

Comparative Study on the Variation Seen in Butterfly Diversity between Lalbagh Botanical Garden and Harike

Shreya G. Rao¹, Dr. P U Antony²

¹Student, 2nd year M.Sc. Zoology, CHRIST (Deemed to be University), Hosur road, Bangalore

²Professor, Department of Lifesciences, CHRIST (Deemed to be University), Hosur Road, Bangalore

Abstract:- This paper deals with the comparison of butterfly diversity in two different places with completely different characteristics. Lalbagh botanical garden is in the most populated place of Karnataka state that is Bangalore and Harike is a small village in Sringeri taluk of Chickamagaluru district, Karnataka, with very less population. Monsoon season study was carried out in both the places and the collected data was analysed using various indices. The two places were then compared and it was found that the butterflies were abundant in Harike than Lalbagh Botanical Garden except Lycaenidae species. The diversity of butterflies also indicated that the place also had a rich floral diversity.

Keywords:- Butterflies, Diversity, Evenness, Indices, Lycaenidae, Nymphalidae

I. INTRODUCTION

Butterflies are the indicator species which helps in understanding the health of the ecosystem [1]. The butterflies have typical 4 staged life cycle and they prefer particular plants for feeding and laying egg [2]. Hence, the butterfly study also gives an idea about floral diversity of that area.

Western Ghats is known as the “Biodiversity Hotspot” of India is a home to variety of butterflies and various endemic species. The region is also rich in floral diversity and the human interaction with the wildlife is very less since the population residing there is relatively lower than the urban areas [3] [4].

Lalbagh Botanical Garden is in the Bangalore South and it is a home for various tropical plants and the garden

also includes various flowering plants which are the host plant for various butterflies [5]. It also has areas filled with grass which is the preferred plants for Lycaenidae species. The Botanical Garden stays in the urban area where the human interaction is more with the butterflies [6].

This paper deals about the variation in the diversity of butterflies between Harike, a small village in the Western Ghats of Karnataka and Lalbagh Botanical Garden in Bangalore Urban Region. Monsoon season study was done in both the places to compare the butterfly diversity in two places with different characteristics. Study was carried out in the month of July and August, which are the peak months of Monsoon season.

II. PLACE OF STUDY

Two places were selected for study to compare the variation in diversity of butterflies. They are,

A. A small village called Harike in Sringeri taluk, Chickamagaluru district of Karnataka state, India. The village lies on the banks of River Tunga and has thick forests, Areca nut farms and paddy fields. This village is surrounded by thick evergreen forest which is rich in flowering plants, creepers, leaf litter and also rich with medicinal plants, wild herbs and shrubs, grass and weeds which are the host plants of various butterflies. It is close to the Kudremukh National Park, Western Ghats and lies in the buffer zone of Bhadra wildlife Sanctuary. It is a very small village with the population of about 50 people hence, the human interference is very less. The study area falls between 13024'04.3N and 75014'48.7E with latitude and longitude 13.401197,



Fig 1:- Satellite image of Harike (75.246867 respectively)



Fig 2:- Satellite image of Lalbagh

B. Lalbagh Botanical Garden, Bangalore Urban- Lalbagh is a 240 acres garden and is located in Bengaluru South. The garden has over 1,000 species of flora. The park has some rare species of exotic plants. (Fig. 2).

Lalbagh has four gates. The western gate is situated near Siddapura Circle. The eastern gate has a wide road and Jayanagar is very close. The southern gate is often referred to as a small gate and is near Lalbagh Road. The northern gate is a fairly wide and big road leading to the Glass House and serves as the primary exit [7].

III. METHOD AND METHODOLOGY

A. Surveying Techniques

Two surveying techniques were used, they include Line Transect method and Random Sampling Method. In line transect method, roads within the forests and Garden were used as a line. In Random sampling method, the sampling areas were selected throughout the study area in a random or irregular fashion and it was used to avoid bias. The butterflies in the area under study were randomly observed and counted. Butterflies were identified using various manuals, reports [8] [9], books [4], journals [3].

B. Analysing the Data using Various Indices

The collected data were analysed using various indices like diversity and evenness indices to get the values.

➤ Diversity Indices

- Simpson’s Index

$$D = \sum (n/N)^2 \qquad D = \frac{\sum n(n-1)}{N(N-1)}$$

Where

ni = the number of individuals of the species

N = known total number of individuals for all species.

