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Diversity Pattern of Lepidoptera Community in Catchment of Rani Durgawati University Campus, Jabalpur (M.P.)

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Abstract: ***Butterflies (Lepidoptera) generally observed high in man-made gardens or disturbed forests. Present data was collected during study of one year from March 2015 to March 2016 in catchment of Rani Durgavati university campus, Jabalpur as part of an extensive study of biodiversity. Diversity of butterfly community has included 20 species belonging to 5 families and categories on the basis of their abundance and flight period of different seasons. This study is aimed towards contributing to the plane of biodiversity restoration in studied region and development of management strategies so as to ensure sustenance of butterflies and ecosystem services derived from them.***

Keywords: Rani Durgavati Campus, Diversity, Host Plant, Pollination, Butterflies

1. Introduction

Butterflies (Lepidoptera) are the most beautiful and colorful creatures on the earth and have a great aesthetic value. Taxonomically it is regarded as best studied group among class Insect. Generally observed, butterflies play an important role in maintaining the balance of nature and health of the living world. Worldwide there are more than 28,000 species of butterflies and about 80 percent of them found in tropical regions [1] and absent in Antarctica continent while according to Gaonkar, [2] and Kunte [3] approximately 17,200 species of butterfly throughout the world of which, 1,501 species of butterfly are known from India. Alfred *et al.,* [4] have revealed that Indian subcontinent comprise of 2.3 percent of total world's land mass in which approximately 89,500 animal species (7.28% of total world fauna) have been recorded previously.

The Indian subcontinent bearing a diverse terrain, climate and vegetation to hosts about 1500 species of Lepidoptera [5], some of them are migratory species. They fly thousands of miles in the winter to places having a warmer climate, and return back in the spring. Butterflies serve as important plant pollinators in the local environment, and help to pollinate more than 50 economically important plant crops [6]. Butterflies are also good indicators of environmental changes as they are sensitive to habitat degradation and climate changes [3]. Butterflies play an important role in ecosystem where they interact with plants as it is one on the major source of pollination and also an herbivorous insect [7]. Tiple, [8] revealed that the Indian subcontinent hosts about 1,504 species of butterflies out of which peninsular India and the Western Ghats host 351 and 334 species respectively. In Madhya Pradesh and Vidarbha of central India 177 species of butterfly species have been documented [9].

In the recent past, several researchers have studied butterflies from some districts and conservation areas of Madhya Pradesh and Chhattisgarh [10-19] recorded 174 species of butterflies belonging to eight families from Madhya Pradesh and Chhattisgarh.

Jabalpur is one among the major cities of Madhya Pradesh in India. Jabalpur (23°10' N and 79°59' E) is situated in the eastern half of M.P. in the central region of India with geographic area of 5211 square km out of which 1169 square km area has covered under forest that is 22.43% of its geographical area. Rani Durgavati University also known as University of Jabalpur is Government University in Jabalpur, Madhya Pradesh, India. It was named after the queen Rani Durgavati. The university was constituted and established on 12 June 1956 under the Jabalpur University Act, 1956 (Act No. 22 of 1956) with territorial jurisdiction over Jabalpur revenue district. It shifted to its present location at Saraswati Vihar, Pachpedi, Jabalpur in 1961. The Rani Durgawati University campus is spread over 99.63 acres (403,200 m^2) of scenic beauty and environment-friendly surroundings. It accommodates various education departments and facilities, therefore, people used to say that the university campus is a city within the city of Jabalpur. Rani Durgawati Vishwavidyalaya created an excellent habit and source of alteration for many faunal species like insects, reptiles, birds and mammals. The area is surrounded with a very large variety of trees, mini forest, vast grassland and very small hills; these are the elements for architecting a preferred habitat or such species.

2. Material and Methods

Study site: Rani Durgavati University Campus, Jabalpur (M.P.)

The Rani Durgawati University Jabalpur lies at on Dumna Airport Road (79.9787° E and 23.1614° N) about 4 km east of Jabalpur railway station. The campus is spread over an area of 99.63 acres (403,200 m^2) of scenic beauty and environment-friendly surroundings. The area enjoys semi-arid climate with mean annual precipitation of 1350 mm.

The campus is surrounding by trees, shrubs, grasslands and small hills. The vegetation planted around the university has created a very good habitat and source of attraction for many faunal species like insects, reptiles, birds and mammals.

Figure 1: Rani Durgawati University Campus, Jabalpur (M.P.)

3. Collection and Identification

In central India, The random survey on butterflies was carried out on sunny days every month continuously for one year from March 2015 to March 2016. The abundance and seasonality was observed from 5 to 9 in the morning and from 5 to 7 in the evening by transect counting.

Butterflies were primarily identified directly in the field by observation and the difficult cases followed capture or photography of the organism. In critical conditions, specimens were collected only with handheld aerial sweep nets. Each specimen was placed in a plastic bottle and carried to the laboratory for further identification with the help of a field guide [20], [3],[5],[21-22]. In the present study, all scientific names followed [23] guidelines. The observed butterflies were categorized in five categories on the basis of their abundance in Rani Durgavati campus i.e., Very common, Common, Not Rare [8].

