

Seasonal Biodiversity of Butterflies in Mata Jija Bai Government College, Lal Bag Palace, and Surrounding Area in Indore, Madhya Pradesh.

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ABSTRACT

Butterflies, often referred to as the “beauty of the insect world,” are among the most studied insect groups due to their ecological and economic significance. Belonging to the order Lepidoptera and superfamily Papilionoidea, they serve as vital pollinators and effective bio-indicators of environmental health. Their sensitivity to changes in temperature, humidity, rainfall, and habitat quality makes them reliable indicators of ecosystem stability. However, factors such as habitat destruction, urbanization, pesticide use, and illegal collection have led to a decline in butterfly species richness and abundance across India.

The present study was conducted in Indore, located on the southern edge of the Malwa Plateau, Central India. Surveys were carried out over one month in three different seasons across varied habitats including the campus of Mata Jija Bai Government Girls P.G. College (17 acres), Lal Bagh Palace (76 acres), local parks, streets, and terrace gardens. The survey areas, characterized by tree species such as neem, mango, tamarind, ashoka, and diverse shrubs and grasses, provided suitable conditions for butterfly populations. This study aims to document butterfly diversity in Indore and evaluate their role as indicators of ecosystem health. The findings are expected to provide valuable insights into local biodiversity status, highlight the impact of urbanization on species richness, and emphasize the need for conservation measures to protect butterfly habitats in rapidly developing urban landscapes.

Keywords: *Butterflies, Bio-Indicators, Biodiversity, Ecosystem Health, Pollination, Urbanization, Habitat Loss, Indore.*

1. INTRODUCTION

The butterflies are one of the most visible and functional species in the ecosystem (7). Butterflies belong to the Insect order Lepidoptera, specifically belonging to the super family Papilionoidea. The lifespan of butterfly is generally a few weeks to several months. Butterflies are also called the, "Beauty of the Insect world", (Duncan, 1934). Butterflies are the most studied group of insects. Butterflies are also considered as bio-indicators as their presence indicates the status of environment and ecosystem. More the number of species of butterflies present, healthier is the ecosystem.

Central India is associated with a rocky plateau covered by various forest types, grasslands, wetlands, and rivers manifesting functional ecosystems to support rich biodiversity. Insects have their dynamic role in the ecosystem at different trophic levels from producers to carnivores (pollination to decomposition) (2). Butterflies are generally regarded as one of the best taxonomically studied group of insects. Butterflies

are scaled wing insects belonging to the order Lepidoptera of class Insecta. They provide the best rapid indicators of habitat quality (14).

Butterflies are lovely and graceful insects provide economic and ecological benefits to the human society (5). Although India has a rich butterfly fauna, but due to various reason such as habitat destruction, fire, use of pesticides and weedicides and illegal collection for trade, many species have become very and some are on the verge of extinction. Increase urbanization one of the main cause of decrease butterfly species richness, diversity and abundance (2,4,11). Butterflies play an immense role in pollination brings variations through kinds of pollen dispersion from one place to another place (8). Butterflies are one of the most conspicuous species of the Earth's biodiversity. Being extremely responsive to any changes in their environment, namely temperature, humidity, light and rainfall patterns (9,16).

Butterflies hold a special position in ecosystem and their presence and diversity indicates good environmental health of the ecosystem(Kunte 2000; Aluri and Rao 2002; Thomas 2005). Butterflies are considered as one of the best bio-indicators as they are extremely sensitive to any changes in their environment like temperature, light ,rainfall, humidity & loss of habitat .They also have short life cycle due to which their response to change is quick and easily visible (11).A large percentage of butterfly species, like many other insects, are confined to particular microhabitats in comparatively tiny areas of seminatural habitat (Thomas 1991, 1993). At present thereare 315 butterfly species inRed Data Book, and manyof themare extinct [2].

2. STUDY AREA

Indore is located on the southern edge of Malwa Plateau, at an average altitude of 553m (1814ft) above sea level.

Coordinates- 22°43'0"N 75°50'50"E

The survey is conducted at various locations including the campus of Mata Jija Bai Govt. Girls P.G. College, Indore (22.7199° N, 75.8968° E) spread across 17 acres and Lal Bagh Palace, Indore (N 22° 42' 0.198", E 75° 50' 49.5384") spread across 76 acres. Along with these places the local streets, nearby parks and terrace gardens are also visited during the survey.

