



Butterfly species diversity and relative abundance in Smriti Upvan Ashiyana, Lucknow, U.P., India

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Abstract

The studies on butterfly's population were conducted in the Smriti Upvan Ashiyana, Lucknow from the month of February 2021 to August 2021. And revealed presence of 62 species of butterflies belonging to 45 genera which represents five families. Family Nymphalidae has been most abundant and comprising 24 species, followed by 16 species of Lycaenidae, 14 species of Pieridae, 6 species of family Papilionidae and 2 species of Hesperidae was recorded from the study area during the study period. The relative abundance and diversity of each butterfly species depends upon the availability of food source, habitat condition and their environmental conditions. The present study will illuminate the knowledge about the diversity and abundance of butterflies in the Smriti Upvan Ashiyana, Lucknow.

Keywords: Species-diversity, habitat conditions, environmental factors, abundance lepidoptera

Introduction

Lepidoptera (Butterflies and Moths) are the second largest order of Arthropods and are well recognized, making them particularly valuable for biodiversity survey (Erhardt, A., 1985; Kremen C., 1994; Inouye, D.W., 2001; Tiple and Arun, 2009). Numerous species of butterflies are seasonal and selects only specific set of habitats (Kunte, 1997) [15]. Butterflies are an important aspect of ecosystem for they interact with plants as pollinators and herbivores (Tiple et.al, 2006) [23]. The connection between plants and butterflies is extremely complex and co-evolved (Ehrlich and Raven, 1964) [4], since the butterflies that depends on plants for the food and accomplish their life cycle, opposite to this many of the economically relevant plant species are pollinated by butterflies (Barges et.al, 2003). Some butterflies are attracted on the rotten fruit, carrion, urine and animal dung (Kerr, 2001) [10]. Butterflies are usually regarded as one of the best taxonomically studied groups of insects (Robbins and Opler 1997). The areas with undisturbed natural vegetation and excessive floral diversity support large butterfly communities (Harinath, et.al., 2014). The diversity and distribution of a specific species of butterfly is dependent not merely on the geographical area and the capability of the species to move around within it, but also on the ecological demands of the species (Khan et.al., 2011) [11]. Butterflies are sensitive to environmental pressures and thus extremely suitable for monitoring the health and diversity of ecosystems and detecting indications of environmental change (Hayes et.al, 2009; Bonebrake et.al. 2010) [1, 8]. In previous studies of 5 Urban forest fragments at Lucknow, total 643 butterflies belonging to 5 families of 26 genera were observed by Kumar and Rana, 2018. The main objective of this study is to investigate the butterfly diversity and relative abundance in the Smriti Upvan Ashiyana, Lucknow.

Material and Methods

The Smriti Upvan Ashiyana, Lucknow is a serene, expansive green space and popular venue for large events, including Lucknow mahotsav. It is known for its natural beauty and is located near shaheed path in the Ashiyana/Vrindavan Yojna area. This study was done from the month

of February 2021 to August 2021 in the Smriti Upvan Ashiyana, Lucknow. studies were done twice a day 9:00 to 11:00 AM and 2:00 to 4:00 PM, when butterflies are more active, resting on plants and those in flight has been counted and identified. The diversity and abundance of butterflies were recorded by the direct watching and through the photographic confirmations. The collection of specimen was strictly avoided. Photographs were taken from different angles as often as possible to get sufficient photos with DSLR Camera. On the basis of constant sighting of the butterfly species has been divided into three categories namely Very Common, Common and Rare. All scientific name followed in the present study are in accordance with Kunte, 2000 [14]; Varshney, 1983; Van Gasse P. 2021 and common English names follow Wynter-Blyth, 1957. The collected all data has been calculated by Simpson's Diversity (D), Shannon-Wiener Diversity Index (H),

$$\text{Genus (\%)} = \frac{\text{total number of genus in a family}}{\text{total number of genus in all families}} \times 100$$

$$\text{Species (\%)} = \frac{\text{total number of species in a family}}{\text{total number of species in all families}} \times 100$$

Results and Discussion

The studies on butterfly's population were conducted in the Smriti Upvan Ashiyana, Lucknow from the month of February 2021 to August 2021. The total 62 species belonging to 5 families of 45 genera recorded from the study site Table-1. The diversity and abundance of butterflies are declining through the fragmentation of their natural habitat, extending of modern cities. Among them 24 species belonged to family Nymphalidae, 14 species belonged to Pieridae, 16 species belonged to Lycaenidae, 6 species belonged to Papilionidae and 2 species belonged to Hesperidae. Among these 62 species of butterflies was recorded from the study area, where 4 species of butterflies have found to be protected under the Wildlife Protection Act, 1972. Gaudy Baron (*Euthalia lubentina*) belongs to Schedule IV, Danaid Eggfly (*Hypolimnas misippus*) belongs to Schedule I, Lime Blue (*Chilades lajus*) belong to Schedule II and Gram Blue (*Euchryops cnejus*) belongs to

