

A case study of cotton leaf roller, *Haritalodes derogata* (Lepidoptera: Crambidae) infestation on *Hibiscus rosa-sinensis* (Malvaceae) in an Urban Greenspace of Kolkata

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Abstract

Biological indicator groups such as butterflies and moths are frequently selected for ecological studies, as they serve as reliable monitors of ecosystem health and local biodiversity. Moths, in particular, are fascinating due to their dual ecological roles, acting both as destructive pests and as pollinators that contribute to ecosystem services. Previous records of this species from West Bengal have primarily focused on taxonomic identification and species occurrence. This study presents the first biological documentation of *Haritalodes derogata* (Fabricius, 1775), the cotton leaf roller, infesting *Hibiscus rosa-sinensis* (L.) in an urban greenspace of Kolkata, West Bengal.

Keywords: Cotton leaf roller, life cycle, urban green space, Banabitan Biodiversity Park, Host Record

Introduction

Haritalodes derogata (Fabricius, 1775), commonly known as the cotton leaf roller or okra leaf roller (Dalsaniya *et al.*, 2025)^[4], belongs to the subfamily Spilomelinae of the family Crambidae within the superfamily Pyraloidea (Sodhi, 2024)^[8].

Crambid moths are easily recognized by their distinctive glossy, brightly colored wings with intricate patterns. Typically, the forewings are long, narrow, and pointed, while the hindwings are shorter, broader, and rounded features that help distinguish them from other moth families. (Singh *et al.*, 2024)^[10].

Navya *et al.* (2025)^[4] studied the biology, seasonal occurrence, and damage caused by the cotton leaf roller moth (reported as *Syleptaderogata*) on *Hibiscus rosa-sinensis* in Kerala. According to them, this moth also feeds on several other important host plants other than *Hibiscus*, including *Corchorus capsularis*, *Corchorus olitorius*, *Ceiba pentandra*, *Manihot esculenta*, various *Coleus* species, and *Durio zibethinus*.

H. derogata (Fabricius, 1775) was reported by Mitra *et al.* (2019)^[3] from the mangrove ecosystems of the Andaman and Nicobar Islands, highlighting its presence in coastal habitats. According to Sodhi (2024), this species has also been recorded in other parts of India, including Himachal Pradesh, Uttarakhand, the Eastern Himalayas, Northeast India, and the central, western, and southern regions of the country. In West Bengal, it has been documented from multiple locations: the Sundarban Biosphere Reserve (Biswas *et al.*, 2016), Kolkata (Shah *et al.*, 2018), and Bankura district (Nayak, 2021)^[5, 9]. However, it is important to note that all these records are based on taxonomic surveys and species occurrence reports.

The present study marks the first biological investigation of *Haritalodes derogata* infesting *Hibiscus rosa-sinensis* within an urban greenspace in Kolkata. While previous records

from West Bengal have focused primarily on taxonomic identification and species occurrence, this work provides new insights into the moth's life cycle, feeding behaviour, and damage patterns on ornamental *Hibiscus* plants in a city landscape.

Materials and Methods

Study Area

This study was conducted in October 2025^[6] at Banabitan Biodiversity Park, also known as Central Park. It is situated in the Salt Lake City, Kolkata, at coordinates 22°35'04.56" N, 88°24'58.32" E (Fig. 1). It is the third largest open space in Kolkata Metropolitan area after the Maidan and Eco Park. The area of the park is about 100 acres and vegetated with big trees, shrubs and herbs. A big water body is also present within the area (Fig.1). This place serves as a refuge for biodiversity in a highly urbanised landscape (Rong *et al.*, 2025; Chatterjee *et al.*, 2024; Rong *et al.*, 2024)^[1, 7].

Methods

During seasonal butterfly observations in the Butterfly Garden of Banabitan Biodiversity Park, a good number of caterpillars were found actively feeding on the leaves of *Hibiscus rosa-sinensis* (Fig. 2A). The height of host plants ranged in from 3.5 - 4 feet. To facilitate further study, the caterpillars along with infested leaves were carefully collected directly from the shrubs and placed in plastic containers (Fig. 2B & 2C). These containers were then transported to the laboratory, where the specimens were reared (Fig.2D). Each container was covered with mosquito netting to allow airflow while preventing escape.

