

## Report of new larval host plants for the butterflies *Cigaritis lohita* (Horsfield, 1829), *Zizeeria karsandra* (Moore, 1865) and *Rapala manea* (Hewitson, 1863), from Joypur Forest in Bankura, West Bengal, India

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### Abstract

Butterflies are holometabolous insects in which for larval development, females deposit their eggs on suitable host plants. However, females may not always choose the best host, and new larvae may reject the plant they are hatched on and need to locate a better host plant for survival. Occasionally a butterfly turns down a preferred plant as its larval host plant and then may accept a new host plant of the same family or from a different family. An opportunistic survey was done to report *Ziziphus nummularia* (Burman.f. Wight and Arnott., 1833) (Rhamnaceae) as a newly identified larval host plant for *Cigaritis lohita* (Horsfield, 1829) (Lycaenidae). Additionally, *Polycarpon prostratum* (Forssk. Asch. and Schweinf., 1889) (Caryophyllaceae) is recognized as a new larval host plant for *Zizeeria karsandra* (Moore, 1865) (Lycaenidae). Furthermore, *Pithecellobium dulce* (Roxb. Benth., 1844) (Fabaceae) and *Albizia lebbek* (Linnaeus and Benth, 1844) (Fabaceae) are documented as new larval host plants for *Rapala manea* (Hewitson, 1863) (Lycaenidae).

**Key words:** Chotonagpur Plateau, Jungle Mahal, Lepidoptera, life history, new food plants

### Introduction

Gathering information on the plants consumed by Lepidoptera larvae is vital for comprehending butterfly ecology and formulating effective conservation strategies. The distribution and diversity of larval host plants significantly influence the diversity and range of Lepidoptera. Butterflies, a prominent group within Lepidoptera, play an essential role in pollination (Vishwakarma et al., 2022; Mukherjee and Mondal, 2023). Historically, in India significant research on butterfly larval host plants has been conducted by Bell (1909–1927), Wynter-Blyth (1957), and more recently, Nitin et al. (2018), who documented 834 larval host plants for 320 butterfly species in the Western Ghats of India. In the same year, Karmakar et al. (2018) reported 64 host plants of 78 butterfly species, and some larval host plants were new from this Northeast region of India. Noteworthy contributions have also emerged from West Bengal, where, for instance, new larval host plants for *Papilio crino* (Fabricius, 1792) were reported by

Mukherjee and Ghosh (2018). Additionally, Mukherjee (2021) identified new larval host plants for *Rapala manea* (Hewitson, 1863), *Charaxes solon* (Fabricius, 1793), and *Zizula hylax* (Fabricius, 1775) all butterflies from Bankura, West Bengal, India. Further, Mukherjee (2022a) documented new larval host plants for *Virachola isocrates* (Fabricius, 1793) and *Junonia orithya* (Linnaeus, 1758) from the same region, while Mukherjee (2022b) reported on larval host plants of *Leptosia nina* (Fabricius, 1793) and *Rapala manea* (Hewitson, 1863) from Bankura, West Bengal, India. Mukherjee and Mondal (2023) provided a preliminary checklist of larval host plants for butterflies in the Bankura and Purulia districts of West Bengal, India, and Payra and Bhatt (2024) reported new larval host plants of *Euchrysops cnejus* (Fabricius, 1798) and *Rapala manea* (Moore, 1879) from Eastern India. The primary goal of this study was to determine the availability of host plants for butterfly larvae in the Bankura district of West Bengal, India.