Schedule II. The butterfly list along with their abundance of different families is given in (Table-2). The results show that the highest relative abundance of butterflies was recorded from the family Nymphalidae (2.133) and least abundant family was Hesperidae with (0.223) than the other families given in (Table-2). The diversity of butterfly in different families has been calculated by Simpson Diversity Index (D). Family Nymphalidae shows highest diversity index (0.85) and the lowest diversity was recorded from the family Hesperidae (0.38) (Table-2). In the present observation estimation, highest genera percentage were recorded of the family Nymphalidae and Lycaenidae 15 genera (33.33%) followed by Pieridae 10 genera (22.22%), Papilionidae 3 genera (6.66%) and Hesperidae 2 genera (4.44%) given in (Table-3, Fig-1). The highest species percentage composition of butterfly were recorded from the family Nymphalidae 24 species(38.70%) followed by Pieridae 14 species (22.58%), Lycaenidae 16 species (25.80%), Papilionidae 6 (9.67%) and Hesperidae 2 species (3.22%) given in (Table-3, Fig-1). Smriti upvan provides a better prospect to shield biodiversity and set a paradigm of how wildlife can be secluded and conserved close to urban

areas, without encumbering the development of the same. Matter *et al.*, 2003 suggested that the abundance of individuals is assumed to increase proportionately with habitat area. The results are in tune with the findings of Venkataramana,S.P.,2010 who reported that the relative abundance of butterfly species of Eastern Ghats in Andhra Pradesh under categories like very common, common, less common, rare and very rare. Similar results were also reported by Deokar and Shukla, 2015, who reported that the 65 species of butterflies from Kolamarka Conservation Reserve, Central India and the highest number of species was observed from family Nymphalidae and the lowest from Hesperidae. Thakur and Bhardwaj 2011, Harsh,S., 2014, Shiva and Swamy, 2014, Sushmita,et.al.,2021^[20]; 2022 also reported that the family Nymphalidae is the most diverse family in Himachal Pradesh, Madhya Pradesh and Andhra Pradesh India respectively. Further, the results are supported by Rajagopal *et al.*, 2011 who observed that the relative abundance of butterfly species diversity usually increases with diversity of plant species in Arignar Anna Zoological Park during 2005 to 2006.

Table 1: Checklist of butterfly species recorded from the Smriti Upvan Ashiyana, Lucknow

S.No.	Families/Common Name	Scientific Name	Status
PAPILIONIDAE G3/ S6			
1	Common Rose	<i>Atrophaneura aristolochiae</i> (Fabricius)	R
2	Common Mormon	<i>Papilio polytes</i> (Linnaeus)	VC
3	Lime Butterfly	<i>Papilio demoleus</i> (Linnaeus)	C
4	Common Jay	<i>Graphium doson</i> (Linnaeus)	VC
5	Tailed Jay	<i>Graphium agamemnon</i> (Linnaeus)	R
6	Spot Swordtail	<i>Graphium nomius</i> (Esper)	R
PIERIDAE G10/S14			
7	Psyche	<i>Leptosia nina</i> (Fabricius)	C
8	Three- Spot Grass Yellow	<i>Eurema blanda</i> (Boisduval)	VC
9	Small Grass Yellow	<i>Eurema brigitta</i> (Cramer)	VC
10	Pioneer	<i>Belenois aurota</i> (Fabricius)	R
11	Yellow Orange Tip	<i>Ixias pyrene</i> (Linnaeus)	R
12	Common Gull	<i>Cepora nerissa</i> (Fabricius)	R
13	Common Jezebel	<i>Delias eucharis</i> (Drury)	C
14	Mottled Emigrant	<i>Catopsilia pyranthe</i> (Linnaeus)	VC
15	Common Wanderer	<i>Pareronia valeria</i> (Cramer)	C
16	Common Emigrant	<i>Catopsilia pomona</i> (Fabricius)	VC
17	Spotless Grass Yellow	<i>Eurema laeta</i> (Boisduval)	C
18	Common Grass Yellow	<i>Eurema hecabe</i> (Linnaeus)	VC
19	Indian Cabbage White	<i>Pieris canidia</i> (Evans)	R
20	Tree Yellow	<i>Gandaca harina</i> (Horsfield)	VC
NYMPHALIDAE G15/S24			
21	Blue Tiger	<i>Tirumala limniace</i> (Cramer)	C
22	Striped Tiger	<i>Danaus genutia</i> (Cramer)	C
23	Plain Tiger	<i>Danaus chrysippus</i> (Linnaeus)	VC
24	Common Crow	<i>Euploea core</i> (Cramer)	VC
25	Black Rajah	<i>Charaxes solon</i> (Fabricius)	R
26	Common Palmfly	<i>Elymnias hypermnestra</i> (Linnaeus)	C
27	Common Bush Brown	<i>Mycalesis perseus</i> (Fabricius)	C
28	Tawny Coster	<i>Acraea violae</i> (Fabricius)	R
29	Common Leopard	<i>Phalanta phalantha</i> (Drury)	R
30	Common Baron	<i>Euthalia aconthea</i> (Cramer)	C
31	Gaudy Baron	<i>Euthalia lubentina</i> (Cramer)	R
32	Painted Lady	<i>Vanessa cardui</i> (Linnaeus)	C
33	Yellow Pansy	<i>Junonia hierta</i> (Fabricius)	R
34	Chocolate Pansy	<i>Junonia iphita</i> (Cramer)	VC
35	Lemon Pansy	<i>Junonia lemonias</i> (Linnaeus)	R
36	Peacock Pansy	<i>Junonia almana</i> (Linnaeus)	VC
37	Grey Pansy	<i>Junonia atlites</i> (Linnaeus)	R
38	Great Eggfly	<i>Hypolimnas bolina</i> (Linnaeus)	VC
39	Danaid Eggfly	<i>Hypolimnas misippus</i> (Linnaeus)	R

