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Seasonal Patterns of Lepidoptera Abundance and Species Diversity in Pariyat River at Panagar Region, Jabalpur (M.P)

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Abstract

A preliminary study on the diversity of butterflies was carried out in Pariyat River at Panagar region and its vicinity, Jabalpur district, M.P., India from June 2015 to May 2016. The Pariyat river landscape is featured by sprawling by lush green hillocks, natural floral vegetation and also dump yard of dairy farm effluent as well as eco-forests which serves as the store house of a wide variety of butterflies showing an excellent diversity. A total of 36 species of butterflies belonging to 28 genera and five families were recorded during the study period of four seasons, of which 9 species were under the rare category. During the course of the present studies it was observed that the family Nymphalidae represented by 13 species was the most dominant followed by Lycaenidiae (7 species), Pieridae (7species), Hesperidia (5 species) and Papilionidae (4 species). In the whole study year maximum species (30 species) were recorded during post monsoon season. As the study area houses 36 species of butterflies distributed throughout the riverside of Pariyat, it can be presumed to have a good diversity of butterflies, which may be attributed especially to the floral vegetation, provides a suitable nectar source throughout the varying seasons that serves a breeding habitat to the butterflies.

Keywords: Lepidoptera, Diversity, Seasonal Variation, Pariyat River.

Introduction

Insects are the most diverse group and comprise half of earth's diversity in which butterflies are regarded as one of the best taxonomically studied groups of insects (Thomas, 2005). Globally there are more than 28,000 species of butterflies, of which about 80 percent found in tropical regions (Robbins and Opler, 1997) and absent in Antarctica continent while according to Gaonkar (1996) and Kunte (2000) approximately 17,200 species of butterfly throughout the world of which, 1,501 species of butterfly are known from India where as Kunte (2009) and Tiple (2011) documented that Indian subcontinent is a diverse terrain, climate and vegetation which hosts about 1,504 species of butterflies with 100 (15%) endemic and 26 (1.8%) globally threatened species (Singh and Pandey, 2004). According to Venkataramani (1986) India is a "Butterfly Paradise". Heppner (1998) documented that since early 18th Century, so far 19,238 species were studies taxonomically and documented worldwide. Butterflies are highly sensitive to their habitat quality (Ramana, 2016).

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Insects which have scales on their wings are belonging to order Lepidoptera. Lepidopteron are Butterflies which commonly referred to as "insects of the sun" with their eye catching colour and delicate charisma. Butterflies play a significant role in ecology by actively involved in pollination thus help in fertilization and seed setting of plant. Butterflies have aesthetic value due to their diverse colors on their wings and behavioral display (Gupta and Mondal, 2005; Chandraker et al., 2007). The butterflies occur seasonally in a specific habitat (Krishna *et al.* 2008), so that butterflies are considered as best ecological indicator of habitat quality (Brown, 1991; Kocher and Williams, 2000). They are sensitive to habitat disturbance caused by both manmade anthropogenic activities and abiotic factor including the temperature, humidity, and light levels (Balmer and Erhardt, 2000). Butterflies serve as important plant pollinators in the local environment, and help to pollinate more than 50 economically important plant crops (Borges et al., 2003). Thus the present study aimed to explore the species richness, abundance, diversity and seasonal variation of butterflies in Pariyat river of Panagar region which might be helpful to improve the habitat, pave the way for future research and formulation of an effective strategy for conservation of this important group of insects.

Material and Methods

The findings presented here are based on 6 months random surveys carried out June 2015 to May 2016 in the surroundings of Pariyat River at Panagar region, Jabalpur. 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 and placed in a plastic bottle and carried to the laboratory for further identification with the help of a field guide (Wynter-Blyth 1957; Kunte 2000; Haribal 1992). In the present study, all scientific names followed Varshney (1983) guidelines. The observed butterflies were categorized in five categories on the basis of their abundance in Panagar region of Pariyat river i.e., Very common, Common, Very rare, Rare, Not Rare (Tiple et al., 2006).

