



Species diversity and habitat preference of butterflies (Insecta: Lepidoptera) in Inani Reserve Forest of Cox's Bazar, Bangladesh

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ABSTRACT. Butterflies of the Inani Reserve Forest were studied between May 2014 and May 2015. One hundred twenty five species of butterflies belonging to 84 genera and six families (Hesperiidae, Papilionidae, Pieridae, Lycaenidae, Riodinidae and Nymphalidae) were recorded during this study. The highest number of species comprised Family Nymphalidae (38 species, 30.4%) followed by Lycaenidae (35 species, 20.8%), Hesperiidae (26 species, 20.16%), Pieridae (16 species, 12.8%), Papilionidae (9 species, 7.2%) and the Family Riodinidae comprised the lowest (one species, 0.8%). The abundance of recorded butterflies was calculated in term of Very Common (20 species), Common (29 species), Uncommon (32 species), Rare (23 species) and Very Rare (21 species). The butterflies preferred different types of habitat (viz., Grass Land, Crop Land, Open Forest, Scrub Forest, Dense Forest and Bamboo Patch). Thirty species of butterflies were regularly observed in all kind of habitats, 69 species preferred multiple habitats (8 in 4 types, 24 in 3 types and 38 in 2 types of habitat) and 25 species were recorded only in a single type of habitat. Mud-puddling of 36 species were also observed. During this study, *Zinaspia todara* (Family: Lycaenidae) was the first time record in Bangladesh and *Euploea doubledayi* (Family: Danaidae) was recorded after 150 year later.

Key words: Abundance, Butterflies, Checklist, Diversity, Inani Reserved Forest.

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Introduction

There are about 16,823 species of butterflies spread throughout the world (Landing 1984); although Heppner (1998) reported that about 19,238 species have been documented. Literatures reveal that 1,501 species of butterflies have been reported in

India, 651 species in Nepal, 242 species on Sri Lanka, 237 species in Japan, and 1,182 species in Malaysia (Islam 2011). In Bangladesh, few works have been done on butterflies. For instances, Baksha and Choudhury (1983, 1985) reported 17 species

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from the Family Pieridae and 16 species from the Family Papilionidae and they also developed identification keys for the recorded species. Larsen (2004) annotated a list of 236 butterfly species from Bangladesh and Ahmad *et al.* (2009) recorded 148 species in the country. Chowdhury and Hossain (2013) compiled 225 species from Bangladesh and they guessed that the total butterflies may exceed 400 species.

Some regional works also have been done on the checklist of butterflies in Bangladesh. Chowdhury and Mohiuddin (2003) recorded 121 species from Sylhet and Moulvibazar districts of Sylhet division, and Chittagong and 4 hill districts of Chittagong division. Hossain *et al.* (2003) recorded 51 species from Jahangirnagar University Campus. Islam *et al.* (2011) annotated 158 species from Savar, Dhaka; Hossain (2014) accounted 37 species from the Sundarbans and Khandokar *et al.* (2014) reported 160 species from Lawachara National Park, Moulavibazar. Chowdhury *et al.* (2014) also recorded 71 butterfly species from Dinajpur and Rahman *et al.* (2015) listed 77 species of butterfly from the Kushtia.

There is no more study has been done on butterfly in the Inani Reserve Forest (IRF). So, it is needed to study the butterfly fauna of the IRF, which may also enrich the checklist of the country. The major aims of the study were to: (1) know the status of the recorded species in the IRF, (2) abundance of occurrence of the butterfly families, (3) species-wise habitat preference in the area.

Material and methods

Study Area: IRF is located in Ukhiya upazila of Cox's Bazar district, 22 km south of Cox's Bazar town (21° 13.968' N and 92° 03.054' E), is surrounded by Himchari National Park in the north, Teknaf Wildlife

Sanctuary in the south, suburbs area in the east and the Bay of Bengal in the west (Fig. 1). It is a hilly and mixed-evergreen forest with secondary plantations covers an area of 7,248 hectares. There are also two canals (Boro Khal and Choto Khal), lot of hilly streams (e.g., Dakchara, Narkeilla Jhira, Gonar Mukh, Patar Ghuna, Holar Chara, etc.), valleys and surrounded by plain lands, crop lands and coastal line along with the Bay of Bengal. There are three distinct seasons in the IRF like elsewhere in Bangladesh: Summer (March–May), Rainy (June–October) and Winter (November–February).

Data Collection: The study on butterflies was conducted in the IRF for 13 months (May 2014 and May 2015). A total of 40 days' observation was done during this study period. The data were collected through Strip transect sampling (Buckland *et al.* 2001) and opportunistic findings have also been considered. Butterflies were searched through the existing roads, trails, streams and bridle paths used as transects, and seven such transects were established to record data (Fig. 1).

One full day in a week was spent for collecting data throughout the study period. Butterflies were mostly available during Summer (March to May) and Monsoon (June to August), became low in number during Post-monsoon (September to November) and the lowest during Winter (November to February). Field observations were done throughout day but emphasis was given to sunny bright period of the day when butterflies are more active than other times to find them in their natural habitat. Opportunistic findings of butterflies have also been included in the list. The habitats of butterflies were also observed and recorded (*viz.*, Grass Land, Crop Land, Open Forest, Scrub Forest, Dense Forest and Bamboo Patch).

