

**RESEARCH ARTICLE :**

## Biology of Bihar hairy caterpillar, *Spilarctia obliqua* (Walker) (Erebidae: Lepidoptera) on field bean

■ MALLIKARJUN WARAD AND C.M. KALLESHWARASWAMY

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**SUMMARY :** Biology of the Bihar hairy caterpillar, *Spilarctia obliqua* (Walker) reared on field bean leaves revealed that the eggs were creamy white when laid became pale yellow in colour before hatching. The number of eggs per mass varied from 148 to 232. Egg, larval and pupal period varied from 5 to 6, 20 to 21 and 8 to 9 days, respectively. The average eggs laid by a female moth were 148 - 232. Larvae had six instar with a total larval duration of days. The length of male and female moth varied from 51 to 55 mm and 55 to 59 mm, respectively. The total life span of male and female ranged from 37 to 42 days and 39 to 44 days, respectively.

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**KEY WORDS :**

Biology, Erebidae,  
Field bean, *Spilarctia obliqua*

**BACKGROUND AND OBJECTIVES**

The field bean, *Lablab purpureus* L. is an important pulse cum-vegetable crop in tropics, is cultivated for its tender and mature pods, seeds and also for fodder. The primary cause attributed for lower yields of field bean has been due to the damage caused by the insect pests (Thejaswi *et al.*, 2008). Field bean is attacked by more than 55 species of insects and mite pests from seedling stage till the harvest of the crop in Karnataka (Govindan, 1974). Bihar hairy caterpillar, *S. obliqua* has been reported as major pest of Mulberry in Aurangabad, India (Sunil and Chandrashekar, 2013).

Bihar hairy caterpillar, *Spilarctia obliqua* (Walker) is a polyphagous pest

attacks plant species across several families. It inflicts damage to field bean by defoliating the leaves. There is no literature available on the reproductive biology of *S. obliqua* on any of its host. Hence the study was conducted. These hairy caterpillars are very notorious to rear because of difficulty in handling as they produce skin allergy and also known to undergo diapauses in pupal stage. These may be the limiting factors in attempting biology studies of hairy caterpillars. In this study we made effort to study detailed biology of *S. obliqua* on field bean. Few workers Sinha *et al.* (1988) and Kalra (1986) observed the pest *S. obliqua* Wlk. as *Kharif* pest attacking *Kharif* crops like black gram, green gram, season in different parts of the country India.

**Author for correspondence :**

**MALLIKARJUN WARD**  
Department of  
Agricultural  
Entomology, University  
of Agricultural Sciences,  
RAICHUR (KARNATAKA)  
INDIA  
Email : [mbwarad@gmail.com](mailto:mbwarad@gmail.com)

See end of the article for  
authors' affiliations

## RESOURCES AND METHODS

Immature stages of hairy caterpillars were collected from the field and used as nucleus culture to study the biology Department of Agricultural Entomology, College of Agriculture, Shivamogga at room temperature during 2015-16. The caterpillars were reared to adults and reared to adults. Later, pair of adult moths were released into a cage for egg laying and incubation period was recorded. The adults were fed with 10 per cent honey solution.

The freshly hatched larvae were placed on its host with the help of hair brush and kept in a petri plate whose cap is made perforated in order to facilitate aeration and were observed twice a day for the larval moulting. For the last instar larvae the soil was be provided to facilitate pupation. Egg period, larval period, pre-pupal period, pupal period, total life cycle after pupation the pupal period was also recorded. Biological characteristic of adults such as pre-oviposition period, oviposition and post oviposition period, and fecundity were also recorded.

## OBSERVATIONS AND ANALYSIS

The growth parameters such as egg, larvae, pupae and adult developmental periods recorded was presented in Table 2 (Plate 1).

### Egg :

The freshly laid eggs were creamy white and turned pale yellow and are slightly flattened at one side. The egg measured about  $0.25 \pm 0.021$  mm in diameter. The number of eggs per mass varies considerably but was often 148 to 232 in batches and covered with hairy scales of the tip of the abdomen of the female moth. When the eggs were about to hatch, turned blackish which was the developing head of the larvae (Table 2).