Life cycle studies of the cotton leaf roller were conducted under laboratory conditions at Banabitan Biodiversity Park. The larvae were provided with fresh, healthy leaves of the host plant daily. Simultaneously, field observations continued in the butterfly garden.

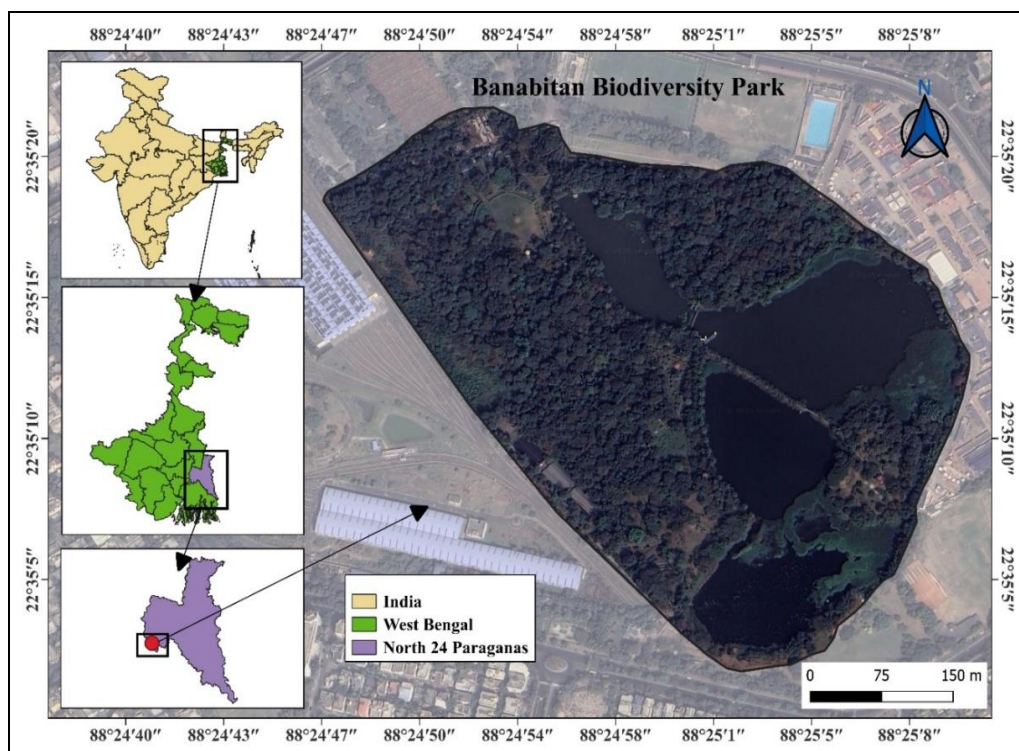


Fig 1: Study Area Map of Banabitan Biodiversity Park



Fig 2: Picture of *Hibiscus rosa-sinensis* at Banabitan Biodiversity Park; A: full picture of the plant, B–C: pictures of the collection process, D: picture of the procedure of rearing in lab condition, E–F: picture of infected leaves.

Results

The butterfly garden at Banabitan Biodiversity Park in Salt Lake City, Kolkata (Fig. 1), is vegetated with a diverse array of host and nectar plants for butterflies, along with ornamental species that enhance the visual appeal of the landscape. The studied plants of *Hibiscus rosa-sinensis* (Jaba in Bengali) commonly referred to as China rose, is a prominent member of the Malvaceae family (Fig. 2A). This plant is widely recognized not only for its ornamental beauty but also for its significant medicinal properties Navya *et al.* (2025) [4]. The flowers of *Hibiscus rosa-sinensis* are traditionally offered in religious rituals and deity worship across West Bengal.