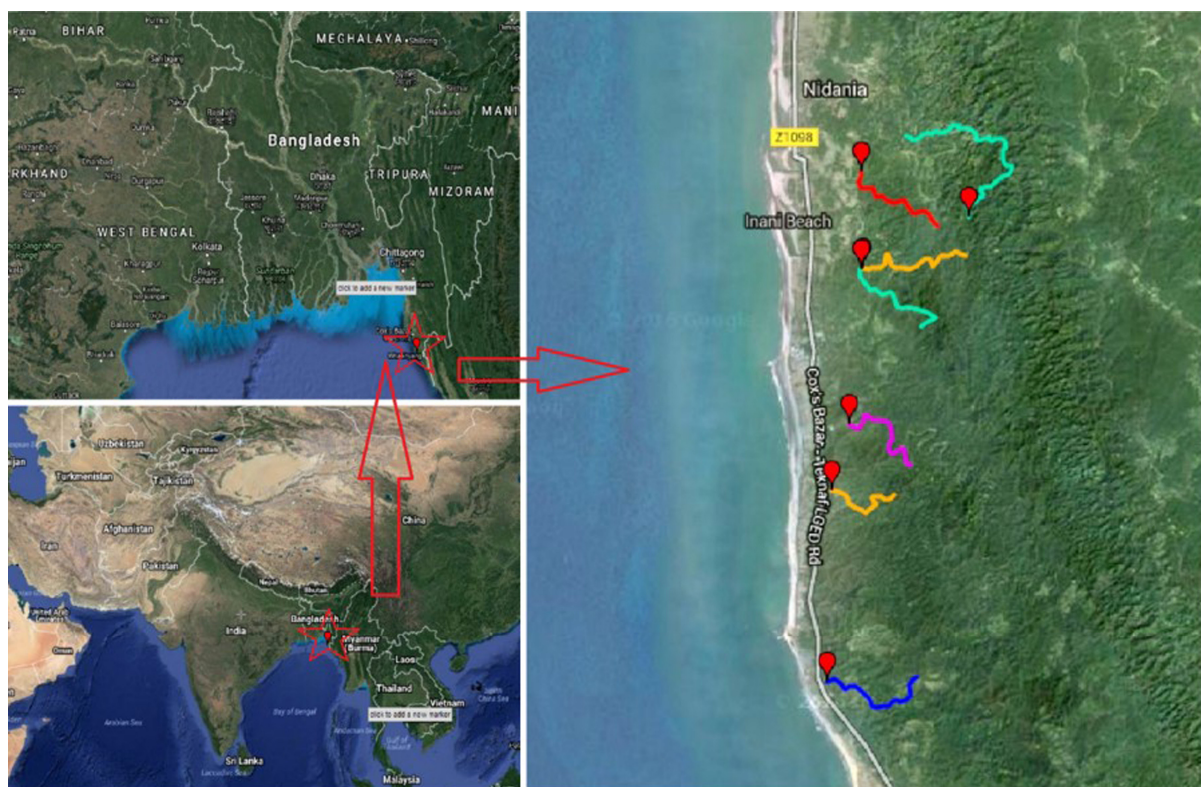


Figure 1. Map of study area showing transects in Inani Reserve Forest of Cox's Bazar, Bangladesh.

Species Identification and data analysis: During searching butterflies the species were recorded in note book and confused specimens were photographed using camera (Canon EOS 600D with 75–300 mm IS II lens and Canon EOS 60D with 300 mm prime lens) for confirming the species. The specimens were identified using the keys developed by Marshall and de Niceville (1883), Bingham (1905), Evans (1932) and Bashar (2014); and field guides (e.g., Chowdhury and Hossain, 2013; Kehimkar, 2013).

The butterflies were assessed as Very Common (VC), those species were observed more than 30 times (>75% of the total observation days); Common (C), those species were observed 20 to 29 times (50–74% of the total observation days); Uncommon (UC), those species were observed 10 to 19 times (25–49% of the total observation days); Rare (R),

those species were observed four to nine times (10–24% of the total observation days); and Very Rare (VR), those species were observed less than four times (<10% of the total observation days).

Results

A total of 125 species of butterflies belonged to 84 genera and 6 families including Hesperidae (Figs. 2–3), Lycaenidae (Figs. 4–6), Nymphalidae (Figs. 7–9), Papilionidae (Fig. 10), Pieridae (Fig. 11) and Riodinidae (Fig. 12) were recorded. The abundance and habitat preference of the recorded species from the IRF during the study period are given in Table 1. The Family Nymphalidae comprised the highest number of species (38 i.e., 30.4%), whereas the Family Riodinidae comprised the lowest (one species, 0.8%) (Table 2).



Figure 2. Photographs of Butterflies of the Family HesperIIDae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Aeromachus pygmaeus* Fabricius, 1775; **B.** *Ampittia dioscorides* Fabricius, 1793; **C.** *Ancistroides nigrita* Latreille, 1824; **D.** *Astictopterus jama olivascens* Moore, 1878; **E.** *Badamia exclamationis* Fabricius, 1775; **F.** *Celaenorrhinus leucocera* Kollar, 1848; **G.** *Cephrenes acalle* Evans, 1932; **H.** *Cupitha purrea* Moore, 1977; **I.** *Gerosis bhagava* Moore, 1865; **J.** *Gerosis phisara* Moore, 1884; **K.** *Hasora badra badra* Moore, 1857; **L.** *Hasora chromus* Cramer, 1780; **M.** *Hyarotis adrastus praba* Moore, 1865; **N.** *Iambrix salsala salsala* Moore, 1865; **O.** *Koruthaialos butleri* de Nicéville, 1883.

