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Article

Checklist of butterfly larval host plants and their spatial distribution at Ram Pahar and Sita Pahar of Kaptai National Park, Bangladesh

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Abstract: Adult butterflies lay their eggs on specific plants that serve as the primary food source for caterpillars once they hatch. This study, conducted from March 2023 to April 2025, aimed to develop a comprehensive checklist and evaluate the distribution of butterfly species in Kaptai National Park (KNP), Bangladesh. A total of 103 plant species from 41 families were identified as larval host plants for 87 butterfly species belonging to 9 families. Of these plant species, 17 were classified as Least Concern (LC) according to the IUCN Red List 2024 for Bangladesh, while 86 species remain unclassified. The study covered eight sites (S1-S8) in Ram Pahar and Sita Pahar within KNP, emphasizing the distribution of 26 important larval host plant species that are ecologically significant and commonly utilized by butterflies. The 26 key plants include *Syzygium cumini, Mangifera indica, Anacardium occidentale, Annona squamosa, Alstonia scholaris, Calotropis gigantea, Aristolochia indica, Mikania micrantha, Terminalia catappa, Delonix regia, Butea monosperma, Saraca asoca, Mimosa pudica, Tamarindus indica, Senna alata, Lagerstroemia speciosa, Bombax ceiba, Abelmoschus manihot, Ficus benghalensis, Moringa oleifera, Jasminum auriculatum, Passiflora foetida, Neolamarckia cadamba, Citrus aurantiifolia, Mimusops elengi,* and *Curcuma longa*. These findings underscore the urgency of protecting butterfly habitats, including native plant species. The study also highlights the importance of habitat restoration and sustainable conservation initiatives in the Chittagong Hill Tracts area.

Keywords: Lepidoptera; habitat management; IUCN Red List; Chittagong Hill Tracts

1. Introduction

Butterflies, as vital pollinators and indicators of ecosystem health, are closely connected to specific plants known as larval host plants (Tallamy and Shropshire, 2009). These plants are crucial during the early stages of a butterfly's life cycle, as female butterflies lay their eggs exclusively on certain species that support their larvae after hatching (Futuyma and Agrawal, 2009). The larvae feed on these host plants, which provide essential nutrients for their growth and development. Without access to suitable host plants, butterfly populations cannot thrive, making the identification and conservation of these plants essential for sustaining butterfly species (Wepprich *et al.*, 2019). This dependency is starkly illustrated by widespread population declines, largely driven by the loss of specific host plants (Halsch *et al.*, 2021). The erosion of such specialized relationships disrupts local ecosystems, leading to cascading effects such as reduced food availability for predators and impaired pollination services (Burghardt *et al.*, 2008).

Kaptai National Park (KNP) in Bangladesh is a biodiversity-rich area, home to nearly 200 butterfly species (Habib *et al.*, 2016; Khan *et al.*, 2016). However, despite the park's diverse butterfly population, there is a significant knowledge gap regarding the larval host plants of these species (Khan *et al.*, 2016). This lack of information poses a major challenge for effective conservation, as it is insufficient to protect butterfly species alone; their specific larval host plants must also be safeguarded (Shihan, 2016; Steward and Boggs, 2020). Without understanding the connection between butterfly species and their larval host plants, conservation efforts may overlook critical factors that influence the survival and reproduction of butterflies (Koh, 2004; Shihan, 2018). In the context of KNP, understanding the spatial distribution of larval host plants is particularly urgent. The park spans various ecological zones, each with different plant communities that may influence the distribution of butterfly species. If the larval host plants are not adequately identified and conserved, some butterfly species may face declining populations or even extinction, especially in areas where their host plants are scarce or under threat (Thomas *et al.*, 2004; Weil and Brady, 2016).

The conservation of butterfly populations in KNP is hindered by a significant knowledge gap regarding their larval host plants, despite the park's high butterfly diversity. The absence of a documented checklist and limited understanding of how these host plants are spatially distributed across Ram Pahar and Sita Pahar creates a critical barrier to effective habitat management and species conservation. To address this gap, this study asks: Which larval host plant species are used by butterflies in these areas, and how are these plants distributed across the landscape? The study is guided by the hypothesis that butterfly species depend on a distinct set of larval host plants whose availability and spatial patterns vary significantly among sites, thereby influencing butterfly occurrence. The objective is to identify the larval host plants, analyze their diversity, map their spatial distribution, and highlight key species essential for conservation planning in KNP. By mapping the occurrence of these host plants, the study will provide valuable insights into the ecological relationships between butterflies and their food sources. This information is essential for developing conservation strategies that focus on protecting both butterfly species and the plant species they rely on throughout their life cycle. The findings of this research will not only enhance scientific understanding of butterfly ecology but also serve as a foundation for creating more effective and sustainable conservation plans for KNP.

2. Materials and Methods

2.1. Ethical approval

No ethical approval was required for conducting this study.

2.2. Study area and duration

The KNP is located at approximately 22°29′56.25″N latitude and 92°10′39.61″E longitude (Figure 1). The study encompassed Ram Pahar and Sita Pahar within KNP. The Ram Pahar area included Wagga Chora (S1), Bazar Chora (S2), Shilchori (S3), and Bangchori (S4), while Sita Pahar comprised Thandachori (S5), Ronir Chora (S6), Sita Mondir (S7), and Jamai Chora (S8). Regular surveys at these locations were conducted to document the distribution of key plant species from March 2023 to April 2025.

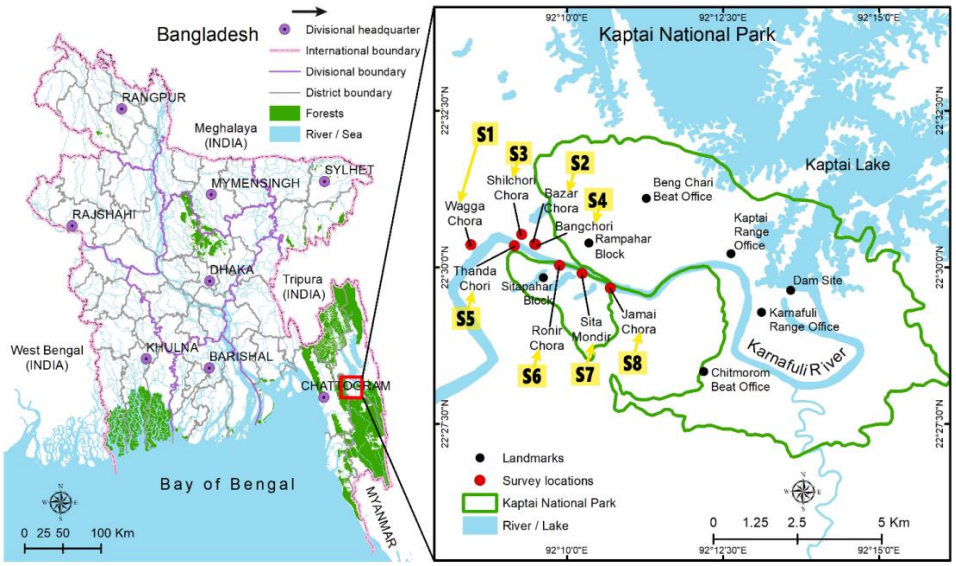

Figure 1. The eight study sites (S1-S8) at Ram Pahar and Sita Pahar of Kaptai National Park, Bangladesh.

