

Butterfly Diversity in and Around Bolpur-Shantiniketan Urban Area, West Bengal, India

Naznin Kamar

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ABSTRACT

Butterfly species are the most important pollinators and herbivores in nature, and they have coevolved with the plants from which they obtain their food. Biodiversity monitoring can serve as a link between local and regional environmental changes. During the present study in Bolpur, West Bengal, India 76 butterfly species were recorded in which Nymphalidae dominate with 28.94% (22 species) followed by Lycaenidae, Pieridae, Hesperidae and Papilionidae with 25%, (19 species), 19.73% (15 species), 14.47% (11 species) and 11.84% (9 species) contribution. This type of may help in conserving this insect species and also helps to maintain thae habitat suitable for them.

Keywords Butterfly, Biodiversity, Conservation, Bolpur-Shantiniketan.

INTRODUCTION

Butterfly species are considered as one of the most important pollinator and herbivore in nature. They coevolved with the host plants and with the food plants from which they collect their food (Ehrlich and Raven 1964; Kunte, 2000; Tiple et al. 2006) and maintain their life cycle. Biodiversity monitoring may serve as a link with environmental changes in local as well as in regional scale. Usually the adult butterflies rely on nectar and the larvae on leaves. It has been established that morphological variables of butterfly species highly influenced for their foraging behavior on the particular plant species (Mukherjee and Mondal 2020; Mukherjee and Hossain 2020; Mukherjee *et al.* 2021; Mukherjee and Hossain 2021). Caterpillars of the family Lycaenidae often show mutualism with ants (Nimbalkar *et al.* 2011) in which the caterpillars find protection and in return the ants receive some sugary stuff secreted from the larval body. The butterfly species are sensitive to changes in environmental conditions and are considered as one of the most important biological indicators of ecosystem health (New 1991, Kunte 2000, Thomas 2005. Bonebrake *et al.* 2010, Biswas *et al.* 2019). These organism are well-reflective of anthropogenic effects on habitat quality and their subsequent degradation (Kocher and Williams 2000, Kunte 2000, Summerville and Crist 2001, Koh 2007). The majority of butterfly fauna contributes to the maintenance of floral community structure in tropical regions (Bonebrake *et al.* 2010; Samanta *et al.* 2017). Globally almost 19000 butterfly species have been described (Heppner 1998) and the

Naznin Kamar
Assistant Professor
Department of Zoology, Bolpur College, Bolpur, Birbhum 731204,
WB, India
Email : nazninkamar@gmail.com

Indian subcontinent is home to 1318 butterfly species (Varshney and Smetacek 2015). In India several studies are being performed with butterfly diversity including their interaction with food plants (Kunte *et al.* 1999; Mukherjee *et al.* 2016). Butterfly diversity benefits in sustenance of numerous plant communities (Murugesan *et al.* 2013). The interaction between plants and diverse butterfly species are emphasized as a mutualistic relationship (Mukherjee *et al.* 2016). Butterfly diversity studies are critical for determining the effects of urbanization on insect communities and different aspects of biological conservation (Blair 1999, Singh and Pandey 2004; Clark *et al.* 2007, Di Mauro *et al.* 2007; Saikia *et al.* 2009). In the present study, it has been tried to investigate the number of butterfly species found in the Bolpur Municipality and its adjoining areas and to prepare a checklist of the butterfly species of the area. This type of study also has the probability to find out new species (Mirza and Mondal 2018). The outcome of this study may help in conservation management of the lepidopteran insects in this less explored area in West Bengal, India.

MATERIALS AND METHODS

Study area and sampling time

The study was conducted in Bolpur, West Bengal India during April 2019 to March 2020 and the survey was carried out in between 7 AM to 2 PM of the day.

Sampling technique

The survey was conducted by using Pollard walk method with some important modifications (Pollard and Yates 1993) and butterfly species were observed and photographed by using a camera (Nikon Coolpix P600) and in some cases butterfly species were captured for identification using insect net without noticeable harm. Butterfly species were identified with the help of suitable key (Kunte 2000; Kehimkar 2008). The captured butterfly species were released after identification.

