

Diversity of lepidopteran insects associated with *Lantana camera* L. in and around Saheb Bandh area, Purulia, West Bengal

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Abstract:

Saheb bandh is a popular biodiversity-rich water body in the Purulia district in West Bengal. The present study was conducted to record the lepidopteran diversity associated with the invasive plant species, *Lantana camera* L. in and around Saheb Bandh Lake. The study recorded 24 insect species belonging to 06 families under the order Lepidoptera. Family Nymphalidae shared the maximum species richness (11 species) followed by Pieridae (04 species), Papilionidae (03 species), Lycaenidae (03 species), Crambidae (02 species), and Hesperidae (01 species) from the *Lantana camera*. Three butterfly species and two moth species have been recorded for the first time from the Purulia district of West Bengal, a unique geographic location of the state, i.e., the part of the Chhotanagpur plateau.

Keywords: Lepidoptera, Biodiversity, *Lantana camera*, New records, Purulia.

Introduction:

Lantana camera L., also known as wild sage or red sage, is a native plant of South American tropical forest and a most widespread low shrub species among approximately 150 species

under the genus *Lantana* of the family Verbenaceae (Ghisalberti, 2000; Girish, 2017). In the year 1807, the species was first introduced to the Acharya Jagadish Chandra Bose Botanical Garden of Kolkata (erstwhile, Royal Botanical Garden, Calcutta) as an ornamental plant (Thakur et al., 1992). Afterward, this invasive weed was rapidly spread all over the wild habitats in the Indian subcontinent due to the opportunistic growth behaviour, allelopathy (Kato-Noguchi and Kurniadie, 2021), and, high adaptive power to tolerate a wide range of climatic conditions (Sharma and Raghubanshi, 2012). Moreover, the wide ecological tolerances of this alien species *Lantana* enabled them to spread over the different terrestrial ecosystems and be categorized in the Category-I invasive exotic species (Priyanka and Joshi, 2013). According to the Global Invasive Species Program, the *L. camera* is the World's worst plant invader species and become one of the biggest causes of native biodiversity loss.

The plant species can easily be identified by the bright green colour leaves with a rough surface and fine hair-like projection with a pungent smell emitted when crushed. The inflorescence of this plant is small tubular shaped and the colour of the flower may also be changed after pollination (Mohan Ram and Mathur, 1984). Despite several negative impacts on the environment and human health such as photosensitivity and hepatotoxicity, loss of native biodiversity, etc., the positive impact of *L. camera* cannot be denied for their medicinal values as well as the capacity of holding a great insect diversity. The lepidopteran insects are one of the most abundant flower-visitors, which are attracted by the vibrant coloured flowers of *Lantana* (Dutta and Mitra, 2017).

Plants and lepidopteran insect association is a very important phenomenon for the survival of both (Raghavendra et al., 2020). The lepidopteran insects are considered as ecological indicators of ecosystem health (Bouyer et al., 2007). Assessment of lepidopteran diversity may help understand the overall biodiversity and environmental monitoring of an area.

Being an eye-catchy creature, the butterflies were recorded in a few works previously from the Purulia district (Samanta et al., 2017; Chowdhury and Chowdhury, 2020). But the information on Lepidoptera from the present study area is scanty. Moreover, there is no previous study on butterflies and moths from *L. camera* from this area. The present study was conducted to record the lepidopteran insects associated with the *L. camera* in and around the Saheb Bandh Lake, an urban area under Purulia Municipality of Purulia district. The present article may be helpful to prepare an inventory of the butterflies and moths from this area.

Materials and Methods:

Study area: Saheb bandh, situated in the urban landscape of Purulia municipality is a well-known water body in the Purulia district. The area belongs to the Chotanagpur Plateau in the state of West Bengal (22.60° N - 23.50° N latitudes and 85.75° E - 86.65° E longitudes). The district is very rich in faunal and floral biodiversity due to the presence of dense dry deciduous forest, scattered bushes, and jungles.

Methodology: Primarily the lepidopteran insects were observed and recorded from the *L. camera* directly in the field once a week from early morning to late evening during the flowering season of the plant species. The surveys were conducted in four different locations within a 3 KM radius around the Saheb Bandh Lake, during the month of July-2020 to June-2021 (Figure 1). Lepidopteran insects, especially the butterflies were identified by the photographs taken in the field, with the help of the Butterflies of India website by Kunte et al. (2021). In some cases, if the identification is critical and not possible with the naked eye or could not be photographed, only then they were captured by the net and after identification, they were released in the same habitat with the least disturbance. Moths were collected with the help of an insect net, preserved in insect boxes, and identified under the guidance of subject experts.

