

# Diversity of Butterflies during Monsoon Season in an Urban Reserve Forest Patch of Bangalore City

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**Abstract:-** Butterflies are the indicators of various ecological characteristics of a habitat. They are highly sensitive to the changes in the environment and thus would help to determine the health of the ecosystem. Hence assessing the diversity of butterflies of an area becomes very much significant. The present study on butterfly diversity during the monsoon season was carried out in Bangalore – urban, at two different study areas; Doresanipalya reserve forest and Lalbagh Botanical garden. Random survey of butterflies was done using a Line transect method. A total of 43 species of butterflies, belonging to six families were recorded in the Doresanipalya forest and a total of 30 species, belonging to five families were recorded in Lalbagh. The family Nymphalidae was found to be dominant family at both the study areas. The diversity indices such as Shannon-Weiner diversity index, Shannon Evenness index and Simpsons diversity index were calculated for the study sites.

**Keywords:-** Butterfly, Diversity, Forest, Line-Transect, Monsoon, Urban Forest.

## I. INTRODUCTION

More than half of the world's biodiversity consists of insects. They account for a total of 70% of the world's animal population [1]. The insects lie in the zone of maximum species richness when related to biodiversity [2]. Among the insects the butterflies are the most popular and the most well-known species. They are the most colorful and beautiful insects in the world [4]. These are called as the flying jewels of the nature. Around 1700 species of butterflies are found throughout the world. In India there are around 1500 species of butterflies, of which peninsular India hosts around 351 species of butterflies [3]. Butterflies are the biological indicators and a good indicator of climate and season; they also serve in framing strategies for conservation [5]. They indulge in a range of behaviours such as basking, mud-puddling, mating, resting, etc. [6]. The butterflies belong to the phylum Arthropoda, class Insecta

and order Lepidoptera. They can be classified into two superfamilies Hesperioidea and Papilionoidea. The Hesperioidea consists of skippers and the Papilionoidea consists of the true butterflies. There are six families; Hesperioidea, Papilionoidea, Pieridae, Nymphalidae, Riodinidae and Lycaenidae [6].

The present study on butterfly diversity during the monsoon season aims to have knowledge on the species richness and diversity of butterflies at two different study areas of Bangalore urban - Doresanipalya forest and Lalbagh Botanical Garden during the monsoon season.

## II. STUDY AREA

The study was conducted in two different areas in Bangalore urban; Doresanipalya forest and Lalbagh. Doresanipalya forest is also known as J P Nagar Reserve forest. It is located amidst the concrete city, J P Nagar, Bangalore. It is a lush green 35-hectare patch of forest. The latitude and longitude of the forest are **12.972442, 77.580643 respectively**. The climate is very pleasant and moderate. The mean temperature in the monsoon is 26°C. The forest has a rich green cover, Bamboo, Acacia and Eucalyptus are some of the plants that are found in plenty. The forest can be approached by four gates; towards the north is J P Nagar 4<sup>th</sup> phase, Panduranga nagar is towards east, Brigade Millennium Ave in the south and Arekere Mico Layout in the west.

Lalbagh Botanical Gardens, is located in the heart of the city. The garden is home for a variety of flora and fauna. It is spread over an area of 240 acres, it has well laid out roads, a good collection of plant species, and has more than 1,854 species of plants and trees. The mean temperature being 26°C in the monsoon. The latitude and longitude of the garden are **12.950743 and 77.584777 respectively**. The garden can be approached by four gates, the main gate is at the North facing towards Subbaiah circle, the West gate is towards Basavanagudi, the South gate is towards Jayanagar and the East gate is towards the Double Road [7].



