J. Adv. Sci. Edu. Res. 2024: 5: 8-12, ISSN: 2583-0155 (ONLINE)
https://doi.org/10.56253/JASER.5.1.2025.8-12
Published: 30.06.2025(http://jaser.rkmvccrahara.org/)

A PRELIMINARY STUDY ON THE LIFE CYCLE OF *Asota caricae* (Fabricius, 1775) IN NATURAL HABITAT OF NORTH 24 PARGANAS, WEST BENGAL

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Abstract
The Tropical Tiger Moth (*Asota caricae*, Fabricius, 1775) is one of the most significant insect pests affecting *Ficus* trees in tropical and subtropical regions of Asia and Africa. The life cycle of *Asota caricae* was studied in its natural habitat in North 24 Parganas district, encompassing four stages: egg, larva, pupa, and adult. This communication specifically reports observations from the 2nd instar to adult stages, with a detailed study on the pupal stage included. The findings on the biological traits of *Asota caricae* may provide valuable scientific evidence for developing effective moth management programs.

Key Words: Tropical Tiger Moth, *Ficus carica*, Life cycle, North 24 Parganas, West Bengal

1. Introduction:

Moths always are being attractive and tantalizing group of creatures in the Class Insecta. Among the lepidopterans, moths exhibit high species diversity (approximately 90% of lepidoptera) and have significant economic impact. They act as important ecological indicators, pollinators, biological control agents, model organisms for environmental surveys, key constituents of different type of food chain and also serious pest species of different plant community. The larval stage of many moth species are notorious pests of different crops, forest trees, ornamental plants, and thus cause considerable economic loss to human beings.

Tropical tiger moth is one of the major pests even throughout tropical and subtropical regions of Asia and Africa.The genus *Asota* comprises of 51 species worldwide (Zwier, 2008; Bayarsaikhan *et al*., 2016). In India, so far nine species of *Asota* were reported (Kalawate et al. 2022).

Asota caricae, belongs to the Subfamily Aganainae of the Family Erebidae. It is widely distributed throughout India and Australia, China, Indonesia, Java, Malysia, Myanmar, Philippines, New Guinea, Solomon Islands, Sri Lanka (Singh,2019).

Unfortunately, little is known about the biology and immature stages of this moth species. With this view, an effort was made to study and identify the stages of the life cycle of this notorious pest in its natural habitat.

2. Materials & Methods:

The life cycle and different developmental stages have been observed in this study. The study was carried out in the locality near Nimta, Belgharia (Latitude- 22.6567° N, Longitude- 88.4089° E) in North 24 Parganas district of West Bengal from 1stAugust, 2024 to 26th August, 2024. Though the moths possess four stages (Egg, Larva, Pupa and Adult) in their holometabolus life cycle, in this study we recorded from the 2nd instar larval stage. The host plant also been identified as *Ficus carica* Linnaeus upon which the larva was feed on.

Ficus carica or fig plant is a small deciduous tree or large shrub growing up to 7-10m (23-33ft) tall, with smooth white bark. Its large leaves have three to five deep lobes.The height of the host plant was approximately 103cm (Fig-1). The caterpillars were present at the ventral side of new leaves of the host plant.

FIG-1: LARVAL HOST PLANT (*Ficus carica*)

3. Observation& Results:

Fertilized eggs were laid by the female of *Asota* on the host plant, especially upper surface of leaves, underside of leaves, leaf petioles, stem terminals and axils, then moved towards the larval stages. During the developmental stages, the larvae were collected on 1st August, 2024 from the above mentioned place from the host plant, *Ficus carica* (Fig-1).

2nd Instar Larva- The collected larva (Fig-2) was 1.1cm long. Body was cylindrical, slightly flattened dorsally with pale yellow marking. Head was more or less rounded in shape, pale yellow having black markings. Prothorax had a pair of dorsal setae. Mesothorax and metathorax each had 2 pairs of dorsal setae. The abdomen had 8 segments. Each segment had 4 setal pairs (2 Dorsal & 2 Sub-dorsal). A distinctive pale-yellow dorsal stripe was present along the body. A series of pale-yellow lateral spots were present on each segment. Pro-legs were present on 3rd to 6th segments and 8th segment.

3rd Instar Larva- After 3 days (On 3rd August, 2024) the collected larva became 1.9cm long (Fig-3). Body was cylindrical and slightly flattened dorsally with pale yellow marking and reddish-brown lateral patches were also present. Head was more or less rounded in shape, pale yellow having black markings. Prothorax had a pair of dorsal setae and 2 pairs of lateral setae. Mesothorax and metathorax each had 2 pairs of dorsal setae and 2 pairs of lateral setae. The abdomen had 8 segments. Each segment had 4 setal pairs (2 Dorsal & 2 Sub-dorsal). A distinctive pale yellow dorsal stripe was present along the body. A series of pale yellow lateral spots were present on each segment. Pro-legs were present on 3rd to 6th segments and 8th segment.