Results and Discussions:

The present study was an attempt to observe and prepare an inventory of the Lepidopteran insect species associated with *L. camera* in and around the Saheb Bandh Lake in the Purulia district. A total of 24 insect species belonging to 06 families under the order Lepidoptera were recorded from this geographic location. The family Nymphalidae was the most species-rich group (45.8%) among the other lepidopteran families with 11 species (Figure 2). The dominance of the family Nymphalidae also matches the findings of Dutta and Mitra (2017). Other recorded families from the present study area are Pieridae (04 species), Papilionidae and Lycaenidae (both with 03 species each), and Hesperidae (01 species). The moth species were belonging to the family Crambidae with two representative species (Table 1).

The abundance of the butterflies and moths was found to vary in different diurnal hours. The butterflies were mostly observed during the early morning and declined with the

increasing diurnal hours. This observation was also supported by Dutta and Mitra (2017), which describe the morning hours as the peak foraging time of butterflies in *L. camera*. On the other hand, the moths were mostly found in the early evening time.

Bagchi and Chattopadhyay (2013) recorded 04 species of Lepidoptera associated with *L. camera* in a previous study in West Bengal, whereas Dutta and Mitra (2017) recorded 24 species of lepidopteran insects in different time frames on *L. camera* in the urban landscape of Kolkata. The present communication on the lepidopteran insects from *L. camera* recorded 24 species, of which only 13 lepidopteran species were found common to the previous studies, while the rest 11 species have been reported from *L. camera* in the present study.

Samanta et.al. (2017) recorded 54 butterfly species from Baghmundi, and Chowdhury and Chowdhury (2020) recorded 33 butterfly species from Joychandi Hill in Purulia district. In the present study, three butterfly species, namely, *Appias libythea* (Fabricius, 1775) from the family Pieridae, and *Chilades lajus lajus* (Stoll, 1780) and *Tarucus* sp. from the family Lycaenidae were recorded for the first time from Purulia District. Besides these, two moth species, *Parapoynx fluctuosalis* (Zeller, 1852) and *Aethaloessa calidalis* (Guenée, 1854) from the family Crambidae were also recorded for the first time from this district (Figure 3).

Conclusion:

During the present study, the members of Lepidoptera were found predominant on *Lantana* host plants in and around the Saheb bandh area. *L. camera* is a widespread invasive plant that has many negative effects on the environment but has the capacity to hold a great insect diversity, especially the insects under the order Lepidoptera. The butterflies are attracted by the beautiful and vibrant coloured flowers of this plant which may help the plant in pollination unintentionally. The present study recorded the lepidopteran insect diversity on *L. camera* in and around Saheb Bandh area of Purulia district as baseline data, with few previously unreported species from the district, which may help in future studies.

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Conflict of Interest: The authors declare that they have no conflict of interest.

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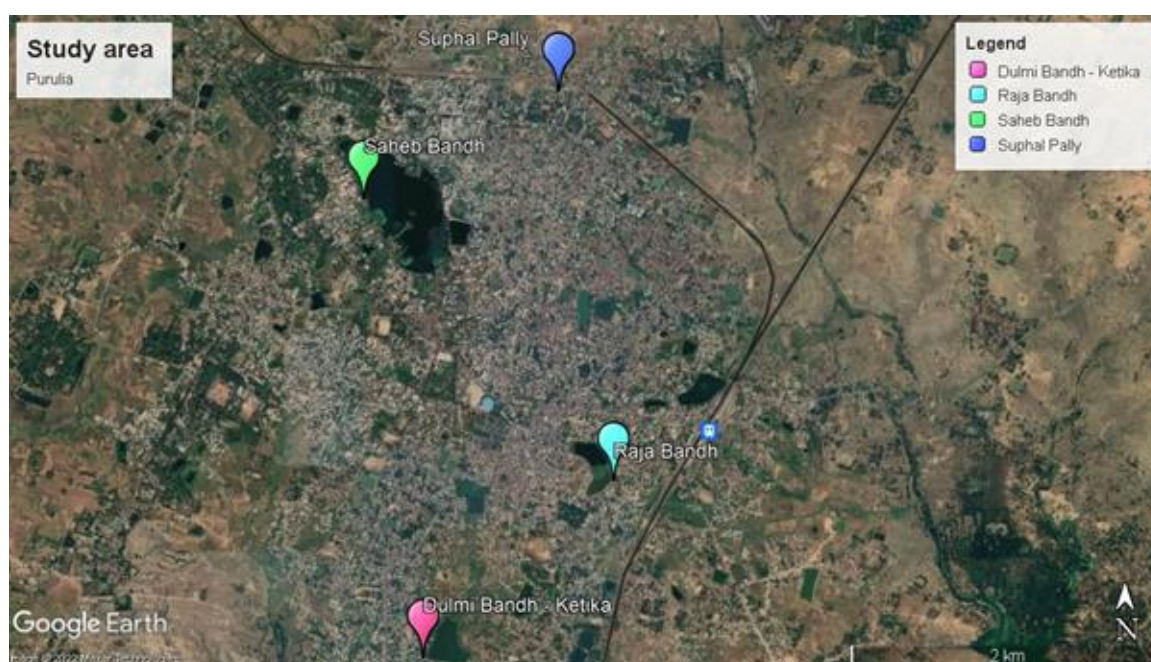