One day prior to hatching, the dark head of the young larva was observed inside the egg shell. Incubation period ranged from 5 – 6 days with an average of 5.75 days.

### Larva :

During its larval developmental period, the caterpillar moulted five times and had six larval instars. The total larval period ranged from 20 – 21 days with an average of 20.55 days.

### First instar:

The newly hatched larvae were sluggish in nature

which became active after some time. Young larvae were translucent light yellow with dark head. The head is prominently big and was bigger than any part of the body. The larval body was covered with number of long hairs arising from dark coloured tubercles. The width of the first instar larval head capsule ranged from 0.06 – 0.07mm with an average of 0.07 mm (Table 1).

**Table 1 : Head capsule width of *Spilarctia obliqua* during different moults on field bean leaves (n = 20)**

Stage of insect	Head capsule width (mm)	
	Range	Mean $\pm$ SD
First moult	0.06 - 0.07	0.07 $\pm$ 0.002
Second moult	0.09 - 0.12	0.10 $\pm$ 0.01
Third moult	0.17 $\pm$ 0.19	0.18 $\pm$ 0.007
Fourth moult	0.21 $\pm$ 0.28	0.25 $\pm$ 0.01
Fifth moult	0.40 $\pm$ 0.54	0.47 $\pm$ 0.03
Sixth moult	0.45 $\pm$ 0.70	0.61 $\pm$ 0.06

The first instar took 3 to 4 days with an average of 3.3 days to enter into next instar (Table 2).

### Second instar:

As the larva advances to second instar, the body grows faster and as a result, the body turns wider than the head. The larva was translucent light yellow in colour with prominent setae and tubercles.

During the second instar, the width of the head capsule was 0.09 – 0.12 mm with an average of 0.10 mm (Table 1). The second instar varied from 2 to 3 days with an average of 2.25 days to enter into next instar (Table 2).

### Third instar:

The third instar larva was morphologically similar to that of second instar with prominent setae and tubercles. The larva was light yellowish in colour with black patches on the anterior and posterior region of the body. The spiracles were black in colour and are nine in number.

The head capsule width of third instar larva was 0.17 to 0.19 mm with an average of 0.18 mm (Table 1). The duration of third instar larvae was 5 to 6 days with an average of 5.60 days (Table 2).

### Fourth instar:

The larva was yellowish in colour with yellow longitudinal stripes. Head and prothoracic shield were dark brown. Black patches were present on the anterior

and posterior region.

The width of fourth instar larva head capsule measured 0.21 to 0.28 mm with an average of 0.25 mm (Table 1). The duration of fourth instar larvae was 3 to 4 days with an average of 3.80 days (Table 2).

#### Fifth instar:

Fifth instar larva was almost similar to fourth instar, except in its size. Black patches were present on the anterior and posterior region. The larvae had dense hairs on its body.

The head capsule width of fifth instar larva was 0.40 to 0.54 mm with an average of 0.47 mm (Table 1). The duration of fifth instar larvae was 3 to 4 days with an average of 3.70 days (Table 2).

#### Sixth instar:

The fully grown larva was stout and cylindrical, brown in colour, the head of the larva was dark brown and conspicuous dark anterior and posterior patches of the larva. The larvae had dense hairs on its body.

The head capsule width of sixth instar larva was 0.45 to 0.70 mm with an average of 0.61 mm (Table 1). The duration of sixth instar larvae was 5 to 6 days with an average of 5.35 days (Table 2).

#### General habit and behavior of the larva :

Immediately after hatching the larva was gregarious

at first, later spread over the leaves. Later instar larvae fed voraciously on field bean leaves. At the time of moulting, the larva became inactive.

#### Pupa :

Pupation occurred in the soil as sterilized soil was provided as medium. The pupa was elongated and oval in shape. The eyes and the antennal case were prominent. The freshly formed obtect pupa was yellowish and gradually reached to dark brown. They undergone pupation inside the hairy cocoon, hence pupal sexing was not possible. The total pupal duration ranged between 8 to 9 days with an average of 8.60 days (Table 2).