RESULTS AND DISCUSSION

Studies of butterfly diversity aids in visualising habitat heterogeneity, indicating the spatial distribution of

host and nectaring plants across the landscape (Harrington and Stork 1995; Öckinger *et al.* 2006, 2009, Mukherjee and Ghosh 2018). As a good indicator of the ecosystem health (Stefanescu *et al.* 2004), the richness data of some distinct species found in different geographical areas often assist us in understanding the habitat of the concerned locality (Mukherjee and Mondal 2020, Mukherjee *et al.* 2021). Besides charismatic species members of butterfly fauna also recognized as the species that perform numerous roles in the ecosystem. Several information regarding environmental conditions can be supplied by the butterfly species and can be treated for monitoring of environmental conditions and habitat assessment. In the present study total 76 butterfly species were observed in Bolpur town and adjoining areas (Table 1). Out of 76 butterfly species 11 species belonging to family Hesperiiidae, 9 from Papilionidae, 15, 19 and 22 from Pieridae, Lycaenidae and Nymphalidae respectively (Table 1). Nymphalidae dominate with 28.94 % out of 76 butterfly species observed during

Table 1. List of butterfly species observed during survey in Bolpur, West Bengal, India.

Sl. No.	Scientific name	Common name
A. Family Hesperiiidae		
1	<i>Hasora chromus</i> (Cramer [1780])	Common Banded Awl
2	<i>Capila jayadeva</i> (Moore [1866])	Striped Dawnfly
3	<i>Tagiades japetus ravi</i> (Moore, [1866])	Common Snow Flat
4	<i>Odontoptilum angulata</i> (R. Felder 1862)	Chestnut Angle
5	<i>Spialia galba</i> (Fabricius 1793)	Indian Skipper
6	<i>Oriens goloides</i> (Moore 1885)	Common Dartlet
7	<i>Parnara guttatus</i> (Bremer & Gray, [1852])	Straight Swift
8	<i>Borbo cinnara</i> (Wallace 1866)	Rice Swift
9	<i>Pelopidas mathias</i> (Fabricius 1798)	Small Branded Swift
10	<i>Iambrix salsala</i> (Moore [1866])	Chestnut Bob
11	<i>Suastus gremius</i> (Fabricius 1798)	Indian Palm Bob
B. Family Papilionidae		
12	<i>Graphium doson</i> (C. & R. Felder, 1864)	Common Jay
13	<i>Graphium agamemnon</i> (Linnaeus 1758)	Tailed Jay
14	<i>Papilio clytia</i> (Linnaeus 1758)	Common Mime
15	<i>Papilio polytes</i> (Linnaeus 1758)	Common Mormon
16	<i>Papilio polymnestor</i> (Cramer [1775])	Blue Mormon

Table 1. Continued.