2.3. Data collection and validation

The documentation and identification of larval host plants for butterfly species were conducted in KNP. Data collection was performed using the Visual Count Method (VCM) along standardized transect walks, a common approach for surveying floral and faunal populations (Buckland *et al.*, 2001). Representative plant specimens were collected and photographed within KNP using a 24-105 mm lens mounted on a Canon EOS 5D Mark IV DSLR camera (Canon Inc., Tokyo, Japan). Plant identification was carried out through expert evaluation and by consulting relevant taxonomic resources, including Prain (1903), Siddiqui *et al*. (2007), and Ahmed *et al*. (2009). Additionally, type images were reviewed on websites of international organizations, including Plants of the World Online (2025) (https://powo.science.kew.org/), Pl@ntNet (2025) (https://identify.plantnet.org/k-world-flora/identify), and Flowers of India (2025) (http://www.flowersofindia.net). GPS devices (Garmin GPSMAP 78s and eTrex, Garmin Ltd., Olathe, Kansas, USA) were used to record the coordinates of the collected larval host plants.

2.4 Statistical analysis

Microsoft Excel 2019 was used for data analysis of plant families, species, and their relationships to butterflies. Photoshop 7.0 was employed to process and edit the specimen photos. The study area map was created using satellite imagery and finalized with adjustments in ArcGIS software version 10.8.2 and Photoshop 7.0.

3. Results

The study identified 87 butterfly species and 103 species of larval host plants from 41 families in Ram Pahar and Sita Pahar within KNP (Table 1).