#### Adult (Plate 1) :

The adults are medium sized brown moths and had pink abdomen. Wings pinkish with numerous black spots. The head, thorax, and abdomen were distinct. The antennae and legs were light brown. Two long segmented filiform antennae were located dorsally on the head and close to the compound eyes.

The male moth was almost similar to the female but it was smaller than female in size. The abdomen was sharply tapered compared to female (Plates). The average longevity of the adult male was 4.00 to 5.00 days with an average of 4.40 days (Table 2).

The female was bigger than the male. The abdomen of female was blunt while the abdomen of male was

**Table 2 : Duration of different life stages of *Spilarctia obliqua* (Walker) on field bean leaves and fecundity of adults**

Sr. No.	Life stages		Range (days)	Mean (days)
1.	Incubation period		5.00 – 6.00	5.75 ± 0.44
2.	Larval period	I instar	3.00 – 4.00	3.30 ± 0.47
		II instar	2.00 – 3.00	2.25 ± 0.44
		III instar	5.00 – 6.00	5.60 ± 0.50
		IV instar	3.00 – 4.00	3.80 ± 0.41
		V instar	3.00 – 4.00	3.70 ± 0.47
		VI instar	5.00 – 6.00	5.35 ± 0.48
		Total	20.00 – 21.00	20.55 ± 0.51
3.	Pupal period		8.00 – 9.00	8.60 ± 0.50
4.	Pre-oviposition period *		1.00 – 1.50	1.33 ± 0.25
5.	Oviposition period *		3.00 – 4.00	3.66 ± 0.51
6.	Post-oviposition period *		1.00– 1.50	1.10 ± 0.22
7.	Fecundity/female *		148 - 232	194.6 ± 36.08
8.	Male adult longevity *		4.00 – 5.00	4.40 ± 0.54
9.	Female adult longevity *		6.00 – 7.00	6.20 ± 0.44
10.	Total life cycle	Male	37.00 – 42.00	39.80 ± 1.92
		Female	39.00 - 44.00	41.60 ± 2.07

