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Studies on Butterfly (Order: Lepidoptera) fauna in Different sites of District Lucknow, Uttar Pradesh, India

Ashok Kumar *

Department of Zoology, B.S.N.V.P.G. College, University of Lucknow, Lucknow, Uttar Pradesh, India

Corresponding Author: * Ashok Kumar

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Abstract

The diversity of biological organisms at one place, group, or time is, in itself, more or less not useful, but comparable measurements of diversity from multiple places, Groups or times will answer crucial questions about how the diversity arose and how we may best act to maintain it. Butterflies are among the most easily recognisable and attractive of all animals. They are instantly familiar and also universally popular. Lucknow, located in the centre of Uttar Pradesh state, possesses gardens and a green belt. There are many species of plants present in these gardens and green areas, which support a wide variety of butterfly species. Butterfly fauna in the Lucknow region was investigated by using an aerial net, a killing jar in four different sites, e.g. Cantonment Area, Vrindavan Yojana, National Bureau of Fish Genetic Resources, and Indian Institute of Sugarcane Research from July 2018 to June 2019. During the entire study, the total collection by all possible methods yielded a total of 655 butterflies representing 23 species belonging to 4 families. Out of 23 species, Cantonment Area 19 species (178), Vrindavan Yojana 12 species (126), National Bureau of Fish Genetic Resources 16 species (160) and Indian Institute of Sugarcane Research 19 species (191) Overall 8 species were found to be common at all the selected areas and 3 species namely *Pieris rapae*, *Precis hirta* and *Hypolimnas missipus* rarely were found. The species population was maximum at NBFGR (191), followed by VY 19 species (178), IISR 16 species (160) and minimum at CA 12 species (126).

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INTRODUCTION

Butterflies are among the most easily recognisable of all animals. They are instantly familiar and also universally popular. Their wings, unlike those of most other insects, are colourful, opaque and of characteristic shape. The development of color the range, diversity, brilliance and kaleidoscopic assortment of patterns exhibited by butterflies is unrivalled anywhere in the animal kingdom, except possibly by the birds. Butterflies are typically active during the day, and because they are so skilled in flight, they have achieved an almost worldwide distribution, though, as

with most animal groups. There is a greater diversity to be found in the tropics. Unfortunately, butterflies are threatened by habitat destruction and fragmentation almost everywhere (Mathew, 2001). The distribution of butterflies involves both expanding and contracting ranges. Natural changes in the distribution of species can be difficult to deduce because they tend to be slower and subtler than the dramatic changes caused by man. Unfortunately, most expanding ranges involve introduced species, and most contracting ranges are due to the destruction of natural habitats (Lafontaine, 1997). Expansion in a species range

may often be in response to human activities favouring these species, making these butterflies opportunists. To document such temporal changes over time, a baseline faunal inventory must first be established.

Butterflies have been studied systematically since the early 18th century, and 19,238 species have been documented worldwide (Heppner 1998). This figure is not constant because of the continuous discovery of new butterflies (Goodden, 1997; Stokoe, 1974; Green and Huang, 1998), and also due to ongoing disagreements between taxonomists over the status of many species. All over the world, butterfly populations are declining because of environmental changes and anthropogenic activities. It is necessary to understand the significance of butterflies, as these attractive creatures are crucial for the ecosystem. In our ecosystem, the existence of Lepidoptera (Butterflies) serves as an ecological indicator of a healthy environment and plays a critical role in pollination, both of which are essential for achieving sustainability and conserving the diversity of flora and fauna as well. Nearly 28,000 species of butterflies exist globally, approximately 80% found in tropical regions. The Indian subcontinent is home to 1,379 species of butterflies that are well-known for their diverse topography, climate, and vegetation (Varshney and Smetacek, 2015; Van Gasse, 2021). They are the second-largest, most prevalent, and most recognisable arthropods, coming under the phylum Arthropoda and making up the insect order Lepidoptera. Butterflies have frequently taken on a central role in biodiversity monitoring actions and are considered umbrella species in conservation efforts (New, 1997). The appearance of butterflies is seasonal, observable sometimes, rare, and not visible at other times (Kunte, 2000). The population of butterflies is significantly affected if even minor changes occur in environmental conditions such as temperature, precipitation, humidity, and other factors (Prakash *et al.*, 2024a). Butterflies are a very well-studied group of insects. Because they are so sensitive to changes in their environment, they make a great model to study the effects of climate change, since ectotherms' physiological processes depend on temperature a lot (Dennis, 1993; Parmesan, 2003; Illan *et al.*, 2012). A broad range of factors poses significant threats to the important natural habitats of butterflies, and the conservation of these natural habitats is crucial for the future survival of endangered species (Boriani *et al.*, 2005; Van Swaay *et al.*, 2006). Dry and wet seasons are key determinants that affect species diversity and seasonality (Wolda 1988; Groton *et al.*, 2012). This paper highlights the diversity, richness, and impact of seasonal variations on the butterfly population of the district of Lucknow.

2. MATERIALS AND METHODS

Butterflies were collected from July 2018 to June 2019 during the morning session (7.00 am-10.00 am) at four different sites in the district of Lucknow. Butterflies were caught using an aerial net and then transferred to a killing jar. The captured butterflies were brought to the laboratory, and their wings were spread on the spreading board. Further, these butterflies were stored in an insect box. Later, the dried specimens were kept in an insect box for future reference. Temperature and humidity were also recorded. Butterflies were identified directly at each site or, in any difficult case, following photography and identification, following Wynter-Blyth 1957; Kunte 1996,1997 & 2000. and compare the photographs available in Indian Butterflies website (photos copyright by Krushnamegh Kunte, June 2007).