Fig 1:- A satellite image of Doresani Palya forest

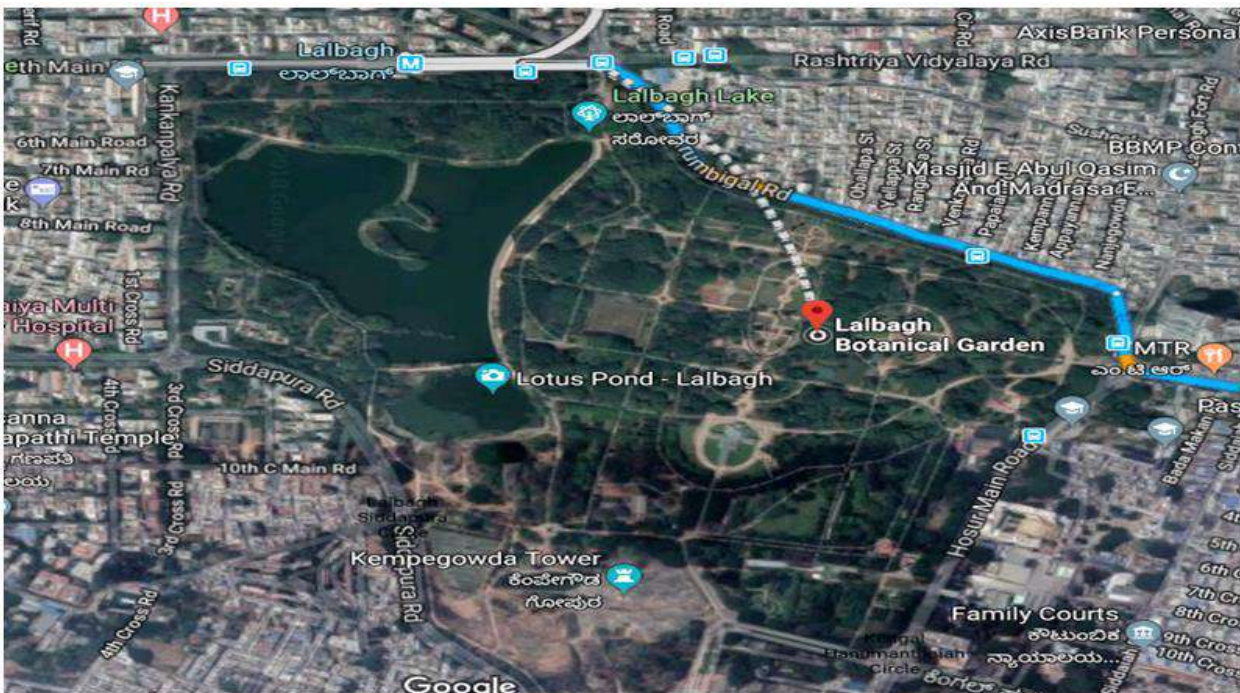


Fig 2:- A satellite image of Lalbagh

**III. METHODOLOGY**

A random survey of the butterflies was carried out during the monsoon season in the months of July and August. The butterflies were counted by direct visual method. A line transect method was adopted to study the diversity of butterflies in the two study areas. In this method, observations were taken in the morning i.e., between 8:30 to 11:00 in the Doresani Palya forest and 9:00 to 1:00 in the Lalbagh, when the butterflies were most active. A field guide was used to identify the butterflies. A binocular was used to observe and a camera Sony DSC-HX10V was used to capture the pictures of the butterflies.

➤ *Statistical Analysis*

The diversity indices – Shannon-Weiner diversity index, Shannon Evenness index, Simpsons diversity index were calculated.