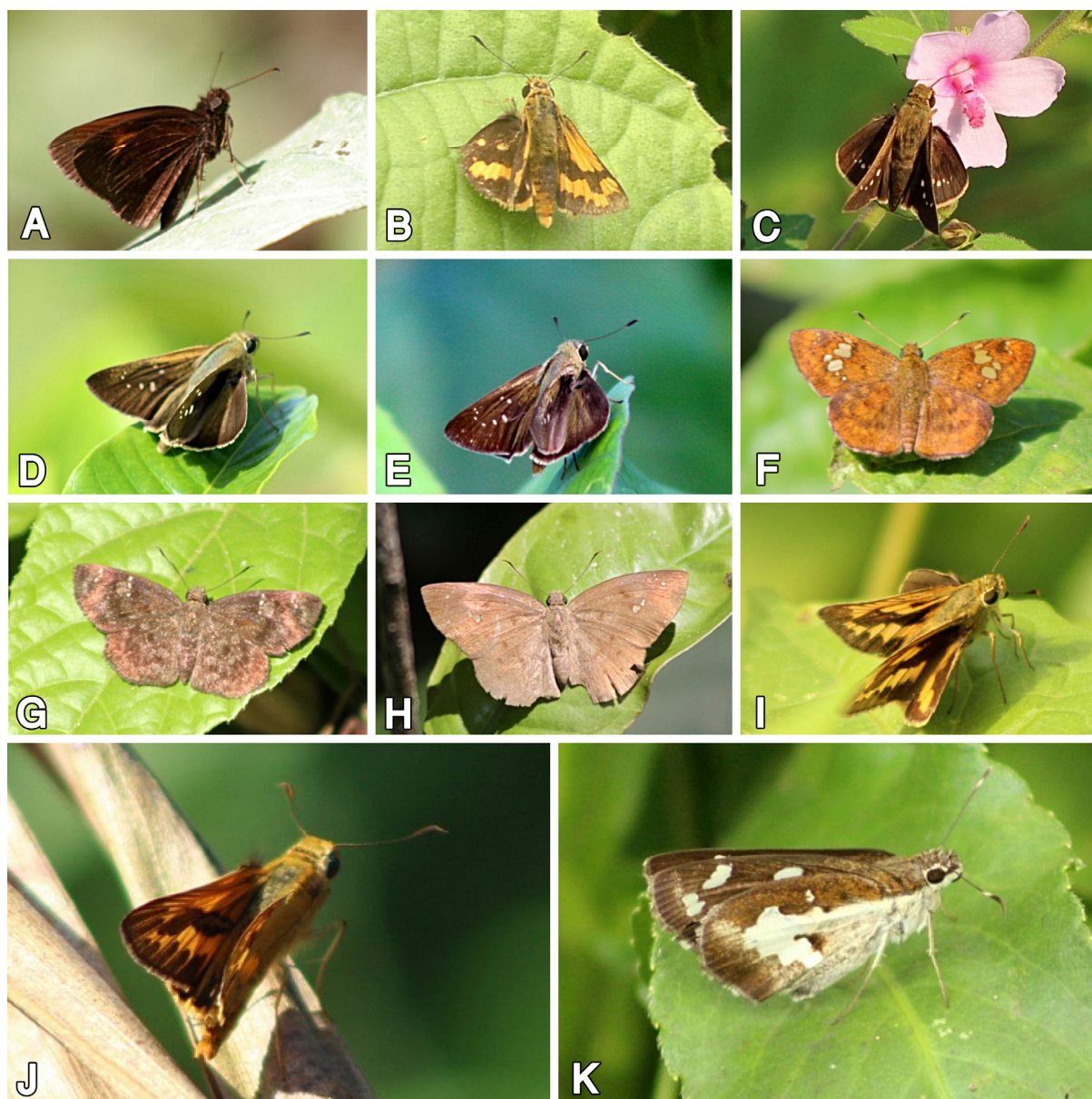


Figure 3. Photographs of Butterflies of the Family Hesperidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Koruthaiolos rubecula cachara* Evans, 1949; **B.** *Oriens gola pseudolus* Mabille, 1883; **C.** *Parnara guttatus mangala* Moore, 1865; **D.** *Pelopidas agna* Moore, 1865; **E.** *Pelopidas mathias* Fabricius, 1798; **F.** *Pseudocoladenia danfabia* Evans, 1949; **G.** *Sarangesa dasahara* Moore, 1865; **H.** *Tagiades japeus ravi* Moore, 1865; **I.** *Telicota bambusae* Moore, 1878; **J.** *Telicota colon* Fabricius, 1775; **K.** *Udaspes folus* Cramer, 1775;

Of the recorded species, 20 species (16%) were categorized as Very Common (VC), 29 species (23.2%) as Common (C), 32 species (25.6%) as Uncommon (UC), 23 species (18.4%) as Rare (R) and 21 species (16.8%) as Very Rare (VR). Of the Very Common

species, Nymphalidae was comprised the highest number (11 species, 55%); among the Common species Nymphalidae was also comprised the highest number (13 species, 44.83%), while Riodinidae was accounted the lowest (one species, 3.45%) (Table 2).



Figure 4. Photographs of Butterflies of the Family Lycaenidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Anthene emolus emolus* Godart, 1823; **B.** *Arhopala centaurus pirithous* Moore, 1883 **C.** *Arhopala eumolphus* Cramer, 1780; **D.** *Castalius rosimon* Fabricius, 1775; **E.** *Catapacecilma major major* Druce, 1895; **F.** *Catochrysops panormus* Felder, 1860; **G.** *Catochrysops strabo strabo* Fabricius, 1793; **H.** *Chilades lajus lajus* Stoll, 1870; **I.** *Chilades pandava* Horsfield, 1829; **J.** *Curetis thetis* Drury, 1773; **K.** *Discolampa ethion* Westwood, 1851; **L.** *Euchrysops cnejus* (Fabricius, 1798); **M.** *Hypolycaena erylus* Godart, 1824; **N.** *Jamides bochus* Stoll, 1782; **O.** *Jamides celeno*, (Cramer, 1775).



Figure 5. Photographs of Butterflies of the Family Lycaenidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Lampides boeticus* (Linnaeus, 1767); **B.** *Loxura atymnus continentalis* Fruhstorfer, 1912; **C.** *Mahathala ameria* Hewitson, 1862; **D.** *Megisba malaya* Horsfield, 1828; **E.** *Nacaduba hermus* Felder, 1860; **F.** *Nacaduba pavana* (Horsfield, 1828); **G.** *Neopithecops zalmora zalmora* (Butler, 1870); **H.** *Prosotas dubiosa* Evans, 1925; **I.** *Prosotas nora ardates* Moore, 1875; **J.** *Pseudozizeeria maha maha* Kollar, 1848; **K.** *Rapala dienece* Hewitson, 1878; **L.** *Rapala manea* Hewitson, 1863; **M.** *Rapala pheretima* Hewitson, 1863; **N.** *Spindasis lahita himalayanus* Moore, 1884; **O.** *Spindasis syama* Horsfield, 1829.

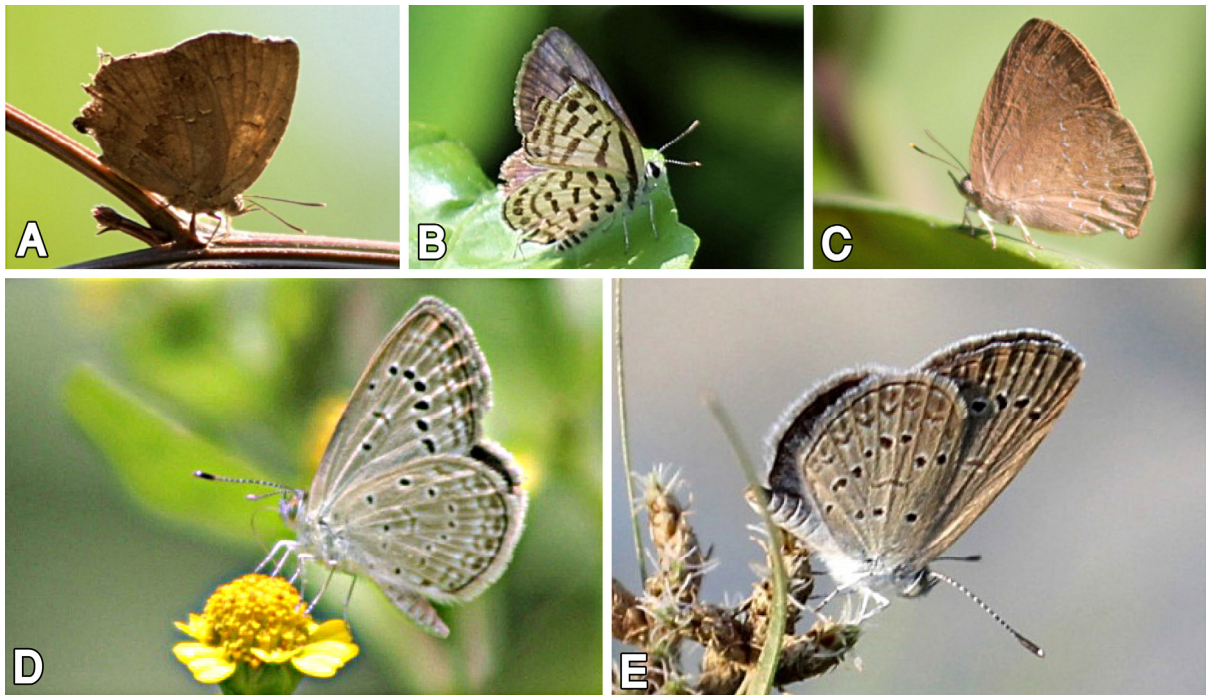


Figure 6. Photographs of Butterflies of the Family Lycaenidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Surendra quercetorum* Moore, 1857; **B.** *Tarucus venosus* Moore, 1882; **C.** *Zinaspia todara* Moore, 1883; **D.** *Zizeeria karsandra* Moore, 1865; **E.** *Zizina otis otis* Fabricius, 1787.

The highest number of Uncommon species belonged to Lycaenidae (11 species, 34.37%). The Family Hesperiiidae consisted of the highest number (eight species, 34.78%) of the Rare butterflies and the highest number of very Rare butterflies species belonged to Lycaenidae (seven species, 33.33%) (Table 2).