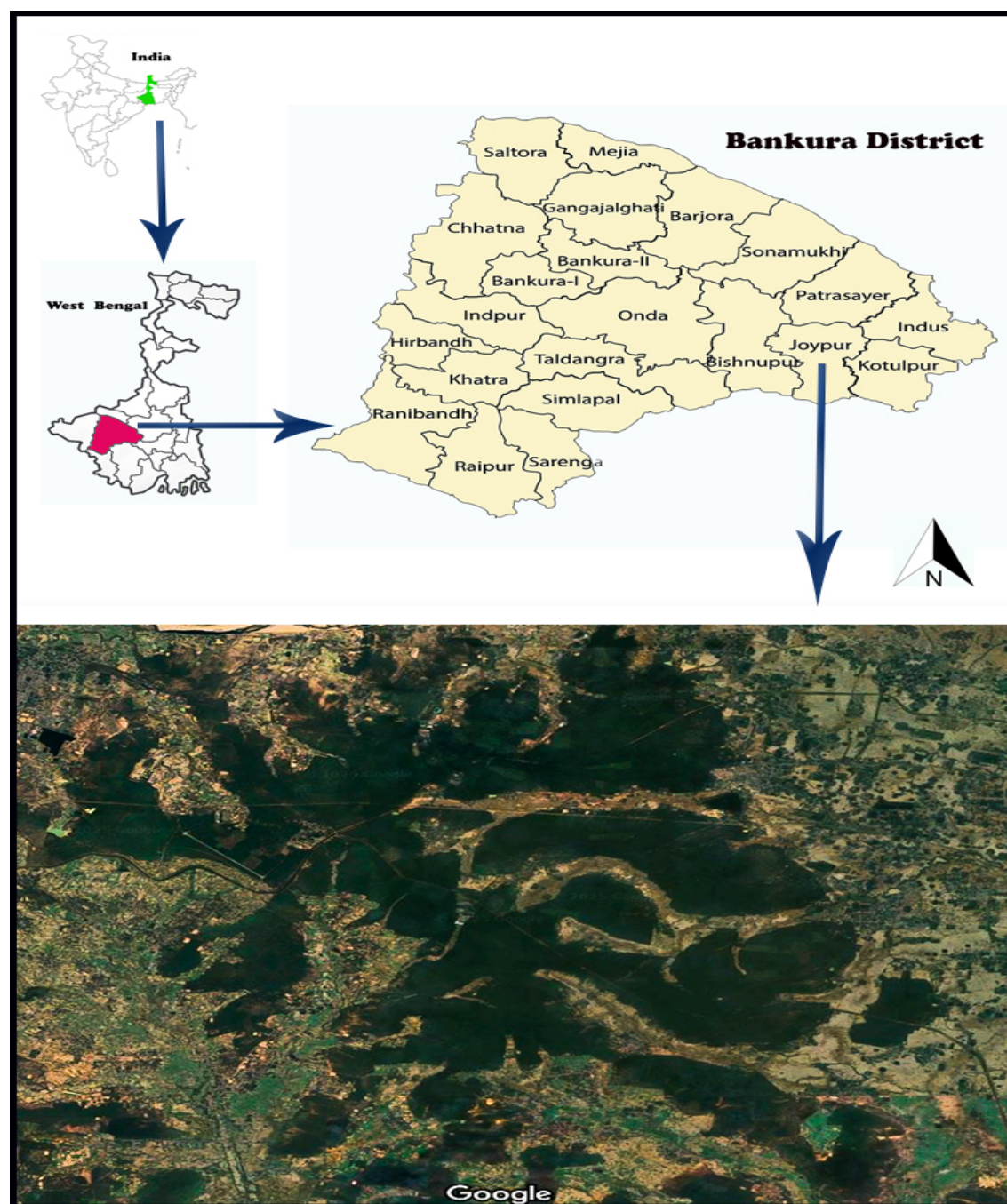
## Material and Methods

### Study area

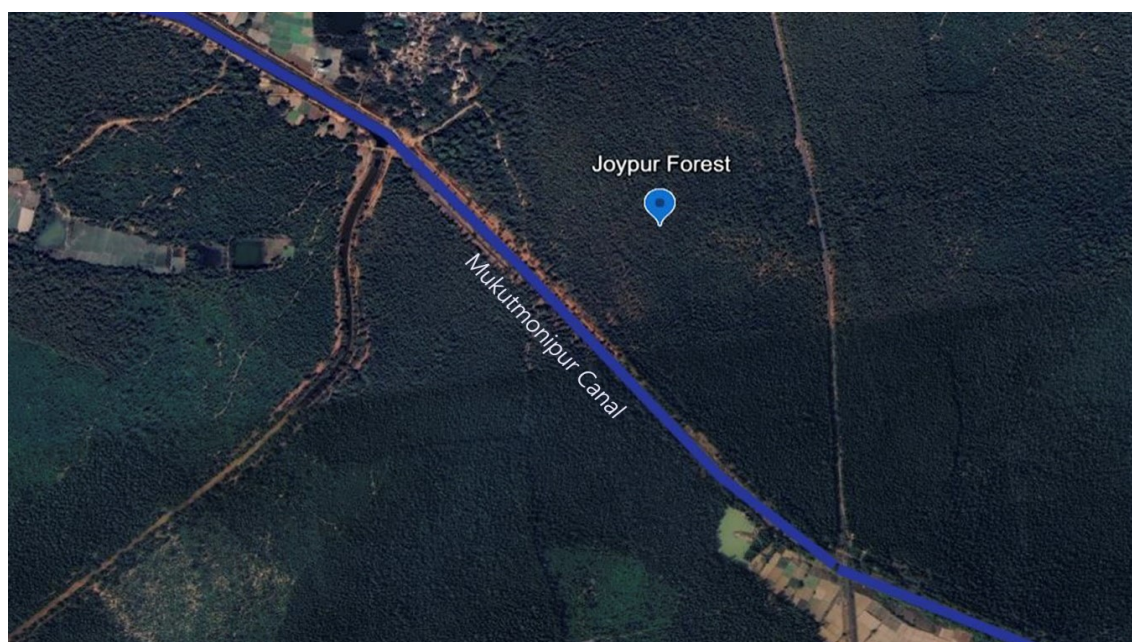
This study presents an opportunistic survey conducted in the Joypur Forest ( $87^{\circ}18'54.46''$  E to  $87^{\circ}29'46.94''$  E and  $22^{\circ}55'49.12''$  N to  $23^{\circ}24'7.10''$  N) located in the Bankura district of West Bengal, India (Fig. 1) from January 2025 to April 2025, twice a week, from 9.00 AM to 12.00 PM IST. The forest falls under the jurisdiction of the Panchet Forest

division. A water canal, known as the Mukutmonipur canal, traverses this forest, connecting to the Kangshabati Dam at Mukutmonipur, Bankura (Fig. 2).