The survey is conducted for one month duration of three seasons. The survey area consists of many trees like ashoka, neem, mango, tamarind, shrubs and grasses making a well suited place where the richness of butterfly population can be found.

3. METHODOLOGY

Visits are done for one month duration for three seasons- Rain, Winter and Spring at the mentioned locations. Normal android phone is used for taking the pictures of butterflies. Photographs of different species of butterflies are collected and indentified with the help of internet and butterflies are identified on field while observation using field guides Butterflies of India (Smetacek, 2016), The book of Indian Butterflies (Kehimker,2008) and Butterflies of India (Singh, 2020). The survey is conducted during the duration of 10:00AM-12:00PM. Camera and binocular was also taken in use.

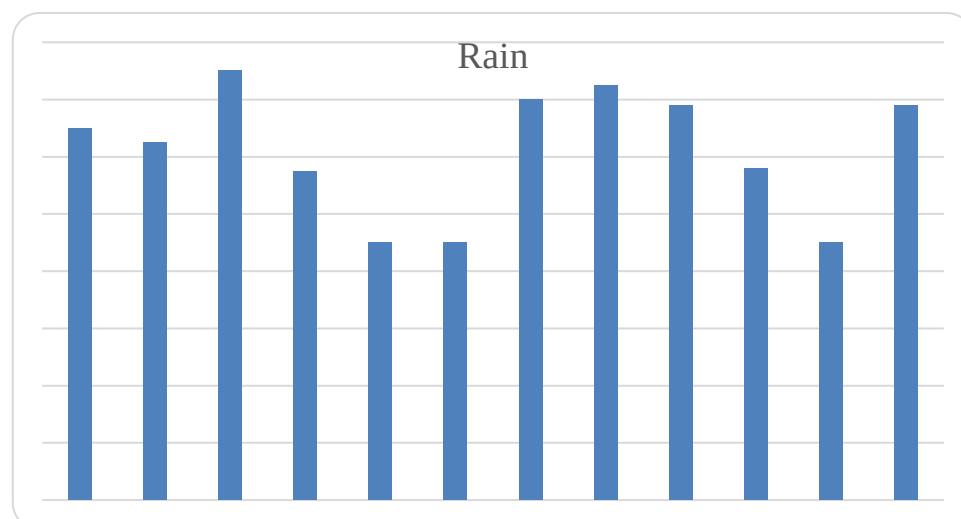


4. OBSERVATIONS

S. No	Species	Common Name	Family
1.	Junoniaiphita	Chocolate pansy	Nymphalidae
2.	Junoniahierta	Yellow pansy	Nymphalidae
3.	Junonialemonias	Lemon pansy	Nymphalidae
4.	Luthrodespandava	Plain cupid	Lycaenidae
5.	Catochrysopsstrabo	Forget me not	Lycaenidae
6.	Camtogrammabilineata	Yellow shell	Geometridae
7.	Ponitaprotodice	Checkered out	Pieridae
8.	Euremalisa	Little yellow	Pieridae
9.	Euremahecabe	Common yellow grass	Pieridae
10	Catopsiliapomona	Common emigrant	Pieridae
11	Ascia	Great southern white	Pieridae
12	Delias eucharis	Jezebel	Pieridae