A. Shannon-Weiner diversity index -

$$H = \sum_{i=1}^{\delta} P_i \ln P_i$$

B. Shannon Evenness index –

$$E = \frac{H_{max}}{\ln(S)}$$

C. Simpsons diversity index–

$$D = \sum (n/N)^2$$

## OBSERVATION

SL NO	COMMON NAME	SCIENTIFIC NAME	OCCURRENCE STATUS	DORESANIPALYA FOREST	OCCURRENCE STATUS	LALBAGH
<b>Hesperiidea</b>						
1	Southern Chestnut Bob	<i>Iambrix salsala luteipalpis</i>	R	+	R	+
2	Common Snow flat	<i>Tagiades japetus obscurus</i>	O	+	-	-
3	Tricolour Pied Flat	<i>Coladenia indrani indra</i>	VR	+	-	-
4	Grass Demon	<i>Udaspes folus</i>	-	-	R	+
<b>Papilionoidea</b>						
5	Common mormon	<i>Papilio polytes</i>	VC	+	VC	+
6	Blue mormon	<i>Papilio polymnestor</i>	R	+	R	+
7	Crimson rose	<i>Pachliopta hector</i>	C	+	C	+
8	Common Rose	<i>Pachliopta aristolochiae</i>	C	+	C	+
9	Tailed jay	<i>Graphium agamemnon</i>	C	+	C	+
10	Common jay	<i>Graphium doson</i>	C	+	C	+
11	Lime Swallowtail	<i>Papilio demoleus</i>	C	+	C	+
12	Narrow-banded Bluebottle	<i>Graphium teredon</i>	C	+	C	+
<b>Pieridae</b>						
13	Indian wanderer	<i>Pareronia hippia</i>	C	+	-	-
14	Common Grass Yellow	<i>Eurema hecabe</i>	VC	+	C	+
15	Lemon Emigrant	<i>Catopsilia pomona</i>	VC	+	C	+
16	Mottled Emigrant	<i>Catopsilia pyranthe</i>	C	+	VC	+
17	Spotless grass yellow	<i>Eurema laeta</i>	VC	+	-	-
<b>Nymphalidae</b>						
18	Dark blue tiger	<i>Tirumala septentrionis</i>	VC	+	VC	+
19	Plain tiger	<i>Danaus chrysippus</i>	VC	+	VC	+
20	Striped tiger	<i>Danaus genutia</i>	VC	+	VC	+
21	Double branded crow	<i>Euploea sylvester</i>	VC	+	VC	+
22	Common crow	<i>Euploea core</i>	VC	+	VC	+
23	Baronet	<i>Euthalia nais</i>	C	+	-	-
24	Chocolate pansy	<i>Junonia iphita</i>	VC	+	VC	+
25	Yellow pansy	<i>Junonia hierta</i>	R	+	-	-
26	Lemon pansy	<i>Junonia lemonias</i>	VC	+	C	+
27	Chestnut	<i>Neptis jumbah</i>	C	+	-	-

	streaked sailer					
28	Common sailer	<i>Neptis hylas</i>	C	+	-	-
29	Bamboo Treebrown	<i>Lethe europa</i>	O	+	-	-
30	Common castor	<i>Ariadne merione</i>	C	+	-	-
31	Angled castor	<i>Ariadne Ariadneindica</i>	C	+	-	-
32	Common Four-ring	<i>Ypthima huebneri</i>	VC	+	VC	+
33	Common Three-ring	<i>Ypthima Asterope mahratta</i>	VC	+	VC	+
34	Tailed Palmfly	<i>Elymnias caudate</i>	R	+	R	+
35	Dark branded Bushbrown	<i>Mycalesis mineus</i>	C	+	-	-
36	Common Bushbrown	<i>Mycalesis perseus</i>	C	+	-	-
<b>Riodinidae</b>						
37	Double-banded Judy	<i>Abisara bifasciata</i>	R	+	-	-
<b>Lycaenidae</b>						
38	Tailless Lineblue	<i>Prosotas dubiosa</i>	R	+	-	-
39	Lankan Large Oakblue	<i>Arhopala amantes</i>	R	+	-	-
40	Common Pierrot	<i>Castalius rosimon</i>	C	+	C	+
41	Red pierrot	<i>Talicauda nyseus</i>	-	-	C	+
42	Small cupid	<i>Chilades parrhasius</i>	C	+	C	+
43	Plains cupid	<i>Chilades pandava</i>	C	+	C	+
44	Tiny grass blue	<i>Zizula hylax</i>	C	+	C	+
45	Lesser grass blue	<i>Zizinaotis otis</i>	-	-	VR	+
46	Lime Blue	<i>Chilades lajus</i>	C	+	C	+

Table 1:- Species Abundance

#### ➤ Occurrence Status

A. *Doresanipalya forest*: VR (Very rare - 1), R (Rare - 7), O (Occasional - 2), C (Common - 20) and VC (Very common - 13)

B. *Lalbagh*: VR (Very rare - 1), R (Rare - 4), O (Occasional - 0), C (Common - 15) and VC (Very common - 10)

#### IV. RESULT AND DISCUSSION

Examination of the data suggested that the *Doresanipalya forest* and *Lalbagh* have a rich diversity of butterflies. A total of 43 species of butterflies were recorded in the *Doresanipalya forest* belonging to 6 families; Hesperioidea, Papilionoidea, Pieridae, Nymphalidae, Riodinidae and Lycaenidae. A total of 30 species were recorded in *Lalbagh* belonging to 5 families; Hesperioidea,

Papilionoidea, Pieridae, Nymphalidae and Lycaenidae. The list of butterflies is provided in the table 1. The Nymphalidae family was found to be dominant in both the study areas; with 19 species in the *Doresanipalya forest* and 10 species in *Lalbagh*. The butterflies were classified as Very rare (VR), Rare (R), Occasional (O), Common (C) and Very common (VC).