The IRF is a hilly forest area comprises of grass land (GL), crop land (CL), open forest (OF), scrub forest (SF), dense forest (DF), bamboo patch (BP) and hill stream for mud puddling (MP). So, the butterflies get opportunities to use different types of habitat in the IRF (Figs. 13-14). Among all 30 species (24%) of butterflies were collected from all kinds of habitats (AH), of which one species belonged to the Family Hesperiiidae, three species to the Papilionidae, one species to the Pieridae, five species to the Lycaenidae and 20 to the Nymphalidae. Sixty nine species were observed in multiple habitats. Out of these

69 species, four types of habitat chose by eight species (6.4%): one species favored CL, OF, SF and DF; three species were collected from GL, CL, OF and SF; three species were detected in GL, OF, SF and DF; and one species was collected from GL, OF, SF and BP. Twenty four species (19.2%) were detected in three types of habitat: 10 species preferred OF, SF and DF; seven species favored GL, OF and SF; three species chose GL, CL and OF; three species desired GL, CL and SF; and one species preferred GL, SF and DF. As the highest, 38 species (30.4%) favored two types of habitat: 21 species chose SF and DF; 10 species exploited OF and SF; three species utilized GL and SF; and four species preferred GL and CL. And the rest, 25 species (20%) were observed only in a single habitat: nine species was only preferred SF; 14 species exploited DF; two species chose GL.



Figure 7. Photographs of Butterflies of the Family Nymphalidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Ariadne ariadne pallidior* Fruhstorfer, 1899; **B.** *Ariadne merione tapestrina* Moore, 1884; **C.** *Athyma perius* (Linnaeus, 1758); **D.** *Cirrochroa tyche* Felder & Felder, 1861; **E.** *Cuphaerymanthis lotis* Sulzer, 1776; **F.** *Danaus chrysippus chrysippus* Linnaeus, 1758; **G.** *Danaus genutia genutia* Cramer 1779; **H.** *Elymnias hypermnestra undularis* Drury, 1773; **I.** *Euploea algae* (Godart, 1819); **J.** *Euploea core core* Cramer, 1780; **K.** *Euploea doubledayi* Felder & Felder, 1865; **L.** *Euploea klugii klugii* Moore, 1857; **M.** *Euploea midamus* Linnaeus, 1758; **N.** *Euploea mulciber mulciber* (Cramer, 1777); **O.** *Euthelia aconthea garuda* Moore, 1857.



Figure 8. Photographs of Butterflies of the Family Nymphalidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Hypolimnys bolina bolina* (Linnaeus, 1758); **B.** *Junonia almanac almanac* (Linnaeus, 1758); **C.** *Junonia atlites atlites* Linnaeus, 1763; **D.** *Junonia hierta* (Fabricius, 1798); **E.** *Junonia iphita iphita* (Cramer, 1779); **F.** *Junonia lemonias lemonias* (Linnaeus, 1758); **G.** *Lebadea Martha Martha* Fabricius, 1787; **H.** *Limenitis procris* (Cramer, 1777); **I.** *Melanitis leda leda* Linnaeus, 1758; **J.** *Mycalesis mineus* (Linnaeus, 1758); **K.** *Mycalesis perseus blasius* Fabricius, 1798; **L.** *Neptis clinia susruta* Moore, 1872; **M.** *Neptis hylas* Moore, 1758; **N.** *Neptis jumbah* Moore, 1857; **O.** *Pantoporia hordonia hordonia* Stoll., 1790.



Figure 9. Photographs of Butterflies of the Family Nymphalidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Parantica aglea aglea* (Stoll, 1782); **B.** *Parthenos Sylvia gambrisius* Fabricius, 1787; **C.** *Phalantha phalantha phalantha* (Drury, 1770); **D.** *Tanaecia lepidea lepidea* Butler, 1868; **E.** *Tirumala limniace exoticus* Gmelin, 1790; **F.** *Vanessa cardui* (Linnaeus, 1758); **G.** *Ypthima baldus* (Fabricius, 1775); **H.** *Ypthima huebneri* Kirby, 1871.

Mud Puddling of 36 (28.8%) species were also observed, which comprised five families (except Riodinidae); and among them Lycaenidae accounted the highest number of species (14 species, 38.89%) and Hesperidae the lowest number (one species, 2.78%).

During this study, *Zinaspia todara* Moore, 1883 (Family: Lycaenidae) was documented as new record and *Euploea doubledayi* Felder & Felder, 1865 (Family: Danaidae) was recorded after a very long time of first discovery by Felder and Felder (1865) in Bangladesh.

Discussion

The IRF is situated at the bank of the Bay of Bengal with steep hill and supports the unique habitats for butterflies viz., grass land, crop land, open forest, scrub forest, dense forest, bamboo patch and hill streams. Among them, scrub forest is the most important habitat that provides supports for 56.8% (71 species) butterflies in the IRF. Though most of the plants (shrubs) of scrub forests are considered as weeds, but this type of forests are more diversified with different flowering plants seasonally.