Table 1. Checklist of larval host plants of butterfly species at Ram Pahar and Sita Pahar of Kaptai National Park.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
Family: Acraeidae														
1	*Acraea terpsicore* (Linnaeus, 1758)	Tawny Coster	*Vitex negundo*	Lamiaceae	NE	Forest	√		√	√			√	√
			Passiflora foetida	Passifloraceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Passiflora incarnata	Passifloraceae	NE	Medicinal	√	√	√	√	√	√	√	√
Family: Amathusiidae														
2	*Discophora sondaica* Boisduval, 1836	Common Duffer	*Bambusa vulgaris*	Poaceae	NE	Forest	√	√	√	√	√	√	√	√
Family: Danaidae														
3	*Parantica aglea* (Stoll, [1782])	Glassy Tiger	*Calotropis gigantea*	Apocynaceae	LC	Medicinal	√	√	√	√	√	√	√	√
4	*Tirumala limniace* Cramer, 1775	Blue Tiger	*Calotropis gigantea*	Apocynaceae	LC	Medicinal	√	√	√	√	√	√	√	√
5	*Danaus chrysippus* (Linnaeus, 1758)	Plain Tiger	*Calotropis gigantea*	Apocynaceae	LC	Medicinal	√	√	√	√	√	√	√	√
			Mikania micrantha	Asteraceae	NE	Forest	√	√	√	√	√	√	√	√
			Lantana camara	Verbenaceae	NE	Medicinal	√	√	√	√	√	√	√	√
6	*Euploea core* (Cramer, [1780])	Common Crow	*Alstonia scholaris*	Apocynaceae	LC	Forest	√	√	√	√	√	√	√	√
			Holarrhena pubescens	Apocynaceae	NE	Forest			√	√	√		√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
			Mikania micrantha	Asteraceae	NE	Forest	√	√	√	√	√	√	√	√
			Delonix regia	Fabaceae	LC	Forest	√	√	√	√	√	√	√	√
			Vitex negundo	Lamiaceae	LC	Forest	√		√	√			√	√
			Ficus benghalensis	Moraceae	LC	Forest	√	√	√	√	√	√	√	√
			Ficus racemosa	Moraceae	LC	Forest	√	√	√	√	√	√	√	√
			Ficus religiosa	Moraceae	LC	Forest	√	√	√	√	√	√	√	√
			Mimusops elengi	Sapotaceae	NE	Forest	√	√	√	√	√	√	√	√
7	*Danaus genutia* (Cramer, [1779])	Striped Tiger	*Calotropis gigantea*	Apocynaceae	LC	Medicinal	√	√	√	√	√	√	√	√
8	*Euploea klugii* Moore, [1858]	King Crow	*Ficus hispida*	Moraceae	LC	Forest	√	√	√	√	√	√	√	√
9	*Euploea mulciber* (Cramer, [1777])	Striped Blue Crow	*Ficus racemosa*	Moraceae	LC	Forest	√	√	√	√	√	√	√	√
Family: Hesperiidae														
10	*Gangara thyrsis* (Fabricius, 1775)	Giant Redeye	*Phoenix sylvestris*	Arecaceae	NE	Forest		√	√	√				√
11	*Badamia exclamationis* (Fabricius, 1775)	Brown Awl	*Terminalia bellirica*	Combretaceae	LC	Forest		√		√	√	√		√
			Vitex negundo	Lamiaceae	NE	Forest	√		√	√			√	√
12	*Udaspes folus* (Cramer, [1775])	Grass Demon	*Trifolium* spp.	Fabaceae	NE	Medicinal			√					√
			Alpinia purpurata	Zingiberaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Curcuma longa	Zingiberaceae	NE	Medicinal	√	√	√	√	√	√	√	√
13	*Spialia galba* (Fabricius, 1793)	Grizzled Skipper	*Abelmoschus manihot*	Malvaceae	NE	Medicinal	√	√	√	√	√		√	√
14	*Odontoptilum angulata* (C. Felder, 1862)	Chestnut Angle	*Microcos paniculata*	Malvaceae	NE	Medicinal	√	√	√	√	√	√	√	√
15	*Matapa sasivarna* (Moore, [1866])	Black-veined Branded Redeye	*Bambusa vulgaris*	Poaceae	NE	Forest	√	√	√	√	√	√	√	√
16	*Pelopidas mathias* (Fabricius, 1798)	Small Branded Swift	*Oryza sativa*	Poaceae	NE	Medicinal	√			√	√			√
			Saccharum officinarum	Poaceae	NE	Medicinal	√			√	√		√	√
			Imperata cylindrica	Gramineae	NE	Medicinal	√	√	√	√	√	√	√	√
17	*Matapa aria* (Moore, [1866])	Common Redeye	*Bambusa vulgaris*	Poaceae	NE	Forest	√	√	√	√	√	√	√	√
18	*Cupitha purreea* (Moore, 1877)	Wax Dart	*Terminalia bellirica*	Combretaceae	NE	Forest		√		√	√	√		√
19	*Notocrypta curvifascia* (C. & R. Felder, 1862)	Restricted Demon	*Curcuma longa*	Zingiberaceae	NE	Medicinal	√	√	√	√	√	√	√	√
Family: Lycaenidae														
20	*Cheritra freja* (Fabricius, 1793)	Common Imperial	*Mangifera indica*	Anacardiaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Albizia lebbeck	Fabaceae	NE	Forest	√	√	√	√	√	√	√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
21	*Rapala iarbus* (Fabricius, 1787)	Common Red Flash	*Terminalia Catappa*	Combretaceae	NE	Forest	√	√	√	√	√	√	√	√
22	*Anthene emolus* (Godart, [1824])	Common Ciliate Blue	*Mangifera indica*	Anacardiaceae	NE	Fruit	√	√	√	√	√	√	√	√
23	*Anthene lycaenina* (R. Felder, 1868)	Pointed Ciliate Blue	*Leucaena leucocephala*	Fabaceae	NE	Forest			√	√				√
24	*Jamides bochus* (Stoll, [1782])	Dark Cerulean	*Alstonia scholaris*	Apocynaceae	LC	Forest	√	√	√	√	√	√	√	√
			Pongamia pinnata	Fabaceae	NE	Forest	√			√	√			√
			Saraca asoca	Fabaceae	NE	Forest			√	√			√	√
25	*Jamides celeno* (Cramer, [1775])	Common Cerulean	*Butea monosperma*	Fabaceae	NE	Forest	√	√	√	√	√		√	√
			Pongamia pinnata	Fabaceae	NE	Forest	√			√	√			√
			Saraca asoca	Fabaceae	NE	Forest			√	√			√	√
			Albizia lebbeck	Fabaceae	NE	Forest	√	√	√	√	√	√	√	√
			Abrus precatorius	Fabaceae	NE	Medicinal		√	√	√	√			√
			Dalbergia sissoo	Fabaceae	NE	Forest	√	√	√		√		√	
26	*Arhopala amantes* (Hewitson, 1862)	Large Oakblue	*Terminalia bellirica*	Combretaceae	NE	Forest		√		√	√	√		√
			Lagerstroemia speciosa	Lythraceae	NE	Forest	√	√	√	√	√	√	√	√
27	*Curetis thetis* (Drury, [1773])	Indian Sunbeam	*Pongamia pinnata*	Fabaceae	NE	Forest	√			√	√			√
			Abrus precatorius	Fabaceae	NE	Medicinal		√	√	√	√			√
28	*Rapala varuna* (Horsfield, [1829])	Indigo Flash	*Lantana camara*	Verbenaceae	NE	Medicinal	√	√	√	√	√	√	√	√
29	*Prosotas dubiosa* (Semper, [1879])	Tailless Lineblue	*Leucaena leucocephala*	Fabaceae	NE	Forest		√		√	√	√		√
			Mimosa pudica	Fabaceae	NE	Medicinal	√	√	√	√	√	√	√	√
30	*Zizina otis* (Fabricius, 1787)	Lesser Grass Blue	*Tephrosia pumila*	Fabaceae	NE	Medicinal	√	√	√	√	√		√	√
31	*Zizeeria karsandra* (Moore, 1865)	Dark Grass Blue	*Oxalis corniculata*	Oxalidaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Phyla nodiflora	Verbenaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Trifolium spp.	Fabaceae	NE	Medicinal			√					√
32	*Zizula hylax* (Fabricius, 1775)	Tiny Grass Blue	*Lantana camara*	Verbenaceae	NE	Medicinal	√	√	√	√	√	√	√	√
33	*Chilades pandava* (Horsfield, [1829])	Plains Cupid	*Saraca asoca*	Fabaceae	NE	Forest			√	√			√	√
			Butea monosperma	Fabaceae	NE	Forest	√	√	√	√	√		√	√
34	*Euchrysops cnejus* (Fabricius, 1798)	Gram Blue	*Trifolium* spp.	Fabaceae	NE	Medicinal			√					√
			Lablab purpureus	Fabaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Crateva religiosa	Capparaceae	NE	Medicinal	√	√	√	√	√	√	√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
35	*Lampides boeticus* (Linnaeus, 1767)	Pea Blue	*Abrus precatorius*	Fabaceae	NE	Medicinal		√	√	√	√			√
			Crotalaria pallida	Fabaceae	NE	Medicinal			√	√	√			√
			Lablab purpureus	Fabaceae	NE	Medicinal	√	√	√	√	√		√	√
			Sesbania bispinosa	Fabaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Robinia pseudoacacia	Fabaceae	NE	Forest			√		√			√
			Ixora coccinea	Rubiaceae	NE	Medicinal	√	√	√	√	√	√	√	√
36	*Pseudozizeeria maha* (Kollar, [1844])	Pale Grass Blue	*Oxalis corniculata*	Oxalidaceae	NE	Medicinal	√	√	√	√	√	√	√	√
37	*Leptotes plinius* (Fabricius, 1793)	Zebra Blue	*Abrus precatorius*	Fabaceae	NE	Medicinal		√	√	√	√			√
38	*Catochrysops strabo* (Fabricius, 1793)	Forget-me-not	*Butea monosperma*	Fabaceae	NE	Forest	√	√	√	√	√		√	√
			Pongamia pinnata	Fabaceae	NE	Forest	√			√	√			√
39	*Hypolycaena erylus* (Godart, [1824])	Common Tit	*Dendrophthoe falcata*	Loranthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Ziziphus mauritiana	Rhamnaceae	LC	Fruit	√	√	√	√	√	√	√	√
40	*Tajuria cippus* (Fabricius, 1798)	Peacock Royal	*Dendrophthoe falcata*	Loranthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
41	*Deudorix epijarbas* (Moore, [1858])	Cornelian	*Punica granatum*	Lythraceae	NE	Fruit	√	√	√	√	√	√	√	√
42	*Remelana jangala* (Horsfield, [1829])	Chocolate Royal	*Lagerstroemia speciosa*	Lythraceae	NE	Forest	√	√	√	√	√	√	√	√
43	*Arhopala centaurus* Fabricius, 1775	Centaur Oakblue	*Lagerstroemia speciosa*	Lythraceae	NE	Forest	√	√	√	√	√	√	√	√
44	*Rathinda amor* (Fabricius, 1775)	Monkey Puzzle	*Barringtonia acutangula*	Lecythidaceae	NE	Forest	√		√	√			√	√
