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ASSESMENT OF BUTTERFLY SPECIES AND RELETIVE ABUNDANCE IN AREA OF GHOT TAHASIL CHAMORSHI DISTRICTGADCHIROLI (M.S.) INDIA

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ABSTRACT

The present study on species diversity and distribution of butterfly was carried out at GhotTahasil ChamorshiDist.Gadchiroli (M.S.).All of the environmental conditions played a significant role in determining the butterfly diversity and density. They are good indicators of climatic, atmospheric and seasonal ecological changes. Being a cold blooded invertebrate's butterflies is easily shows significant impact by climatic changes. Present investigation carried out for two year during Jan 2023to Dec 2024 at rural area of Ghot.In present investigation, total 60 species were recorded and identified among these include in five Families Nymphalidae with 28 species followed by Pieridae with 10 species and family Papilionidae with 09 species family Lycaenidae with 08 species and family Hesperidae with 05 species.Most of the butterfly species were very commonly called as Brush-footed butterflies followed by Papilionidae commonly called as Swallowtails species and Pierdae commonly called as white and Yellows species.Abundance and biodiversity of butterfly depends on climate change. As per the literature its indicate that all butterflies species has its significant importance in balancing biodiversity of ecosystem so in view of the study need of future planning,climate impact and conservation of host plants and also focus on the current status of diversity and abundance of butterflies in Ghot area near ChamorshiDistrictGadchiroli (M.S.) India.

INTRODUCTION

All of the environmental conditions played a significant role in determining the butterfly diversity and density. They are good indicators of climatic, atmospheric and seasonal ecological changes. Being a cold blooded invertebrate's butterflies are easily shows significant impact by climatic changes. In India has more than 329 million hectare of total geographical area. In the animal kingdom, butterfly is a winged insect belonging to the phylum Arthropoda. The Phylum Arthropoda is divided into five major classes, which includes Insecta. The class Insecta is further divided into 29 orders, which included Lepidoptera. A Butterfly belongs to the order Lepidoptera, which means "scale wings". In Greek lepis means scale and Petron' means wings. In India there are total 1504 species of butterflies are found which includes 5 family that is Papilionidae (107 species), Pieridae (109species) Nymphalidae (521 species), Lycaenidae (443species),Hesperidae (321species).The climate and geography of the area are two elements that affect the species diversity (Asher *et. al.*,2001).Climate is a significant component that affects a region's floral and animal diversity.Being a cold bloodedinvertebrates butterflies are easily impacted by climatic change which also have a significant impact on most other animals range (Kehimkar, 2008). They are good indicators of climatic, atmosphericand seasonal ecological changes (Dennis 1993; Warren *et al.*, 2001).

Butterflies are most specific; habitat degradation has a higher impact on both butterfly diversity and abundance. Lepidoptera are mostly accepted as biological indicators of ecosystemindifferentareaof the world (Rosenberg *et al.*, 1986; Beccaloni and Gaston, 1995; Oostermeijer and van Swaay, 1998). Butterflies are known to be sensitive to climate change (Parmesan et al., 1999). (Settele*et al.*, 2008) noted butterflies have a potential tool for determining large scale biodiversity trends is by monitoring the change in abundance and assessing the distribution of butterflies. Some researcher worked on butterflies diversity, Rai*et al.*, (2006), Shashikumar and Venkatesha (2010),Tiple (2011),Sheshadri*et al.*, (2013),Umapati (2016),Harisha and Hosetti (2021), Kunchanwar and Kamble(2021)and Naik (2022).Main aims of the study to collect baseline information for evaluating changes in the variety of butterflies in rural ecosystem and to identify the diversity and abundance of butterfly species and impact of climate changes. The largest number of species found in the research area, the dominant butterfly family was determined.

Materials and Methods

Study site:

The study area village Ghot falls in Gadchiroli district situated in Maharashtra state. Latitude of the study area is

(17.4879°N,73.9366°E).The size of the area is about 10.31 square km. The village Ghot is surrounded by natural forest having varieties of plant diversity. Geomorphological the region is one of the dense woodland, undulating plain and linear structural hills. The normal rainfall annually is 925 mm. Average annual temperature is 27.2°c-32°c.

***Sampling period and time*:**
For present study,three different sites were selected viz.Densely populated plantation, Moderate populated plantation and Minimal populated plantation.The study was conducted during two year between January 2023 to December 2024. Data were collected on monthly basis over a 5 days field period during day time.All observations were conducted in daylight hours during favourable weather.Butterfly were photographed and identified by using butterfly of India website and standardliterature. Sometimes an insect net was used and butterflies were released without harming them.