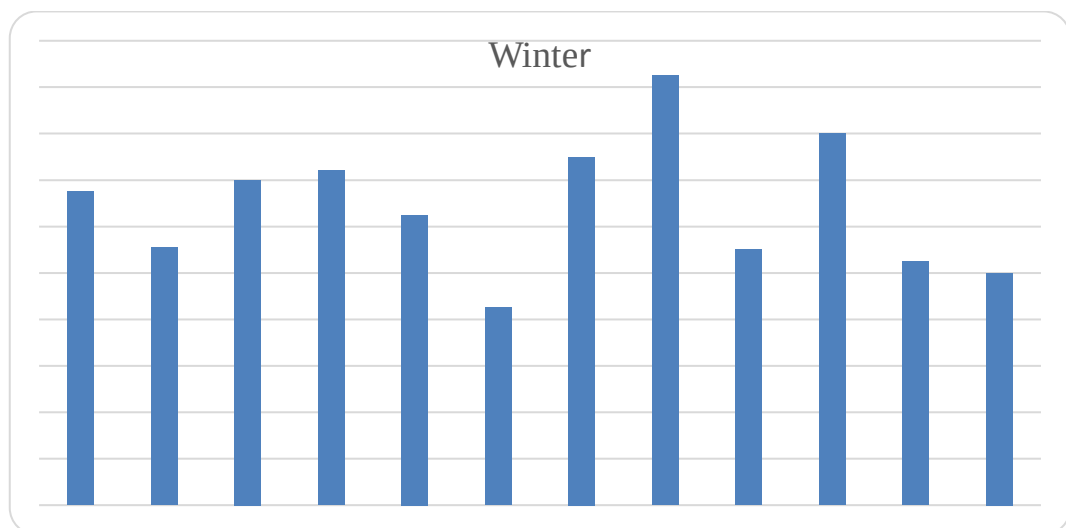
Rainy Season

S. No	Species	Rain
1	Junoniaipshita	130
2	Junoniahierta	125
3	Junonialemonias	150
4	Luthrodespandava	140
5	Camptogrammabilineata	90
6	Ponitaprotodice	110
7	Euremalisa	140
8	Euremahecabe	145
9	Catopsilapomona	138
10	Ascia	116
11	Delias eucharis	90
12	Catochryosops strabo	115



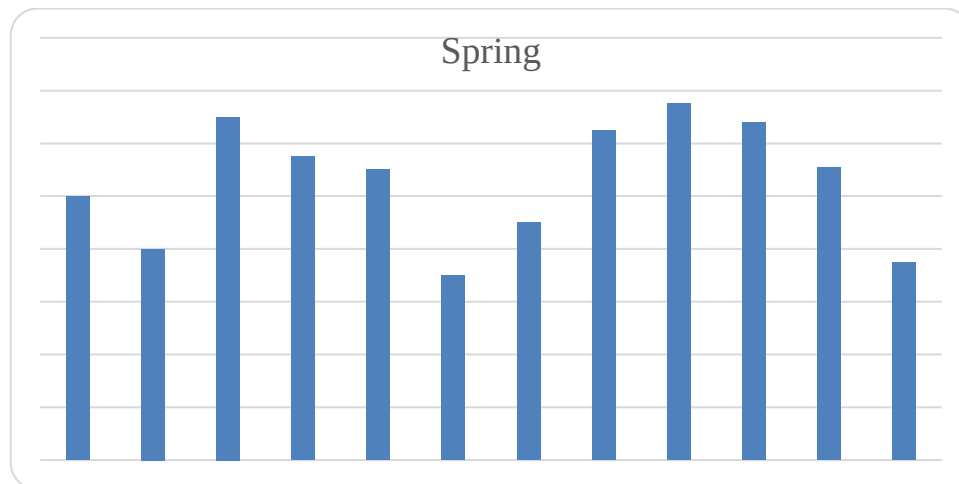
Winter Season

S. No	Species	Winter
1	Junoniaiphita	135
2	Junoniahierta	111
3	Junonialemonias	140
4	Luthrodespandava	144
5	Camptogramma bilineata	125
6	Ponita protodice	85
7	Eurema lisa	150
8	Eurema hecabe	135
9	Catopsilia pomona	110
10	Ascia	160
11	Delias eucharis	105
12	Caatochryosops strabo	100



Spring Season

S. No	Species	Spring
1	Junoniaiphita	100
2	Junoniahierta	80
3	Junonialemonias	130
4	Luthrodespandava	115
5	Camptogrammabilineata	70
6	Ponitaprotodice	90
7	Euremalisa	125
8	Euremahecabe	135
9	Catopsiliapomona	128
10	Ascia	111
11	Delias eucharis	75
12	Catochryosops strabo	70