Table I. List of Butterflies recorded from Panagar Region together with common name and status

S.No.	Zoological Name	Common Name	Status	Flight period			
Pieridae (7)							
1	*Eurema hecabe* (Linnaeus)	Common Grass Yellow	**VC**	S	M	PM	W
2	*Catopsilia pomona* (Fabricius)	Lemon Emigrant	**VC**	S	M	PM	W
3	*Eurema laeta* (Boisduval)	Spotless Grass Yellow	**C**	-	M	PM	W
4	*Catopsilia pyranthe* (Linnaeus)	Mottled Emigrant	**C**	-	M	PM	W
5	*Anaphaeis aurota* (Fabricius)	Pioneer	**R**	S	-	-	-
6	*Leptosia nina* (Fabricius)	Psyche	**NR**	S	-	PM	-
7	*Cepora nerissa* (Fabricius)	Common Gull	**R**	-	-	-	W
Hesperiidae (5)							
8	*Hasora chromus* (Cramer)	Common Banded Awl	**VC**	S	M	PM	W
9	*Badamia exclamationis* (Fabricius)	Brown Awl	**VC**	S	M	PM	W
10	*Pelopidas mathias* (Fabricius)	Small-Branded Swift	**C**	S	M	PM	-
11	*Borbo cinnara* (Wallace)	Rice Swift	**NR**	S	-	PM	-
12	*Spialia galba* (Fabricius)	Indian Skipper	**R**	-	-	PM	-
Lycaenidae (7)							
13	*Spindasis vulcanus* (Fabricius)	Common Silver line	**VC**	S	M	PM	W
14	*Tarucus nara* (Kollar)	Rounded Pierrot	**VC**	S	M	PM	W
15	*Prosotas nora* (C. Felder)	Common Lineblue	**C**	-	M	PM	W
16	*Chilades laius* (Stoll)	Lime Blue	**C**	-	M	PM	W
17	*Arhopala amantes* (Hewitson)	Large Oak blue	**NR**	S	-	PM	-
18	*Psuedozizeeria maha* (Kollar)	Pale Grass Blue	**R**	-	-	PM	-
19	*Zizina otis* (Fabricius)	Lesser Grass Blue	**R**	-	-	PM	-
Papilionidae (4)							
20	*Papilio demoleus* (Linnaeus)	Lime	**VC**	S	M	PM	W
21	*Papilio polytes* (Linnaeus)	Common Mormon	**C**	-	-	PM	W
22	*Pachliopta aristolochiae* (Fabricius)	Common Rose	**NR**	S	-	PM	-
23	*Graphium nomius* (Esper)	Spot Swordtail	**R**	-	M	-	-
Nymphalidae (13)							
24	*Danaus chrysippus* (Linnaeus)	Plain Tiger	**VC**	S	M	PM	W
25	*Euploea core* (Cramer)	Common Indian Crow	**VC**	S	M	PM	W
26	*Danaus genutia* (Cramer)	Striped Tiger	**VC**	S	M	PM	W
27	*Junonia lemonias* (Linnaeus)	Lemon Pansy	**C**	-	M	PM	W
28	*Junonia orithya* (Linnaeus)	Blue Pansy	**C**	-	M	PM	W
29	*Phalanta phalantha* (Drury)	Common Leopard	**C**	-	M	PM	W
30	*Tirumala limniace* (Cramer)	Blue Tiger	**C**	-	M	PM	W
31	*Junonia almanac* (Linnaeus)	Peacock Pansy	**C**	-	M	PM	W
32	*Junonia atlites* (Linnaeus)	Grey Pansy	**R**	-	M	-	-

33	*Junonia hierta* (Fabricius)	Yellow Pansy	**R**	-	M	-	-
34	*Hypolimnas bolina* (Linnaeus)	Great Eggfly	**NR**	S	-	PM	-
35	*Limenitis procris* (Cramer)	Commander	**NR**	S	-	PM	-
36	*Ypthima baldus* (Fabricius)	Common Five Ring	**R**	-	M	-	-

Result and Discussion

During the study, total of 36 species of butterflies, belonging to 28 genera and 5 families namely *Nymphalidae*, *Papillionidae*, *Piridae*, *Hesperiidae* and *Lycaenidae* were recorded (Table 1). Among recorded species from Pariyat river , 36% are belonging to family *Nymphalidae* showed the maximum species richness, comprising of 13 species, while others have shown less representatives (Figure I) i.e., followed by 7 species of *Pieridae*, 7 species of *Lycaenidae*, 5 species of *Hesperiidae* and 4 species *Papillionidae*.