45	*Spindasis vulcanus* (Fabricius, 1775)	Common Silverline	*Psidium guajava*	Myrtaceae	NE	Fruit	√	√	√	√	√	√	√	√
46	*Castalius rosimon* (Fabricius, 1775)	Common Pierrot	*Ziziphus mauritiana*	Rhamnaceae	NE	Fruit	√	√	√	√	√	√	√	√
47	*Loxura atymnus* (Stoll, 1780)	Yamfly	*Smilax zeylanica*	Smilacaceae	NE	Medicinal	√	√	√	√	√	√	√	√
Family: Nymphalidae														
48	*Junonia atlites* (Linnaeus, 1763)	Grey Pansy	*Ruellia tuberosa*	Acanthaceae	NE	Medicinal		√		√	√		√	√
			Alstonia scholaris	Apocynaceae	LC	Forest	√	√	√	√	√	√	√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
49	*Junonia iphita* (Cramer, [1779])	Chocolate Pansy	*Ruellia tuberosa*	Acanthaceae	NE	Medicinal		√		√	√		√	√
			Justicia adhatoda	Acanthaceae	NE	Medicinal		√		√	√		√	√
			Barleria cristata	Acanthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
50	*Junonia lemonias* (Linnaeus, 1758)	Lemon Pansy	*Justicia procumbens*	Acanthaceae	NE	Medicinal		√		√			√	√
			Barleria cristata	Acanthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Barleria prionitis	Acanthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Syzygium cumini	Myrtaceae	LC	Fruit	√	√	√	√	√	√	√	√
			Mikania micrantha	Asteraceae	NE	Forest	√	√	√	√	√	√	√	√
51	*Junonia orithya* (Linnaeus, 1758)	Blue Pansy	*Justicia procumbens*	Acanthaceae	NE	Medicinal		√		√			√	√
			Mimosa pudica	Fabaceae	NE	Medicinal		√		√			√	√
52	*Junonia almana* (Linnaeus, 1758)	Peacock Pansy	*Barleria cristata*	Acanthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Abelmoschus manihot	Malvaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Litchi chinensis	Sapindaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Mimusops elengi	Sapotaceae	NE	Forest	√	√	√	√	√	√	√	√
53	*Junonia hierta* (Fabricius, 1798)	Yellow Pansy	*Barleria cristata*	Acanthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Mimosa pudica	Fabaceae	NE	Medicinal	√	√	√	√	√	√	√	√
54	*Euthalia aconthea* (Cramer, [1777])	Common Baron	*Mangifera indica*	Anacardiaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Anacardium occidentale	Anacardiaceae	NE	Medicinal	√			√	√	√	√	√
55	*Ariadne merione* (Cramer, [1777])	Common Castor	*Ricinus communis*	Euphorbiaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Tragia involucrata	Euphorbiaceae	NE	Medicinal	√	√	√	√	√	√	√	√
56	*Charaxes bernardus* (Fabricius, 1793)	Tawny Rajah	*Tamarindus indica*	Fabaceae	LC	Fruit	√	√	√	√	√	√	√	√
57	*Moduza procris* (Cramer, [1777])	Commander	*Microcos paniculata*	Malvaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Neolamarckia cadamba	Rubiaceae	LC	Forest	√	√	√	√	√	√	√	√
58	*Neptis hylas* (Linnaeus, 1758)	Common Sailer	*Bombax ceiba*	Malvaceae	LC	Forest	√	√	√	√	√	√	√	√
59	*Cethosia cyane* (Drury, [1773])	Leopard Lacewing	*Passiflora foetida*	Passifloraceae	NE	Medicinal	√	√	√	√	√	√	√	√
60	*Symbrenthia lilaea* (Hewitson, 1864)	Common Jester	*Debregeasia saeneb*	Urticaceae	NE	Medicinal			√		√		√	√
61	*Neptis jumbah* Moore, [1858]	Chestnut Steaked Sailor	*Pongamia pinnata*	Fabaceae	NE	Forest	√			√	√			√
62	*Hypolimnas bolina* (Linnaeus, 1758)	Great Eggfly	*Laportea interrupta*	Urticaceae	NE	Medicinal			√		√		√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
Family: Papilionidae														
63	*Papilio polytes* Linnaeus, 1758	Common Mormon	*Thunbergia grandiflora*	Acanthaceae	NE	Forest	√	√		√	√	√	√	√
			Syzygium cumini	Myrtaceae	NE	Fruit	√	√	√	√			√	√
			Mikania micrantha	Asteraceae	NE	Forest	√	√	√	√	√	√	√	√
			Citrus aurantium	Rutaceae	NE	Fruit		√			√	√	√	
			Citrus aurantiifolia	Rutaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Citrus limon	Rutaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Citrus tangerina	Rutaceae	NE	Fruit		√			√	√	√	
			Murraya koenigii	Rutaceae	NE	Medicinal		√		√	√	√	√	√
			Murraya paniculata	Rustaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Aegle marmelos	Rutaceae	LC	Fruit	√	√	√	√	√	√	√	√
			Zanthoxylum rhetsa	Rutaceae	LC	Fruit	√	√	√	√	√	√	√	√
			Citrus maxima	Rutaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Jasminum auriculatum	Oleaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Punica granatum	Lythraceae	NE	Fruit	√	√	√	√	√	√	√	√
64	*Graphium sarpedon* (Linnaeus, 1758)	Common Bluebottle	*Thunbergia grandiflora*	Acanthaceae	NE	Forest	√	√		√	√	√	√	√
			Magnolia champaca	Magnoliaceae	LC	Forest	√	√	√	√	√	√	√	√
65	*Graphium doson* (C. & R. Felder, 1864)	Common Jay	*Artabotrys hexapetalus*	Annonaceae	NE	Forest	√	√	√	√	√	√	√	√
			Murraya paniculata	Rustaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Thunbergia grandiflora	Acanthaceae	NE	Forest	√	√		√	√	√	√	√
			Annona reticulata	Annonaceae	NE	Fruit	√	√		√	√		√	√
			Vitex negundo	Lamiaceae	LC	Forest	√		√	√			√	√
			Magnolia champaca	Magnoliaceae	LC	Forest	√	√	√	√	√	√	√	√
66	*Papilio memnon* Linnaeus, 1758	Great Mormon	*Thunbergia grandiflora*	Acanthaceae	NE	Forest	√	√		√	√	√	√	√
			Artabotrys hexapetalus	Annonaceae	NE	Forest	√	√	√	√	√	√	√	√
			Abelmoschus manihot	Malvaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Citrus tangerina	Rutaceae	NE	Fruit		√			√	√	√	
67	*Papilio demoleus* Linnaeus, 1758	Lime Swallowtail	*Syzygium cumini*	Myrtaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Aegle marmelos	Rutaceae	LC	Fruit	√	√	√	√	√	√	√	√
			Citrus maxima	Rutaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Citrus limon	Rutaceae	NE	Fruit	√	√	√	√	√	√	√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
68	*Graphium agamemnon* (Linnaeus, 1758)	Tailed Jay	*Annona squamosa*	Annonaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Artabotrys hexapetalus	Annonaceae	NE	Forest	√	√	√	√	√	√	√	√
			Magnolia champaca	Magnoliaceae	LC	Forest	√	√	√	√	√	√	√	√
69	*Papilio clytia* Linnaeus, 1758	Common Mime	*Alstonia scholaris*	Apocynaceae	LC	Forest	√	√	√	√	√	√	√	√
			Litsea glutinosa	Lauraceae	LC	Forest	√		√	√			√	√
			Cinnamomum tamala	Lauraceae	LC	Medicinal	√	√	√	√	√	√	√	√
			Pavetta indica	Rubiaceae	NE	Forest	√	√	√	√	√	√	√	√
			Neolamarckia cadamba	Rubiaceae	NE	Forest	√	√	√	√	√	√	√	√
70	*Pachliopta aristolochiae* (Fabricius, 1775)	Common Rose	*Aristolochia indica*	Aristolochiaceae	LC	Forest	√		√	√	√	√		√
71	*Papilio chaon* Westwood, 1845	Yellow Helen	*Murraya koenigii*	Rutaceae	NE	Medicinal		√		√	√	√	√	√
72	*Papilio (agenor) polymnestor* Cramer, 1775	Blue Mormon	*Citrus limon*	Rutaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Citrus maxima	Rutaceae	NE	Medicinal	√	√	√	√	√	√	√	√
73	*Papilio helenus* Linnaeus, 1758	Red Helen	*Citrus tangerina*	Rutaceae	NE	Fruit		√			√	√	√	
			Zanthoxylum rhetsa	Rutaceae	NE	Fruit	√	√	√	√	√	√	√	√
Family: Pieridae														
74	*Eurema hecabe* (Linnaeus, 1758)	Common Grass Yellow	*Syzygium cumini*	Myrtaceae	LC	Fruit	√	√	√	√	√	√	√	√
			Mikania micrantha	Asteraceae	NE	Forest	√	√	√	√	√	√	√	√
			Albizia procera	Fabaceae	LC	Forest	√			√			√	√
			Delonix regia	Fabaceae	NE	Forest	√	√	√	√	√	√	√	√
			Cassia fistula	Fabaceae	NE	Forest	√	√	√	√	√	√	√	√
			Senna tora	Fabaceae	NE	Medicinal	√		√					√
			Senna occidentalis	Fabaceae	NE	Medicinal	√		√	√				√
			Mimosa pudica	Fabaceae	NE	Medicinal	√	√	√	√	√	√	√	
			Senna alata	Fabaceae	NE	Medicinal		√	√	√	√			√
			Leucaena leucocephala	Fabaceae	NE	Forest			√	√				√
			Moringa oleifera	Moringaceae	LC	Medicinal	√	√	√	√	√	√	√	
			Abelmoschus moschatus	Malvaceae	NE	Medicinal			√	√	√		√	
			Leea indica	Vitaceae	NE	Medicinal	√	√	√	√	√	√	√	√
75	*Eurema blanda* (Boisduval, 1836)	Three-spot Grass Yellow	*Albizia amara*	Fabaceae	DD	Forest	√	√	√	√	√	√	√	√
			Delonix regia	Fabaceae	NE	Forest	√	√	√	√	√	√	√	√
			Abelmoschus moschatus	Malvaceae	NE	Medicinal			√	√	√		√	
76	*Delias hyparete* (Linnaeus, 1758)	Painted Jezebel	*Alstonia scholaris*	Apocynaceae	LC	Forest	√	√	√	√	√	√	√	√

