



STATUS AND DIVERSITY OF BUTTERFLY FAUNA IN DEENDAYAL UPADHYAY KISAN PARK, LUCKNOW, INDIA

Kumari Arati¹, Amita Kanaujia² and Ashish Kumar^{1*}

¹Animal Diversity and Ecology Laboratory

²Biodiversity & Wildlife Conservation Laboratory

Department of Zoology, University of Lucknow, Lucknow (U.P.), India

*Corresponding author: adellu111@gmail.com

Article Info:

Research Article

Received

13.07.2023

Reviewed

25.09.2023

Accepted

20.10.2023

Abstract: The aim of this study was to record and document the butterfly diversity in Deendayal Upadhyay Kisan Park, Lucknow, Uttar Pradesh, India from December 2021 to May 2022, utilizing the line transect method. Throughout the study period, a total of 30 butterfly species from four families were identified and documented. The Nymphalidae family exhibited the highest representation, constituting 50% of the total species. Both Pieridae and Lycaenidae families contributed equally, each comprising 20% of the recorded species. The Papilionidae family had the lowest species composition, accounting for 10% of the documented butterflies. Approximately 47% of the butterflies were found to be commonly observed, while the remaining 33% were rarely sighted within the study area. These findings establish a foundational dataset and provide insights into the current status of butterfly species, serving as a platform for further research and the development of conservation strategies.

Keywords: Anthropogenic activities, Butterfly, Conservation, Diversity, Kisan Park, Lucknow.

Cite this article as: Kumari A., Kanaujia A. and Kumar A. (2023). Status and diversity of butterfly fauna in Deendayal Upadhyay Kisan Park, Lucknow, India. *International Journal of Biological Innovations*. 5(2): 28-32. <https://doi.org/10.46505/IJBI.2023.5204>

INTRODUCTION

Butterflies belong to order Lepidoptera, class Insecta and phylum Arthropoda. Insecta is the largest class and Arthropoda is the largest phylum of Kingdom Animalia (Verma and Prakash, 2020a). The term 'lepto' comes from Greek meaning scale and 'ptera' meaning wings, which refers to outstanding scaly wings of adult butterflies. Butterflies splendidly vary in shape, size and colour. They are found in tropical and temperate habitats around the world except close to poles. India harbors a total of 1504 butterfly

species that accounts for 8.74% of the world's butterfly (Kunte *et al.*, 2012). Butterflies play a crucial role in the ecosystem as they act as efficient pollinators and important component of food chain. Moreover, there exist a co-evolutionary relationship between butterflies and plants (Ehrlich and Raven, 1964). Butterflies are good bio-indicators and indicate the health of ecosystem.

Anthropogenic activities and wastes badly influence the distribution and survival of biota



(Verma and Prakash, 2020b; Prakash and Verma, 2022) including insects. The population of butterfly insects is declining rapidly due to habitat destruction; uses of pesticide and people's ignorance of the importance of butterfly (Ghazanfar *et al.*, 2006). The present work aims at enlisting butterflies and finding out their diversity and status in Deendayal Upadhyay Kisan Park, Lucknow. This study will also provide baseline information and updated status of butterflies to Lepidopterologists and common masses in the study area.

MATERIALS AND METHODS

Study area

The study was carried out at Deendayal Upadhyay Kisan Park (Fig. 1) located in district of Lucknow, India. This park is situated in the capital of Uttar Pradesh between $26^{\circ}48'54.6''N$ and $80^{\circ}53'23.9''E$ and is spread over an area of about 3.7 km sq. The park harbors a variety of flora and fauna and is one of the famous recreational spots in Lucknow.