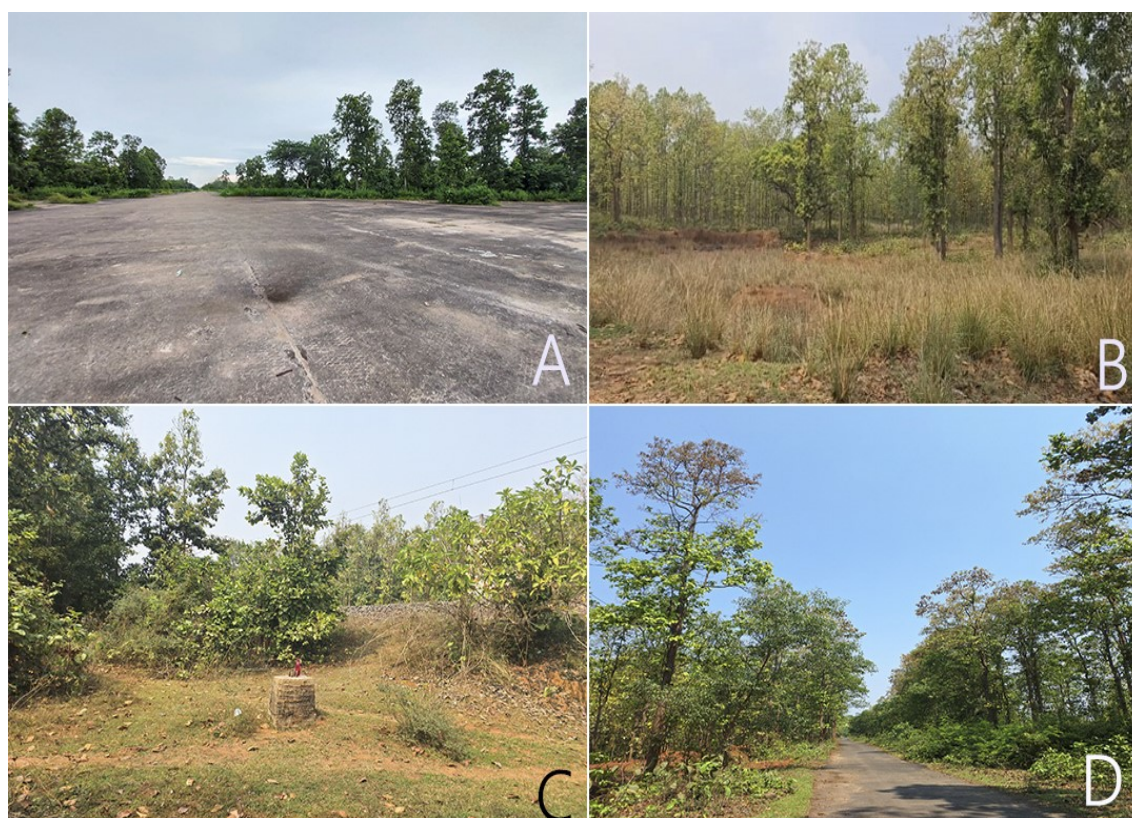
According to the Indian Meteorological Department (IMD, 2025), the average temperature in this region is  $26.9^{\circ}\text{C}$ , with summer temperatures reaching a maximum of  $45^{\circ}\text{C}$  and winter lows between  $4\text{--}6^{\circ}\text{C}$ . The area receives an annual rainfall of 1,508 mm. The predominant vegetation in this forest is dry deciduous, primarily consisting of Shal (*Shorea robusta*, Gaertn. 1805) (Fig. 3).



**Figure 1:** Showing the location of the study area, Joypur Forest, Bankura, West Bengal ( $87^{\circ}18'54.46''$  E to  $87^{\circ}29'46.94''$  E and  $22^{\circ}55'49.12''$  N to  $23^{\circ}24'7.10''$  N), India. Image source- Google Maps.



**Figure 2:** Mukutmonipur Canel in Joypur forest, Bankura, West Bengal, India. Image source- Google Earth.



**Figure 3:** Representative habitat types within the dry deciduous forest landscape of Joypur Forest, Bankura, West Bengal. (A) Lateritic plateau habitat- an open rocky surface with sparse herbaceous cover and scattered *Shorea robusta* (sal) along the edges, typical of nutrient-poor lateritic uplands. (B) Grassland/sal woodland ecotone- a transitional habitat dominated by tall dry grasses and young sal trees, indicating successional dynamics between open grassland and closed-canopy forest. (C) Shrubland at forest margin- secondary growth comprising shrubs and young trees along the forest edge, reflecting regeneration following anthropogenic disturbance. (D) Mixed sal forest along roadside- a well-developed dry deciduous stand with moderate canopy cover and diverse understory vegetation adjacent to a paved forest road.

