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Biodiversity of Butterfly in three Habitats at Raipur (C.G.), India

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ABSTRACT

Diversity of butterfly is an important factor for the stability of an ecosystem. We monitored and studied the diversity and seasonal patterns in butterfly community at Raipur. Three habitats were- i) New Raipur newly constructed area (site 1), ii) Botanical Garden of Pt.RSU (site 2), iii) Roadside area of Shankar Nagar (site 3)- which was heavily disturbed area by traffic. The study was carried out in three season- rainy, winter and summer. Species richness was highest in monsoon season whereas lowest in winter season. Study showed among three sites, the highest number of butterflies are found in site 1 whereas lowest in site 3. A total of 1913 individuals of species belonging to five families Papilionidae, Pieridae, Nymphalidae, Lycaenidae, Hesperidae were recorded in the survey. The relative abundance was highest for Nymphalidae (644) in site 1 and lowest for Pieridae (75) individuals. We also calculated the species richness, species abundance, ecological indices such as Shannon-Wiener index, Simpson's index of biodiversity etc.

Key words: Diversity, Habitat, Season, Species richness, Abundance, Indices.

Introduction

Biodiversity is an important factor for the stability of ecosystems. Animal biodiversity provides good opportunities for studies on population and community ecology (Pollard, 1991). It is affected by environmental area of studies.

Several studies have suggested that butterflies are key taxa for biodiversity monitoring because they reflect changes of climatic conditions (Beaumont and Hughes, 2002) as well as seasonal and other ecological changes (Kunte, 1997; Fileccia *et al.*, 2015).

Study Site

For the study of biodiversity of butterflies in Raipur district, we selected three habitats: i) New Raipur newly constructed area (site 1), ii) Botanical Garden of Pt.RSU (site 2), iii) Roadside area of Shankar

Nagar (site 3). The study was also carried out in three seasons- rainy, winter and summer.

Materials and Methods

One permanent transect was set up at each site, the length is approximately 500 m and width is 15 m. Observations were taken in the morning between 8:30 to 11:30 when the butterflies were most active. Transect of all three areas are also studied in each season. Major field work was done between July

Table 1. Total number of butterflies found in all 3 sites.

Family	Site 1	Site 2	Site 3	Total
1. Papilionidae	121	118	104	343
2. Nymphalidae	261	202	181	644
3. Lycaenidae	165	146	134	445
4. Pieridae	39	24	12	75
5. Hesperidae	167	149	90	406

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2021 to August 2022. The photographs were taken on the fields which were later identified by using The Book of Indian Butterflies (Kehimkar, 2008).

Data Analysis

Biodiversity indices were calculated by using Past@ software, version 4.03 (Hammer *et al.*, 2001).

Observations

In all graphs dots represent the sites (site1, site2, site 3 respectively) in summer, monsoon and winter season.

Results

The total number of 1913 species of Lepidoptera be-

Table 2. Seasonal variation in the number of butterflies recorded in **site 1, 2, 3.**

Family	Summer	Monsoon	Winter	Summer	Monsoon	Winter	Summer	Monsoon	Winter
	Site 1			Site 2			Site 3		
1. Papilionidae									
1. <i>Papilio polytes</i>	9	19	6	4	10	4	11	10	2
2. <i>Papilio crino</i>	11	12	8	5	12	2	9	12	3
3. <i>Papilio demoleus</i>	8	7	4	10	10	1	8	10	2
4. <i>Graphium doson</i>	10	9	2	8	11	8	5	9	3
5. <i>Graphium nomius</i>	3	6	7	9	13	3	7	12	1
Total	41	53	27	36	56	18	40	53	11
2. Nymphalidae									
1. <i>Danaus chrysippus</i>	24	34	19	12	18	10	15	19	8
2. <i>Acraea terpsicore</i>	20	29	12	16	12	9	10	16	10
3. <i>Junonia atlites</i>	18	20	9	11	19	9	12	11	9
4. <i>Neptis hylas</i>	13	19	10	14	22	7	11	15	9
5. <i>Hypolimnas bolina</i>	11	11	12	15	20	8	10	16	10
Total	86	113	62	68	91	43	58	77	46
3. Lycaenidae									
1. <i>Castalius rosimon</i>	8	18	4	9	10	4	12	20	3
2. <i>Caleta caleta</i>	13	24	6	11	13	7	10	17	1
3. <i>Chilades lajus</i>	15	12	5	8	21	3	9	12	2
4. <i>Arhopala atrix</i>	12	20	5	10	20	8	11	14	3
5. <i>Soindasis lohita</i>	6	13	4	9	11	2	8	10	2
Total	54	87	24	47	75	24	50	73	11
4. Pieridae									
1. <i>Catopsilia pomona</i>	4	6	2	2	1	2	1	2	1
2. <i>Catopsilia pyranthe</i>	3	4	2	1	4	2	1	1	1
3. <i>Eurema hecabe</i>	2	5	1	2	2	1		1	1
4. <i>Eurema laete</i>	3	3	1	3		1	1		
5. <i>Cepora Nerissa</i>	1	2		1	2			2	
Total	13	20	6	9	9	6	3	6	3
5. Hesperidae									
1. <i>Sarangesa dasahara</i>	25	30	13	12	20	9	9	10	3
2. <i>Parnara guttatus</i>	11	15	6	9	14	5	4	12	2
3. <i>Caprona ransonnetti</i>	9	12	4	10	11	7	5	9	
4. <i>Telicota ancilla</i>	6	9	1	11	17	2	8	12	2
5. <i>Udaspes folus</i>	8	16	2	8	10	4	3	10	1
Total	59	82	26	50	72	27	29	53	8

Table 3. Diversity indices for butterfly communities in five different habitat types.