4th Instar Larva- After 3 days (On 6th August, 2024) the collected larva became 3.3cm long (Fig-4). Body was cylindrical and slightly flattened dorsally with pale yellow marking and reddish-brown lateral patches were also present. Head was more or less rounded in shape, pale yellow having black markings. Prothorax had 2 pairs of dorsal setae and 3 pairs of lateral setae. Mesothorax and metathorax each had 3 pairs of dorsal setae and 3 pairs of lateral setae. Secondary setae were present. The abdomen had 8 segments. Each segment had 5 setal pairs (2 Dorsal, 2 Sub-

dorsal & 1 Lateral). The first5 segments had lateral setae but the last 3 segments hadn't any lateral setae. A distinctive pale yellow dorsal stripe was present along the body. A series of pale yellow lateral spots were present on each segment. Pro-legs were present on 3rd to 6th segments and 8th segment. Secondary setae were present.

5th Instar Larva- After 3 days (On 9th August, 2024) the collected larva became 4.9cm long (Fig-5). Body was cylindrical and slightly flattened dorsally with pale yellow marking and reddish-brown lateral patches were also present. Head was more or less rounded in shape, pale yellow having black markings. Prothorax had 3 pairs of dorsal setae and 4 pairs of lateral setae. Mesothorax and metathorax each had 4 pairs of dorsal setae and 4 pairs of lateral setae. Secondary and tertiary setae were present. The abdomen had 8 segments. Each segment had 6 setal pairs (2 Dorsal, 2 Sub-dorsal & 2 Lateral). The first 5 segments had lateral setae but the last 3 segments hadn't any lateral setae. A distinctive pale yellow dorsal stripe was present along the body. A series of pale yellow lateral spots were present on each segment. Pro-legs were present on 3rd to 6th segments and 8th segment. Secondary and tertiary setae were present. The larva reduced feeding activity. The body colour and texture becomes changed. It started to form pupal chamber (Fig-6).