Notable larger tree species include *S robusta*, *Ficus benghalensis* (Linnaeus, 1753), *Bombax ceiba* (Linnaeus, 1753), *Madhuca longifolia* (J. Koenig ex L. J.F. Macbr., 1918), *Barringtonia acutangula* (L., Gaertn. 1791), *Lannea coromandelica* (Houtt. Merr. 1938), *Terminalia elliptica* (Willd, 1806), *A lebbeck*, *Mangifera indica* (Linnaeus 1753), *Azadirachta indica* (A. Juss., 1830), and *Butea monosperma* (Lam., Taub. 1894) (Mukherjee and Mondal, 2023). Additionally, various scrub species are present, such as *Glycosmis pentaphylla* (Retz.) DC. (1824), *Barleria cristata* (Linnaeus, 1753), *Flacourtia indica* (Burman. f.) Merr. (1917), *Ziziphus mauritiana* (Lam, 1789), *Urena lobata* (Linnaeus, 1753), *Urena sinuate* (Linnaeus, 1753), *Sida rhombifolia* (Linnaeus, 1753), *Trema orientale* (L.) Blume (1852), *Tragia involucrate* (Linnaeus, 1753), *Laportea interrupta* (L.Chew, 1965), and *Aristolochia indica* (Linnaeus, 1753) (Mukherjee and Mondal, 2023).

The plant species were identified based on regional publications by Sanyal (1994). Synoptic Catalogue of the Butterflies of India, Second Edition by Smetacek et al. (2025) was followed for the scientific names and the common names of the butterflies. A Laboratory World vernier calliper was used to

measure the size of the larvae. A Canon EOS 77D camera with a Canon EF 100 mm IS USM lens were used for the photographic documentation.

## Results and Discussion

### *Cigaritis lohita* (Horsfield, 1829)

*Cigaritis lohita* is commonly known as the Long banded silverline. It is not commonly found in India (Kehimkar, 2008). A female Long banded silverline was observed laying eggs on a *Ziziphus nummularia* bush (height 3 m) in Joypur forest (23°02'44.2" N 87°23'01.0" E) on 23<sup>rd</sup> February 2025. The plant is locally known as “Bhuikul” and its English common name is “Wild Jujuba” (Singh, 2015a). An additional 4 larvae, in a different instar, were observed on the same plant. The eggs hatched after 5 days (28<sup>th</sup> February 2025). The size of the initial larvae was 1 mm and they changed into the first instar after 3 days. The larvae reached their final instar (5<sup>th</sup>) at 2.2 cm in size. The larvae pupated on 17<sup>th</sup> March 2025 and after spending 11 days as pupae. The size of the pupae was 1.4 cm. and eclosed as an adult on 28<sup>th</sup> March 2025 (Fig. 4).



**Figure 4:** Lifecycle of *Cigaritis lohita* on *Ziziphus nummularia* plant. (A) eggs, (B) day old larva, (C) final instar larva, (D) freshly formed pupa, (E) mature pupa, (F) freshly eclosed Long banded silverline, (G) *Z. nummularia* plant with fruits, and (H) leaves of *Z. nummularia*. Photography © Kalyan Mukherjee