Table 1. Contd.

Sl. No.	Butterfly species		Larval host plants		Red list status	Type of plant	Kaptai NP							
	Scientific name	English name	Scientific name	Family			Ram Pahar				Sita Pahar			
							S1	S2	S3	S4	S5	S6	S7	S8
77	*Delias eucharis* (Drury, 1773)	Common Jezebel	*Dendrophthoe falcata*	Loranthaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Litchi chinensis	Sapindaceae	NE	Fruit	√	√	√	√	√	√	√	√
			Lantana camara	Verbenaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Jasminum auriculatum	Oleaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Azadirachta indica	Meliaceae	NE	Medicinal	√	√	√	√	√	√	√	√
78	*Delias pasithoe* (Linnaeus, 1767)	Red-base Jezebel	*Santalum album*	Santalaceae	NE	Medicinal			√	√				√
79	*Catopsilia pomona* (Fabricius, 1775)	Lemon Emigrant	*Alstonia scholaris*	Apocynaceae	LC	Forest	√	√	√	√	√	√	√	√
			Senna occidentalis	Fabaceae	NE	Medicinal	√		√	√				√
			Cassia javanica	Fabaceae	NE	Forest			√	√	√	√		√
			Cassia fistula	Fabaceae	LC	Forest			√	√	√	√		√
			Moringa oleifera	Moringaceae	LC	Medicinal			√	√	√	√		√
			Senna alata	Fabaceae	NE	Medicinal		√	√	√	√			√
80	*Cepora nerissa* (Fabricius, 1775)	Common Gull	*Cleome viscosa*	Cleomaceae	NE	Medicinal	√		√	√	√	√		√
81	*Leptosia nina* (Fabricius, 1793)	Psyche	*Cleome viscosa*	Cleomaceae	NE	Medicinal	√		√	√	√	√		√
			Crateva religiosa	Capparaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Leea indica	Vitaceae	NE	Medicinal	√	√	√	√	√	√	√	√
82	*Catopsilia pyranthe* (Linnaeus, 1758)	Mottled Emigrant	*Senna tora*	Fabaceae	NE	Medicinal	√		√					√
			Senna occidentalis	Fabaceae	NE	Medicinal	√		√	√				√
			Cassia javanica	Fabaceae	LC	Forest			√	√	√	√		√
			Cassia fistula	Fabaceae	NE	Forest			√	√	√	√		√
			Senna alata	Fabaceae	NE	Medicinal		√	√	√	√			√
			Sesbania bispinosa	Fabaceae	NE	Medicinal	√	√	√	√	√	√	√	√
			Jasminum auriculatum	Oleaceae	NE	Medicinal	√	√	√	√	√	√	√	√
83	*Appias lyncida* (Cramer, [1777])	Chocolate Albatross	*Bombax ceiba*	Malvaceae	LC	Forest	√	√	√	√	√	√	√	√
Family: Satyridae														
84	*Mycalesis visala* Moore, [1858]	Long branded Bush Brown	*Oryza sativa*	Poaceae	NE	Medicinal	√			√	√			√
85	*Lethe europa* (Fabricius, 1775)	Bamboo Treebrown	*Bambusa bambos*	Poaceae	NE	Forest			√	√				√
86	*Melanitis leda* (Linnaeus, 1758)	Common Evening Brown	*Cynodon dactylon*	Poaceae	NE	Medicinal			√	√				√
87	*Elymnias hypermnestra* (Linnaeus, 1763)	Common Palmfly	*Glochidion lanceolarium*	Phyllanthaceae	LC	Forest	√	√	√	√	√	√	√	
			Saraca asoka	Fabaceae	NE	Forest			√	√			√	√
			Albizia lebbeck	Fabaceae	NE	Forest	√	√	√	√	√	√	√	√
			Phoenix sylvestris	Arecaceae	NE	Forest			√	√			√	√
			Dypsis lutescens	Arecaceae	NE	Forest			√	√			√	√
			Cocos nucifera	Arecaceae	NE	Forest		√	√	√	√		√	√