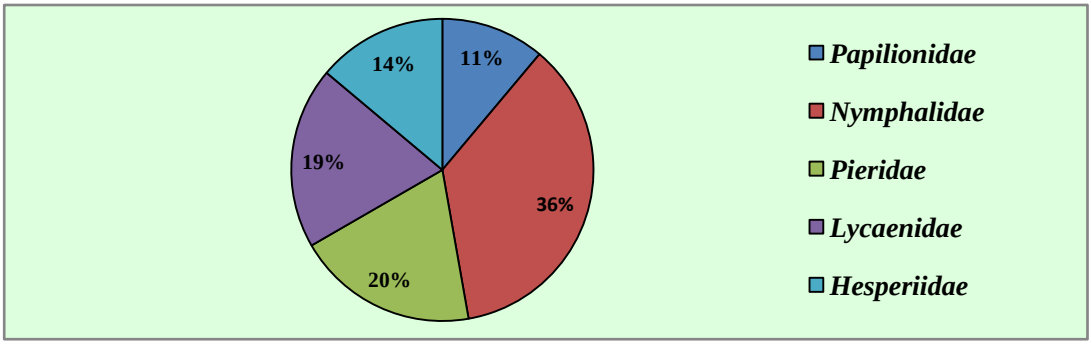
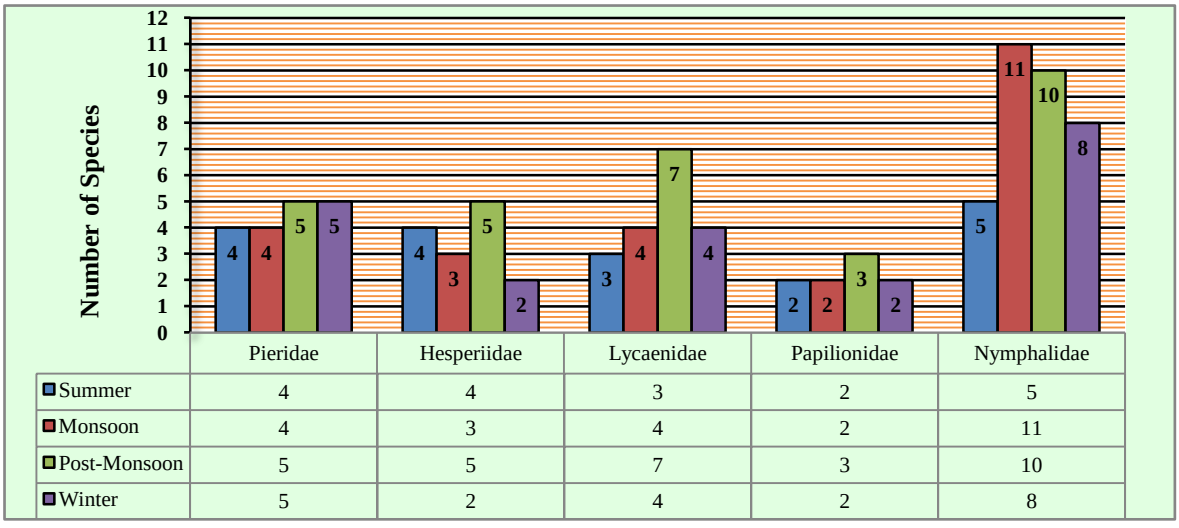


Figure 1: Family wise distribution of Lepidoptera around Pariyat River at Panagar region, Jabalpur (M.P.)

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 Pariyat River indicates a varied asse3mblage 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 (Balasubramaniam et al., 2001).