***Zizeeria karsandra* (Moore, 1865)**

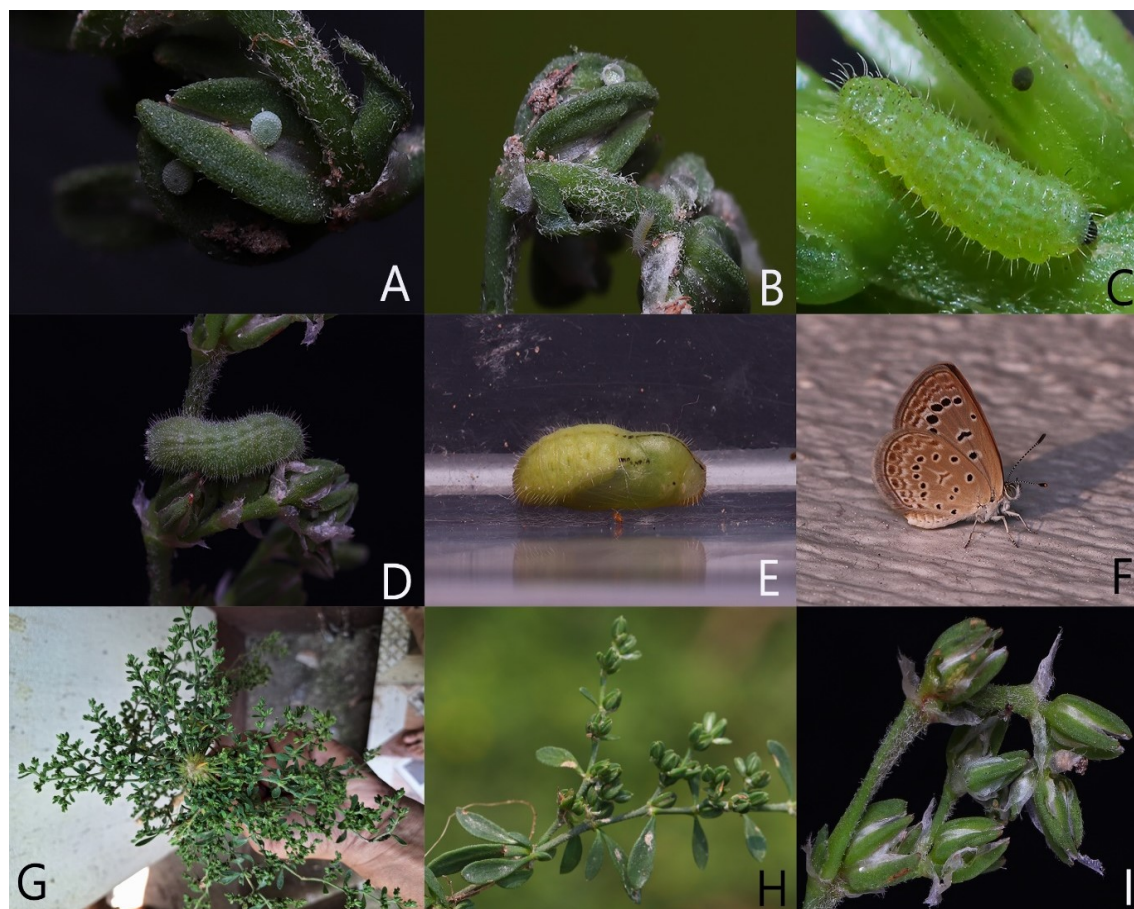
*Zizeeria karsandra* is commonly known as the Dark grass blue, its status is common in India (Kehimkar, 2008) and the species is abundant in the Bankura district (Mukherjee and Mondal, 2020). The species is very common in low elevations and seen throughout the year (Kehimkar, 2008) and a colony spend their entire life in a restricted area (Bhakare and Ogale, 2018). On the 23<sup>rd</sup> March in the study area (23°03'30.5" N; 87°23'49.4" E) some Dark grass blue butterflies were laying eggs on *Polycarpon prostratum* plants, and many larvae were later seen. A single egg was collected and observed to hatch after 2 days (25<sup>th</sup> March 2025). The newly hatched larva was 1 mm in length, after the first instar was 1.5 mm, and then after six days the larva reached the final instar at 9 mm in size. It pupated on 2<sup>nd</sup> April 2025, pupa size was 5 mm, and eclosed as an adult on 8<sup>th</sup> April 2025 (Fig. 5).

***Rapala manea* (Hewitson, 1863)**

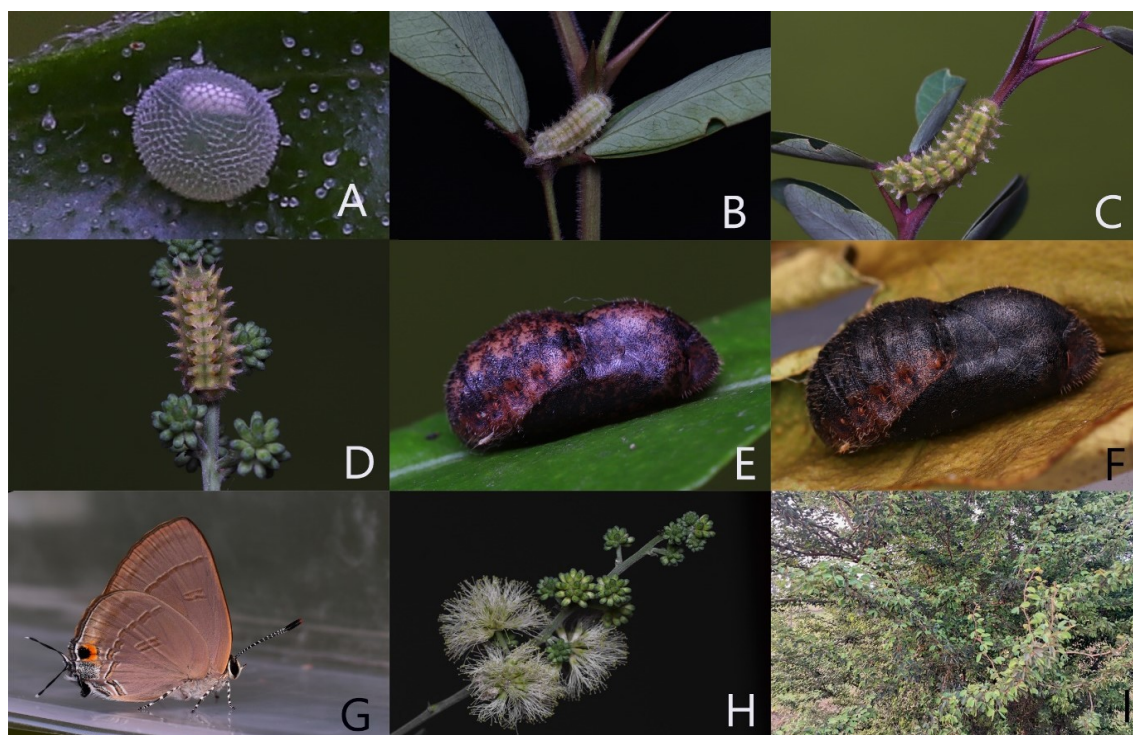
This species is commonly called the Slate flash and is frequently found in the Bankura district (Mukherjee and Mondal, 2020), and is generally common in India (Kehimkar, 2008). It is active in open areas at the edges