LC= least concern; NE= not evaluated; DD= data deficient; √= present

The most dominant plant family was Fabaceae, which included 23 species. It was followed by Rutaceae with seven species, Acanthaceae with six species, and Poaceae with five species. Malvaceae and Moraceae each contributed four species, while Anacardiaceae, Annonaceae, Apocynaceae, and Arecaceae each had three species. The remaining 31 families contained 1 to 2 species each (Figure 2).

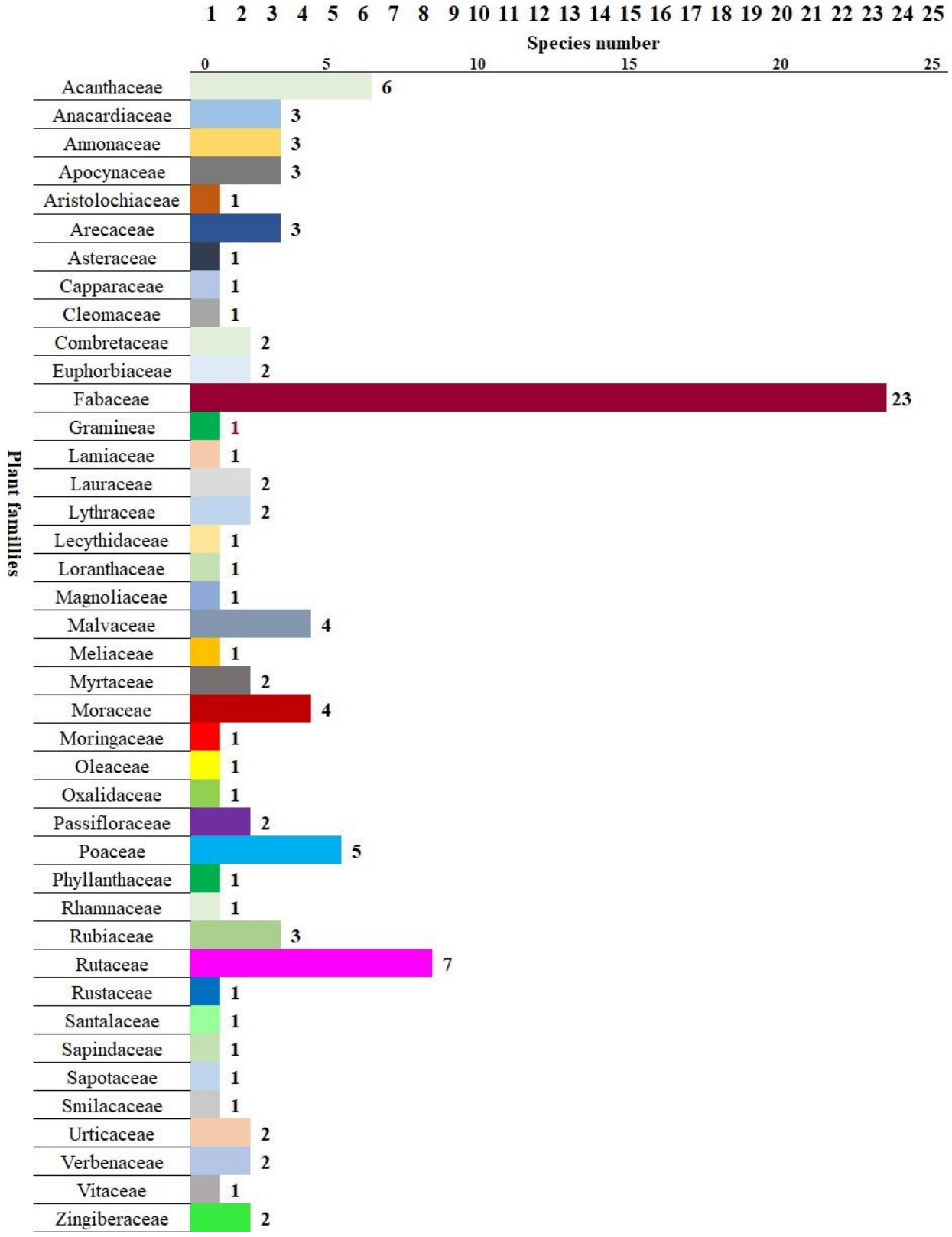

Figure 2. The number of plant species and their associated families at Ram Pahar and Sita Pahar, Kaptai National Park.