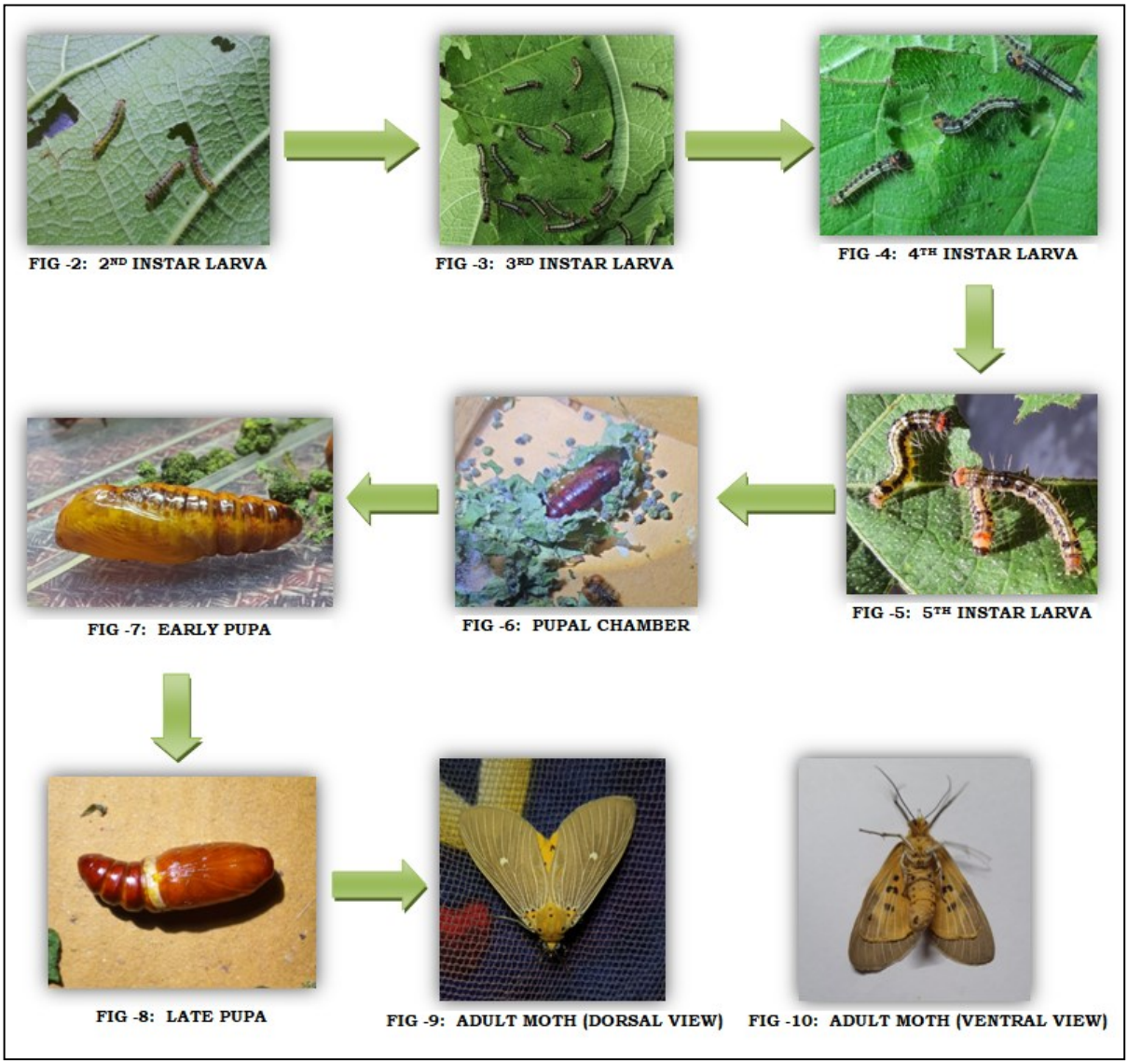

FIG -2: 2ND INSTAR LARVA

FIG -3: 3RD INSTAR LARVA

FIG -4: 4TH INSTAR LARVA

FIG -5: 5TH INSTAR LARVA

FIG -6: PUPAL CHAMBER

FIG -7: EARLY PUPA

FIG -8: LATE PUPA

FIG -9: ADULT MOTH (DORSAL VIEW)

FIG -10: ADULT MOTH (VENTRAL VIEW)

Pupa- After 6 days (on 15th August, 2024) of 5th instar larval stage, the caterpillar started expelling the silk like wastes from its system and round it all over its body to form chrysalis. Body

became contract and relax, released excess fluids. Skin split along the dorsal midline, and the pupa emerged. Pupa underwent a series of muscular contractions to shed the larval skin. The pupa was appendages free, smooth, shiny cuticle, 2.3cm long. At the beginning the pupa was cream or pale yellow colour (Fig-7) and after 2 days this became dark brown colour (Fig-8).

Adult- The fully developed moth emerged out from the pupal case on 26th August, 2024 (Fig-9, 10). Head was almost round in shape. Two large, circular, greyish compounds eyes, two thread-like antennae and a single, coiled proboscis was present. Body was dark yellow in colour. At the ventral side of the body 4 pairs of black spots are present. The widths of the abdominal segments were gradually decreased toward the anal pore. 3 pairs of legs were present (1 pair of fore-legs, 1 pair of mid-legs, & 1 pair of hind-legs). The legs were dark brown in colour.2 pairs of wings were present (2 fore-wings & 2 hind-wings). The fore-wings are comparatively larger. The hind-wings were dorsally covered by fore-wings. The colour of fore-wings and the hind-wings were dark brown and dark yellow respectively. On the fore-wings and hind-wings white coloured reticular vein like patterning were present. Each hind-wing contented 4 black patches. Each fore-wing contented a white spot at the centre position.

4. Feeding Behaviour of The Larval Stages-

The larvae were feeding on leaf surfaces of Fig trees creating small holes. They also ate the tender leaves and larger leaves from the edges (Fig-11). Each larva ate individually throughout the whole larval stage except the molting phase.

FIG- 11: FEEDING BEHAVIOUR OF THE LARVAE

5. Discussions:

The Tropical Tiger Moth, *Asota caricae*, is a highly destructive pest of Fig (*Ficus carica*) trees, causing significant damage as the larvae feed on the foliage. This devastation can lead to considerable economic loss. To mitigate this loss and enhance yield, it is essential to implement proper crop management procedures, which require an understanding of the species' biology, behavior, seasonality, and reproductive cycle.

Moths are significantly influenced by climatic factors such as temperature and humidity. In warmer temperatures and high humidity, they tend to grow faster. The optimal temperature for egg hatching is 18°C, while temperatures between 20°-35°C are suitable for larval, pupal, and adult stages. A humidity range of 60%-90% is favorable for proper development. This species is typically nocturnal.

The study concludes that *Asota caricae* exhibits high activity during the warm months at night and hibernates during the winter months. Understanding these behavioral patterns and

environmental preferences can aid in the development of effective pest management strategies and contribute to reducing the relative abundance of this pest.

6. Acknowledgments:

Author is thankful to Principal Swami Kamalasthananda, Vice Principal Swami Vedanuragananda, Departmental head Dr. Arunava Mukherjee, Dr. Bulganin Mitra, Dr. Joyjeet Ghosh, Department of Zoology, Ramakrishna Mission Vivekananda Centenary College, Rahara for their persisting guidance. I am thankful to my parents, and also give special thanks to my friend Chandrima Paul to help me in this work.

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