Figure 1: Study sites in and around Saheb Bandh area, Purulia, West Bengal.

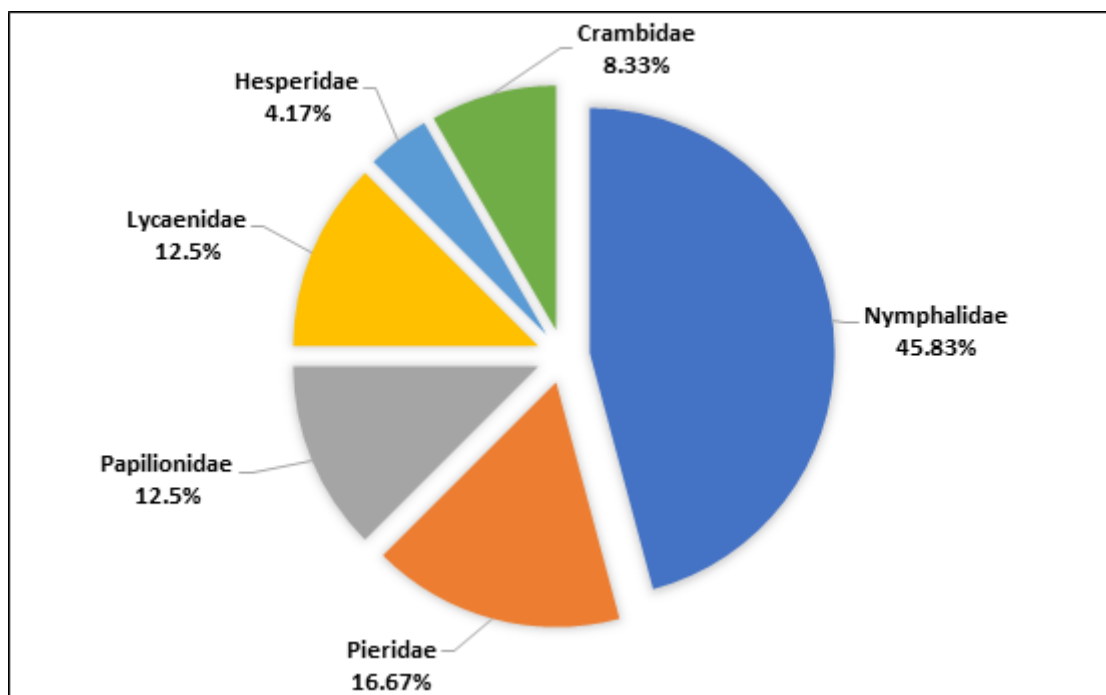


Figure 2: Family-wise Species richness of lepidopteran insects from *Lantana camera* in and around Saheb Bandh area, Purulia, West Bengal.