Of the 103 larval host plant species, 38 are forest plants, 17 are fruit plants, and 48 are medicinal plants. Among these, thirteen forest plant species, two fruit plant species, and two medicinal plant species are categorized as LC on the Bangladesh IUCN Red List 2024, while 86 species remain unclassified (Figure 3).

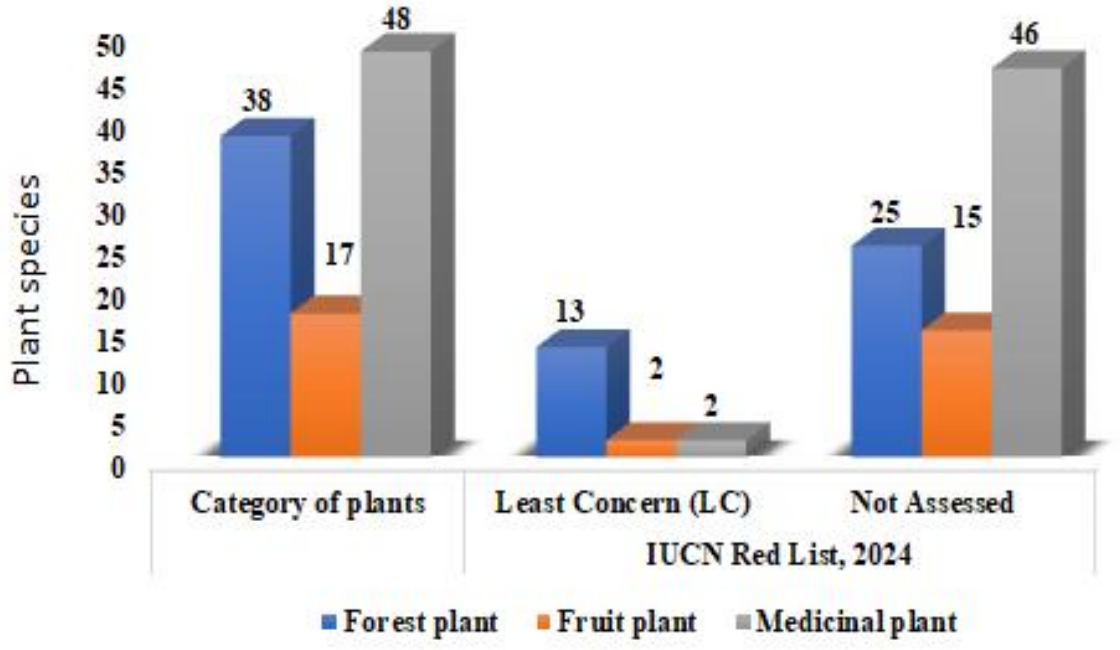

Figure 3. Distribution of larval host plant species by categories and IUCN Red List status (2024).

In the present study, butterfly-plant interactions revealed that 26 butterfly species, out of a total of 87 from six families (Nymphalidae, Pieridae, Lycaenidae, Hesperiidae, Danaidae, and Satyridae), depend on 23 species of Fabaceae (Table 1). Additionally, 10 butterfly species from five families (Papilionidae, Nymphalidae, Pieridae, Lycaenidae, and Danaidae) relied on three Apocynaceae species, while another 10 butterfly species from two families (Papilionidae and Nymphalidae) associated with six Acanthaceae species (Table 1). The remaining 41 butterfly species relied on one to nine species from 38 plant families, totaling 71 plant species (Table 1; Figures 2 and 3). Among these 103 plant species, 26 larval host plants were identified as key species distributed across the study area (Table 1). These key plants included *Syzygium cumini*, *Mangifera indica*, *Anacardium occidentale*, *Annona squamosa*, *Alstonia scholaris*, *Calotropis gigantea*, *Aristolochia indica*, *Mikania micrantha*, *Terminalia catappa*, *Delonix regia*, *Butea monosperma*, *Saraca asoca*, *Mimosa pudica*, *Tamarindus indica*, *Senna alata*, *Lagerstroemia speciosa*, *Bombax ceiba*, *Abelmoschus manihot*, *Ficus benghalensis*, *Moringa oleifera*, *Jasminum auriculatum*, *Passiflora foetida*, *Neolamarckia cadamba*, *Citrus aurantiifolia*, *Mimusops elengi*, and *Curcuma longa* (Figure 4). Among these 26 key host plants, 15 species, such as *Alstonia scholaris*, *Calotropis gigantea*, *Neolamarckia cadamba*, *Mikania micrantha*, *Delonix regia*, *Mimosa pudica*, *Tamarindus indica*, *Bombax ceiba*, *Abelmoschus manihot*, *Ficus benghalensis*, *Moringa oleifera*, *Passiflora foetida*, *Citrus aurantiifolia*, *Murraya paniculata*, and *Curcuma longa*, were found at all sites (S1-S8) (Table 1). In contrast, *Terminalia catappa* and *Butea monosperma* appeared at seven sites (S1, S2, S3, S4, S5, S7, S8), while *Syzygium cumini*, *Anacardium occidentale*, *Annona squamosa*, *Mimusops elengi*, and *Aristolochia indica* were recorded at six sites (S1, S2, S3, S4, S7, S8). Moreover, *Lagerstroemia speciosa* and *Jasminum auriculatum* were found in five sites (S1, S3, S4, S7, S8), and *Saraca asoca* was recorded in four sites (S3, S4, S7, S8). Additionally, *Mimusops elengi* was also recorded in five sites (S3, S4, S5, S7, S8) at Ram Pahar and Sita Pahar within KNP (Table 1; Figure 4).

Figure 4. Documentation of 26 larval host plants extensively utilized by butterflies at Ram Pahar and Sita Pahar, Kaptai National Park. A. *Syzygium cumini,* B. *Mangifera indica,* C. *Anacardium occidentale,* D. *Annona squamosa,* E. *Alstonia scholaris,* F. *Calotropis gigantea,* G. *Aristolochia indica,* H. *Mikania micrantha,* I. *Terminalia Catappa,* J. *Delonix regia,* K. *Butea monosperma,* L. *Saraca asoca,* M. *Mimosa pudica,* N. *Tamarindus indica,* O. *Senna alata,* P. *Lagerstroemia speciosa,* Q. *Bombax ceiba,* R. *Abelmoschus maniho,* S. *Ficus benghalensis,* T. *Moringa oleifera,* U. *Jasminum auriculatum,* V. *Passiflora foetida,* W. *Neolamarckia cadamba,* X. *Citrus aurantiifolia,* Y. *Mimusops elengi* and Z. *Curcuma longa.*

The spatial distribution of larval host plants across the eight study sites (S1-S8) in Ram Pahar and Sita Pahar displayed variation in species counts. Shilchori (S3) recorded the highest number, with 90 species, followed by Jamai Chora (S8) with 97 species, Thandachori (S5) with 89 species, and Bangchori (S4) with 88 species. In contrast, Wagga Chora (S1), Bazar Chora (S2), Ronir Chora (S6), and Sita Mondir (S7) had lower species counts, with 78, 75, 67, and 83 species, respectively (Figure 5).