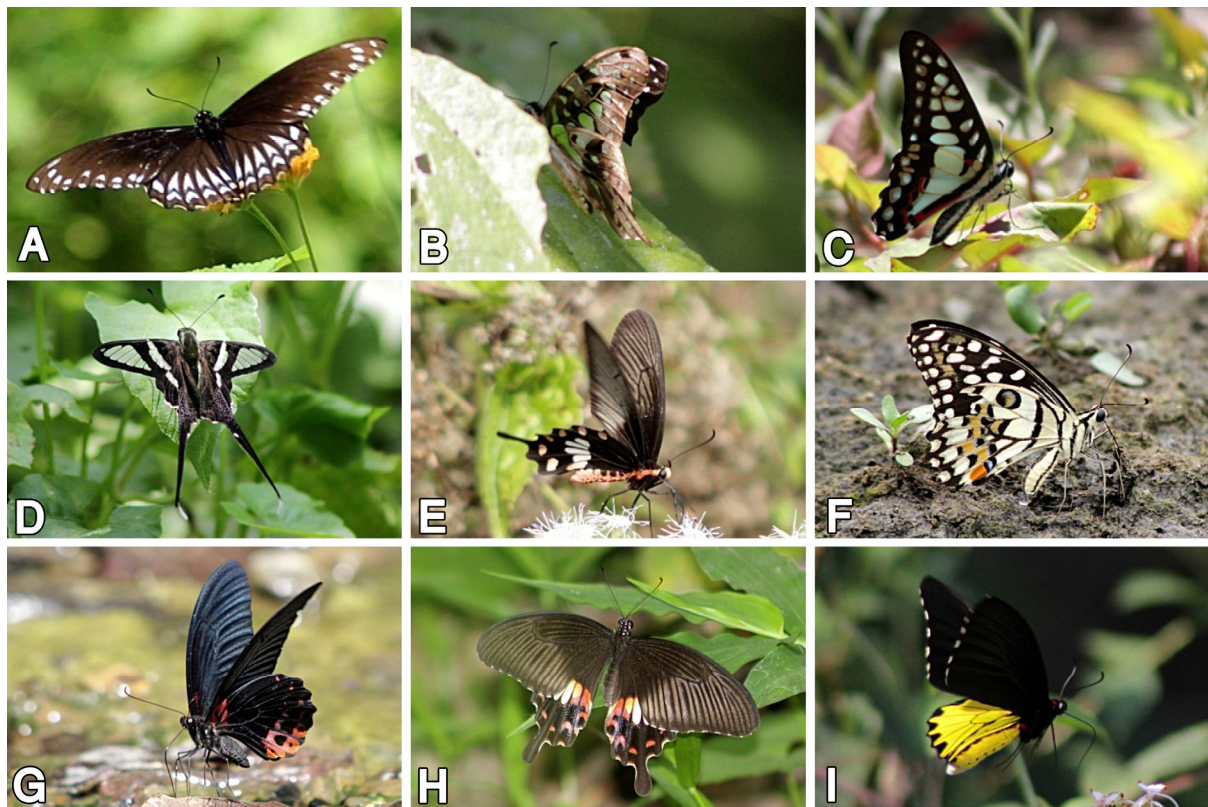


Figure 10. Photographs of Butterflies of the Family Papilionidae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Chilasa clytia clytia* (Linnaeus, 1758); **B.** *Graphium agamemnon agamemnon* (Linnaeus, 1758); **C.** *Graphium doson axion* (Felder & Felder, 1865); **D.** *Lamproptera curius* Fabricius, 1787; **E.** *Pachliopta aristolochiae aristolochiae* Fabricius, 1775; **F.** *Papilio demoleus demoleus* (Linnaeus, 1758); **G.** *Papilio memnon agenor* Linnaeus, 1758; **H.** *Papilio polytes romulus* Cramer, 1775; **I.** *Troides helena* Linnaeus, 1758.

On the other hand, bamboo patches are not neither so diversified nor having flowering plants. Hence very few nymphalid butterflies occur in bamboo patches. The availability of butterflies in the IRF is also greatly interrelated with their nature of habitat choice. Very interestingly, 52.63% (24 of 38) of the butterflies of Family Nymphalidae used all possible kinds of habitat in the IRF and hence 63.16% (24 of 38 [11 VC and 13 C]) of them have been assessed as Very Common and Common. On the other hand, 76.92% (20 of 26) butterflies of the Family HesperIIDae preferred single type or two types of habitat in the IRF and therefore 76.92% (20 of 25 [4 VR, 8 R and 8 UC]) of them have been assessed as Very Rare, Rare

or Uncommon. Similarly, 57.14% (20 of 35) of lycaenid butterflies also prefer single type or two types of habitat and 71.43% (25 of 35 [7 VR, 7 R and 11 UC]) of them have been assessed as Very Rare, Rare or Uncommon. During the study period, butterflies were more diversified in the post monsoon and winter, and more abundant in the summer. The monsoon was least diversified and least abundant with butterflies among the all seasons due to excessive rain and less diversity of flowering plants. So, to keep sustainable the future diversity of butterflies in the IRF, habitats of butterfly should be conserved and developed. So most of the butterflies may get their larval host plants and nectaring plants for their foods and habitats.



Figure 11. Photographs of Butterflies of the Family Pieridae in Inani Reserve Forest of Cox's Bazar, Bangladesh: **A.** *Appias albina* (Boisduval, 1836); **B.** *Appias libythea olferna* Swinhoe, 1890; **C.** *Appias lycnida eleonora* (Boisduval, 1836); **D.** *Catopsilia pomona pomona* Fabricius, 1775; **E.** *Catopsilia pyranthe pyranthe* (Linnaeus, 1758); **F.** *Cepora nerissa phryne* (Fabricius, 1775); **G.** *Delias descombesi descombesi* (Boisduval, 1836); **H.** *Delias eucharis* (Drury, 1773); **I.** *Delias hyparete indica* Wallace, 1867; **J.** *Delias pasithoe pasithoe* Linnaeus, 1767; **K.** *Eurema andersoni* Moore, 1886; **L.** *Eurema blanda silhetana* (Wallace, 1867); **M.** *Eurema hecabe hecabe* Linnaeus, 1758; **N.** *Hebomoia glaucippe glaucippe* (Linnaeus, 1758); **O.** *Leptosia nina nina* Fabricius, 1793; **P.** *Pieris canidia canis* Evans, 1912.



Figure 12. Photograph of Butterfly of *Zemerus flegyas* Cramer, 1780 (the Family Riodinidae) in Inani Reserve Forest of Cox's Bazar, Bangladesh.

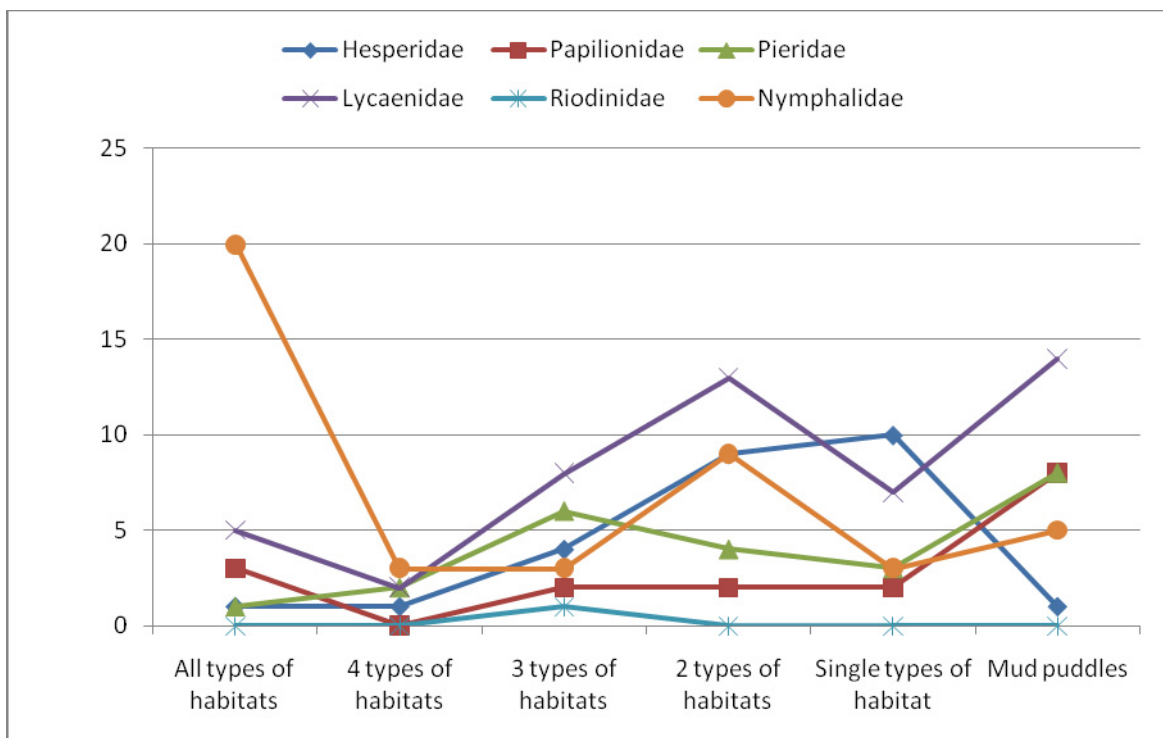


Figure 13. Number of habitat preferred by different butterfly families in Inani Reserve Forest of Cox's Bazar, Bangladesh.