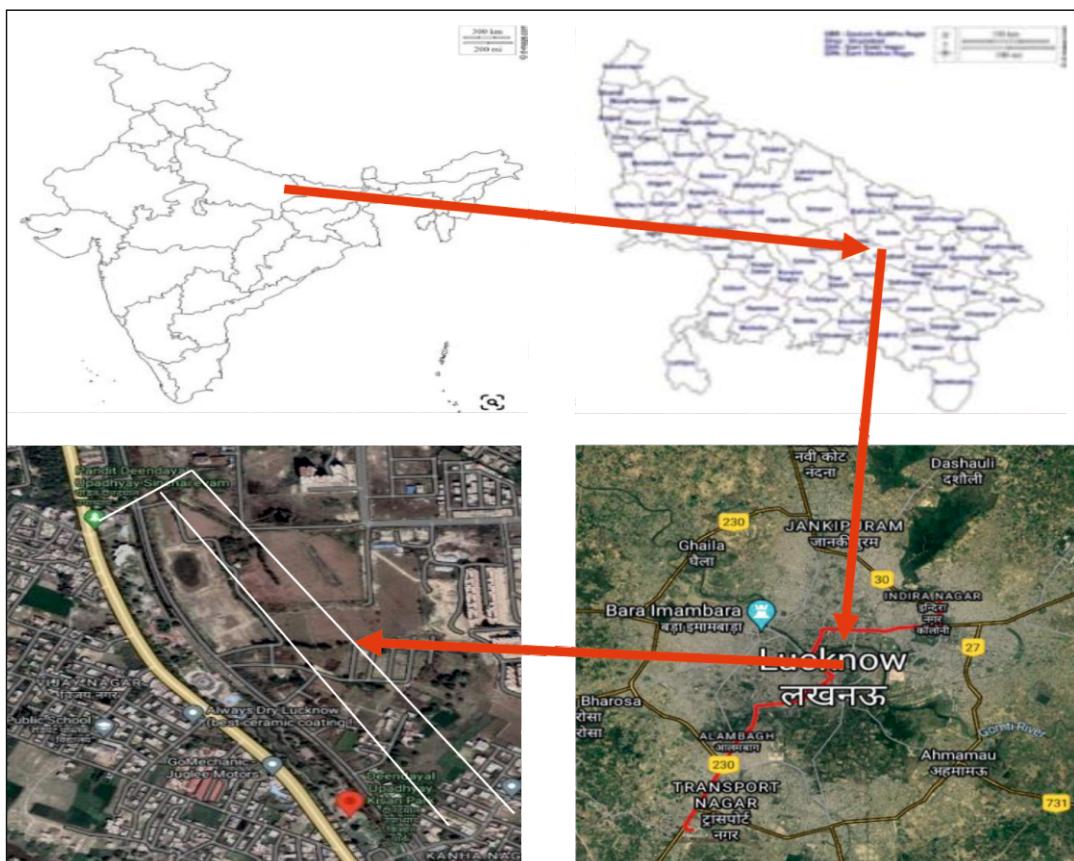


Fig: 1: Map of study area.

Methodology

The survey was conducted from December 2021 to May 2022. The study area was visited 3 to 4 times in a week. The observations were carried out in the morning between 8:00 and 10:00 am and in the evening between 4:30 and 6:00 pm by using the line transect method. A transect of 200 meters length was selected. 8 equidistant points on this transect were identified each of which was 25 meters apart. Samples were collected in 5-meter radius from each point. Butterflies were photographed using Canon EOS 1500D DSLR cameras and were identified according to Varshney and Smetacek (2015).

RESULTS

Authors documented a total of 30 butterfly species representing 22 genera across four distinct families *namely* Nymphalidae, Pieridae, Lycaenidae and Papilionidae. Nymphalidae exhibited the highest species richness, constituting 50% of the recorded species with a total of 15 species. Pieridae and Lycaenidae families made equal contributions, accounting for 20% each, with six species in each family. The lowest species composition comprising 10% of the documented butterflies was observed in the Papilionidae family, which consisted of three species. Nymphalidae showcased the highest

number of 10 genera, followed by Lycaenidae with six genera, Pieridae with four genera, and Papilionidae with two genera. In terms of subfamilies, Nymphalidae displayed the greatest

diversity with six subfamilies, while Pieridae and Lycaenidae each had two subfamilies. The Papilionidae family had a single subfamily. Details are given in table 1.

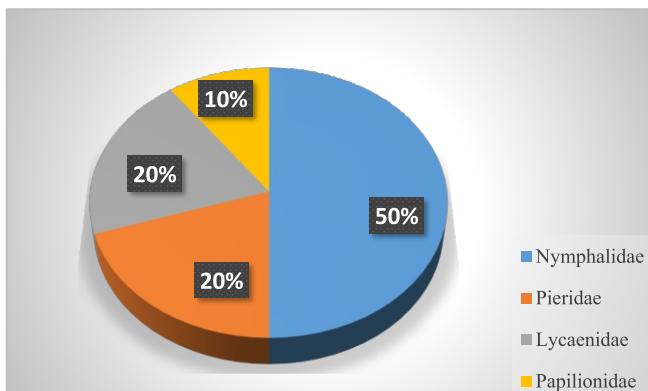


Fig. 2: Pie chart showing percentage of butterfly families in the study area.

