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Biology and feeding pattern of black inch worm, *Hyposidra talaca* Walker (Lepidoptera : Geometridae) : A major defoliating pest of plantation crops

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ABSTRACT

Hyposidra talaca Walker, a polyphagous pest which is considered as a major defoliating pest of tea in north-east India has been reported to feed on a variety of trees, shrubs and weeds. *H. talaca*, commonly known as black inch worm or twig caterpillar, was recently noticed to cause a considerable damage in *Clerodendrum indicum*, a medicinal shrub which is gaining worldwide recognition and importance because of its outstanding medicinal properties in MSSSoA campus during 2018-19. Biology of the pest when studied was observed that the incubation period was about 5.8±0.55 days and there were five larval instars in its complete life cycle. The total larval duration of *H. talaca* was 18.1±2.73 days. In the laboratory, the life cycle of *H. talaca* completed within 47±4.79 days.

Key words : Biology, *Clerodendrum indicum,* defoliating pest, *Hyposidra talaca*

INTRODUCTION

Hyposidra talaca Walker, also known as 'black inch worm', a Geometrid moth belonging to the family Geometridae and order Lepidoptera, is widely distributed in the low land forests of Indo Australian tropics from north-east Himalayas to Queensland and Solomons, mostly in India, Indonesia, Malaysia, Hong Kong, Taiwan, China, Thailand, Papua New Guinea and Australia (Browne, 1968; Holloway, 1993). Out of 26 species of *Hyposidra* from all over the world *H. talaca* Walker has been recorded as pest of tea in Indonesia and is considered as a destructive defoliating pest of tea in the eastern sub-Himalayan foothills of the Dooars and *Terai* region of West Bengal (Das and Mukhopadhyay, 2008; Basu Majumder *et al.* 2011) and the north-eastern region that includes Assam and adjoining states (Rahman *et al.,* 2007; Nair *et al.*, 2008). The larvae of this pest are polyphagous in nature and reported to feed on a variety of trees, shrubs and weeds viz., cocoa, cinchona, coffee and fruit trees (litchi, longan and mango) in tropical countries such as Australia, Thailand and India and that of dipterocarpacean forests of south-east Asia (Dun, 1967; Kennedy, 1996; Singh and Singh 2004; Roy *et al.*, 2017). Earlier, the pest had been reported to feed on 26 host plants (Browne, 1968) over the world.

Occurrence of a few more species of loopers including *H. infixaria*, *Ascotis* and *Ectropis* species in Upper Assam, North Bank of Assam has also been reported (Roy *et al.*, 2018). *H. talaca* is found to be the most dominant one among the newer species of the loopers. Recently, this pest was observed in *Clerodendrum indicum* (L.) Kunte, a shrub belonging to the family Lamiaceae and order Lamiales (Borkataki *et al.*, 2018). This particular shrub is a native to India and the genus is known to contain approximately 342 to 369 species. The shrub is gaining importance as well as demand because of its ethno-medical uses and anti-inflammatory, anti-rheumatism, anti-bronchitis and febrifuge properties (Shrivastava and Patel, 2007). In view of the increasing activity of this pest in north-eastern part of

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the country, generation of data on its feeding habits and host range has become essential to develop proper management strategies in adjoining states viz., Odisha also. However, no concrete information has been found on this pest from Paralakhemundi, Gajapati district. This study could be considered as a good example to know the range expansion and host shift of insect-pests to the alternate host plants and weeds in absence of the preferred host-tea in MSSSoA, Paralakhemundi campus. Pertinent to this fact, the present investigation was undertaken to study the biology of black inch worm, *Hyposidra talaca* Walker as range expansion or host shift of insect-pests could be considered as important phenomena which includes their adaptability for survival, mating, ovipositing and foraging in the new habitat in absence of the host plant.

MATERIALS AND METHODS

Cultures of *Hyposidra talaca* Walker were initiated in the laboratory of Department of Entomology, M. S. Swaminathan School of Agriculture (MSSSoA), Centurion University of Technology and Management (CUTM), Paralakhemundi, with field collected larvae from *Clerodendrum indicum* during 2018-19. The larvae were kept inside glass chimneys (22 x 7.2 cm) covered at upper end with muslin cloth and rubber band. These chimneys were kept erect on separate petriplates. Fresh leaves were provided as food. Renewal of older leaves with fresh leaves was done in every 2-3 days. The larvae were reared in this manner till emergence of adults. Observations on larval period, pupal period and adult emergence were recorded. When the last instar approached pupation, the petriplates were half filled with soil and sand to provide pupation site. After adult emergence, the adults were separated and kept inside glass chimney and honey solution of 1% (aqueous) soaked in cotton were provided as food. Morphometric observations of larva, pupa and adult were taken. All measurements were expressed in cm.

RESULTS AND DISCUSSION

The larvae of *H. talaca* Walker were found defoliating the leaves of *C. indicum* plants during September 2018 to August 2019. Sinu *et al.* (2011) and Chutia *et al.* (2012) reported the same pest on tea plantation from West Bengal and Jorhat. From the present investigation, it was found that the early instar larva cut small holes along the margin, whereas the full grown larva fed voraciously on matured leaves, initially from the margin towards the mid rib. Similar feeding pattern was observed by Uniyal and Singh (2010); Chutia *et al.* (2012) on *Perilla frutescens* and tea from Dehradun and Jorhat.