Table: 1 Systematic list of Lepidoptera (Butterflies) reported from Catchment of Rani Durgavati University campus, Jabalpur (M.P.)

S.No.	Common Name	Scientific Name	Status	Flight period			
Order: Lepidoptera **Suborder: Rhopalocera** **Family: *Papillionidae* (3 Species)**							
1.	Common Mormon	*Papilio polytes* (Linnaeus)	**VC**	S	M	PM	W
2.	Common Jay	*Graphium doson* (Felder)	**C**	-	M	PM	W
3.	Lime Butterfly	*Papilio demoleus* (Linnaeus)	**C**	S	M	-	W
***Nymphalidae* (9 Species)**							
4.	Common Crow	*Euploea core* (Cramer)	**VC**	S	M	PM	W
5.	Peacock Pansy	*Junonia almana* (Linnaeus)	**NR**	-	-	PM	-
6.	Plain Tiger	*Danaus chrysippus* (Linnaeus)	**VC**	S	-	PM	W
7.	Glassy Tiger	*Parantica aglea* (Stoll)	**NR**	S	M	PM	-
8.	Common Evening Brown	*Melanitis leda* (Linnaeus)	**VC**	S	M	PM	W
9.	Common Castor	*Ariadne merione* (Cramer)	**C**	S	-	PM	W
10.	Blue Pansy	*Junonia orithiya* (Linnaeus)	**NR**	S	-	PM	-
11.	Striped Tiger	*Danaus genutia* (Cramer)	**VC**	S	M	PM	W
12.	Lemon Pansy	*Junonia lemonias* (Linnaeus)	**NR**	-	M	-	W
***Pieridae* (4 Species)**							
13.	Common Grass Yellow	*Eurema hecabe* (Linnaeus)	**VC**	S	M	PM	W
14.	Indian Cabbage White	*Pieris canidia* (Sparrman)	**NR**	-	-	PM	W
15.	Psyche	*Leptosia nina* (Fabricius)	**VC**	S	M	PM	W
16.	Common Emigrant	*Catopsilia pomona* (Fabricius)	**C**	S	-	-	W
***Lycaenidae* (3 Species)**							
17.	Plains Cupid	*Chilades pandava* (Horsfield)	**NR**	-	-	PM	W
18.	Pale Grass Blue	*Pseudozizeeria maha* (Kollar)	**C**	S	M	-	-
19.	Common Pierrot	*Castalius rosimon* (Fabricius)	**VC**	S	M	PM	W
***Hesperiidae* (1 Species)**							
20.	Small Branded Swift	*Pelopidas mathias* (Fabricius)	**NR**	-	M	PM	-

VC-Very Common (> 100 sightings), **C**-Common (50-100 sightings), **NR**–Not Rare (15-50 sightings), **S**-Summer, **M**-Monsoon, **PM**-Post Monsoon, **W**-Winter.

4. Result and Discussion

Total 20 species of Lepidoptera have recorded from the study site that belonging to five families namely *Nymphalidae*, *Papillionidae*, *Pieridae*, *Hesperiidae* and *Lycaenidae*. Among recorded species from the university campus, 45% are belonging to family *Nymphalidae* showed the maximum species richness, comprising of 9 species, while others have shown less representatives (Figure 2.) *i.e.,* followed by 4 species of *Pieridae*, 3 species of *Lycaenidae*, 3 species *Papillionidae* and 1 species of *Hesperiidae*. The preference of butterflies for particular habitats is associated with the availability of larval host plants and adult nectar plants. The rich diversity of butterflies, especially the *Nymphalids* in Rani Durgawati University campus indicates a varied assemblage of floral species. The flora in studied site is of mixed type with herbs and shrubs dominating the vegetation in the tropical climate. Even though family *Lycaenidae, Pieridae* and *Nymphalidae* exhibited maximum species diversity, the reason for the abundance of *Nymphalidae* in the study area may be due to the dominance of larval food plants in the region [24].

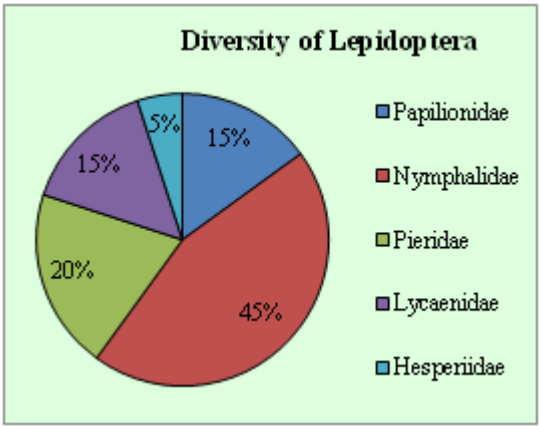

Figure 2: Distribution of Lepidoptera families in Rani Durgawati University Campus, Jabalpur (M.P.)