Sl. No.	Scientific name	Common name
17	<i>Papilio demoleus</i> (Linnaeus 1758)	Lime Butterfly
18	<i>Papilio polyctor</i> (Boisduval 1836)	Common Peacock
19	<i>Atrophaneura hector</i> (Linnaeus 1758)	Crimson Rose
20	<i>Atrophaneura aristolochiae</i> (Fabricius 1775)	Common Rose
C. Family- Pieridae		
21	<i>Eurema brigitta</i> (Stoll [1780])	Small Grass Yellow
22	<i>Eurema hecabe</i> (Linnaeus 1758)	Common Grass Yellow
23	<i>Catopsilia pomona</i> (Fabricius 1775)	Common Emigrant
24	<i>Catopsilia pyranthe</i> (Linnaeus 1758)	Mottled Emigrant
25	<i>Ixias marianne</i> (Cramer [1779])	White Orange Tip
26	<i>Ixias pyrene</i> (Linnaeus 1764)	Yellow Orange Tip
27	<i>Pareronia valeria</i> (Cramer [1776])	Common Wanderer
28	<i>Appias libythea</i> (Fabricius 1775)	Striped Albatross
29	<i>Appias albina</i> (Boisduval 1836)	Common Albatross
30	<i>Pieris canidia</i> (Linnaeus 1768)	Indian Cabbage White
31	<i>Cepora nerissa</i> (Fabricius 1775)	Common Gull
32	<i>Delias eucharis</i> (Drury 1773)	Common Jezebel
33	<i>Leptosia nina</i> (Fabricius 1793)	Psyche
34	<i>Belenois aurota</i> (Fabricius 1793)	Pioneer
D. Family- Lycaenidae		
35	<i>Spalgis epius</i> (Westwood [1851])	Apefly
36	<i>Curetis thetis</i> (Drury [1773])	Indian Sunbeam
37	<i>Rapala manea</i> (Hewitson, 1863)	Slate Flash
38	<i>Cigaritis vulcanus</i> (Fabricius 1775)	Common Silverline
39	<i>Castalius rosimon</i> (Fabricius 1775)	Common Pierrot
40	<i>Caleta caleta</i> (Hewitson 1876)	Angled Pierrot
41	<i>Tarucus nara</i> (Kollar 1848)	Rounded Pierrot
42	<i>Jamides bochus</i> (Stoll [1782])	Dark Cerulean
43	<i>Jamides celeno</i> (Cramer [1775])	Common Cerulean
44	<i>Catochrysops strabo</i> (Fabricius 1793)	Forget-me-not
45	<i>Zizula hylax</i> (Fabricius 1775)	Tiny Grass Blue
46	<i>Pseudozizeeria maha</i> (Kollar [1844])	Pale Grass Blue
47	<i>Zizina otis</i> (Fabricius 1787)	Lesser Grass Blue
48	<i>Neopithecops zalmora</i> (Butler [1870])	Quaker
49	<i>Everes lacturnus</i> (Godart [1824])	Indian Cupid
50	<i>Euchrysops cnejus</i> (Fabricius 1798)	Gram Blue
51	<i>Chilades pandava</i> (Horsfield [1829])	Plains Cupid
52	<i>Chilades lajus</i> (Stoll [1780])	Lime Blue
53	<i>Chilades putli</i> (Kollar [1844])	Eastern Grass Jewel
E. Family- Nymphalidae		
54	<i>Danaus genutia</i> (Cramer [1779])	Striped Tiger
55	<i>Danaus chrysippus</i> (Linnaeus 1758)	Plain Tiger
56	<i>Euploea core</i> (Cramer [1780])	Common Crow

Table 1. Continued.

Sl. No.	Scientific name	Common name
57	<i>Melanitis leda</i> (Linnaeus 1758)	Common Evening Brown
58	<i>Elymnias hypermnestra</i> (Linnaeus 1763)	Common Palmfly
59	<i>Mycalasis perseus</i> (Fabricius 1775)	Common Bushbrown
60	<i>Ypthima baldus</i> (Fabricius 1775)	Common Five-ring
61	<i>Ypthima huebneri</i> (Kirby 1871)	Common Four-ring
62	<i>Acraea violae</i> (Fabricius 1793)	Tawny Coster
63	<i>Phalanta phalantha</i> (Drury, [1773])	Common Leopard
64	<i>Moduza procris</i> (Cramer [1777])	Commander
65	<i>Athyma perius</i> (Linnaeus 1758)	Common Sergeant
66	<i>Euthalia aconthea</i> (Cramer, [1777])	Common Baron
67	<i>Ariadne ariadne</i> (Linnaeus 1763)	Angled Castor
68	<i>Ariadne merione</i> (Cramer [1777])	Common Castor
69	<i>Junonia iphita</i> (Cramer [1779])	Chocolate Pansy
70	<i>Junonia hierta</i> (Fabricius 1798)	Yellow Pansy
71	<i>Junonia atlites</i> (Linnaeus 1763)	Grey Pansy
72	<i>Junonia orithya</i> (Linnaeus 1758)	Blue Pansy
73	<i>Junonia almana</i> (Linnaeus 1758)	Peacock Pansy
74	<i>Hypolimnas misippus</i> (Linnaeus 1764)	Danaid Eggfly
75	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	Great Eggfly

the survey followed by Lycaenidae, Pieridae, Hesperidae and Papilionidae with 25%, 19.73%, 14.47% and 11.84% contribution (Fig. 1). Evaluation of diversity of butterfly species provides information about differences in species richness and abundance along the landscape (Harrington and Stork 1995, Öckinger and Smith 2006). The species richness observed in present study is higher than the western part of South Bengal (Samanta *et al.* 2017, Das 2017) while it is found to be lower when compared with Kolkata urban area

