4-6 buds on an average.

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(Received : August, 2019 Accepted : October, 2019)