OBSERVATIONS AND RESULTS

A total of 655 butterflies of 23 species belonging to four families were observed and identified. 178 individuals of 19 species were recorded in Vrindavan Yojana, 126 individuals of 12 species in Cantomental Area, 160 individuals of 16 species were recorded in IIRS and 191 individuals of 19 species were collected at NBFGR Except for 4 species (*Precis lemonias*, *Precis orithya*, *Pieris rapae* and *Tirumala limniace*), other all species recorded in Vrindavan Yojana except for eleven species (*Atella phalanta*, *Precis lemonias*, *Precis hirta*, *Hypolimnas missipus*, *Danaus genutia*, *Pieris rapae*, *Zizina otis*, *Catoclystis strabo*, *Lampides boeticus*, *Tarucus extricatus*, *Papilio demoleus*), remaining all species were recorded in Cantomental Area. Next, most species were collected in IISR except for seven species (*Precis hirta*, *Hypolimnas missipus*, *Anaphaeis aurota*, *Colotis fausta*, *Catoclystis strabo*, *Lampides boeticus*, *Tarucus extricatus*) and four species (*Atella phalanta*, *Precis hirta*, *Pieris rapae*, *Colotis fausta*), were not found in NBFGR (Table-1, Figure-1).

The diversity of butterflies found at four sites of the District of Lucknow during the study period was high. The total of 23 species collected by hand net and hanging traps can be classified into 4 families and 19 genera. The butterfly families with the highest number of species are Nymphalidae and Pieridae (Table1, 2 &3). These are large groups of Lepidoptera and include many common species that can be seen nearly anywhere. For Nymphalidae, *Danaus chrysippus*, *Euploea core* are the most abundant species that were found at all study sites in the district of Lucknow. (Table1, 2 &3) & Figure 1.

Table 1. Number Of Individuals of Butterflies Recorded from Different Study Sites of District Lucknow

Family Nymphalidae			VY	CA	IISR	NBFGR
1	<i>Atella phalanta</i>	Common leopard	3		2	
2	<i>Precis lemonias</i>	Lemon pansy			10	1
3	<i>Precis orithya</i>	Blue pansy		3	2	12
4	<i>Precis hiera</i>	Yellow pansy	1			
5	<i>Tirumala limniace</i>	Blue tiger		2	1	4
6	<i>Hypolimnas missipus</i>	Danaid eggfly	1			1
7	<i>Danaus genutia</i>	Striped tiger	1		6	3
8	<i>Danaus chrysippus</i>	Plain tiger	9	6	8	8
9	<i>Euploea core</i>	Common crow	2	4	25	6
Family: Pieridae						
10	<i>Ixias marianne</i>	White orange tip	35	24	29	38
11	<i>Catopsilia pyranthe</i>	Mottled emigrant	3	1	5	2
12	<i>Eurema brigitta</i>	Small grass yellow	80	68	44	72
13	<i>Pieris rapae</i>	Small white			4	
14	<i>Catopsilia crocale</i>	Common emigrant	4	2	2	5
15	<i>Anaphaeis aurota</i>	Pioneer	17	1		6
16	<i>Cepora nerissa</i>	Common gull	4	6	12	9
17	<i>Colotis fausta</i>	Large salmon arab	2	5		
Family: Lycaenidae						
18	<i>Chilades contracta</i>	Small cupid	7	4	1	2
19	<i>Zizina otis</i>	Lesser grass blue	1		3	8
20	<i>Catochrysops strabo</i>	Forget me not	3			5
21	<i>Lampides boeticus</i>	Pea blue	2			6
22	<i>Tarucus extricatus</i>	Rounded pierrot	2			1
Family: Papilionidae						
23	<i>Papilio demoleus</i>	Lime butterfly	1		6	2

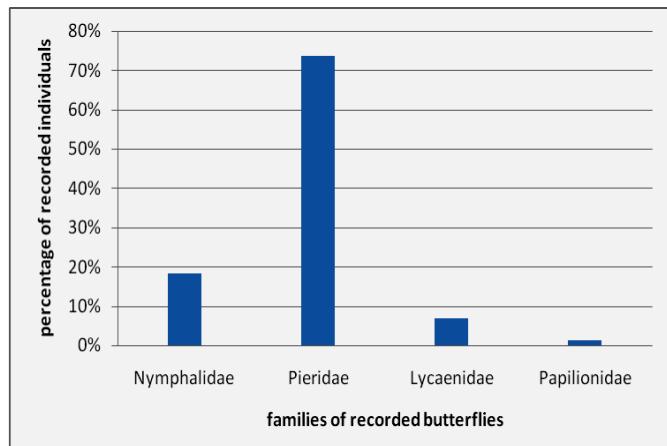
VY-Vridavan Yojana, **CA**-Cantamental Area, **IIRS** Indian Institute of Sugarcane Research, **NBFGR**-National Bureau of Fish Genetic Resources

Table 2. Number Of Individuals and Number of Species in Different Families.

S. No.	Family	Number of individuals	No. of species
1	Nymphalidae	121	9
2	Pieridae	480	8
3	Lycaenidae	45	5
4	Papilionidae	9	1
Total		655	23

Table 3: Number Of Genera, Number of Species and Percentage of Species in Different Families.

S.N.	Family	No. of Genera	No. of Species	Percentage of Species
1.	Nymphalidae	6	9	39.13
2.	Pieridae	7	8	34.78
3.	Lycaenidae	5	5	21.73
4.	Papilionidae	1	1	4.34

Figure 1: Percentage Of Individuals Recorded in Different Family in District Lucknow

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