Table 1. List of butterflies of the Inani Reserve Forest with their status and habitat.

Sl. No.	Family	Common Name	Scientific name	Abundance Status*	Habitat Preference**
1	Hesperiidae	Pigmy Scrub Hopper	<i>Aeromachus pygmaeus</i> Fabricius, 1775	UC	GL
2		Bush Hopper	<i>Ampittia dioscorides</i> Fabricius, 1793	UC	GL, CP, OF
3		Chocolate Demon	<i>Ancistroides nigrita</i> Latreille, 1824	UC	SF, DF
4		Forest Hopper	<i>Astictopterus jama olivascens</i> Moore, 1878	VR	SF, DF, MP
5		Brown Awl	<i>Badamia exclamationis</i> Fabricius, 1775	UC	SF, DF
6		Common Spotted Flat	<i>Celaenorrhinus leucocera</i> Kollar, 1848	VR	OF, SF
7		Plain Palm Dart	<i>Cephrenes acalle</i> Evans, 1932	UC	OF, SF
8		Wax Dart	<i>Cupitha purreea</i> Moore, 1977	R	DF
9		Common Yellow-breasted Flat	<i>Gerosis bhagava</i> Moore, 1865	VR	DF
10		Dusky Yellow-breasted Flat	<i>Gerosis phisara</i> Moore, 1884	VR	DF
11		Common Awl	<i>Hasora badra badra</i> Moore, 1857	R	DF
12		Common Banded Awl	<i>Hasora chromus</i> Cramer, 1780	R	SF
13		Tree Flitter	<i>Hyarotis adrastus praba</i> Moore, 1865	UC	OF, SF, DF
14		Chestnut Bob	<i>Iambrix salsala salsala</i> Moore, 1865	VC	AH
15		Dark Velvet Bob	<i>Koruthaialos butleri</i> de Nicéville, 1883	R	SF, DF
16		Narrow Banded Velvet Bob	<i>Koruthaialos rubecula cachara</i> Evans, 1949	UC	DF
17		Common Dartlet	<i>Oriens gola pseudolus</i> Mabille, 1883	R	SF
18		Straight Swift	<i>Parnara guttatus mangala</i> Moore, 1865	C	SF
19		Obscure Branded Swift	<i>Pelopidas agna</i> Moore, 1865	C	SF
20		Small Branded Swift	<i>Pelopidas mathias</i> Fabricius, 1798	UC	GL, SF
21		Fulvous Pied Flat	<i>Pseudocoladenia dan fabia</i> Evans, 1949	R	SF, DF
22		Common Small Flat	<i>Sarangesa dasahara</i> Moore, 1865	R	OF, SF
23		Common Snow Flat	<i>Tagiades japetus ravi</i> Moore, 1865	VC	OF, SF
24		Dark Palm dart	<i>Telicota bambusae</i> Moore, 1878	C	GL, CP, OF, SF
25		Pale Palm Dart	<i>Telicota colon</i> Fabricius, 1775	C	GL, CP, SF
26		Grass Demon	<i>Udaspes folus</i> Cramer, 1775	R	GL, SF, DF
27		Lycaenidae	Common Ciliate Blue	<i>Anthene emolus emolus</i> Godart, 1823	C
28	Centaur Oakblue		<i>Arhopala centaurus pirithous</i> Moore, 1883	R	SF, DF
29	Green Oakblue		<i>Arhopala eumolphus</i> Cramer, 1780	R	SF, DF
30	Common Pierrot		<i>Castalius rosimon</i> Fabricius, 1775	VC	AH
31	Common Tinsel		<i>Catapacecilma major major</i> Druce, 1895	VR	SF, DF
32	Silver Forget-me-not		<i>Catochrysops panormus</i> Felder, 1860	VR	SF
33	Forget-me-not		<i>Catochrysops strabo strabo</i> Fabricius, 1793	VC	AH, MP
34	Lime Blue		<i>Chilades lajus lajus</i> Stoll, 1870	UC	GL, CP, SF, MP
35	Plains Cupid		<i>Chilades pandava</i> Horsfield, 1829	R	GL, CP, SF
36	Indian Sunbeam		<i>Curetis thetis</i> Drury, 1773	VR	DF
37	Banded Blue Pierrot	<i>Discolampa ethionc</i> Westwood, 1851	R	GL, OF, SF	

Table 1. Continued

38	Nymphalidae	Gram Blue	<i>Euchrysops cnejus</i> (Fabricius, 1798)	UC	GL, CP, OF, SF
39		Common Tit	<i>Hypolycaena erylus</i> Godart, 1824	UC	SF, DF, MP
40		Dark Cerulean	<i>Jamides bochus</i> Stoll, 1782	UC	SF, DF, MP
41		Common Cerulean	<i>Jamides celeno</i> , (Cramer, 1775)	VC	AH, MP
42		Pea Blue	<i>Lampides boeticus</i> (Linnaeus, 1767)	UC	GL, CP
43		Yamfly	<i>Loxura atymnus continentalis</i> Fruhstorfer, 1912	C	AH, MP
44		Falcate Oakblue	<i>Mahathala ameria</i> Hewitson, 1862	VR	SF, DF
45		Malayan	<i>Megisba Malaya</i> Horsfield, 1828	UC	DF, MP
46		Pale Four Lineblue	<i>Nacaduba hermus</i> Felder, 1860	R	DF, MP
47		Small Four Lineblue	<i>Nacaduba pavana</i> (Horsfield, 1828)	UC	DF, MP
48		Quaker	<i>Neopithecops zalmora zalmora</i> (Butler, 1870)	C	AH, MP
49		Tailless Lineblue	<i>Prosotas dubiosa</i> Evans, 1925	UC	GL, OF, SF, MP
50		Common Lineblue	<i>Prosotas nora airdates</i> Moore, 1875	VC	GL, OF, SF, DF, MP
51		Pale Grass Blue	<i>Pseudozizeeria maha maha</i> Kollar, 1848	UC	GL, CP, OF
52		Scarlet Flash	<i>Rapala dienece</i> Hewitson, 1878	VR	SF
53		Slate Flash	<i>Rapala manea</i> Hewitson, 1863	UC	SF, DF
54		Copper Flash	<i>Rapala pheretima</i> Hewitson, 1863	R	SF, DF
55		Long-banded Silverline	<i>Spindasis lahita himalayanus</i> Moore, 1884	UC	GL, SF
56		Club Silverline	<i>Spindasis syama</i> Horsfield, 1829	C	GL, OF, SF, DF, MP
57		Common Acacia Blue	<i>Surendra quercetorum</i> Moore, 1857	R	SF, DF
58		Veined Pierrot	<i>Tarucus venosus</i> Moore, 1882	VR	OF, SF
59		Silverstreak Acacia Blue	<i>Zinaspia todara</i> Moore, 1883	VR	DF
60		Dark Grass Blue	<i>Zizeeria karsandra</i> Moore, 1865	C	GL, CP, OF
61		Lesser Grass Blue	<i>Zizina otis otis</i> Fabricius, 1787	C	GL, CP
62		Angled Castor	<i>Ariadne Ariadne pallidior</i> Fruhstorfer, 1899	C	AH
63		Common Castor	<i>Ariadne merione tapestrina</i> Moore, 1884	C	AH
64		Common Sergeant	<i>Athyma perius</i> (Linnaeus, 1758)	C	GL, OF, SF, DF
65		Common Yomen	<i>Cirrochroa tyche</i> Felder & Felder, 1861	VR	DF, MP
66		Rustic	<i>Cuphaerymanthis lotis</i> Sulzer, 1776	C	SF, DF
67		Plain Tiger	<i>Danaus chrysippus chrysippus</i> Linnaeus, 1758	C	AH
68		Striped Tiger	<i>Danaus genutia genutia</i> Cramer 1779	C	AH
69		Common Palmfly	<i>Elymnias hypermnestra undularis</i> Drury, 1773	VC	AH
70		Long-branded Crow	<i>Euploea algae</i> (Godart, 1819)	UC	SF, DF, MP
71		Common Crow	<i>Euploea core</i> Cramer, 1780	VC	AH, MP
72		Striped Black Crow	<i>Euploea doubledayi</i> Felder & Felder, 1865	R	SF, DF, MP
73	Brown King Crow	<i>Euploea klugii klugii</i> Moore, 1857	VR	SF, DF	
74	Blue-spotted Crow	<i>Euploea midamus</i> Linnaeus, 1758	VR	SF	
75	Striped Blue Crow	<i>Euploea mulciber mulciber</i> (Cramer, 1777)	UC	SF, DF	

