

Biology of Bihar hairy Caterpillar, *Spilosoma obliqua* walker under laboratory conditions on mulberry

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Abstract

The *Spilosoma obliqua* Walker is a polyphagous pest that feeds on various plant species. It feeds on around 126 plant species from 25 plant families, including fiber crops, oilseeds, vegetables, pulses, and medicinal plants. It also feeds on mulberry leaves which is a food plant of silkworm. The biology of *S. obliqua* was studied at the research laboratory of the Department of Zoology, Shivaji University, Kolhapur during the rabi 2023 under controlled conditions (26±2°C and 75 to 80% RH). The investigation revealed the *S. obliqua* eggs incubation period was about 4.8±0.84 days. The duration of first, second, third, fourth, fifth and sixth instar were 3.37±0.49, 3.17±0.70, 5.47±0.51, 3.53±0.51, 3.40±0.50 and 5.67±0.48, respectively. The pupal period was 10.63±0.76 days. The longevity of adult females and males were 8.33±0.48 and 5.07±0.83 days, respectively. The average fecundity of adult female was 773.40±121.10 days.

Keywords: *Spilosoma obliqua*, mulberry, biology, incubation, fecundity

Introduction

The *Spilosoma obliqua* Walker commonly known as Bihar hairy caterpillar or Jute hairy caterpillar belonging to the family Erebidae is a polyphagous pest and has a wide range of hosts. It is a serious and destructive pest of various crops. About 126 plant species from 25 plant families, including fiber crops, oilseeds, vegetables, pulses, and medicinal plants, are known to be consumed by this polyphagous pest (Bhadauria *et al.*, 2001 ^[1]; Gupta and Bhattacharya, 2008) ^[2]. This pest has already reported in countries like India, Myanmar, China (Singh and Seghal, 1992) ^[7]. The caterpillars of early instars gregariously feeds on the green leaves behind the veins, soft tissues, and finally disperse (Gyawali, 1988 ^[3]; Srivastava, 1993). The later instars severely damage the crop resulting in a significant yield loss (Hussain and Begum, 1995; Gupta and Bhattacharya, 2008) ^[2]. Due to its extensive host range, the Bihar hairy caterpillar may turn on readily accessible agricultural plants or natural vegetation during the off-season, which aids in its ability to eat and survive all year long (Kennedy and Storer, 2000) ^[5]. The *S. obliqua* also feeds on mulberry leaves which is a food plant of silkworms. Sericulture plays a significant role in the socioeconomic growth of farming communities. India comes in second place among nations that produce silk. Nowadays, the farmers of Maharashtra are practicing sericulture at large for the production of silk. Kolhapur is one of the major district that has engaged in silkworm rearing. The mulberry leaf quantity and quality are key factors that determine silkworm rearing productivity and profitability. The heavy infestation of bihar hairy caterpillars on the mulberry plants leads to yield loss. The IPM (integrated Pest Management) requires prior knowledge of the biology and ecology of insect pests. The present study focuses on the biology of *S. obliqua* on mulberry.

Material and Methods

The biology of *S. obliqua* was studied at the research laboratory of the Department of Zoology, Shivaji University, Kolhapur during the rabi season of 2023 under controlled conditions (26±2°C and 75 to 80% RH). The matured larvae of *S. obliqua* were collected from the nearby mulberry field and brought into the laboratory. The larvae were reared till pupation by giving mulberry as a feed and the pupa were placed inside the wooden cage (30×30×30 cm). 10 % honey solution was provided for the adults. The five mated adult females were kept individually in wooden cages (one adult/cage). 10 % honey solution was also kept for feeding in each cage and jar. The fresh mulberry leaves are provided as a substrate for oviposition in the cages. The eggs deposited by female moths were counted. The eggs were collected and kept in a circular dish for hatching. The incubation period was recorded. The larvae were reared separately after hatching on freshly mulberry leaves and fed every day till pupation. The duration of larvae and pupae was recorded. Adult longevity was also examined.

Results and Discussion

The investigation revealed the life cycle of *S. obliqua* comprises four stages *viz.*, egg, larva, pupa and adult. The eggs deposited by mated adult female moth were in clusters and initially they are greenish in colour. The eggs turn from greenish to pale yellow and prior to hatching it becomes dark brown. The incubation was about 4.8±0.84 days. After hatching, the larva comes out from the egg. Total five moult and six larval instars were observed. The neonate larvae were small, and creamy white in appearance with brown head and has small hairs. Several brown spots were observed on the entire body. After several hours, the larva turns pale yellow. The duration of first instar was 3.37±0.49 days. The duration of second, third, fourth, fifth and sixth instar were 3.17±0.70, 5.47±0.51, 3.53±0.51, 3.40±0.50 and 5.67±0.48, respectively. The third to fifth instar larvae have anterior and posterior regions black and the middle region

was yellowish brown in colouration. The larval body is covered by dense hairs. The matured larvae or sixth instar larvae were stout, cylindrical with dark head, brown body colouration, anterior and posterior black patches, and the body bears dense hairs. The fully grown larvae were voracious feeders. The matured larva stops feeding after several days and its body contracted. The total larval period of 24.61 ± 1.14 days was observed.

