

Diversity and Relative Abundance of Insects in Jagoth, Rudraprayag district, Uttarakhand, India

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Abstract

Insects are a diverse and abundant group of organism that play a crucial role in shaping the earth biodiversity and functioning of ecosystem. A study was conducted in Jagoth, Rudraprayag District and the main aim of this study is to understand the diversity of insects in the area by using sweep net method and the handpicking method and analysis by respected equation and indexes. A total of 556 individuals belonging to 29 species of 17 families and 5 orders were recorded from study sites during the study period. Lepidoptera was the most 'dominant order, and Nymphalidae was the most dominant family. The main aim of this study is to collect and identify insect diversity and abundance in Jagoth Rudraprayag Uttarakhand.

Keywords: Insects, diversity, abundance, richness

Introduction

Insects are the most species rich group on the earth hence it play numerous crucial role in ecosystem functioning and the global economy. They are truly ubiquitous and usually quite conspicuous member of the phylum Arthropoda under class insect. The class Insecta is the most important and most dominant class of phylum Arthropoda comprising over three quarters of all the described species on the earth. Out of 1,552,319 globally described species of animals, class Insecta (1,020,007 species) accounts for about 66 percent of all animals (Zhang, 2011) [1]. Insects display an immoderate variety in size, appearance, habits and distribution. Insect community covers a wide range of functional groups and acts as an important driver of ecosystem process. Insects play a fundamental and irreplaceable ecological role in the intricate web of biodiversity and ecosystem. In India, there are roughly 63,760 species of insects belonging to 29 orders

and three classes, with eight orders making up 94% of the insect fauna, while the remaining 21 orders are represented by small numbers (6% of species), accounting for almost 7% of global insect diversity (Linta, P. 2020). Insects play an important role in our environment by supporting the production of fruits, seeds, vegetables and flowers (James et al., 2008) [2].

Materials and methods

Study area

The present study was conducted in Jagoth Village of Rudraprayag district This village is located 13 km away from Augustmuni and situated Latitude 30.394556° N and Longitude 79.096284°E. Jagoth village is located in Augustmuni Block of Rudraprayag district. The geographical area of Jagoth village is 157.85 heactares.



Fig 1: Map of the study area

Collection and Identification

The direct observation method, sweep method and the handpicking method, as described by Gadakar in 1990. After collecting the insects, they were transferred into jars containing cotton soaked in ethyl acetate. These jars were

brought to the laboratory for further examination. The specimens were then stretched, pinned, and oven-dried before being placed in wooden boxes. Insects were identified by using available literature and order-wise field guides along with their respective characters. n. Sometimes

unidentified specimens were examined by comparing them with the already identified specimens with the help of other taxonomists/researchers.

Data Analysis

Diversity indices were calculated

1. Shannon- Wiener equation (Luo *et al* 2023)

$$H'(S) = - \sum p_i \log p_i \quad i=1$$

Where, p_i = fraction of entire population made up of species;

S = total number of species;

i = proportion of species

2. Evenness Index (Hill, 1973)

$$E = H / \ln S$$

Where, S = total number of species;

H = Index of species;

3. Margalef's index

Margalef's index was used as a simple measure of species richness (Margalef, 1958). Margalef's index = $(S - 1) / \ln N$
 S = total number of species
 N = total number of individuals in the sample
 \ln = natural logarithm

Result and Discussion

Table 1 shows the diversity abundance of insect species discovered in the study area. A total of 556 individuals belonging to 29 species of 17 families and 5 orders were recorded from study sites during the study period. Among the total insects recorded Lepidoptera was found to be the most dominant order with 12 species Constituting about 48.73% of total abundance (fig.1) followed by Diptera (6 Species, 20.82%), Coleoptera (5 species 19.93%), Hemiptera (2 species 7%), Hymenoptera (1 species 3.59%).