of forests and in forest clearings (Bhakare and Ogale, 2018). On 17<sup>th</sup> March 2025 a female was seen to deposit an egg on a flower bud of *Pithecellobium dulce* in Joypur forest, Bankura (23°03'30.5" N; 87°23'49.4" E). This plant is commonly known as “Jhilipi Gach” locally and its English common name is Manila tamarind or Madras thorn (Singh, 2015b). The plant was approximately 6 m in height. On the same day a large larva was also seen on another branch of the same plant. The egg hatched after 4 days and the larva started feeding the flower bud and the flowers of the *P. dulce* plant. The larva pupated after 16 days (30<sup>th</sup> March 2025) from the day of egg laying. The size of the final instar larva was 1.6 cm., and the pupa size was 1.4 cm. The pupa eclosed after 8 days (6<sup>th</sup> April 2025) which means that the larva took a total of 21 days to be adult and complete the lifecycle (Fig. 6).

On another day (2<sup>nd</sup> March 2025) a female *Rapala manea* female was observed laying eggs on the flower bud of a big *Albizia lebbbeck* tree in the Joypur Forest (23°01'53.1" N 87°21'28.8" E). *Albizia lebbbeck* is a large deciduous plant in the Fabaceae family. The plant was about 9 m in height and was in full flower. The plant is known as ‘Sirish’ in Bengali.



**Figure 5:** Lifecycle of *Zizeeria karsandra* on *Polycarpon prostratum* plant. (A) Eggs, (B) day old larva, (C) second instar larva, (D) final instar, (E) pupa, (F) freshly eclosed Dark grass blue, (G) *P. prostratum* plant, (H) leaves of *P. prostratum*, and (I) close photo of leaves of *P. prostratum*. Photography © Kalyan Mukherjee



**Figure 6:** Lifecycle of *Rapala manea* on *Pithecellobium dulce* plant. (A) Egg, (B) second instar larva, (C) third instar larva, (D) final instar, (E) pupa, (F) mature pupa (G) freshly eclosed *Rapala manea*, (H) flowers of *P. dulce*, and (I) *P. dulce* plant. Photography © Kalyan Mukherjee

Many eggs were found of that plant that day and one was collected for rearing. This egg hatched after 3 days (5<sup>th</sup> March 2025) and the size of the newly hatched larva was 1 mm. The larva started feeding on buds of the *A. lebbek* plant. The final instar larval size was 1.5 cm and it pupated on 15<sup>th</sup> March 2025. The size of the pupa was 1.3 cm and it spent a total of 19 days becoming an adult from the date of egg laying; eclosing on 21<sup>st</sup> April 2025 (Fig. 7).

This opportunistic survey reveals that *Ziziphus nummularia*, which had previously been reported as a larval host of the butterflies *Castalius rosimon* (Fabricius, 1775), *Cigaritis schistacea* (Moore, 1881), *Cigaritis vulcanus* (Fabricius, 1775), *Tarucus balkanica* (Freyer, 1844), *Tarucus hazara* (Evans, 1932), *Tarucus nara* (Kollar, 1844) and *Tarucus venosus* (Moore, 1882) (Nittin et al., 2018), has never been reported as the larval host plant for *Cigaritis lohita*. The list of previously reported larval host plants is given in the Table 1.

To this date the plant *Polycarpon prostratum* has never been reported as a larval host plant for any butterfly species. It is reported here, for the first time, as the larval host plant for *Zizeeria karsandra*. Previously reported larval host plants of *Zizeeria karsandra* are *Amaranthus spinosus* (L. 1753) and *Amaranthus viridis* (L. 1753) (Kunte, 2000; Robinson et al., 2010; Nittin et al., 2018).

