

BIODIVERSITY OF BUTTERFLY SPECIES OF ORDER (LEPIDOPTERA) AND IMPACT OF CLIMATE CHANGE ACROSS DIFFERENT RURAL AREA OF GHOT, NEAR CHAMORSHI DISTRICT-GADCHIROLI (M.S.) INDIA

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ABSTRACT

All of the environmental conditions played a significant role in determining the butterfly diversity and density. They serve as excellent markers of changes in the atmosphere, climate, and seasonal ecology. Being a cold-blooded invertebrate's butterflies are easily showing significant impact by climatic changes. Present investigation carried out for one year during October 2022 to September 2023 at rural area of Ghot, near Chamorshi District-Gadchiroli (M.S.). India. In present investigation, total 21 species were recorded and identified among these include in three families Nymphalidae belongs 14 species followed by Papilionidae with 05 species and least appearance of Pieridae with 02 species. Most of the butterfly species were very commonly called as Brush-footed butterflies followed by Papilionoidea commonly called as Swallowtails species and Pieridae commonly called as white and Yellows species. As per the literature its indicate that all butterflies 'species has its significant importance in balancing biodiversity, so in view of the study required future planning, climate impact and host plants conservation and also focus on the current status of biodiversity of butterflies in Ghot area near Chamorshi District-Gadchiroli (M.S.) India.

INTRODUCTION

All of the environmental conditions played a significant role in determining the butterfly diversity and density. Being a cold-blooded invertebrate's butterflies are easily showing significant impact by climatic changes. As per the literature its indicate that all butterflies' species has its significant importance in balancing biodiversity of ecosystem Butterflies are one of the excellent creatures on earth, all Butterflies belong to the order Lepidoptera which having the micro and macro scales that over all the wings. Butterfly's species are shows their abundance overall the world. In our India has more than 329 million hectares 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. Along with butterfly Moth be included into the same order Lepidoptera 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),Hesperiidae(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-blooded invertebrates' butterflies are easily impacted by climatic change which also have a significant impact on most other animals range (Kehimkar, 2008) Environmental parameters like temperature, humidity, light, rainfall have significant influence on the number of butterflies (Dennis 1993; Warren *et al.*, 2001). As Butterflies are most specific, habitat degradation has a higher impact on both butterfly diversity and abundance. Main aims the study to collect baseline information for evaluating changes in the variety of butterflies in rural ecosystem, to identified the diversity and abundance of butterfly species and impact of climate changes. Some researcher s work on butterflies' diversity, Singh (2004), Rai *et al.*, (2006), Sharma and Radhakrishnan (2006), Sharma (2008) and Tiple (2011).

Materials and Methods

Study Area

The state Maharashtra is situated at latitude 19.7515°N and 75.7139°E with a tropical monsoon environment with cold, hot and wet seasons as well as dry summers. The normal rainfall annually is 925 mm. Average annual temperature is 27.2°c-32°c.

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. For my present work selected three different sites densely populated plantation, moderate populated plantation and minimal populated plantation.

The study was conducted during October 2022 to September 2023 and data were collected on monthly basis over a 5 days field period from For selected village sites of Ghot area district Gadchiroli situated in Maharashtra state. All observations were conducted in daylight hours during favourable weather. In the current study, the study site was regularly accessed 5 days every month. Butterfly were photographed and identified by using butterfly of India website and standard literature. Sometimes an insect net was used and butterflies were released without harming them.

Data Collection

Investigation of butterfly was carried out during morning time by random observations of butterfly survey, the Pollard walk method was employed (Pollard 1977) was trailed to observe butterflies as they travelled along a predetermined path and record the species. Photographs of butterflies were obtained in the field for identification using a camera. Colour patterns, sizes, shapes and their designs were taken into consideration with the use of suitable literature that was available. Field guides were used to identify the butterflies (Gunathilagaraj *et al.*, 1998) (Kunte, 1997). (Kunte, 2000) which help in classification, identification and nomenclature of butterflies.