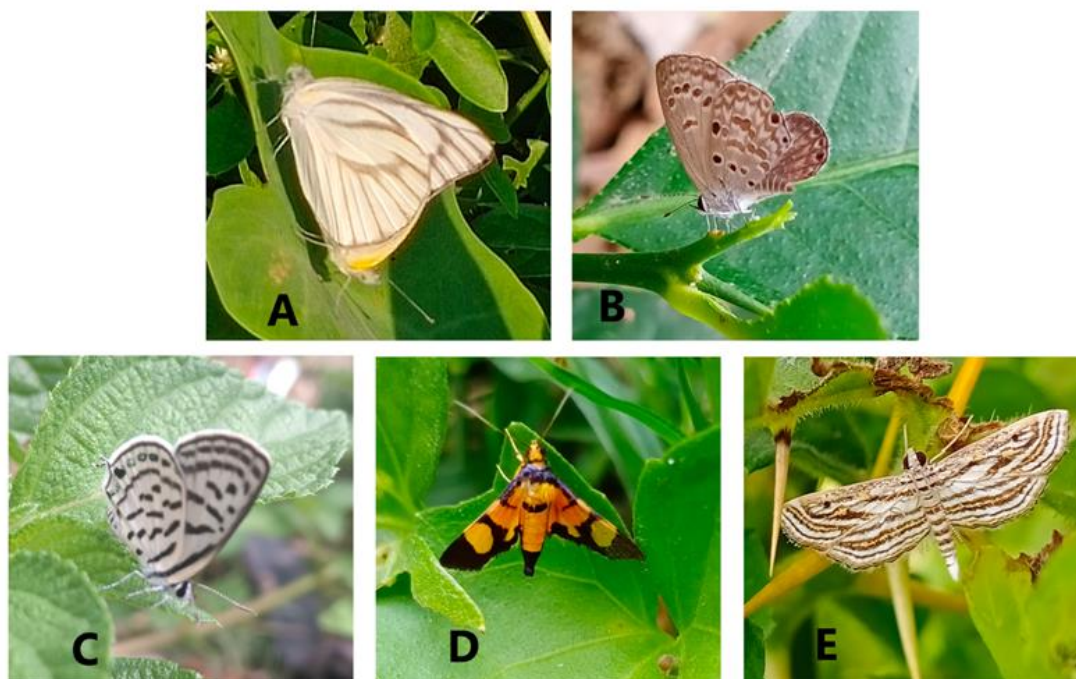


Figure 3: First-time reported lepidopteran species from Purulia District photographed during the study. (A) *Appias libythea* (B) *Chilades lajus lajus* (C) *Tarucus* sp. (D) *Aethaloessa calidalis* and (E) *Parapoynx fluctuosalis*.

Table 1: List of the lepidopteran insect species recorded from *Lantana camera* L. in and around Saheb Bandh area, Purulia, West Bengal.

Family	Sl. no.	Name of the species	Common name
Nymphalidae	1	<i>Acraea terpsicore</i> (Linnaeus, 1758)	Tawny coaster
	2	<i>Ariadne merione</i> (Cramer, 1777)	Common Castor
	3	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain tiger
	4	<i>Tirumala limniace</i> (Cramer, 1775)	Blue tiger
	5	<i>Elymnias hypermnestra</i> (Linnaeus, 1763)	Common palmfly
	6	<i>Euploea core</i> (Cramer, 1780)	Common Crow
	7	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	Great Eggfly
	8	<i>Junonia almana almana</i> (Linnaeus, 1758)	Oriental Peacock Pansy
	9	<i>Junonia atlites</i> (Linnaeus, 1763)	Grey pansy
	10	<i>Melanitis leda</i> (Linnaeus, 1758)	Common evening brown
	11	<i>Mycalesis perseus</i> (Fabricius, 1775)	Common bush brown
Pieridae	12	<i>Appias libythea</i> (Fabricius, 1775)	Western Striped Albatross
	13	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)	Mottled Emigrant
	14	<i>Leptosia nina nina</i> (Fabricius, 1793)	Oriental Psyche
	15	<i>Eurema hecabe</i> (Linnaeus, 1758)	Common grass yellow
Papilionidae	16	<i>Graphium agamemnon</i> (Linnaeus, 1758)	Tailed Jay
	17	<i>Papilio polytes</i> Linnaeus, 1758	Common Mormon
	18	<i>Papilio demoleus</i> Linnaeus, 1758	Lime Swallowtail
Lycaenidae	19	<i>Chilades lajus lajus</i> (Stoll, 1780)	Indian Lime Blue
	20	<i>Pseudozizeeria maha</i> (Kollar, 1844)	Pale Grass Blue
	21	<i>Tarucus</i> sp.	Pierrot butterfly
Hesperidae	22	Unidentified species	
Crambidae	23	<i>Parapohnx fluctuosalis</i> (Zeller, 1852)	Pyralid Moth
	24	<i>Aethaloessa calidalis</i> (Guenée, 1854)	Crambid Moth