Table 1. Continued

76	Papilionidae	Common Baron	<i>Euthelia aconthea garuda</i> Moore, 1857	C	AH	
77		Great Eggfly	<i>Hypolimnas bolina bolina</i> (Linnaeus, 1758)	C	AH, MP	
78		Peacock Pansy	<i>Junonia almanac almana</i> (Linnaeus, 1758)	VC	AH	
79		Grey Pansy	<i>Junonia atlites atlites</i> Linnaeus, 1763	VC	AH	
80		Yellow Pansy	<i>Junonia hierta</i> (Fabricius, 1798)	C	AH	
81		Chocolate Pansy	<i>Junonia iphita iphita</i> (Cramer, 1779)	VC	AH	
82		Lemon Pansy	<i>Junonia lemonias lemonias</i> (Linnaeus, 1758)	VC	AH	
83		Common Bushbrown	<i>Mycalesis perseus blasius</i> Fabricius, 1798	VC	AH	
84		Knight	<i>Lebadea Martha Martha</i> Fabricius, 1787	C	OF, SF, DF	
85		Commander	<i>Limenitis procris</i> (Cramer, 1777)	C	OF, SF, DF	
86		Common Evening Brown	<i>Melanitis leda leda</i> Linnaeus, 1758	VC	AH	
87		Dark Branded Bushbrown	<i>Mycalesis mineus</i> (Linnaeus, 1758)	C	GL, OF, SF, BP	
88		Clear Sailer	<i>Neptis clinia susruta</i> Moore, 1872	UC	GL, OF, SF	
89		Common Sailer	<i>Neptis hylas</i> Moore, 1758	VC	AH	
90		Chestnut-streaked Sailer	<i>Neptis jumbah</i> Moore, 1857	R	OF, SF	
91		Common Lascar	<i>Pantoporia hordonia hordonia</i> Stoll, 1790	UC	AH	
92		Glassy Tiger	<i>Parantica aglea aglea</i> (Stoll, 1782)	UC	SF, DF	
93		Clipper	<i>Parthenos Sylvia gambrius</i> Fabricius, 1787	UC	DF	
94		Common Leopard	<i>Phalanta phalantha phalantha</i> (Drury, 1770)	UC	AH	
95		Grey Count	<i>Tanaecia lepidea lepidea</i> Butler, 1868	VC	OF, SF	
96		Blue Tiger	<i>Tirumala limniace exoticus</i> Gmelin, 1790	UC	AH	
97		Painted Lady	<i>Vanessa cardui</i> (Linnaeus, 1758)	R	OF, SF	
98		Common Fivering	<i>Ypthima baldus</i> (Fabricius, 1775)	VC	AH	
99		Common Furring	<i>Ypthima huebneri</i> Kirby, 1871	C	AH	
100		Pieridae	Common Mime	<i>Chilasa clytia clytia</i> (Linnaeus, 1758)	UC	OF, SF, MP
101			Tailed Jay	<i>Graphium agamemnon agamemnon</i> (Linnaeus, 1758)	VR	SF, DF, MP
102			Common Jay	<i>Graphium doson axion</i> (Felder & Felder, 1865)	VR	DF, MP
103			White Dragontail	<i>Lamproptera curius</i> Fabricius, 1787	VR	DF, MP
104			Common Rose	<i>Pachliopta aristolochiae aristolochiae</i> Fabricius, 1775	C	AH, MP
105	Lime Butterfly		<i>Papilio demoleus demoleus</i> (Linnaeus, 1758)	C	AH, MP	
106	Great Mormon		<i>Papilio memnon agenor</i> Linnaeus, 1758	C	OF, SF, DF, MP	
107	Common Mormon		<i>Papilio polytes romulus</i> Cramer, 1775	VC	AH, MP	
108	Common Birdwing		<i>Troides helena</i> Linnaeus, 1758	R	OF, SF, DF	
109	Common Albatross		<i>Appias albino</i> (Boisduval, 1836)	VR	SF, MP	
110	Striped Albatross		<i>Appias libythea olferna</i> Swinhoe, 1890	C	GL, CP, OF, SF, MP	
111	Chocolate Albatross	<i>Appias lycinda eleonora</i> (Boisduval, 1836)	UC	GL, OF, SF, MP		

Table 1. Continued

112	Riodinidae	Common Emigrant	<i>Catopsilia pomona pomona</i> Fabricius, 1775	VC	AH, MP
113		Mottled Emigrant	<i>Catopsilia pyranthe pyranthe</i> (Linnaeus, 1758)	UC	GL, SF, MP
114		Common Gull	<i>Cepora nerissa phryne</i> (Fabricius, 1775)	VR	SF
115		Red-spot Jezebel	<i>Delias descombesi descombesi</i> (Boisduval, 1836)	C	CP, OF, SF, DF
116		Common Jezebel	<i>Delias eucharis</i> (Drury, 1773)	VR	OF, SF
117		Painted Jezebel	<i>Delias hyparete indica</i> Wallace, 1867	UC	OF, SF, DF
118		Red-base Jezebel	<i>Delias pasithoe pasithoe</i> Linnaeus, 1767	R	OF, SF, DF
119		One Spot Grass Yellow	<i>Eurema andersoni</i> Moore, 1886	R	GL, MP
120		Three-Spot Grass Yellow	<i>Eurema blanda silhetana</i> (Wallace, 1867)	R	GL, OF, SF
121		Common Grass Yellow	<i>Eurema hecabe hecabe</i> Linnaeus, 1758	VC	GL, CP, MP
122		Great Orange Tip	<i>Hebomoia glaucippe glaucippe</i> (Linnaeus, 1758)	R	OF, SF, DF, MP
123		Psyche	<i>Leptosia nina nina</i> Fabricius, 1793	UC	GL, CP
124		Indian Cabbage White	<i>Pieris canidia canis</i> Evans, 1912	VR	GL, OF, SF
125		Punchinello	<i>Zemeros flegyas</i> Cramer, 1780	C	OF, SF, DF

*VC= Very Common, C-Common, UC-Uncommon, R-Rare, VR-Very Rare; **AH-All Habitat, GL-Grass Land, CL-Crop Land, OF-Open Forest, SF-Scrub Forest, DF-Dense Forest, BP-Bamboo Patches, MP-Mud Puddles

Table 2. Relative abundance of butterflies in the Inani Reserve Forest, Bangladesh.