40	Angled Castor	<i>Ariadne ariadne</i> (Linnaeus)	VC
41	Common Castor	<i>Ariadne merione</i> (Cramer)	VC
42	Common Evening Brown	<i>Melantis leda</i> (Linnaeus)	C
43	Dark Evening Brown	<i>Melanitis phedima</i> (Cramer)	C
44	Commander	<i>Moduza procris</i> (Cramer)	R
LYCAENIDAE G15/S16			
45	Gram Blue	<i>Euchrysops cnejus</i> (Fabricius)	C
46	Plains Cupid	<i>Chilades pandava</i> (Horsfield)	VC
47	Common Hedge Blue	<i>Actolepis puspa</i> (Horsfield)	C
48	Pale Grass Blue	<i>Pseudozizeeria maha</i> (Kollar)	C
49	Indian Sunbeam	<i>Curetis thetis</i> (Drury)	R
50	Forget–Me–Not	<i>Catochrysops strabo</i> (Fabricius)	R
51	Quaker	<i>Neopithecops zalmora</i> (Butler)	R
52	Dark Cerulean	<i>Jamides bochus</i> (Stoll)	R
53	Common Line blue	<i>Prosotas nora</i> (C.felder)	R
54	Dark Grass Blue	<i>Zezeeria karsandra</i> (Moore)	C
55	Lime Blue	<i>Chilades lajus</i> (Stoll)	C
56	Pea Blue	<i>Lampides boeticus</i> (Cramer)	R
57	Common Pierrot	<i>Castalius rosimon</i> (Fabricius)	R
58	Zebra Blue	<i>Leptotes plinius</i> (Fabricius)	R
59	Cornelian	<i>Deudorix epijarbas</i> (Moore)	C
60	Silver Streak blue	<i>Iraota timoleona</i> (Stoll)	R
HESPERIIDAE G2/S2			
61	Rice Swift	<i>Borbo cinnara</i> (Wallace)	VC
62	Small branded swift	<i>Pelopidas mathias</i> (Fabricius)	C

G-Genus, S-Species, VC - Very Common, C -Common, R - Rare.

Table 2: Calculate the species diversity and relative abundance of butterfly in the Smriti Upvan Ashiyana, Lucknow

S.No.	Family	Species diversity	Relative abundance
1	Papilionidae	0.56	0.958
2	Pieridae	0.8	1.787
3	Nymphalidae	0.85	2.113
4	Lycaenidae	0.47	0.855
5	Hesperiidae	0.38	0.223

Table 3: Families, number and percentage of genus and species of butterflies recorded from the Smriti Upvan Ashiyana, Lucknow

S.NO.	Family	Genus (45)	Species (62)	Genus (%)	Species (%)
1	Papilionidae	3	6	6.66	9.67
2	Pieridae	10	14	22.22	22.58
3	Nymphalidae	15	24	33.33	38.70
4	Lycaenidae	15	16	33.33	25.80
5	Hesperiidae	2	2	4.44	3.22

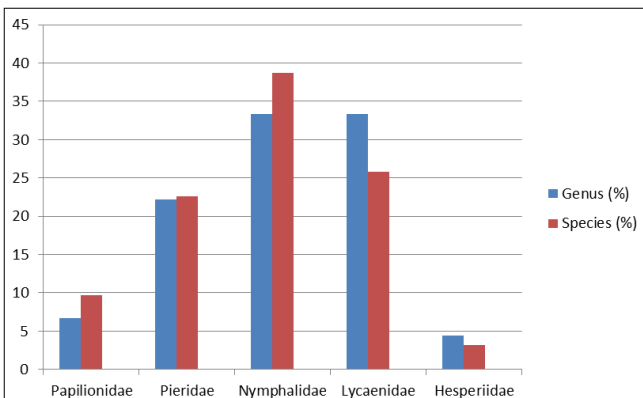


Fig 1: Family wise percentage compositions of butterflies genus and species recorded in the Smriti Upvan Ashiyana, Lucknow

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