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Community Composition and Species Diversity of Butterfly Fauna with in Gurukula Kangri Vishwavidyalaya Campus

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Abstract

Present study was carried out at Gurukul Kangri University Campus, Haridwar to record the species composition of butterflies. During this study a total of 179 individuals belonging to 25 species and 04 families were reported. The Nymphalidae was the most dominant family in terms of number of species and represented by 10 species followed by Pieridae (09), Danaidae (04) and Papilionidae (02). During first year of sampling maximum number of species belonged to Nymphalidae (08) followed by Pieridae (07), Danaidae (03) and Papilionidae (01), similarly during second year of study, Nymphalidae was the most dominant family represented by 06 species followed by Pieridae (05), Danaidae (03) and Papilionidae (02). During first year Shannon index species diversity was maximum for Pieridae (1.696), followed by Nymphalidae (1.020), Danaidae (0.498) and Papilionidae (0.128). During second year value of species diversity was maximum for family Nymphalidae (1.116) followed by Pieridae (0.894), Danaidae (0.352) and Papilionidae (0.203).

Keywords: Species Diversity, Community Composition, Butterfly.

1. Introduction

Butterflies are the most brightly colored insects belonging to order Lepidoptera of class insecta and it is the second largest order after Coleoptera. Adults of many Lepidopterans are most efficient pollinators as they suck the sap of Nectar by sucking mouth parts, while the caterpillars of many Lepidopterans defoliate various types of plants and causing severe damages to them. The distribution of butterfly depends upon the availability of their food plants. Butterflies are of most ecological significance. Some butterflies show symbiotic and parasitic relationships with social insects such as ants. Butterflies are the good indicators of environmental quality[2, 3, 12]. Changes in abundance and distribution of butterflies have been linked to a range of factors, including habitat loss and fragmentation, land use and climate change[1]. Some species appear to be benefitting from climate warming and have expanded in both range and abundance[4].

2. Materials and Methodology

The findings presented here are based on a monthly random survey carried out from April 2009 to March 2011 at the Campus of Gurukul Kangri University, Haridwar. Haridwar district, covering an area of about 2360 sq. km. is in the western part of the Uttarakhand State of India. Its latitude and longitude are 29.58° N and 78.13° E respectively. The height from the sea level is 249. 7 mts. The insects were collected by "Sweep Sampling Method", as per Gadagkar *et al.,* 1990[5]. The collection of insects was carried out in the early hours of the day because butterflies are usually active at early sun rise, therefore, it was easy to observe and collect them. Butterflies were primarily identified directly in the field or, in difficult cases, specimen were identified with the help of scientists of different institutions.

Calculation of species diversity: The species and seasonal diversity will be calculated by using "Shannon Wiener Index" which is defined as –

Species Diversity

$$H'(S) = -\sum_{i=1}^{s} p_i \log p_i$$

Where,
$p_i = n_i/N$
n_i = number of individuals of species i
N = size of whole community
s = total number of species

3. Results and Discussions

During present study a total of 179 individuals belonging to 25 species and 04 families were reported, out of 04 families Nymphalidae was the most dominant family in terms of number of species and represented by 10 species followed by Pieridae (09), Danaidae (04) and Papilionidae (02). In terms of number of individuals the family Pieridae was most dominant (72 individuals) followed by Nymphalidae (70), Danaidae (30) and Papilionidae (09) (Tables 01 and 02).

During first year of sampling maximum number of species belonged to Nymphalidae (08) followed by Pieridae (07), Danaidae (03) and Papilionidae (01), similarly during second year of study Nymphalidae was the most dominant family represented by 06 species followed by Pieridae(05), Danaidae(03) and Papilionidae(02)

Table 1: Taxonomic composition of Butterflies recorded from Gurukul Kangri University Campus during 2009-2011

S. N.	Taxonomic Composition	Common Name	2009-10	2010-11
	1. Family- Pieridae			
1	*Anaphase a. aurora* (Fabr.)	Caper White	+	+
2	*Catopsilia crocale* (Cramer)	Common emigrant	+	-
3	*Catopsilia pomona* (Fabr)	Lemon Emigrant	-	+
4	*Catopsilia pyranthe* (Latre.)	Mottled Emigrant	-	+
5	*Eurema hecabe* (Linn.)	Common Grass Yellow	+	-
6	*Huphina herissa phryne* (Fabr.)	-	+	-
7	*Pieris brassicae* (Linn.)	Cabbage white butterfly	+	+
8	*Pieris canidia indica* (Sparrman)	Indian cabbage white	+	-
9	*Pontia daplidice moori* (Robert)	Himalayan bath white	+	+
	2. Family- Nymphalidae			
10	*Atella p. phalanta* (Drury)	Common leopard	+	+
11	*Egrulis marion* (Cramer)	-	+	+
12	*Euthalia aconthea* (Hewitson)	Baron	+	-
13	*Libythea myrrha* (Godart)	Snouts	+	-
14	*Neptis nata* (Moore)	Sailer	-	+
15	*Precis almana* (Linn.)	Peacock pansy	+	-
16	*Precis hierta* (Fabr.)	Yellow pansy	-	+
17	*Precis iphata*(Cramer)	Chocolate pansy	+	+
18	*Precis l. lemonas* (Linn.)	Lemon pansy	+	+
19	*Precis atlites* (Linn.)	Grey pansy	+	-
	3. Family - Danaidae			
20	*Danaus algae* (Stoll)	Monarch butterfly	+	-
21	*Danaus chrysippus* (Linn.)	Plain tiger	+	+
22	*Danaus plexippus* (Linn.)	Monarch butterfly	+	+
23	*Euploea midamus* (Linn.)	Blue spotted crow	-	+
	4. Family - Papilionidae			
24	*Papilio polytus romulus*(Cramer)	Great Mormon	-	+
25	*Zetides agamemnon* (Linn.)	Swordtails	+	+