After the completion of larval stage, pupation occurs. The pupae were dark brown in colouration and has covering of a thin silken cocoon. The duration of pupa was 10.63 ± 0.76 days. The adults emerge from the pupa after several days. The adult male moths were small as compared to adult females. The adults were straw coloured and had brick red abdomen with the dorsal side possessing black spots which were arranged in rows (on each abdominal segment). The scattered black spots were observed on the wings. The longevity of adult females and males were 8.33 ± 0.48 and 5.07 ± 0.83 days, respectively. The total life cycle ranges from 39-43 days in males, while 43-46 days in females. The mean fecundity of adult female was 773.40 ± 121.10 days. The present findings are in accordance with Pandit and Veeranna (2020)^[6] who reported the biology of Bihar hairy caterpillar on sunflower. The incubation, larval and pupal period were observed as 4- 6.50, 22-25 and 10-12.50 days, respectively. The total life cycle of adult males and females

were 42-44 and 45-47.50 days, respectively. Similarly, Warad and Kalleshwaraswamy (2017)^[8] studied the biology of *S. obliqua* on field bean. The eggs of *S. obliqua* were creamy white at the time of deposition and turned pale yellow before hatching. The duration of egg, larva and pupa were 5 to 6, 20 to 21 and 8 to 9 days, respectively. The total life span of adult females and males ranged from 39 to 44 days and 37 to 42 days, respectively.

Table 1: Biology of *Spilosoma obliqua* reared on mulberry leaves

Stages	Mean±SD	Range (Days)
Incubation period*	4.8±0.84	4-6
Larval period	24.61±1.14	21-28
I instar	3.37±0.49	3-4
II instar	3.17±0.70	2-4
III instar	5.47±0.51	5-6
IV instar	3.53±0.51	3-4
V instar	3.40±0.50	3-4
VI instar	5.67±0.48	5-6
Pupal period	10.63±0.76	10-12
Fecundity*	773.40±121.10	620-900
Male adult longevity	5.07±0.83	4-6
Female adult longevity	8.33±0.48	8-9
Total life cycle (egg to adult)	41.57±1.10	39-43
Male		
Female	44.17±1.05	43-46

n=30, n=05*



Fig 1: Neonate larvae of *S. obliqua* hatched from egg mass (A), Larva (B), Cocoon (C), Adult (D) and Infestation of *S. obliqua* larvae on the mulberry field.

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Conflict of Interest

All authors declares no conflict of interest.

References

1. Bhadauria NK, Bhadauria NS, Jakhmola SS. Larval development and survival of Bihar hairy caterpillar,

Spilosoma obliqua (Walk.) on different host plants. *Indian J Entomol*,2001;63(4):475-477.

- Gupta G, Bhattacharya AK. Assessing toxicity of post-emergence herbicides to the *Spilarctia obliqua* Walker (Lepidoptera: Arctiidae). *Journal of Pest Science*,2008;81:9-15.
- Gyawali BK. Damage and yield loss of soyabean from hairy caterpillar (Lepidoptera: Arctiidae). *Quarterly Newsletter*. 1988;31(3):35-41.

4. Husain M, Begum M. Food preference of jute hairy caterpillar, *Spilosoma obliqua* (Walk.), on some varieties of jute. *Bangladesh J Entomology*,1995:5(1-2):57-59.
5. Kennedy GG, Storer NP. Life systems of polyphagous arthropod pests in temporally unstable cropping systems. *Annual review of entomology*,2000:45(1):467-93.
6. Pandit VR. Biology of Bihar hairy caterpillar, *Spilarctia obliqua* Walker (Erebidae: Lepidoptera) under laboratory condition on sunflower. *J Farm Sci*,2020:33(2):284-287.
7. Singh S, Seghal SS. Studies on growth and development of *Spilosoma obliqua* (Walker) on different food plants. *Indian Journal of Entomology*. 1992:54(4):471-482.
8. Warad MA, Kalleshwaraswamy CM. Biology of Bihar hairy caterpillar, *Spilarctia obliqua* (Walker)(Erebidae: Lepidoptera) on field bean. *Agric Update*,2017:12(5):1256-60.