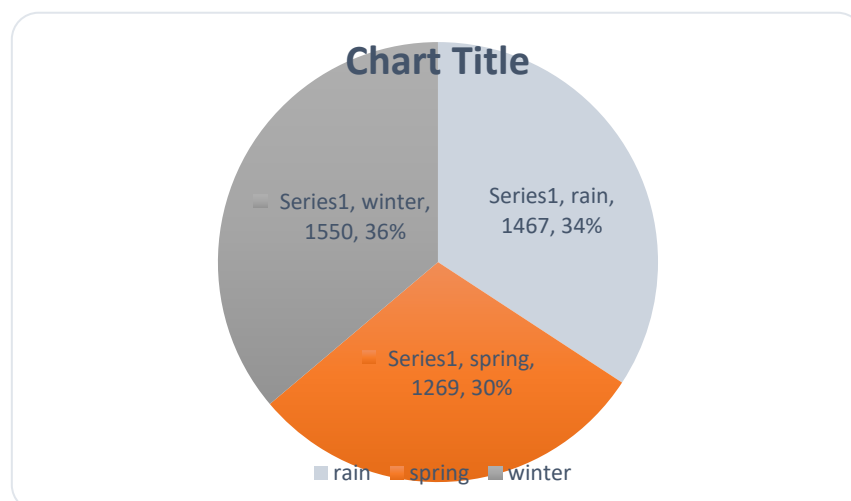
5. RESULT

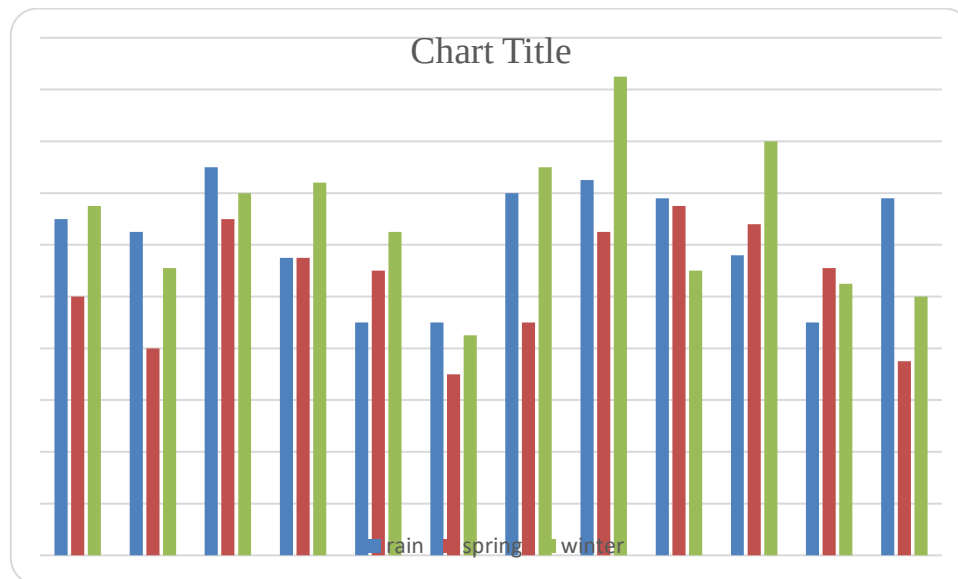
During the survey, 12 species were recorded belonging to 4 different families namely Nymphalidae, Lycaenidae, Geometridae and Pieridae. Among these families 3 species found belonging to family Nymphalidae, 2 species of family Lycaenidae, 1 species of Geometridae and 6 species of family Pieridae. This is observed that population and species of butterflies varies at different locations like some are found on tall trees and some on ground areas. And on ground areas too, species varies like, some species reside on clean and dry areas and many species are found in marshy and shrubby areas.

Rainy Season- The abundant quantity of species of butterflies population is found in rainy season with total to 34%. The majority of species (3 species) found in rainy season belongs mostly to Pieridae family and 1-1 species of family Lycaenidae and Nymphalidae.

Winter Season- The population of butterflies species found 36% during the cold weather conditions. There is only a slight percentage variation in species quantity as compared to rainy season. Maximum number of butterflies which are found belongs to Pieridae family along with two species of Nymphalidae family and one species of Lycaenidae family.

Spring Season- The quantity of species population in this season is found around 30%. The % of butterflies is less as compared to winter and rainy season the reason may be that in spring season there is variation in temperature and humidity in the environment. The species of Nymphalidae and Pieridae family are found in majority during spring season.





6. DISCUSSION

The list of butterflies found in Mata Jija Bai Govt. Girls P.G. College, Indore and Lal Bagh Palace, Indore are formulated in table with their common name and family name. 12 species of butterflies are observed belonging to different families namely Nymphalidae, Lycaenidae, Geometridae and Pieridae with family Pieridae having maximum species.

Human interference result in more gaps, edges which provide more light and space, and diversity in plant structure to support more butterfly species than natural forest (13,6,1). The correlation of disturbance and occurrence of butterflies is attributed to the emergence of secondary vegetation like Lantana camera and so forth, which are good food source of many butterfly species (16). Many species of butterflies depend on remnant vegetation or secondary forest for survival especially in urban areas (13,12). So, for the conversation of species in human dominated landscape, institutional campus maintaining high plant diversity and also different type of habitats is a good option.

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