Table 1: Species richness and relative abundance (%) of insect fauna collected from the study area

S. No	Species	Common Name	No. of individuals	Relative Abundance (%)
Order-Lepidoptera, Family- Nymphalidae				
1	Ypthima hubner	Ypthima	31	5.57
2	Neptis hylas	Common sailor	26	4.67
3	Aglais cashmirensis	Small tortoiseshell	32	5.75
4	Vanessa indica	Indian red admiral	35	6.29
5	Acraea issoria	Yellow coaster	29	5.21
family-Lyceanidae				
6	Heliophorus epicles	Heliophorus	11	1.97
7	Heliophorus moorei	Heliophorus	13	2.33
8	Cupido argiades	Easterntailed blue	11	1.97
9	Lycaena phlaeas	Common copper	17	3.05
family-Pieridae				
10	Pieris canidia indica	Pieris canidia	23	4.13
11	Aporia agathon	Great blackvein	28	5.03
12	Catopsilia pyranthe	White Emigrant	14	2.51
Order -Hymenopter, family-Apidae				
13	Bombus ternaries	Bumble bee	13	2.33
14	Spalangia sp	Spalangidae	7	1.25
Order- Coleoptera, family – Chaetosomatidae				
15	Chaetosomodes halli	Chaetosomodes	11	1.97
family- Coccinellidae				
16	Coccinella septempunctata	Coccinellidae	8	1.43
family- Scarabaeidae				
17	Protaetia alboguttata	Flower chafer	32	5.75
18	Cheirotonus gestroi	cheirotonus	10	1.79
family- Buprestidae				
19	Anthaxia sp	Anthaxia	23	4.13
family-Chrysomelidae				
20	Chrysochus cobaltinus	Blue milkweed beetle	27	5.56
Order –Diptera, family–syrphidae				
21	Eristalis tenax	Drone fly	20	3.59
family-Stratiomyidae				
22	Hermetia illucens	Black soldier fly	12	2.15
family-Tephritidae				
23	Oxya flavipennis	Oxya	7	1.25
family-Tipulidae				
24	Tipula longiventris	Crane fly	14	2.51
family-Calliphoridae				
25	Lucilia sericata	Common green bottle fly	25	4.49
family-Muscidae				
26	Musca domestica	House fly	26	4.67
27	Eudasyphora cyanicolor	Eudasyphora	12	2.15
Order-Hemiptera, family- lygaeidae				
28	Orsillus depressus	Orsillini	23	4.13
family-Cicadellidae				
29	Atkinsoniellaheiyuana.	leafhopper	16	2.87

The order lepidoptera is dominant because total number of individuals of Lepidoptera was (270), followed by Diptera (116), Coleoptera (111), Hemiptera (39) and Hymenoptera (20). Overall high biodiversity in the present area. In 17

families Nymphalidae was the most dominant family constituting about 17.24% followed by Lyceanidae 13.79% Pieridae 10.34%, Apidae, scarabaeidae and muscidae 6.89% syrphidae 1.44%.



Fig 2: Insects collected from the Study Area

Table 2: Number of species abundance and relative abundance (%) of different Insects order and their families

Order	Family	N0. of Species	Relative abundance (%)	No. of individuals	Relative abundance (%)
Lepidoptera	Nymphalidae	5	17.24	153	27.51
	Lyceanidae	4	13.79	52	9.53
	Pieridae	3	10.34	65	11.69
Hymenopter	Apidae	2	6.89	20	3.59
Coleoptera	Chaetosomatidae	1	3.44	11	1.97
	Coccinellidae	1	3.44	8	1.43
	Scarabaeidae	2	6.89	42	7.55
	Buprestidae	1	3.44	23	4.13
	Chrysomelidae	1	3.44	27	4.85
Diptera	Syrphidae	1	3.44	20	3.59

	Stratiomyidae	1	3.44	12	2.15
	Tephritidae	1	3.44	7	1.25
	Tipulidae	1	3.44	14	2.51
	Calliphoridae	1	3.44	25	4.49
	Muscidae	2	6.89	38	6.83
Hempitera,	lygaeidae	1	3.44	23	4.13
	Cicadellidae	1	3.44	16	2.87
		29		556	

Table 3: Diversity indices of insects

Months	Species No	Abundance	Relative abundance (%)	Shannon Index (H)	Eveness (E)	Margaleefs index (d)
March	4	97	17.44	0.58	0.418	0.65
April	5	106	19.06	0.68	0.422	0.85
May	4	101	18.16	1.17	0.843	0.65
June	9	120	21.58	0.79	0.359	1.67
July	8	132	23.74	0.82	0.394	1.43

Conclusion

A total of 556 individuals belonging to 29 species of 17 families and 5 orders were recorded from study sites during the study period. The average number of Insects present suggests that the region is only marginally biologically and ecologically balanced, which could be a sign of an inadequately healthy ecosystem.

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