During systematic monitoring of insect pests and pollinators in the Butterfly garden, a few caterpillars were observed feeding on the foliage of *Hibiscus rosa-sinensis*. These

caterpillars predominantly infested the young, green leaves of the host plant. Mostly the infestation was recorded between the middle storey and canopy levels of the shrub (Fig. 2B). It was noted that the caterpillars typically began feeding from the petiole and progressed toward the leaf tip. In some cases, they created holes in the leaf blade. Feeding activity was mainly concentrated on the ventral (underside) surface of the leaf, which is rough in texture.

During the present survey, beside the larvae also a cluster of eggs of *Haritalodes derogata* were found in natural habitats (Fig. 3A). Among them maximum number of eggs were hatched out and very few were remained intact. To study their development and growth, the eggs were collected and transferred to the butterfly garden laboratory at Banabitan. Fresh *Hibiscus* leaves were provided daily as their sole food source, replicating their natural diet until pupation.

The caterpillars were first observed after hatching and at that time, the freshly hatched larvae had yellowish, transparent bodies and measured between approximately 3 mm in length (Fig. 3B). The head was covered with several small bristles. On the lateral side of each body segment, one pair of bristles was present.

To study their development and growth, the larvae were collected and transferred to the butterfly garden laboratory at Banabitan. Fresh *Hibiscus* leaves were provided daily as their sole food source, replicating their natural diet until pupation.

After one day, the larvae developed yellowish-green bodies and light brown heads, growing to a length of 3.5 to 4 mm. (Fig. 3C). Within 1-2 days, their body color turned dark green, and they measured 7 to 8 mm in length (Fig. 3D). At this stage, they were observed to be actively feeding.

Two days later, the larval body became dorsally dark green and ventrally light green in color with dark brown heads and reached a length of 11 to 12.5 mm (Fig. 3E). This larva

rolled the leaf with the help of a fibrous substrate which was secreted by their salivary gland (Fig. 2E-F).

After 2–3 days, the mature green larvae stopped feeding and began spinning silken cocoons between two leaves, using their saliva to bind the leaves together (Fig. 3F). The prepupal stage was brief average 2-3 days.

The newly formed pupae were reddish brown in color (Fig. 3F). The pupae were long and cylindrical in shape measuring between 14 mm and 16 mm. After an average of 9–10 days, adult moths emerged and were identified as *Haritalodes derogata*, commonly known as the cotton leaf roller (Fig. 3G-H).

Adults of *Haritalodes derogata* are nocturnal in habit. The adults recorded during the study were about 20 mm in body length (Fig. 3G). This displayed characteristics such as medium size and an attractive colour pattern. The colour ranged from white to creamy, with a network of brown markings on both the forewings and hind wings. Their thorax and abdomen were whitish yellow with yellow-brown bands and covered with white hairs (Fig. 3G).