- Shannon-Weiner Index

$$H = -\sum (Pi \ln Pi) \quad i=1$$

where Pi= No. of species of particular family/ total no. of species

➤ Evenness Indices

- Shannon’s Evenness Index (EH):

$$EH = H/H_{max} \quad \text{where, } H_{Max} = \ln(S)$$

where S is the total number of the species of that season and H is the Shannon-Weiner index.

- Evenness Index (J)

$$J = H / (\log S)$$

where, H is Shannon- Weiner index and S is the total number of the species of the season.

➤ Observation

The observed butterflies in both the places were noted down, numbers were counted and listed in the tables below. (Table 1 and Table 2). Total 52 individuals were observed in Lalbagh Botanical Garden and 65 individuals were observed in Harike belonging to various families.

Total of 19 species belonging to 5 different families were observed in Lalbagh Botanical Garden listed in Table 1.

Sl. No	Common Name	Scientific Name	Remark	No. of Individuals seen
Family Papilionidae- Swallowtails				
1	Common Blue bottle	<i>Graphium serpedon</i>	Flying, nectaring	2
2	Tailed Jay	<i>Graphium agamemnon</i>	Flying, nectaring	3
3	Common Mormon	<i>Papilio polytes</i>	Flying	3
4	Crimson Rose	<i>Pachliopta hector</i>	Nectaring, flying	2
Family Lycaenidae- blues				
1	Indian Lime Blue	<i>Chilades laju</i>	Basking	3
2	Lesser Glass Blue	<i>Zizina otis</i>	Basking, flying	2
3	Tiny Grass Blue	<i>Zizula hylax</i>	Flying, resting, laying eggs	4
4	Oriental Plains Cupid	<i>Chilades pandava pandava</i>	Basking, rstring	4
5	Red Pierrot	<i>Talicauda nyseus</i>	Basking, resting	3
6	Small cupid	<i>Chilades parrhasius</i>	Basking, resting	2
Family Nymphalidae- Brush footed butterflies				
1	Common Four Ring	<i>Ypthima huebneri</i>	Basking	2
2	Striped Tiger	<i>Danaus genutia</i>	Flying	2
3	Chocolate Pansy	<i>Junonia iphita</i>	Basking, flying	3
4	Tailed Palmfly	<i>Elymnias caudata</i>	Flying	5
5	Lemon Pansy	<i>Junonia lemonias</i>	Basking	2
Family Pieridae- Yellows and whites				
1	Common grass yellow	<i>Eurema hecabe</i>	Resting, nectaring	2
2	Common Emigrant	<i>Catopsilia pomona</i>	Flying, nectaring, resting	5
Family Hesperidae- skippers				
1	Chestnut bob	<i>Iambrix salsala</i>	Resting, basking	2
2	Small spotted ace	<i>Thoressa astigmata</i>	basking	1

Table 1:- Butterflies seen in Lal Bhag Botanical Garden, Monsoon Season

Total 22 species belonging to 5 different families were observed in Harike. They were counted and listed in Table 2.

Sl. No	Common Name	Scientific Name	Remark	No. of Individuals seen
Family- Papilionidae- Swallowtails				
1	Common rose	<i>Pachliopta aristolochiae</i>	flying	1
2	Blue Mormon	<i>Papilio polymnestor</i>	Mud puddling, flying, nectaring, resting	9
3	Crimson rose	<i>Pachliopta hector</i>	nectaring	1
4	Tailed jay	<i>Graphium agamemnon</i>	Nectaring, flying	2
Family Lycaenidae- blues				
1	Angled pierrot	<i>Caleta decidia</i>	resting	1
2	Common Grass blue	<i>Zizina labradus</i>	Resting	1
Family- Nymphalidae- Brush footed butterflies				
1	Chocolate pansy	<i>Junonia iphita</i>	Basking, flying	5
2	Common Crow	<i>Euploea core</i>	Basking, flying, ranging	3
3	Dark blue tiger	<i>Tirumala septentrionis</i>	flying	2
4	Common four ring	<i>Ypthima huebneri</i>	Basking, flying	3
5	Glassy tiger	<i>Parantica aglea</i>	Nectaring, flying, resting	7
6	Common three ring	<i>Ypthima asterope</i>	Resting, basking, flying	6
7	Rustic	<i>Cupha erymanthis</i>	Resting, basking	2
8	Sahyadri cruiser	<i>Vindula erota</i>	Nectaring, mud puddling	3
9	Gladeye bushbrown	<i>Mycalasis patina</i>	Resting, basking	9
10	Malabar tree nymph	<i>Idea malabarica</i>	flying	2
Family Pieridae- Yellows and White				
1	Chocolate albatross	<i>Appias lycnida</i>	flying	1
2	Small grass yellow	<i>Eurema brigitta</i>	Nectaring, flying	2
3	Great orange tip	<i>Hebomoia glaucippe</i>	Nectaring, flying	2
Family Hesperidae- Skippers				
1	Fulvous pied flat	<i>Pseudocoladenia dan</i>	Basking	1
2	Chestnut bob	<i>Iambrix salsala</i>	Resting, basking	2
3	Common dartlet	<i>Oriens gola</i>	Resting	1