Sampling techniques:
The photographs of butterflies were captured by DSLR Camera.On the basis of observation,butterflies were divided in four categories.i.e.Rare, Uncommon, Common and Very common. During study relative abundance of butterflies in study site was also calculated. , the Pollard walk method was employed (Pollard, 1977) was trailed to observe butterflies as they travelled along a pre-determined path and record the species, field guides were used to identify the butterflies (Gunathilagaraj*et al.*,1998) and Butterflies of Western Ghats(Kunte,1997).Standard guides and resources that are accessible (Kunte,2000)which help in classification, identification and nomenclature of butterflies.

Statistical analysis:
The diversity and distribution of butterfly studied in three selected sites used for calculation of Total abundance,Species richness and Diversity indexes ,Shannonand Weaver (1949).

***Species diversity*:**
The diversity of species was calculated by using Shanon-Weiner diversity index
(H') **H' = -Σ Pi ln Pi**
Where, **Pi= ni/N, ni**=number of individual of a species at a time i**, N=** size of whole community and **ln**= natural log.

***Evenness of butterflies*:**
The species Evenness(J') was calculated by using
J'= H'/ln S
Where, S = number of species present in the site, ln = natural log and H' is the diversity index. The value of J ranges from 0-1.

Result and Discussions:

In present investigation, total 1067individuals were recorded and identified in and around 3 study sites. Among these include 60 species belongs to 5 families viz., Nymphalidae. Papilionidae, Pieridae ,Lycaenidae and Hesperidae.On the basis of collected species of butterflies highest no.of butterflies was recorded from family Nymphalidae(28 species with relative abundance 46.66 %)family Pieridae(10 species with relative abundance 16.66%) family Papilionidae(09 species with relative abundance 15%) family Lycaenidae(08 species with relative abundance 13.33%) and family Hesperidae(05 species with relative abundance 8.33%) (Table no.1.1 and fig,1) The species occurrence was surveyed at three different sites during study period. Biodiversity indices were used to assess the viability of ecosystem. The species occurrence with Shannon,Simpson and Evenness index of diversity was used for the study.The diversity index and abundance are analysed by using the number of individual species. At site I the Abundance of species was 394 Simpson D was 0.014 Shannon H was 2.225 and Evenness was 1.187. At site II the Abundance of species was 358, Simpson D was 0.025, Shannon H was 3.672 and Evenness was 2.310, and at site III the Abundance of species was 315, Simpson D was 0.010, Shannon H was 2.184 and Evenness was 1.403. The abundance of butterflies depends on presence of host plants .Three study sites have different types of host plants,so butterfly diversity,richness abundance and evenness were also different in different sites.From total 60 species of butterflies site I (Dense populated plantation)total abundance of butterfly species were (n=394) site II (Moderate populated plantation)total abundance of butterfly species were (n=358)site III (Minimal populated plantation)total abundance of butterfly species were (n=315).(Table no.1.2). Maximum butterfly species were observed from June to September months and October to January month.

The abundance of butterflies on monthly basis shows variations shows peak from August to November and low from February to May. It means abundances of butterflies increased from monsoon to winter and decreased in summer and pre monsoon as result of change in temperature,humidity,rainfall and other climatic factors.Represented in Table no.1.3.In climate changes pattern mostly temperature was responsible for abundance of butterflies, during low atmospheric temperature reduction of butterfly species and similarly during high temperature also reduction of abundance.In heavy rainy season destruction of habitat which was responsible for reduction of abundance. HarishaandHosetti (2021) studied on status, abundance, and seasonality of butterfly fauna at Kuvempu University Campus, Karnataka, India. Atmospheric physical parameters like temperature,humidity,light,rainfall have influence on the count of butterflies.Thehighrichness observed during the month of October to January, Overall species richness and abundance observed was high during the winter season followed by summer and rainy season. The Shannon diversity indices observed was high in summer, high evenness index was observed in summer season and high index was observed in winter.Similar work noted by Naik et al., (2022) reported seasonal patterns and polyphenism of butterfly communities in coastal plains of central Western Ghats.