Mean of 20 observations; \* Data of six adults

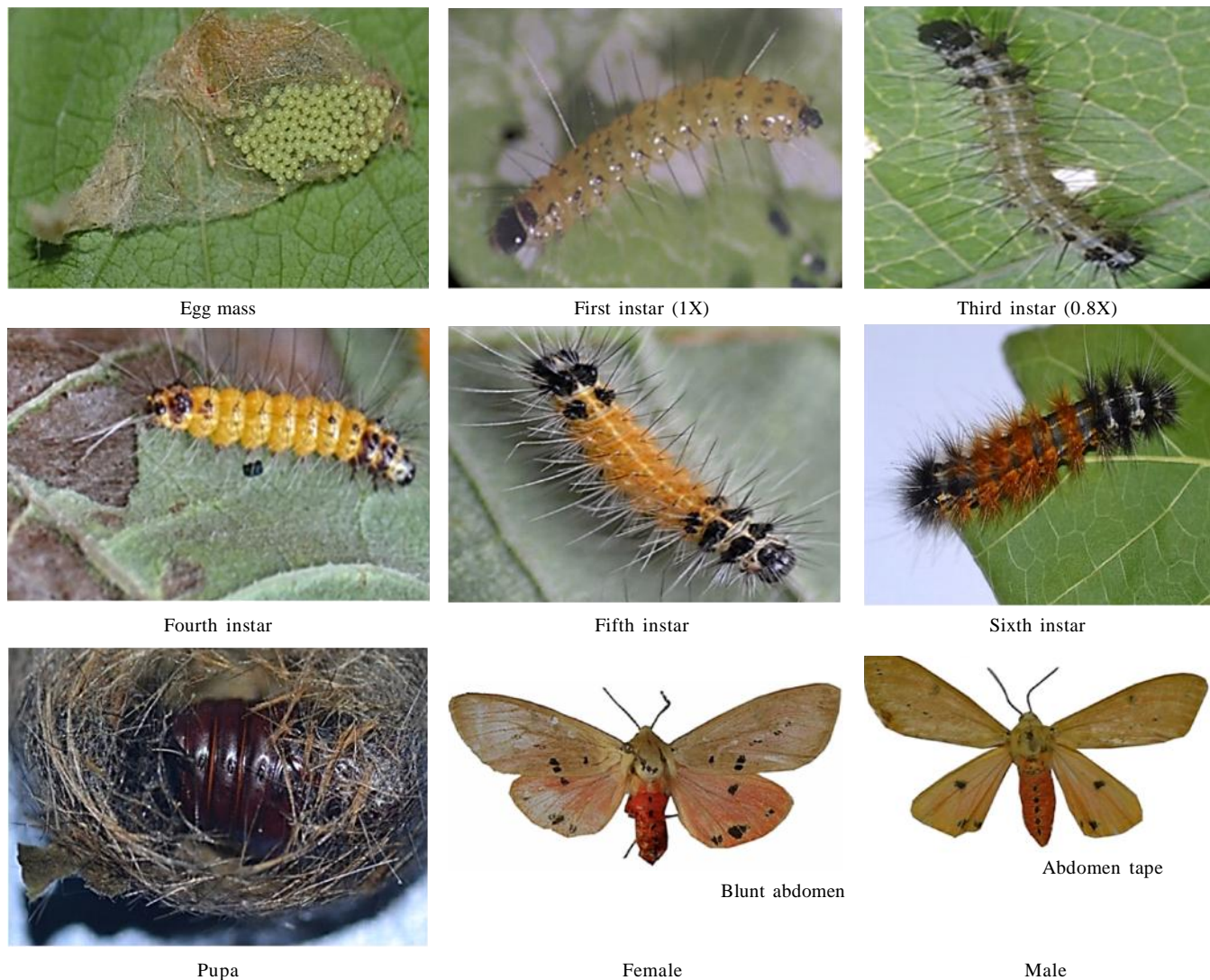


Plate 1 : Life stages of *Spilarctia obliqua* on field bean leaves

narrower and pointed. The average longevity of the adult female was 6 to 7 days with an average of 6.20 days (Table 2).

**Total life span:**

Total life span of male and female ranged from 37 to 42 days with an average 39.80 days and 39 to 44 days with an average of 41.60 days, respectively (Table 2).

**Oviposition:**

The mated female moths laid their eggs during night hours. The oviposition site was first located by the female. After the site was identified, the insect cleaned the leaf surface area by wiping using the tip of the

abdomen. Oviposition took place immediately after. The eggs were deposited in 2 to 3 batches. The pre-oviposition period varied from 1.00 to 1.50 days with an average of 1.33 days, ovipositional period was 3.00 to 4.00 days with an average of 3.66 days and post-oviposition period was 1.00 to 1.50 days with an average of 1.10 days. The fecundity data of 6 females studied individually revealed that the egg laying capacity varied from 148 to 232 eggs with an average of 195 eggs per female (Table 2).

The present studies indicated that the eggs are pearly white become pale yellow in colour slightly flattened on one side. The number of eggs per mass varies considerably but is often 148 to 232 in batches and covered hairy scales from the tip of the abdomen of the

female moth. Biology of *Diacrisia oblique* Walk. was studied by Djou (1938), observed that a female laid 342-1356 eggs and incubation period was 6-11 days. In absence of the literature pertaining to the biology of *S. obliqua* on field bean, reviews on other crops were considered. There is no relevant literature is available on this aspect to support the present study. Gotyal *et al.* (2013) studied the comparative biology of *S. obliqua* on jute. They reported effect of cultivated and wild species of jute on the larval survivability, larval weight, pupal weight and adult emergence of *S. obliqua* at different days after feeding. Ganiger and Sannaveerappanavar (2007) have studied the field biology of Red headed hairy caterpillar *Amasacta albistriga* (Walker) under groundnut ecosystem in Karnataka. But unlike other lepidopterans, *S. obliqua* had six larval instars the reason may be due to the prevailing environmental conditions in the laboratory or due host nutritional characteristics. Bhuiyan and Sardar (1971) examined the effect of rearing *S. obliqua* larvar under solitary and crowding conditions. They found decreasing developmental days with crowding.

Authors' affiliations :

**C.M. KALLESHWARASWAMY**, Department of Agricultural Entomology, University of Agricultural and Horticultural Sciences, SHIVAMOGGA (KARNATAKA) INDIA

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