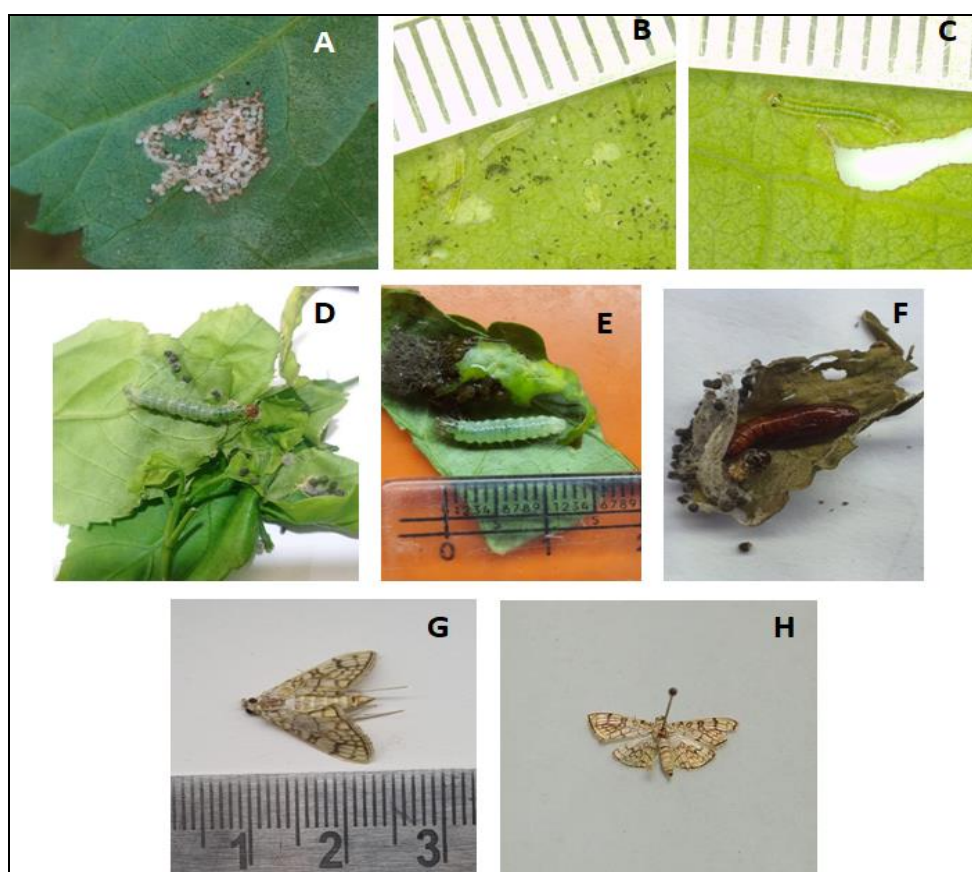


Fig 3: Life Cycle stages of *Haritalodes derogata*

Discussion

Dalsaniya *et al.* (2025) [2] observed the life cycle and studied the morphometric characteristics of *H. derogata* in unsprayed plots of the non-Bt cotton hybrid (RCH 659 NBt) in Surat. Apart from the cotton plant, Selvam *et al.* (2024) [8] found the cotton leaf roller moth (*H. derogata*) feeding on *Hibiscus arnottianus* in Tamil Nadu, identifying it as a new host plant.

Beside this, several host plants were also reported of this dangerous pest, like *Abelmoschus esculentus*, *Abutilon* sp., *Alcea* sp., *Alcea rosea*, *Althaea* sp., *Althaea rosea*, *Gossypioideaskirkii*, *Gossypium* sp., *G. barbadense*, *G.*

herbaceum, *Hibiscus* sp., *H. cannabinus*, *H. mutabilis*, *H. parviformis*, *H. rosa-sinensis*, *H. sabdariffa*, *H. tiliaceus*, *Kydiacalycina*, *Sida* sp., *S. cordifolia*, *S. orientalis*, *Thespesia danis*, *T. lampas*, *T. populnea*, *Urena* sp., *U. lobata*, *Hibiscus syriacus* L. and *Hibiscus mutabilis* L. (Selvam *et al.*, 2024) [8]. Observations indicate that, apart from cotton, most of the host plants attacked by *H. derogata* belong to the Malvaceae family.

According to Navya *et al.* (2025) [4], the cotton leaf roller, *Syleptaderogata* Fabricius (syn. *Haritalodes derogata*), has emerged as a significant pest in *Hibiscus* cultivation, particularly in the selected localities of Dharmadam

Panchayath, Kannur district, Kerala. The species is known for its foliar feeding behaviour, which can lead to substantial defoliation and aesthetic damage in ornamental plantations.

In light of this, the recent detection of *H. derogata* infesting *Hibiscus rosa-sinensis* within the Butterfly Garden of Banabitan Biodiversity Park, Salt Lake City, Kolkata, is a matter of concern. This study represents the first confirmed record of *H. derogata* on *Hibiscus rosa-sinensis* in this region and underscores its potential impact on urban biodiversity landscapes. The findings highlight the need for regular pest surveillance and integrated management strategies to safeguard the health and diversity of host plants in butterfly gardens and similar conservation habitats.

Conclusion

Haritalodes derogata was recorded infesting *Hibiscus rosa-sinensis* in Banabitan Biodiversity Park, Kolkata, representing the first biological documentation of this species on hibiscus in an urban greenspace of West Bengal. The study documented its life cycle, feeding behaviour, and characteristic leaf-rolling damage. These findings highlight the potential threat posed by this pest to ornamental hibiscus plants and emphasize the need for regular monitoring and management in urban biodiversity parks and gardens.

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