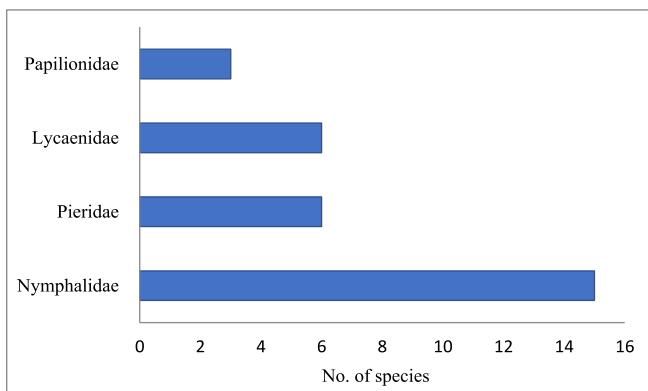


Fig. 3: Graph showing number of species in different families.

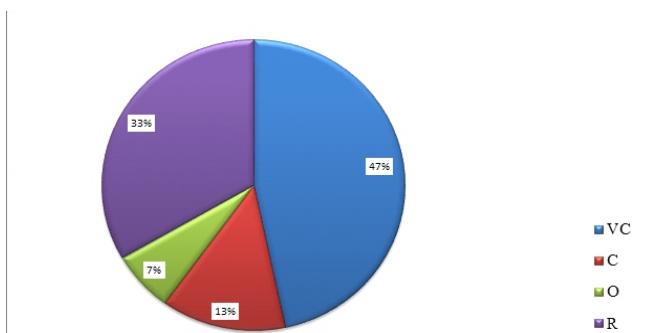


Fig. 4: Pie chart showing percentage of very common, common, occasionally seen and rarely seen butterfly species in the study area.

Nearly half (47%) of butterflies were very common and rest (33%) were rarely seen at the study area. Family Nymphalidae had the highest number of very common and occasionally seen species. The highest number of common species was seen in Pieridae. Family Lycaenidae recorded with the highest number (3) of rarely seen.

DISCUSSION

During the exploration, authors recorded a total of 30 species of butterflies belonging to 4 families and 21 genera from the area studied. The richest family, Nymphalidae, constituted 50% of the total species followed by Pieridae 20%, Lycaenidae 20% and Papilionidae, 10% respectively (Fig. 2). A similar observation was reported by (Prateek *et al.*, 2023). The largest number of species was reported in the family Nymphalidae (15), followed by Pieridae (6), Lycaenidae (6) and the minimum number of genera were reported in the family Papilionidae (3) (Fig. 3).

The study on butterfly status based on the frequency of sightings showed that 14 (47%) were very common, 10 (33%) were rare, 4 (13%) were common and 2 (7%) were occasionally seen (Table 1, Fig. 4). The Nymphalidae family is a large group of strong-bodied butterflies that comes in almost every colour and shape. It outnumbered the rest of the families in terms of the number of butterfly species (15). This family contains 8 very common species, 1 common, 1 occasionally seen and 5 rare species. The family Pieridae has some of the most familiar butterflies, which includes 6 species with 3 very common and 3 common in the study area. Lycaenidae included 6 butterfly species, 3 very common species and 3 rare species. Papilionidae was represented by 3 species and among them, 2 were rare species, 1 occasionally seen species in our study area.

Butterfly species richness depends on a number of factors such as seasonality, flowering plants, altitude, precipitation, suitable temperature and anthropogenic activities. Butterflies prefer specific habitats to avail themselves to obtain the resources for survival in the ecosystem. They show various feeding habits, and therefore the varied habitats provide appropriate sites for feeding, foraging and resting during different stages in their life cycle (Santhosh and Basavarajappa, 2017). The area studied has a rich diversity of flowering plants, which encourages the butterfly population. Butterflies are also very sensitive to habitat and climate changes, which influence their distribution and abundance. In the study area, no significant anthropogenic

Table 1: Butterfly species in the study area and their status.