CONCLUSION

Study summaries that the findings during investigation, the Nymphalidae was the most dominant family, followed by Pieridae, Papilionidae, Lycaenidae and Hesperidae with the least number of species from the five families of butterfly. The fluctuation is seen in species number and individual number, the changing pattern in diversity indices and abundance.Environmental factors play major role in abundance of butterflies.All biologists are quite concerned about how climate change is affecting the diversity of butterflies.Butterflies have been particularly appreciated by researchers and environmentalists because they can be used as flagship organisms to show environmental health and climate change.The study provided us with important information about the diversity, quantity, and richness of butterflies in several eco-climatic zones, indicating that the distribution of butterflies varies depending on the local climate.

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Conflict of Interest: Author has no conflict of interest

Table No1.1: List of butterfly species with relative abundance in study area

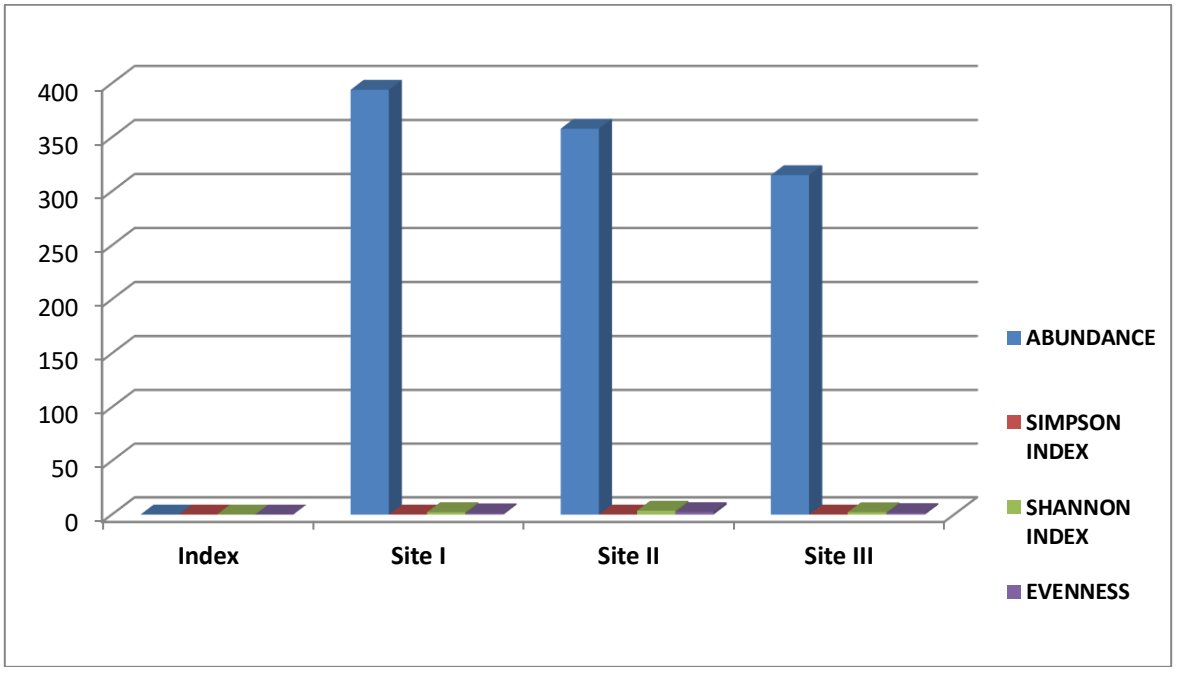
S N.	Genus	Species	Family	Frequency	Abundance	Site I	Site II	Site III
1	*Danaus*	*chrysippus*	Nymphalidae	18	18	-	+	+
2	*Danaus*	*genutia*	Nymphalidae	17	1.97	-	+	+
3	*Parantica*	*algea*	Nymphalidae	13	1.51	+	-	+
4	*Tirumala*	*limniace*	Nymphalidae	15	1.74	+	+	-
5	*Euploea*	*core*	Nymphalidae	16	1.86	+	+	+
6	*Mycalesis*	*mineus*	Nymphalidae	14	1.62	+	-	+
7	*Mycalesis*	*perseus*	Nymphalidae	17	1.97	+	-	-
8	*Melanitis*	*leda*	Nymphalidae	23	2.67	+	+	+
9	*Melanitis*	*phedima*	Nymphalidae	23	2.67	-	+	+
10	*Hypolimnas*	*bolina*	Nymphalidae	15	1.74	-	+	-
11	*Hypolimnas*	*misippus*	Nymphalidae	17	1.97	+	+	+
12	*Lethe*	*rohira*	Nymphalidae	20	2.32	-	+	+
13	*Symphaedra*	*nais*	Nymphalidae	15	1.74	+	+	+
14	*Junonia*	*orithya*	Nymphalidae	15	1.74	-	+	-
15	*Junonia*	*iphita*	Nymphalidae	19	2.2	+	+	+
16	*Euthalia*	*aconthea*	Nymphalidae	19	2.2	+	-	-
17	*Ariadne*	*merione*	Nymphalidae	14	1.62	+	+	+
18	*Ypthima*	*baldus*	Nymphalidae	17	1.97	+	-	+
19	*Ypthima*	*huebneri*	Nymphalidae	12	1.39	+	+	+
20	*Pantoporia*	*hordonia*	Nymphalidae	19	2.2	-	+	+
21	*Phalanta*	*phalantha*	Nymphalidae	18	2.09	-	+	+