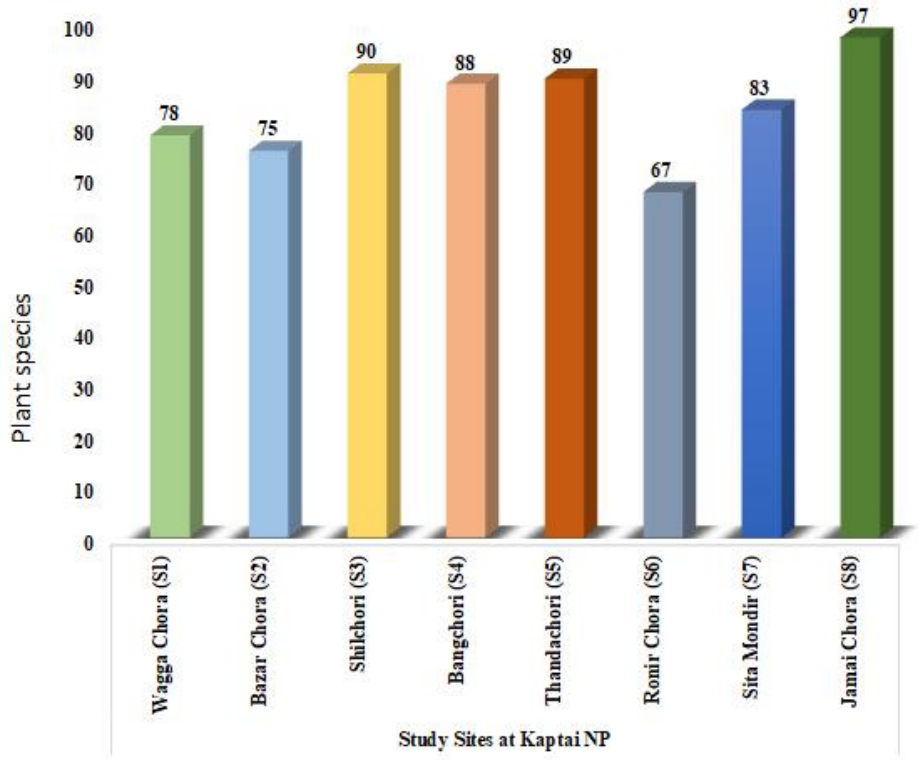

Figure 5. Spatial distribution of larval host plants at Ram Pahar and Sita Pahar in Kaptai National Park.

4. Discussion

This study reveals a rich assemblage of butterfly–plant associations in Ram Pahar and Sita Pahar of Kaptai National Park (KNP), documenting 87 butterfly species and 103 larval host plant species across 41 families (Table 1). The dominance of Fabaceae, contributing 23 host plant species, underscores its ecological significance as a foundational plant family supporting the highest number of butterfly species. This pattern aligns with global trends, where Fabaceae is widely recognized for its chemical diversity and nutritional suitability for Lepidopteran larvae (Kunte, 2000; Nitin *et al.*, 2018; Robinson *et al.*, 2023). The strong dependence of 26 butterfly species on Fabaceae plants highlights the central role of this family in sustaining butterfly diversity within KNP (Braby, 2016; Nitin *et al.*, 2018). Similarly, the interactions observed with Apocynaceae and Acanthaceae reflect their importance as secondary host families, supporting several butterfly species across multiple families. The presence of 38 forest plants, 17 fruit plants, and 48 medicinal plants indicates that larval host plants span diverse ecological and economic categories, suggesting that butterfly survival in KNP relies on both natural forest vegetation and human-associated plant species.

The study reveals a significant contribution of medicinal and fruit plants, alongside forest species, to butterfly-plant interactions. The identification of 38 forest plant species as larval hosts supports reports that forest habitats provide essential resources for many lepidopteran species, including those of conservation concern (Koh *et al.*, 2004; Thomas *et al.*, 2004). Additionally, the presence of 48 medicinal plant species underscores their importance in supporting biodiversity and contributing to ecosystem conservation (Shanley and Luz, 2003). Notably, several of these species are classified as LC on the IUCN Red List, suggesting that, while many plants are not immediately at risk, the stability of their habitats is crucial for maintaining butterfly populations (IUCN Bangladesh, 2015; IUCN Bangladesh, 2024 a,b).

The spatial distribution of larval host plants across different sites within the park displayed significant variability, with some sites (e.g., Jamai Chora and Shilchori) supporting more diverse plant species than others.

This variation can be attributed to ecological factors such as soil type, moisture, and plant community composition (Murcia, 1995; Freschet *et al*., 2018). The differences in species counts between sites highlight the importance of habitat heterogeneity in maintaining biodiversity, as shown in studies that underscore the role of microhabitats in supporting species richness (Haddad *et al*., 2015; Feng *et al*., 2022). Furthermore, the identification of 26 key larval host plants across multiple sites emphasizes their vital role in maintaining ecological stability and butterfly diversity (Hanski, 1998). Their widespread presence suggests they are central to sustaining butterfly populations in KNP. Focusing conservation efforts on these plants could enhance butterfly habitat quality, making the preservation of both butterfly species and their host plants essential for the park's biodiversity (Memmott *et al*., 2004; Tylianakis *et al*., 2008).

4. Conclusions

This study offers valuable insights into the ecological relationships between butterflies and their larval host plants in Kaptai National Park, highlighting the need for conservation efforts. It emphasizes the importance of preserving native plants and promoting sustainable conservation practices. Future research should investigate the impacts of environmental changes on butterfly populations, the genetic diversity of host plants, and expand the study to other areas within the Chittagong Hill Tracts to strengthen overall conservation strategies.

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Data availability

All relevant data and information are included in the manuscript.

Conflict of interest

None to declare.

Authors' contribution

Selina Sultana: sample acquisition, data collection, data analysis, initial drafting of the manuscript, and revisions to the final manuscript; Md. Monwar Hossain: conceptualization, supervision, data analysis, initial drafting of the manuscript and revisions to the final manuscript. All authors have reviewed and approved the final version of the manuscript.

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