Life Cycle of *Hyposidra talaca* Walker

There were five larval instars of *H. talaca* Walker recorded in its complete life cycle. The larva exhibited striking polymorphism. Its colour varied from black to brown to brownish green. Data on duration of developmental stages and measurement on larval instars of *H. talaca* Walker are presented in Tables 1 and 2.

Table 1. Duration of developmental stages of *Hyposidra talaca* Walker

Stages	Duration (days) Mean±SD
I. Egg	8±0.55
II. 1st instar	4±0.55
III. 2nd instar	2.7±0.55
IV. 3rd instar	3.6±0.54
V. 4th instar	3.8±0.54
VI. 5th instar	5.6±0.55
Total larval period	18.10±2.73
VII. Pupal period	
(a) Male	7.6±0.45
(b) Female	9.2±0.54
Total pupal period	16.80±0.98
VIII. Adult	
(a) Male	5.6±0.54
(b) Female	6.5±0.54
Life cycle completed within	47±4.79

Mean of five observations.

Eggs

In the field, eggs were found in bark of nearby tree trunks. The eggs were greenish blue in colour and oval in shape. The incubation period was about 5.8±0.55 days. However, Chutia *et al.* (2012) reported that the incubation period was about 6.2±0.45 days.

Larval Stages

First instar : The first instar larva just after hatching entered into a resting phase of 10-20 min and then started feeding on the

Table 2. Measurement of different instars of Hyposidra talaca Walker

Stages	Colour	Characters (Mean±SD)	
		Length (cm)	Breadth (cm)
I. 1st instar	Black to brownish black	0.29±0.15	0.09±0.03
II. 2nd instar	Dark brown	0.62±0.22	0.10±0.03
III. 3rd instar	Brownish to dark brown	1.5±0.22	0.15±0.04
IV. 4th instar	Light brown	3.64±0.42	0.30±0.06
V. 5th instar	Light brown to greenish	5.05±0.40	0.56±0.08
VI. Pupa			
(a) Male	Blackish red	1.33±0.11	0.38±0.09
(b) Female	Blackish red	1.74±0.20	0.55±0.09
VII. Adult			
(a) Male	Brownish	1.45±0.12	0.25±0.05
(b) Female	Blackish brown	1.79±0.18	0.47±0.08

Mean of five observations.

tender leaf. The first instar larva was blackish with seven transverse white stripes, about 0.29±0.15 cm in length and 0.09±0.03 cm in breadth. First instar duration was 2.4±0.55 days.

Second instar : The second instar larva also preferred to feed on tender leaves. The body of the larva was dark brown with seven transverse white stripes. The larva was about 0.62±0.22 cm in length and 0.10±0.03 cm in breadth and instar duration was 2.7±0.55 days.

The total larval duration of *H. talaca* Walker was 18.1±2.73 days. The last instar larva stopped feeding before pupation and became indolent. It then entered into the soil that was provided by half filling the petriplates and pupated in the soil. The pre-pupal duration was 2.60±0.48 days.

These findings are in close confirmation with Chutia *et al.* (2012) who reported first larval instar was about 0.30±0.16 cm in length, 0.08±0.02 cm in breadth and duration was 2.4±0.54 days; second larval instar was 0.64±0.24 cm in length, 0.11±0.04 cm in breadth and instar duration was 2.6±0.55 days; third larval instar was 1.4±0.21 cm in length, 0.14±0.04 cm in breadth and larval duration was 3.6+0.55 days; forth larval instar 3.66±0.44 cm long, 0.32±0.06 cm broad and instar duration was 3.8±0.45 days and fifth instar was about 5.06±0.40 cm in length, 0.58±0.08 cm in breadth with a instar duration of 5.4±0.55 days.

Pupa : When the last larval instar approached pupation, the petriplates were half filled with sand and soil to provide pupation site. Pupation took place in soil. The pupa was obtect type, blackish red with shinning smooth surface and was rounded at the anterior end. The posterior end of the pupa was slightly tapering. The male pupa was 1.33±0.11 cm in length and 0.38±0.09 cm in breadth; whereas the female pupa was slightly larger than the male pupa with 1.74±0.20 cm length and 0.55±0.09 cm breadth. The pupal period of male and female was 7.6±0.45 days and 9.2±0.54 days, respectively. The total pupal duration was 16.8±0.98. Chutia *et al.* (2012) reported the pupal period to be 7.8 ± 0.45 days and 9.4±0.55 days.

Adult

The female moth was slender with a light brown abdomen, about 1.79±0.18 cm in length with a wing span of 4.5±0.34 cm. Adult longevity of the female moth was 6.5±0.54 days. The male was comparatively smaller with a length of 1.45±0.12 cm and wing span of 3.35±0.11 cm. The male moth had an adult longevity of 5.6±0.54 days. The life cycle of *H. talaca* completed within 47±4.79 days. According to Chutia *et al.* (2012), the female moth was about 1.78±0.19 cm long with a wing span of about 4.7±0.35 cm and its longevity was 6.6±0.55 days whereas the male moth was 1.44±0.11 cm long with a wing span of about 3.38±0.13 cm and adult longevity of 5.6±0.55 days.

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