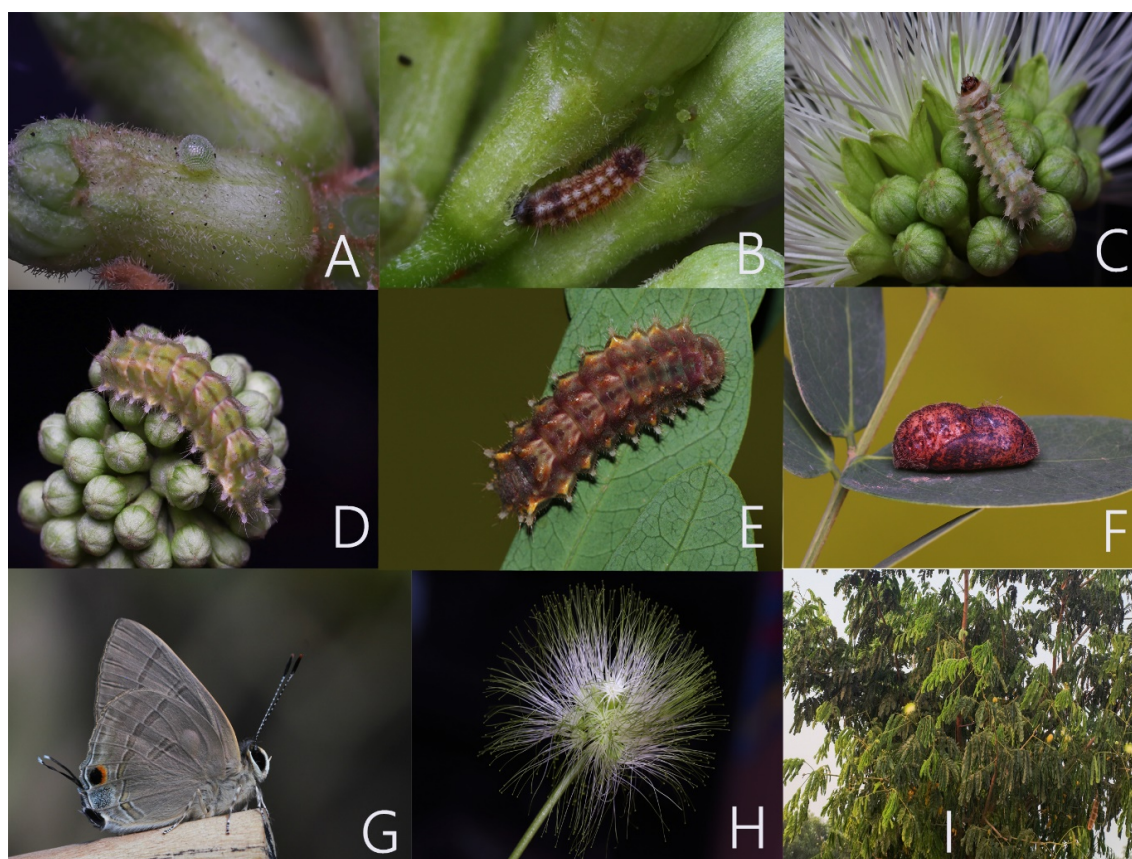
The tree *Pithecellobium dulce* has already been reported as the larval host plant of *Anthene lycaenina*

(R. Felder, 1868), *Prosotas dubiosa* (Evans, 1925), *Prosotas nora* (Moore, 1875), *Charaxes psaphon* (Butler, 1870), *Charaxes solon* (Fabricius, 1793), *Eurema blanda* (Wallace, 1867) and *Eurema hecabe* (Linnaeus, 1758) (Nitin et al., 2017) from India, but has never been identified as a host plant of *Rapala manea*. The list of previously documented larval host plants for *R. manea* is given in Table 2.

Previously, *Albizia lebbek* was reported as the larval host plant for *Leptotes plinius* (Fabricius, 1793), *Charaxes bhārata* (C. and R. Felder, 1867), *Eurema blanda* (Wallace, 1867) and *Pantoporia hordonia* (Stoll, 1790) (Mukherjee and Mondal, 2023). In this study, for the first time, *A. lebbek* is reported as the larval host plant of *Rapala manea* (Table 2).

These observations generated during this opportunistic survey highlight a broader ecological pattern within butterfly host plant associations in semi-arid and urban-rural interface landscapes (Mukherjee and Mondal, 2023). Several lycaenid species show greater plasticity in larval host selection than previously documented, suggesting that host plant breadth may be wider, or more context-dependent, than the literature has traditionally assumed (Robinson et al., 2010).

The newly recorded associations indicate that butterflies may opportunistically exploit locally abundant species, when primary or preferred hosts are scarce, providing insight into the dynamic nature of herbivore plant interactions in changing habitats (Roy et al., 2025).