Table 2: Butterflies seen in Harike, Monsoon Season

IV. RESULT AND DISCUSSION

The values obtained after analysing the data with various indices were listed in Table 3.

Indices	Lalbagh	Harike
Simpson’s Index	0.192	0.251
Shannon Diversity index	1.512	1.419
Shannon Evenness Index	0.514	0.459
Evenness Index	1.183	1.057

Table 3:- Result of Indices

It was seen that Shannon Weiner index was higher in Lalbagh than Harike in Monsoon season indicating that the Lalbagh has richness and evenness. It is known that higher the evenness value, lower is the diversity. From the table it is seen that the evenness indices values are lower for the data obtained in Harike, indicating that the diversity is more compared to Lalbagh Botanical Garden.

Simpson’s Diversity value is higher for Harike than Lalbagh, higher the value, greater is the diversity. From all the indices value it is seen that the diversity is more in Harike than Lalbagh. The indices values are plotted in the graph below (Fig. 3).

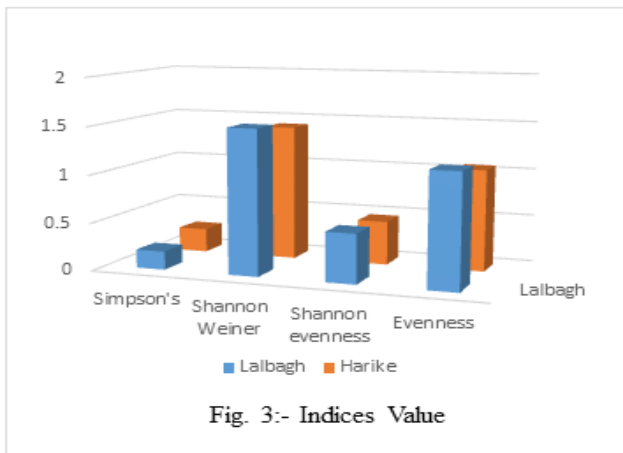


Fig. 3:- Indices Value

in Lalbagh than Harike. Lycaenidae species usually dependent on grass. Harike experiences heavy rainfall due to which the grass dies. But Lalbagh receives comparatively less rain and grass abundancy is more in Lalbagh hence, number of lycaenids were more in Lalbagh. All the other families are more abundant in Harike due to the floral richness seen in that place.

V. CONCLUSION

From the data obtained from comparison it is seen that the butterfly diversity is more in Harike and the species evenness is more in Lalbagh Botanical Garden. Lycaenidae species were abundant in Lalbagh due to availability of grasses required for their life cycle. Nymphalidae were the abundant species in Harike including 10 different species indicating that the plants required for their growth is abundant in Harike. From the results it is clear that the floral diversity is also higher in Harike than Lalbagh Botanical Garden.

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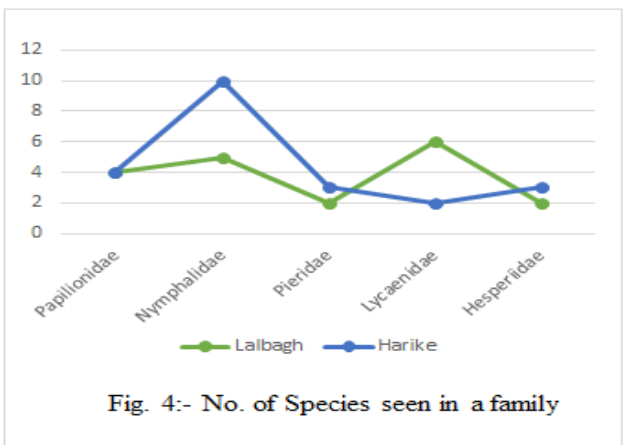


Fig. 4:- No. of Species seen in a family

Another graph was plotted to compare the number of species seen in both the places (Fig. 4). From the graph, it is seen that Family Lycaenidae species were more abundant

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PHOTO GALLERY

