

**SEASONAL BIOLOGY OF BIHAR HAIRY CATERPILLAR, *SPILARCTIA OBLIQUA* WALKER (LEPIDOPTERA : ARCTIIDAE) ON CASTOR, A PRIMARY FOOD PLANT OF ERI SILKWORM**

**Y. DEBARAJ AND RAVINDRA SINGH**

REGIONAL SERICULTURAL RESEARCH STATION,  
JORHAT-785 005, INDIA.

(e-mail : yumnadebaraj@yahoo.com)

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The biological aspects of Bihar hairy caterpillar, *Spilarctia obliqua* Walker infesting castor, *Ricinus communis* (Non-bloomy red variety) were studied in different seasons at RSRS, Mendipathar. The biological parameters like larval period, pupal period, total life cycle, fecundity, hatchability, incubation period, and adult longevity were recorded during four seasons, viz. March-April, June-July, October-November and December-January. Egg incubation varied from 6.5 -10.5 days, the shortest in October-November and longest in December-January. The season has no effect in the egg hatchability of the insect. The larval period varied from 24 days (June-July) to 44 days (December-January). Similarly, the total life cycle (egg to adult) took only 39.6 days in June-July and it was prolonged up to 70 days during December-January. The fecundity was recorded maximum in October-November (987 eggs) and lowest in December-January. (654 eggs). Adult longevity was more or less same in all the seasons.

**Key words :** Castor, seasonal biology, *Spilarctia obliqua*.

## **INTRODUCTION**

Bihar hairy caterpillar, *Spilarctia obliqua* Walker is an important polyphagous insect pest of great economic value that can survive in wide range of climatic conditions in India. It feeds over variety of food plants viz. the pulses, oil and fibre yielding crops including soybean, sunflower, castor, sesame and jute, vegetables, fodders, ornamentals, orchards and timber plants. The insect has been reported feeding on 104 hosts belonging to 40 families (Singh, 1992). In India, studies on some biological aspects of this pest were carried out by different workers on different crops (Deshmukh *et al.*, 1982; Singh & Sehgal, 1992; Singh & Singh, 1993; Singh & Singh, 1995; Sarma & Kalita, 2000). But no detail study on biological aspects of this pest has been carried out in Meghalaya particularly infesting castor, a primary host of eri silkworm. Therefore, an attempt was made to study the biology of *S. obliqua* under the agro-climatic condition of Meghalaya and North East India.

## **MATERIALS AND METHODS**

The pest was collected from the general plot of castor plantations maintained at Regional Eri Research Station, Mendipathar. The stock culture of the pest was maintained in the laboratory under room condition. After completion of three generations, the newly hatched larvae were transferred individually in petridishes (10 cm dia), which was provided with fresh castor leaves. Fifteen larvae per replication were maintained for the experiment. The castor leaves were changed daily till pupation and the data on biological parameters were collected. Adult pairs of the same age were released inside the glass chimney (22 × 9 cm) for oviposition, which was provided with the castor leaves putting in small bottles filled with water. The top of the glass chimney was covered with muslin cloth and tied with rubber band. Cotton swabs dipped in 10% Honey

solution were provided as food for the adults. The fecundity, hatchability and adult longevity were recorded.

## RESULTS AND DISCUSSION

**Egg :** The eggs are bright greenish in colour at the time of oviposition and change to pale yellow and become dark before hatching. The eggs are oval in shape, measuring about 0.71 mm in diameter. Eggs were laid in clusters on the lower surface of the leaf and rarely on the upper surface. Each female lays 654 to 987 eggs in different seasons. The incubation period varied from 6-8 days in summer and 10-12 days in winter. Similar findings were reported by Singh & Singh (1995), Sarma & Kalita (2000) and Goel (2001).

**Larva :** There are six larval instars in the life cycle of *S. obliqua*. The larval period is shorter in summer (24-29 days) and longer in winter seasons (35-40 days). The mean larval period varied from 24 days (June-July) to 44 days (December-January). The size of the caterpillars varied markedly throughout the larval stages. The findings are in conformity with that of Sarma & Kalita (2000) and Goel (2001). The duration and body sizes of different life cycle stages are presented in Table II.

The newly hatched larvae were creamy-yellow, head black and covered with numerous setae. The body size of first instar larva was 1.85 mm in length and 0.36 mm in width. The first instar lasts 3-4 days in summer and 4-5 days in winter. They feed on the soft chlorophyll portion of the leaf and are gregarious in nature and always confined on the lower surface of the leaf. The second instar larvae are pale yellow in colour with head brown and measured 3.92 mm and 1.71 mm in body length and width. It lasts for 3-4 days in summer and 6-7 days in winter. The third instar larva is yellowish in colour and body length and width measured 8.80 mm and 2.94 mm. The larvae are gregarious and disperse in different directions to feed voraciously on the leaf. The fourth instar larvae are yellowish in colour and profusely covered with the body setae. The duration of this stage is similar with third stage and measure 14.99 mm and 4.25 mm in body length and width. The fifth instar larvae are yellowish brown in colour and measured 21 mm and 4.78 mm in length and width. The body is covered with numerous black and brown setae. The sixth and final stage larvae are more elongated and measure 31.75 mm in length and 5.65 mm in width. Its duration ranged from 5 -7 days in summer and 10 -12 days in winter. Maximum leaf was consumed in this stage and continued up to prepupal stage. The larval characteristics in the present findings are in agreement with those of Singh & Singh (1995), Sarma & Kalita (2000) and Goel (2001). Some of the variations may be attributed to the varying agro-climatic conditions prevailed in the areas and different hosts used for the studies.