Sites	Species Number(S)	Individual Number (N)	Shannon (H)	Pielou (J)	Simpson		Margalef (d)
					D	1-D	
Site 1	25	753	3.032	0.942	0.054	0.94	3.62
Site 2	25	639	3.073	0.954	0.049	0.95	3.71
Site 3	25	521	3.025	0.939	0.052	0.94	3.83

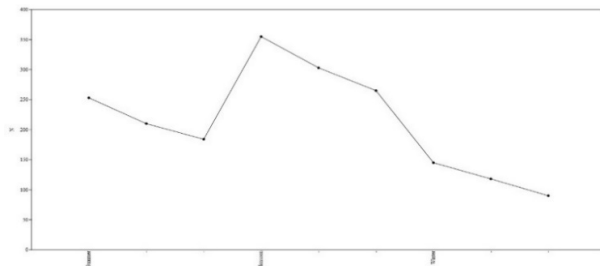


longing to five families were recorded in the three different habitats. The list of butterflies and their

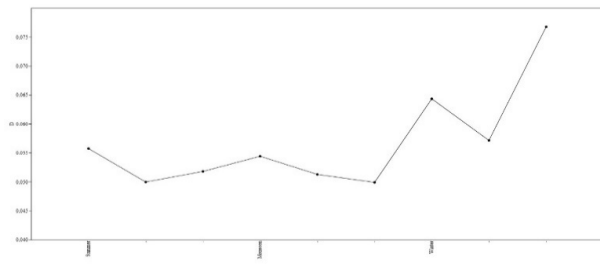
relative abundance is present in Table 1, out of five families recorded Nymphalidae was the most common with 644 in site 1 identified followed by Lycaenidae (445) and the lowest number of species was observed in the family Pieridae (75).

Diversity Indices

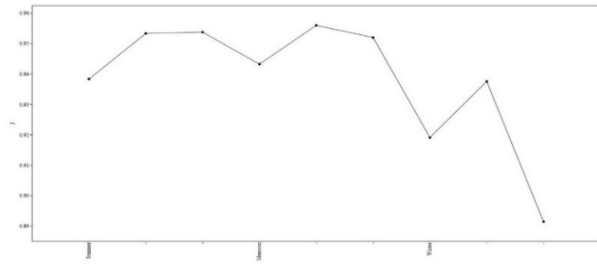
The diversity of butterfly communities in the three habitats for the entire period are present at table- 2. It shows that all sites have around the equal number of butterflies. The value of Pielou’s index indicates that there is around the same distribution of species in all three habitats. The Shannon index value is also



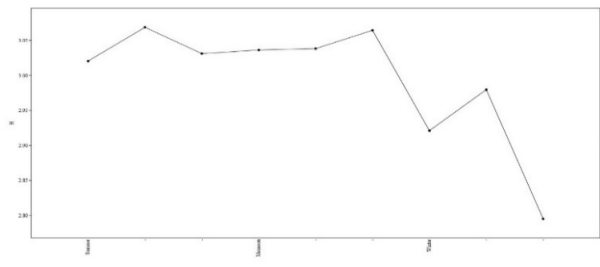
Graph 1. Graphical representation of five families for 3 sites which show the seasonal trends of number of individuals (N).



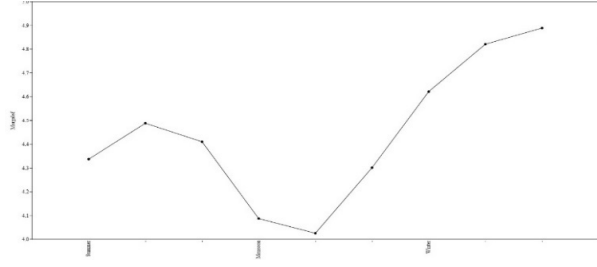
Graph 2. Graphical representation of five families for 3 sites which show diversity indices: Simpson’s Dominance Index (D).



Graph 4. Graphical representation of five families for 3 sites which show diversity indices: Pielou’s Equitability Index (J).



Graph 3. Graphical representation of five families for 3 sites which show diversity indices: Shannon-Wiener Diversity Index (H).



Graph 5. Graphical representation of five families for 3 sites which show diversity indices: Margalef Index (d).

around the same and a little higher in site 2. In Simpson's index site 1 and site 3 shows the dominance of species whereas site 2 shows evenness.

Seasonal Variation

Seasonal variations of the diversity indices is shown in Graph 1-5. The values of Shannon index (H) is higher in summer season in site 2 whereas least in site 3 (Table 3). Margalef index shows the highest in winter season in site 3 least in monsoon season. The lowest biodiversity found in summer season in site 2 whereas highest in winter season in site 3.

Discussion and Conclusion

Butterflies in all habitat showed a highly seasonal trend (Kunte, 1997). Similar results are also found in our studies. A previous study (Wynter Blyth, 1956) had identified two seasons as peaks March, April and October for butterfly abundance in India however our study show the seasonal abundance in rainy season. The population were low in spring and summer (Kunte, 1997). This result generally correspond to the results obtained by us. The values of these indices little varied in different seasons and different sites.

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(C.G.) for providing the necessary facilities.

Conflict of Interest

All authors declare that they have no conflict of interest.

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