It was also noted that 10 species were present in all seasons from which *Papilio demoleus* belongs to *Palpillionidae* family, *Euploea core*, *Danaus chrysippus* and *Danaus genutia* belong to *Nymphalidae* family, *Eurema hecabe* and *Catopsilia pomona* belong to *Pieridae* family, *Spindasis vulcanus* and *Tarucus nara* belong to *Lycaenidae* family and *Hasora chromus* and *Badamia exclamationis* belong to *Hesperiidae* family. Highest number which is 30 species has seen during post monsoon. Total 21 species have observed during winter while least number 18 species have recorded in summer season. High number that is 21 species has observed during monsoon (Figure II).



	Pieridae	Hesperiidae	Lycaenidae	Papilionidae	Nymphalidae
Summer	4	4	3	2	5
Monsoon	4	3	4	2	11
Post-Monsoon	5	5	7	3	10
Winter	5	2	4	2	8

Figure II. Seasonal pattern of Lepidoptera around Pariyat River at Panagar region, Jabalpur

Among the 36 species recorded, the analysis on the status of butterflies shows that 9 were rare, 6 were not rare, 11 were common and 10 were very common, which contributed 25%, 17%, 30% and 25% of species wise frequency of occurrence of butterfly fauna of the study area (Figure III).

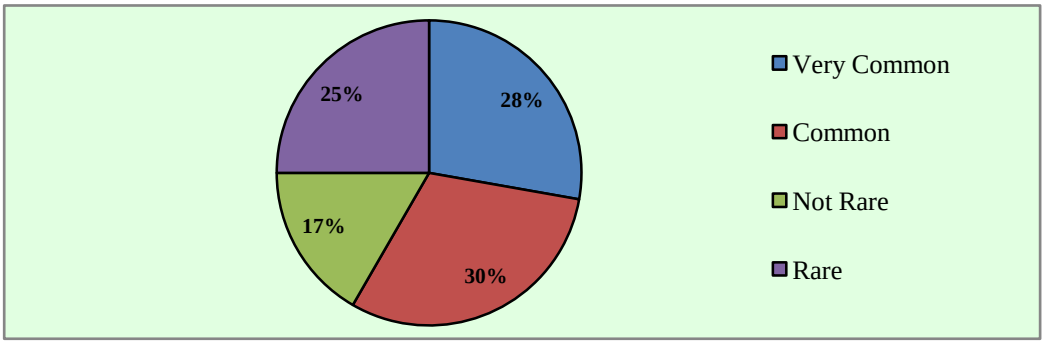


Figure III. Abundance status of Lepidoptera around Pariyat River at Panagar region, Jabalpur

Butterfly diversity varies with season. They are abundant for only a few months and rare or absent during other months of the year (Kunte, 2000). Wynter- Blyth (1957) 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 Tiple (2012) and Tiple and Khurad (2009). The species abundance was less during summer. Butterfly diversity studies carried out at various places has shown a varied pattern the Lakeville range of Bhadra Wildlife Sanctuary, Karnataka with 54 species, west Singhbhum in Jharkhand revealed 71 species (Arun, 2010). 109 species *Nymphalidae* butterflies in Rani-Garbhanga reserve forest in Assam was reported (Saikia et al., 2010). Choubey and Shukla (2016) were recorded total 21 species of Lepidoptera which belonging to five families from Bansagar reservoir of Son river. Among the species recorded from the reservoir area, 34% are belonging to the family *Nymphalidae* showed the maximum species richness. The diversity in tropical forest research institute, Jabalpur, was recorded 66 species (Tiple, 2012) and 24 species of butterflies were reported by Shukla and Maini (2015) from three different sites of Jabalpur. Painkra et al., (2016) reported 19 species during six month survey from February 2015 to September 2015 in the Gwarighat region of river Narmada.

Conclusion

In the present study Pariyat River 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 river at Panagar region. Butterfly fauna has fluctuated with season and along with shrub, grasses and flowering plants also support more butterflies. The river catchment 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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