+ = Species present; - = Species absent

Many workers have carried out studies on butterfly diversity in Uttarakhand[6,7]. Many workers have been reported the species diversity of butterfly in Great Himalayan National Park and reported 50 species of butterfly belonging to 5 families and 13 subfamilies[13]. During the entomological survey of mango orchards of district Haridwar, 57 species of Lepidoptera have been reported, out of which Nymphalidae was the most dominant family represented by 15 species followed by Pieridae (12), Danaidae (06), Papilionidae (05), Satyridae (04), Hesperiidae (03), Noctuidae (03), Lycaenidae (03), Crambidae (02), Sphingidae (02), Eupterotidae (01) and Syntomidae (01)[8].

Some workers have made entomological surveys at Guru Ghasidas University campus and Bilaspur urban area and reported 51 species with 24 Nymphalidae, 11 Lycaenidae, Pieridae (07), Papilionidae (06), Hesperiidae (03)[9]. During a comparative study in wild and human-impacted areas in the campus of SGB Amravati University, Amravati, Maharashtra, India a total of 52 butterfly species belonging to Hesperiidae, Papilionidae, Pieridae, Lycaenidae and

Nymphalidae have been recorded[13].

During first year the total species diversity was 3.342 and diversity for Pieridae was maximum (1.696), followed by Nymphalidae (1.020), Danaidae (0.498) and Papilionidae (0.128). During second year value of species diversity was maximum for the family Nymphalidae (1.116) followed by Pieridae (0.894), Danaidae (0.352) and Papilionidae (0.203) (Table 03).

During a scientific study a total of 1005 individuals of 59 species in 48 genera have been reported. Out of total, 23 species belonged to the family Nymphalidae, which accounted for 38.98% of the total species and 45.20% of the total number of individuals in different habitat types in Trishna wildlife sanctuary[10].

Table 2: Relative abundance of Butterflies recorded from Gurukul Kangri University Campus during 2009-2011

S. N.	Taxonomic Composition	2009-2010	2010-2011
	1. Family-Pieridae		
1	*Anaphase a. aurora* (Fabr.)	07	09
2	*Catopsilia crocale* (Cramer)	08	-
3	*Catopsilia pomona* (Fabr.)	-	3
4	*Catopsilia pyranthe* (Latre.)	-	4
5	*Eurema hecabe*(Linn.)	03	-
6	*Huphina herissa phryne* (Fabr.)	07	-
7	*Pieris brassicae* (Linn.)	10	08
8	*Pieris canidia indica* (Sparrman)	07	-
9	*Pontia daplidice moori* (Robert)	02	04
	2. Family-Nymphalidae		
10	*Atella p. phalanta* (Drury)	07	05
11	*Egrulis marion* (Cramer)	02	03
12	*Euthalia aconthea* (Hewitson)	05	-
13	*Libythea myrrha* (Godart)	02	-
14	*Neptis nata* (Moore)	-	05
15	*Precis almana*(Linn.)	04	-
16	*Precis hierta* (Fabr.)	-	09
17	*Precis iphata*(Cramer)	06	07
18	*Precis l. lemonas* (Linn.)	04	06
19	*Precis atlites* (Linn.)	03	-
	3. Family- Danaidae		
20	*Danaus algae* (Stoll)	06	-
21	*Danaus chrysippus* (Linn.)	08	03
22	*Danaus plexippus* (Linn.)	04	06
23	*Euploea midamus* (Linn.)	-	03
	4. Family- Papilionidae		
24	*Papilio polytus romulus* (Cramer)	-	04
25	*Zetides agamemnon* (Linn.)	04	01
	Total	99	80

Table 3: Relative abundance, species composition and species diversity of Butterflies recorded from Gurukul Kangri University Campus during 2009-2010 and 2010-2011.

Family	Number of individuals		% of total individuals		No. of species		% of species		Species diversity(H')	
	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11	2009-10	2010-11
Pieridae	44	28	44.44	35.00	7	5	36.84	31.25	1.696	0.894
Nymphalidae	33	35	33.33	43.75	8	6	42.10	37.50	1.020	1.116
Danaidae	18	12	18.18	15.00	3	3	15.78	18.75	0.498	0.352
Papilionidae	4	5	04.04	6.25	1	2	05.26	12.50	0.128	0.203
Total	99	80	100	100	19	16	100	100	3.342	2.565

4. Conclusion

From above study it was concluded that the Nymphalidae was the most dominant family in terms of number of species followed by Pieridae, Danaidae and Papilionidae, while in terms of number of individuals the family Pieridae was most dominant followed by Nymphalidae, Danaidae and Papilionidae.

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