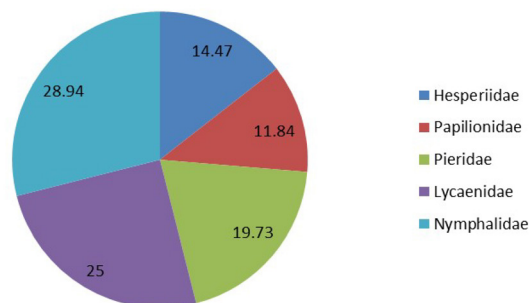


Fig. 1. Percent contribution of the different butterfly families.

(Mukherjee *et al.* 2015). None of the observed 76 butterfly species are globally threatened according to the IUCN red list but *Appias libythea* and *Euchrysops cnejus* are protected under Wildlife (Protection) Act 1972 in Schedule II category.

CONCLUSION

During the survey in Bolpur, West Bengal, India, we observed 76 butterfly species in total. Out of 76 butterfly species, 11 are Hesperidae, 9 are Papilionidae, 15, 19, and 22 are Pieridae, Lycaenidae, and Nymphalidae, respectively. Nymphalidae dominate with 28.94% of the 76 butterfly species observed during the survey, followed by Lycaenidae, Pieridae, and Hesperidae with 25%, 19.73%, 14.47%, and 11.84% contributions, respectively. This type of study may help to conserve the butterfly species in Bolpur and also help to maintain the habitat quality that are suitable for this lepidopteran species.