L. No.	Family	Relative Abundance					Number of species (% of 125)
		Very Common (% of 20)	Common (% of 29)	Uncommon (% of 32)	Rare (% of 23)	Very Rare (% of 21)	
1	Hesperiidae	2 (10%)	4 (13.79%)	8 (25.00%)	8 (34.78%)	4 (19.05%)	26 (20.80%)
2	Papilionidae	1 (5%)	3 (10.35%)	1 (03.12%)	1 (04.35%)	3 (14.29%)	9 (07.26%)
3	Pieridae	2 (10%)	2 (06.90%)	4 (12.60%)	4 (17.39%)	4 (19.05%)	16 (12.90%)
4	Lycaenidae	4 (20%)	6 (20.69%)	11(34.37%)	7 (30.43%)	7 (33.33%)	35 (28.23%)
5	Riodinidae	-	1 (03.45%)	-	-	-	1 (0.81%)
6	Nymphalidae	11 (55%)	13(44.83%)	8 (25%)	3 (13.04%)	3 (14.29%)	22 (30.65%)
Total		20	29	32	23	21	125

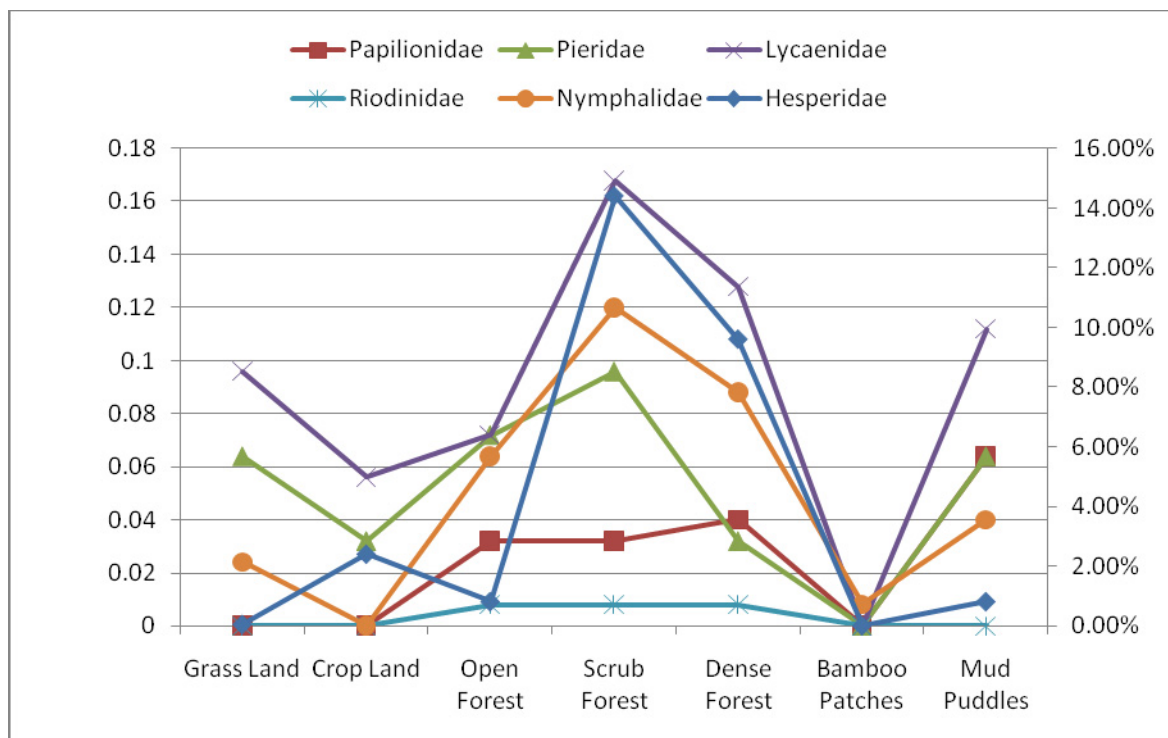


Figure 14. Types of habitat preferred by different butterfly families in Inani Reserve Forest of Cox's Bazar, Bangladesh.

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تنوع گونه‌ای و ترجیح زیستگاهی پروانه‌های روزپرواز (Insecta: Lepidoptera) در جنگل محافظت شده اینانی، بنگلادش

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چکیده: پروانه‌های روزپرواز جنگل محافظت شده اینانی بنگلادش از ماه می ۲۰۱۴ تا ۲۰۱۵ مورد بررسی قرار گرفتند. ۱۲۵ گونه از روزپرها، متعلق به ۸۴ جنس و شش خانواده (Nymphalidae، Lycaenidae، Pieridae، Papilionidae، Hesperidae و Nymphalidae) طی این تحقیق شناسایی شدند. بیشترین تعداد گونه متعلق به خانواده Nymphalidae (۳۸ گونه، ۳۰/۴٪) و پس از آن خانواده‌های Lycaenidae (۳۵ گونه، ۲۰/۸٪)، Hesperidae (۲۶ گونه، ۲۰/۱۶٪)، Pieridae (۱۶ گونه، ۱۲/۸٪)، Papilionidae (۹ گونه، ۲/۷٪) قرار داشتند. خانواده Riodinidae کمترین تنوع را داشت (یک گونه، ۰/۸٪). فراوانی گونه‌های ثبت شده به صورت بسیار رایج (۲۰ گونه)، رایج (۲۹ گونه)، غیر رایج (۳۲ گونه)، کمیاب (۲۳ گونه) و بسیار کمیاب (۲۱ گونه) محاسبه شد. روزپرها زیستگاه‌های مختلفی را ترجیح می‌دادند (علفزارها، مزارع، جنگل‌های کم‌تراکم، جنگل‌های با درختان کوتاه و درختچه‌ها، جنگل‌های انبوه و کشتزارهای بامبو). ۳۰ گونه از روزپرها عمدتاً در همه انواع این زیستگاه‌های یافت شدند. در حالی که ۶۹ گونه دارای زیستگاه‌های چندگانه بودند (۸ گونه در ۴ نوع زیستگاه، ۲۴ گونه در ۳ نوع زیستگاه و ۳۸ گونه در دو نوع زیستگاه). فعالیت ۳۶ گونه در مناطق گل‌آلود مشاهده شد. در طی این تحقیق، گونه *Zinaspis todara* (خانواده Lycaenidae) برای اولین بار از بنگلادش گزارش شد. گونه *Euploea doubledayi* (خانواده Danaidae) مجدداً پس از ۱۵۰ سال مشاهده شد.

واژگان کلیدی: فراوانی، روزپرها، چک‌لیست، تنوع، جنگل محافظت شده اینانی.