S.No	Family	Subfamily	Common Name	Scientific Name	Status
1.	Nymphalidae	Nymphalinae	Great Eggfly	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	VC
2.			Danaid Eggfly	<i>Hypolimnas misippus</i> (Linnaeus, 1964)	VC
3.			Peacock Pansy	<i>Junonia almana</i> (Linnaeus, 1758)	VC
4.			Blue Pansy	<i>Junonia orithya</i> (Linnaeus, 1758)	VC
5.			Painted Lady	<i>Vanessa cardui</i> (Linnaeus, 1758)	R
6.		Danainae	Striped tiger	<i>Danaus genutia</i> (Cramer, 1779)	R
7.			Plain Tiger	<i>Danaus chrysippus</i> (Linnaeus, 1758)	VC
8.			Common crow	<i>Euploea core</i> (Cramer, 1780)	O
9.		Limenitidinae	Commander	<i>Moduza procris</i> (Cramer, 1777)	R
10.			Common Baron	<i>Euthalia acontinea</i> (Cramer, 1777)	VC
11.		Biblidinae	Angled Castor	<i>Ariadne ariadne</i> (Linnaeus, 1763)	R
12.			Common Castor	<i>Ariadne merione</i> (Cramer, 1777)	VC
13.		Satyrinae	Common Evening Brown	<i>Melanitis leda</i> (Linnaeus, 1958)	C
14.			Dark Evening Brown	<i>Melanitis phedima</i> (Cramer, 1780)	VC
15.		Heliconinae	Common Leopard	<i>Phalanta phalantha</i> (Drury, 1773)	R
16.	Pieridae	Coliadinae	Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus, 1758)	VC
17.			One spot Grass Yellow	<i>Eurema andersoni</i> (Moore, 1886)	C
18.			Common Emigrant	<i>Catopsilia pomona</i> (Fabricius, 1775)	VC
19.			Mottled Emigrant	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)	C
20.		Pierinae	Common Gull	<i>Cepora nerissa</i> (Fabricius, 1775)	C
21.			Common Jazabel	<i>Delias eucharis</i> (Drury, 1773)	VC
22.	Lycaenidae	Polyommatinae	Dark Grass Blue	<i>Zizeeria karsandra</i> (Moore, 1865)	VC
23.			Lesser Grass Blue	<i>Zizina otis</i> (Fabricius, 1787)	VC
24.			Pale Grass Blue	<i>Pseudozizeeria maba</i> (Kollar, 1844)	VC
25.			Pierrot	<i>Castalius rosimon</i> (Fabricius, 1775)	R
26.			Tiny Grass Blue	<i>Zizula hylax</i> (Fabricius, 1775)	R
27.		Curetinae	Indian Sunbean	<i>Curetis thetis</i> (Drury, 1773)	R
28.	Papilionidae	Papilioninae	Lime	<i>Papilio demoleus</i> (Linnaeus, 1758)	R
29.			Common Crow	<i>Papilio polytes</i> (Linnaeus, 1758)	O
30.			Common Jay	<i>Graphium doson</i> (C. & R. Felder, 1864)	R

Note: VC- Very common; C- Common; O- Occasionally seen; R- Rare.

disturbances were observed. Therefore, biologically rich and active life supporting conditions at different areas in park might have supported these 30 butterfly species.

Grass yellow (*Eurema* spp.) was the most abundant butterfly reported during the survey. This might be because of polyphagous nature, which makes this species commonest butterfly in

world (Larsen, 1987). Wet and dry forms which were morphologically different were seen in Common Emigrant. This ability to produce dry form (Wynter-Blyth, 1956) also seen in Evening Brown. Hence, butterflies are ubiquitous creatures, which exhibit unique evolutionary adaptations that enable them to associate with diversified ecosystem (Pierie *et al.*, 2002).

Authors recommend conducting comprehensive and detailed investigations on butterfly habitat specificity. This would involve a deeper understanding of butterfly biology, the ecology of their host plants, and the distribution and abundance of food plants within the study area. Such studies play a crucial role in formulating effective policies aimed at restoring and preserving the existing flora, particularly in protected areas. By gathering this valuable information, researchers can gain insights into the current status of butterfly species and initiate further research endeavors focused on their conservation. These efforts are pivotal in addressing the needs and challenges faced by butterflies, ultimately contributing to their long-term survival and well-being.

ACKNOWLEDGEMENTS

The authors are thankful to the Head, Department of Zoology, University of Lucknow for providing necessary laboratory facilities; local visitors and park employees who provided secondary information for this exploration.

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