The number of butterflies were found to be more in the *Doresanipalya forest* when compared to *Lalbagh*. This could be due to the availability of the host plants in large numbers, it is less disturbed by human habitat and also because the environment was suitable for their growth and development, hence an abundant number of species were found in *Doresanipalya forest*.

Some of the species like Red pierot (*Talicauda nyseus*), Lesser grass blue (*Zizina Otis*) and Grass Demon (*Udaspes folus*) were found only in Lalbagh and not in Doresanipalya forest.

Sl. No	Family	No. of species in Doresanipalya forest	% of participation	No. of species in Lalbagh	% of participation
1	Hesperiidea	3	7	2	4
2	Papilionoidea	8	19	8	33
3	Pieridae	5	12	3	13
4	Nymphalidae	19	44	10	42
5	Riodinidae	1	2	-	-
6	Lycaenidae	7	16	7	8

Table 2:- Family-wise depiction of butterflies

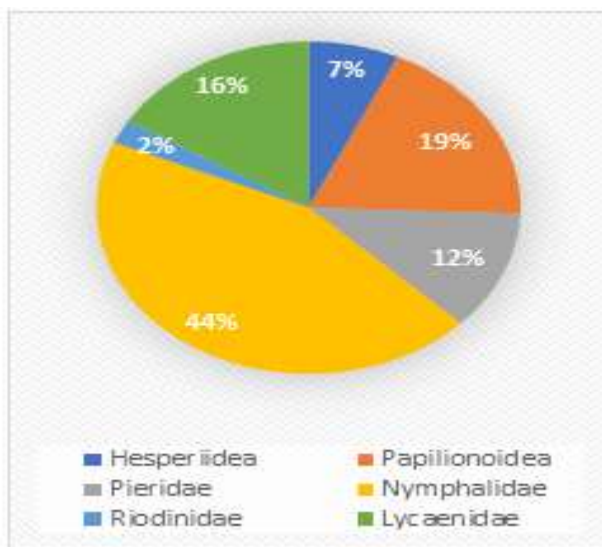


Fig 3:- Graph depicting species abundance in Doresanipalya forest

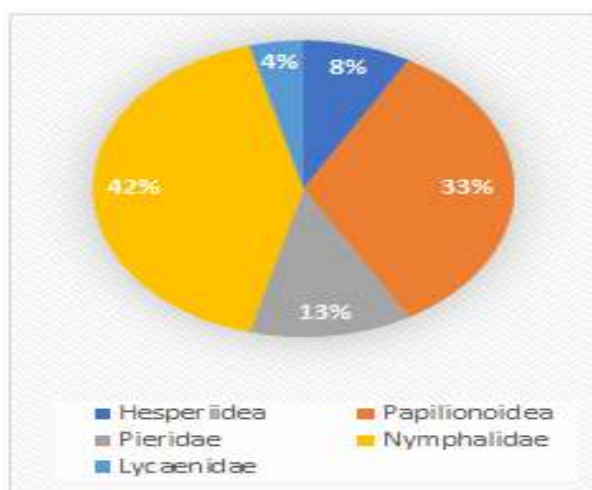


Fig 4:- Graph depicting species abundance in Lalbagh

Sl. No	Index	Doresanipalya forest	Lalbagh
1	Shannon Weiner index	1.447	1.444
2	Evenness index	0.808	0.897
3	Simpsons diversity index	0.742	0.775

Table 3:- Table showing the various indices

The different diversity indices were calculated for the given data, the Shannon Weiner index was high, the Evenness index was less and the Simpsons diversity index

was high for Doresanipalya forest. This indicates that the diversity of butterflies is high for the Doresanipalya forest.

## V. CONCLUSION

The study on butterfly diversity gave us an immense knowledge about the habitat, the various species of butterflies that are present in the two study areas. In a patch of 34 - hectare land, 43 species of butterflies were found, Doresanipalya forest being a reserve forest and less disturbed, had an abundant number of butterfly species. This observation is quite significant and it stresses on the conservation of butterfly species in urban pockets.



Fig 5

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