Among these species, 7 (35%) were not rare, 5 (25%) were commonly occurring and 8 (40%) were very common (Figure 2). It was also noted that 7 species were present in all seasons from which *Papilio polytes* belongs to *Palpillionidae* family, *Euploea core, Melanitis leda* and *Danaus genutia* belong to *Nymphalidae* family, *Eurema hecabe* and *Leptosia nina* belong to *Pieridae* family and *Castalius pandava* belong to *Lycaenidae* family. Highest number which is 17 species has seen during post monsoon. Total 14 species have observed during summer while least number 15 species have recorded in winter season. Least number that is 13 species has observed during monsoon (Figure 4).

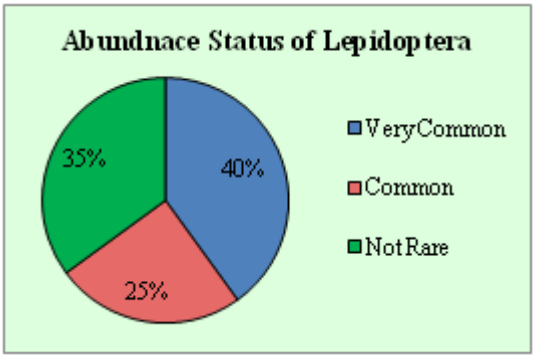

Figure 3: Abandence Status of Lepidoptera in Rani Durgawati University Campus, Jabalpur (M.P.)

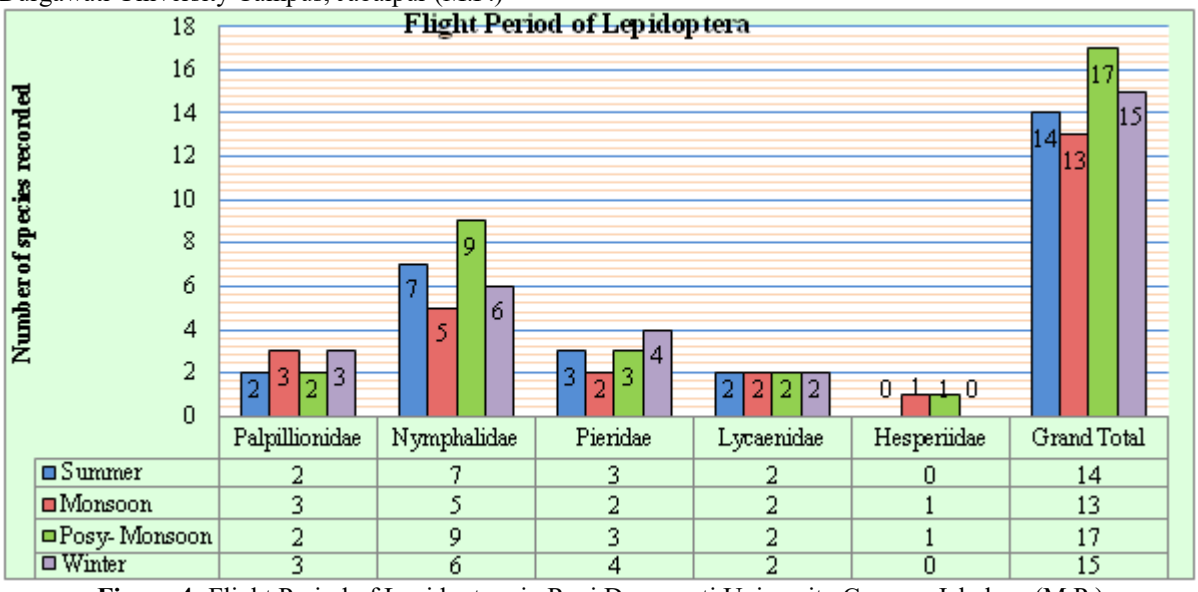

Figure 4: Flight Period of Lepidoptera in Rani Durgawati University Campus Jabalpur (M.P.)

Butterfly diversity varies with season. They are abundant for only a few months and rare or absent during other months of the year [3]. Wynter- Blyth, [20] have identified two seasons as peaks, March-April and October for butterfly abundance in India. In present study numbers of butterflies were peaked during post-monsoon season (late August to October) which was similar to the findings of [25-26]. The species abundance was less during monsoon.

Butterfly diversity studies carried out at various places showed a varied pattern the Lakeville range of Bhadra Wildlife Sanctuary, Karnataka with 54 species, west Singhbhum in Jharkhand revealed 71 species [27]. Nymphalid butterflies in Rani-Garbhanga reserve forest; Assam was 109 species [28]. The diversity in tropical forest research institute, Jabalpur, was 66 species [25] and 25 species of butterflies were reported by [29] from Southeast region of Narmada valley Jabalpur.

5. Conclusion

In the present study Rani Durgawati University catchment has found a good habitat for butterflies which have abundant vegetation and green-lands. This is the first effort in exploring the butterfly wealth of Rani Durgawati University campus. Butterfly fauna has fluctuated with season and along with shrub and grasses with flowering plants also support more butterflies. The university campus need to be continuously monitored and efforts to be made to document its unknown butterflies and there is essential need to have a vision documentation on the sustainable development of university area. The present list of butterfly species is not conclusive and exhaustive and future exploration will be continued to update this checklist.

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