22	*Neptis*	*hylas*	Nymphalidae	17	1.97	+	+	+
23	*Tnaecia*	*lepidea*	Nymphalidae	18	2.09	-	+	-
24	*Junonia*	*atlites*	Nymphalidae	19	2.2	+	+	+
25	*Junonia*	*lemonias*	Nymphalidae	18	2.09	+	+	+
26	*Cynthia*	*cardui*	Nymphalidae	17	1.97	+	-	-
27	*Junonia*	*alamana*	Nymphalidae	19	2.2	+	+	+
28	*Junonia*	*hierta*	Nymphalidae	18	2.09	+	-	-
29	*Papilio*	*polymnestor*	Papilionidae	17	1.97	+	+	+
30	*Papilio*	*crino*	Papilionidae	15	1.74	+	-	-
31	*Graphium*	*sarpedon*	Papilionidae	17	1.97	+	+	+
32	*Papilio*	*polytes*	Papilionidae	18	2.09	+	-	+
33	*Pachliopta*	*hector*	Papilionidae	17	1.97	+	+	+
34	*Graphium*	*homius*	Papilionidae	17	1.97	+	+	-
35	*Papilio*	*demoleous*	Papilionidae	15	1.74	-	+	+
36	*Battus*	*polydamas*	Papilionidae	19	2.2	+	+	+
37	*Papilio*	*nephelus*	Papilionidae	19	2.2	+	-	-
38	*Eurema*	*hecabe*	Pieridae	16	1.86	+	+	+
39	*Ixias*	*marianne*	Pieridae	20	2.32	-	+	+
40	*Eurema*	*blanda*	Pieridae	18	2.09	-	+	-
41	*Cepora*	*nerissa*	Pieridae	13	1.51	+	+	+
42	*Eurema*	*laeta*	Pieridae	22	2.55	+	-	-
43	*Leptosia*	*nina*	Pieridae	17	1.97	+	+	+
44	*Eurema*	*brigtta*	Pieridae	15	1.74	+	-	+
45	*Pareonia*	*valeria*	Pieridae	20	2.32	+	+	-
46	*Delias*	*eucharis*	Pieridae	16	1.86	-	+	+
47	*Catopsilis*	*pyranthe*	Pieridae	14	1.62	+	+	+
48	*Zizula*	*hylax*	Lycaenidae	12	1.39	-	+	+
49	*Rathinda*	*amor*	Lycaenidae	8	0.93	+	+	+
50	*Chilades*	*lajus*	Lycaenidae	4	0.46	+	-	+
51	*Jamides*	*celeno*	Lycaenidae	6	0.69	+	+	+

52	*Jamides*	*bochus*	Lycaenidae	3	0.34	+	–	+
53	*Prosotas*	*nora*	Lycaenidae	3	0.34	+	+	+
54	*Castalius*	*rosimon*	Lycaenidae	6	0.69	–	+	+
55	*Chilades*	*trochylus*	Lycaenidae	9	1.04	–	+	–
56	*Udaspes*	*folus*	Hesperidae	4	0.46	+	+	–
57	*Spialia*	*galba*	Hesperidae	3	0.34	+	–	–
58	*Parnara*	*naso*	Hesperidae	3	0.34	+	–	+
59	*Imbeix*	*salsala*	Hesperidae	3	0.34	+	+	+
60	*Borbo*	*cinnara*	Hesperidae	3	0.34	+	–	+
		Total Abundance		**860**				

Table No. 1.2: Diversity index of Butterfly speciesfor different study sites in study area of Ghot

Index	Abundance	Simpson (D)	Shannon (H)	Evenness(E)
Site I	394	0,014	2.225	1.187
Site II	358	0.025	3.672	2.310
Site III	315	0.010	2.184	1.403

Fig No. 1: Diversity index of Butterfly speciesin study area of Ghot



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