**Figure 7:** Lifecycle of *Rapala manea* on *Albizia lebbek* plant. (A) Egg, (B) four days old larva, (C) third instar larva, (D) fourth instar larva, (E) final instar larva, (F) pupa (G) freshly eclosed *Rapala manea*, (H) flowers of *Albizia lebbek*, and (I) *Albizia lebbek* plant. Photography © Kalyan Mukherjee

**Table 1:** Previously reported host plants of the butterfly *Cigaritis lohita* (Long banded silverline) from India.

Sl. No.	Host plant name	Family	References
1	<i>Carissa carandas</i>	Apocynaceae	Nittin et al. (2018)
2	<i>Terminalia paniculata</i>	Combretaceae	Bell (1919a); Wynter-Blyth (1957); Kunte (2000)
3	<i>Dioscorea pentaphylla</i>	Dioscoreaceae	Davidson et al. (1896); Bell (1919a); Wynter-Blyth (1957); Kunte (2000)
4	<i>Ixora brachiata</i>	Fabaceae	Nittin et al. (2018)
5	<i>Smilax zeylanica</i>	Smilacaceae	Nittin et al. (2018)
6	<i>Psidium guajava</i>	Myrtaceae	Kehimkar (2008)

**Table 2:** Previously reported host plants of the butterfly *Rapala manea* (Slate flash) from India.

Sl. No.	Host plant name	Family	References
1	<i>Lantana camara</i>	Verbenaceae	Nitin et al. (2017)
2	<i>Camellia sinensis</i>	Theaceae	Wynter-Blyth (1957); Kunte (2000)
3	<i>Clerodendrum infortunatum</i>	Lamiaceae	Saji et al. (2018)
4	<i>Mangifera indica</i>	Anacardiaceae	Robinson et al. (2010)
5	<i>Combretum indicum</i>	Combretaceae	Wynter-Blyth (1957); Kunte (2000)
6	<i>Acacia pennata</i>	Fabaceae	Wynter-Blyth (1957); Kunte (2000)
7	<i>Mimosa invisa</i>	Fabaceae	Nitin et al. (2017)
8	<i>Urena lobata</i>	Malvaceae	Saji et al. (2018)
9	<i>Ziziphus</i> sp.	Rhamnaceae	Wynter-Blyth (1957); Kunte (2000)
10	<i>Sorbaria sorbifolia</i>	Rosaceae	Wynter-Blyth (1957); Kunte (2000)
11	<i>Lepisanthes tetraphylla</i>	Sapindaceae	Saji et al. (2018)
12	<i>Antidesma ghaesembilla</i>	Phyllanthaceae	Wynter-Blyth (1957); Kunte (2000)
13	<i>Antidesma acidum</i>	Phyllanthaceae	Wynter-Blyth (1957); Kunte (2000)
14	<i>Acacia megaladena</i>	Fabaceae	Wynter-Blyth (1957); Kunte (2000)
15	<i>Calliandra heamotocephala</i>	Fabaceae	Mukherjee (2021)
16	<i>Spondias pinnata</i>	Anacardiaceae	Mukherjee (2022)
17	<i>Malotus rapandus</i>	Euphorbiaceae	Banerjee et al. (2023)
18	<i>Caesalpinia bonduc</i> (L.) Roxb	Fabaceae	Payra and Bhatt (2024)

The novel records involving *Cigaritis lohita*, *Zizeeria karsandra*, and *Rapala manea* underscore how underexplored many landscapes still are (Mirza and Mondal, 2018). The discovery of larval feeding on commonly overlooked, or botanically inconspicuous, plants such as *Polycarpon prostratum* (previously never recognized as a butterfly host) emphasizes the importance of fine-scale vegetation surveys when documenting life-history traits. These relationships may remain unnoticed in rapid biodiversity assessments, revealing the value of incidental discoveries made through repeated monitoring or community-based observation (Mukherjee, 2022b). Such findings also raise the possibility that some butterfly populations may demonstrate facultative shifts to secondary hosts, potentially aiding their persistence in fragmented or human-modified habitats (Mukherjee and Mondal, 2020).

The addition of new host plants for *Rapala manea* and *Cigaritis lohita* further suggests an ongoing need to revise and update host plant databases, particularly for Lycaenidae, a family known for complex larval biology and specialized interactions (Robinson et al., 2010). These new associations may reflect ecological resilience (Mondal et al., 2023), but they also point to gaps in our understanding of larval resource use, phenology, and local abundance patterns. It becomes evident that species-level distributions cannot be fully explained without parallel documentation of larval ecology, especially in regions where floristic composition is shifting due to anthropogenic pressures (Batabyal et al., 2022).

Overall, the findings reinforce the significance of opportunistic, ground-level, observations as a complementary tool to conventional field surveys (Mukherjee and Ghosh, 2018). Such records have the potential to reshape existing knowledge on butterfly ecology, support updated conservation assessments, and highlight plant species that may be more crucial for butterfly life cycles than previously recognized (Mukherjee and Mondal, 2023). By expanding the known host plant repertoire of several species, this study contributes to a more integrative understanding of butterfly community dynamics and underscores the necessity for continued landscape-level monitoring in under-documented regions (Mukherjee and Mondal, 2020).

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### Author contributions

K. M. conducted all the field work, took all the photos, designed the figures and maps, collected the data, and prepared the draft manuscript.

### Conflict of interest

The author declares that there are no conflicting issues related to this research article.

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