**Pre-Pupa :** The matured sixth instar larva stopped feeding and became prepupa stage with head raising, became sluggish and started spinning loose cocoon mixed with setae from its body. The prepupal stage lasted for 3-5 days.

**Pupa :** The pupa is cylindrical, obect type and usually spindle shaped and reddish brown in colour. Thin silken cocoons are formed by the interwoven shed hairs of caterpillars inside which the pupa lies. The length and width of male pupa is 16.30 mm and 5.55 mm and that of female is 20.10 mm and 6.85 mm. The pupal period lasts for 8 - 12 days in summer and 14 -19 days in winter. The pupal period ranged from 9 days

**Table I :** Biological parameters of Bihar hairy caterpillar, *Spilarectia obliqua* Walker on castor during different seasons.

Season	Egg incubation (days)	Larval period (days)	Pupal period (days)	Total life cycle (days)	Adult Longevity (days)	Fecundity (no.)	Mean Temp (°C)	Mean R.H. (%)	Mean Rain-fall (mm)
Mar.-Apr.	7.50	26.50	11.50	45.50	4.00	920	26.50	89.25	168.33
Jun.-Jul.	6.60	24.00	9.00	39.60	3.90	885	30.75	91.50	301.94
Oct.-Nov.	6.50	27.30	12.30	46.10	4.00	987	28.00	90.23	55.46
Dec.-Jan.	10.50	44.00	15.50	70.00	4.30	654	18.75	88.50	119.13

**Table II :** Life cycle of *Spilarectia obliqua* Walker on castor.

Stages	Duration (days)		Mean Body size (mm)	
	Summer	Winter	Length	Width
Egg incubation	6 - 8	10 - 12	-	-
Larva I	3 - 4	4 - 5	1.85	0.36
II	3 - 4	6 - 7	3.92	1.71
III	4 - 5	4 - 6	8.80	2.94
IV	4 - 5	4 - 6	14.99	4.25
V	4 - 5	4 - 6	21.00	4.78
VI	5 - 7	10 - 12	31.75	5.65
Total	24 - 29	35 - 40	-	-
Pupa	8 - 12	14 - 19	M - 16.30 F - 20.10	5.55 6.85
Adult	2 - 4	3 - 5	M - 15.84 F - 19.63	38.57 47.70

(June-July) to 15.50 days (December-January). Similar findings of pupal size and minimum pupal period during June was also reported by Singh & Singh (1995), Sarma & Kalita (2000) and Goel (2001). The longest pupal period observed in this study was contradictory with many workers which may be due to different in host plant and climatic conditions. It may also be due to exceptional weather observed at Mendipathar, where the winter temperature spell is very short and ultimately pupal period was not longer.

**Adult :** The adult moths are light brown in colour with brick red spots in the abdomen, head dull yellow. Antennae black, narrow and bipectinate in male, males are smaller in size than females. The wings are dull yellow with few black spots on both fore and hind wings and covered with scales. In most of the cases, male moth emerges out earlier than the female moths. The males measure 15.84 mm in body length and 38.57 mm across wing expanse whereas that of female is 19.63 mm in body length and 47.70 mm across the wings, respectively. Similar observation was also reported by Sarma & Kalita (2000) and Goel (2001).

The adults emerged usually at night and maximum emergence was recorded during early hours of the day. After emergence, the adults require a pre-oviposition period of 2-3 days for oviposition. The mating period of the matured pair lasts for about 8-12 h. A fully mated female moth starts laying eggs at the preferred position on the lower surface of the leaves. The fecundity of *S. obliqua* varied from 654 (December-January) to 987 eggs (October-November). In the present investigation, the adult longevity was more or less same in all the seasons both in male and female ranging from 3 -5 days. Total life cycle varied from 39.6 days (June-July) to 70 days (December-January). The present finding confirms the results of Goel (2001), Sarma & Kalita (2000) and Singh & Singh (1995).

Table I revealed that the pest can develop favourably during Spring (March-April) and late Autumn (October-November) season with the maximum fecundity (920-987 eggs) and moderate total life span of 45 - 46 days under temperature range of 26 - 28°C and 89 - 90 % relative humidity.

### ACKNOWLEDGEMENT

The authors are grateful to the Director, Central Muga Eri Research & Training Institute, Lahdoigarh (Jorhat) for providing laboratory facilities

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