REFERENCES

- Biswas SJ, Patra D, Roy S, Giri SK, Paul S, Hossain A (2019) Butterfly diversity throughout Midnapore urban area in West Bengal, India. *J Threat Taxa* 11: 14816–14826.
- Blair RB (1999) Birds and butterflies along an urban gradient: Surrogate taxa for assessing biodiversity? *Ecol Appl* 9: 164–170.
- Bonebrake TC, Ponisio LC, Boggs CL, Ehrlich PR (2010) More than just indicators: A review of tropical butterfly ecology and conservation. *Biol Conserv* 143(8): 1831–1841.
- Clark PJ, Reed JM, Chew FS (2007) Effects of urbanization on butterfly species richness, guild structure, and rarity. *Urban Ecosyst* 10: 321–337.
- Di Mauro D, Dietz T, Rockwood L (2007) Determining the effect of urbanization on generalist butterfly species diversity in butterfly garden. *Urban Ecosyst* 10: 427–439.
- Ehrlich PR, Raven PH (1964) Butterflies and plants: A study in coevolution. *Evolution* 18(4): 586–608.
- Harrington R, Stork N (1995) *Insects in a Changing Environment*. Academic Press, London, pp 535.
- Heppner JB (1998) Classification of Lepidoptera. Part 1. Introduction. *Holarctic Lepidoptera* 5 (Suppl. 1) : 1–148.
- Kehimkar I (2008) *The book of Indian butterflies*. Mumbai: BNHS and Oxford University Press pp 497.
- Kocher SD, Williams EH (2000) The diversity and abundance of North American butterflies vary with habitat disturbance and geography. *J Biogeogr* 27(4): 785–794.
- Koh LP (2007) Impacts of land use change on South-east Asian forest butterflies: A review. *J Appl Ecol* 44 (4): 703–713.
- Kunte K (2000) *Butterflies of Peninsular India*. Universities Press (Hyderabad) and Indian Academy of Sciences (Bangalore), pp 147.
- Kunte K, Joglekar A, Utkarsh G, Padmanabhan P (1999) Patterns of butterfly, bird and tree diversity in the Western Ghats. *Curr Sci* 77(4): 577–586.
- Mirza ZA, Mondal A (2018) A new genus Gravelia with two species of the family Nemesiidae (Araneae: Mygalomorphae) from India. *Acta Arachnologica* 67(1): 43–48.
- Mukherjee K, Mondal A (2020) Butterfly diversity in heterogeneous habitat of Bankura, West Bengal, India. *J Threat Taxa* 12 (8): 15804–15816.
- Mukherjee S, Aditya G, Basu P, Saha GK (2016) Butterfly diversity in Kolkata metropolis: A synoptic check list. *Check List* 12: 1858.
- Mukherjee S, Banerjee S, Saha GK, Basu P, Aditya G (2015) Butterfly diversity in Kolkata, India: An appraisal for conservation management. *J Asia Pac Biodiver* 8: 210–221.
- Mukherjee SS, Ahmed MT, Hossain A (2021) Role of a Global Invasive Species (GIS), *Lantana camara* in conservation and sustenance of local butterfly community. *Acta Ecol Sin* <https://doi.org/10.1016/j.chnaes.2021.02.008>.
- Mukherjee SS, Hossain A (2020) Role of morphological variables of the visitor butterfly species in relation to their foraging behavior on *Lantana camara* : Implication for conservation. *Acta Ecol Sin* <https://doi.org/10.1016/j.chnaes.2020.11.003>.
- Mukherjee SS, Hossain A (2021) Morphological variables restrict flower choice of Lycaenid butterfly species: Implication for pollination and conservation. *J Ecol Environ* : 32–45.
- Murugesan M, P Arun R, Prusty BAK (2013) The butterfly community of an urban wetland system - a case study of Oussudu Bird Sanctuary, Puducherry, India. *J Threat Taxa* 5: 4672–4678.
- New TR (1991) *Butterfly conservation*. Oxford University Press, pp 1–224.
- Nimbalkar RK, Chandekar SK, Khunte SP (2011) Butterfly diversity in relation to nectar food plants from Bhor Tahsil, Pune District, Maharashtra, India. *J Threat Taxa* 3(3): 1601–1609.
- Öckinger E, Dannestam Å, Smith HG (2009) The importance of fragmentation and habitat quality of urban grasslands for butterfly diversity. *Landsc Urban Pl* 93(1): 31–37.
- Öckinger E, Eriksson AK, Smith HG (2006) Effects of grassland abandonment, restoration and management on butterflies and vascular plants. *Biol Conserv* 133(3): 291–300.
- Öckinger E, Smith HG (2006) Landscape composition and habitat area affects butterfly species richness in semi-natural grasslands. *Oecologia* 149(3): 526–534.
- Pollard E, Yates TJ (1993) *Monitoring butterflies for ecology and conservation*. London: Chapman and Hall.
- Saikia MK, Kalita J, Saikia PK (2009) Ecology and conservation needs of nymphalid butterflies in disturbed tropical forest of eastern Himalayan biodiversity hotspot, Assam, India. *Int J Biodivers Conserv* 1: 231–250.
- Samanta S, Das D, Mandal S (2017) Butterfly fauna of Baghmundi, Purulia, West Bengal, India: A preliminary checklist. *J Threat Taxa* 9: 10198–10207.
- Singh AP, Pandey R (2004) A model for estimating butterfly species richness of areas across the Indian subcontinent: Species proportion of family Papilionidae as an indicator. *BNHS* 101: 79–89.
- Stefanescu C, Herrando S, Páramo F (2004) Butterfly species richness in the north-west Mediterranean Basin: The role of

- natural and human-induced factors. *J Biogeogr* 31(6): 905–915.
- Summerville KS, Crist TO (2001) Effects of experimental habitat fragmentation on patch use by butterflies and skippers (*Lepidoptera*). *Ecology* 82 (5): 1360–1370.
- Thomas JA (2005) Monitoring change in the abundance and distribution of insects using butterflies and other indicator groups. *Philos Trans R Soc Lond B Biol Sci* 360 : 339–357.
- Tiple AD, Deshmukh VP, Dennis RLH (2006) Factors influencing nectar plant resource visits by butterflies on a university campus: Implications for conservation. *Nota Lepidoptera* 28: 213–224.
- Varshney RK, Smetacek P (eds) (2015) A Synoptic Catalogue of the Butterflies of India. Indinov Publishing, New Delhi. pp 261.