Result and Discussions

In present investigation, total 21 species were recorded and identified among these include in three families Nymphalidae with 14 species followed by Papilionidae with 05 species and least appearance of Pieridae with 02 species. Most of the butterfly species were very commonly called as Brush-footed butterflies followed by Papilionidae commonly called as Swallowtails species and Pieridae commonly called as white and Yellows species. In present investigation, uttermost butterfly species were counted from June to September months and October to January months. In very cold weather butterflies can't able to survive so their abundance gets reduced from January to onwards. Similarly reported,

Ecological factors like dispersal and physical traits like body and wing size can clash because of climate change and also rising ambient temperatures. Body size decreases due to changing climates have several effects, chief among them being decreased fertility and dispersal capacity. data on morphology derived from swallowtail butterflies, Weiss *et al.*, (1988). The variety and amount of butterflies are correlated with the plants blossoming phenology (Gutierrez and Menendez 1995); (Kunte, 2000; Watt *et al.*, 1974). Total 48 butterfly species from five families were reported by Tiple *et al.*, (2006), including 5 species that had never been seen in Amravati University campus. In and around Nagpur city, 86 different species of butterflies were found including family wise diversity was Papilionidae (12), Pieridae (15), Lycaenidae (23), Nymphalidae (39) and Hesperidae (11) (Kasambe and Wadatkar, 2008). Total 298 butterfly species were reported by Kunte *et al.*, (2012) in Garo Hills. Nimbalkar *et al.*, (2011) stated and identified total 122 species from Bhore Tahsil, Pune district, Maharashtra, which are belongs to 5 families and 76 genera, among these most common family was Nymphalidae followed by Lycaenidae, Pieridae, Hesperidae and Papilionidae. Gaikwad *et al.*, (2015) reported similar findings at Phaltan region of Satara district stated that the Lycaenidae was the most dominant family with 13 species, Nymphalidae with 7 species and 6 species from Hesperidae.

About 52 butterflies of family Nymphalidae were recorded by Pawar and Deshpande (2016) from Satara tahsil. Total 84 species belonging to 5 families and 54 genera was observed by Patil *et al.*, (2017) from Rawanwadi Reservoir, Bhandara. About 103 species of butterflies were recorded by Virani (2020). that belongs to 5 families. The result shows that Pandharkawada forest area of Maharashtra has a great environment for diversity of butterflies.

In present investigation, sampling sites were group into three categories i.e. very common 11 (52%), common 06 (29%), and rare 04 (19%). In this region the maximum temperature was 30-48°C while the minimum temperature ranges from 12-25°C. Relative humidity was 10-15% to 60-95%, annual precipitation was 1700 mm. Out of which 90% of the precipitation found in 4 months i.e. from June to September. The two main parameters influencing the distribution and assemblages of butterfly species are temperature and relative humidity. It is reported in present investigation, diversity and abundance of butterflies are maximum from monsoon to post monsoon and low from pre summer onwards, it was due to reduction in moisture and less availability of feeding plant species. Butterflies' species are highly affected by air pollution, the pollutants like Sulfur oxides (SO_x) and Nitrogen oxides (NO_x) causes acid rain and air pollution, acid rain is major cause of corrosion of body parts of butterflies, similar investigations made by, Tiple (2007) and Gupta *et al.*, (2019).

CONCLUSION

Study summaries that the findings during investigation, the Among families, Nymphalidae was the most prominent, followed by Papilionidae and Pieridae with the least number of species from the three families of butterfly. Impact of environmental factors like temperature, humidity, rainfall etc are correlated with species diversity and abundance. To maintain balance of ecosystem there is need of conservation as well as protection of rare butterfly species. Main aims of the study to collect baseline information for evaluating changes in the variety of butterflies in rural ecosystem, to identify the present status of butterfly species and impact of climate changes. The largest number of species found in the research area; the butterfly family was dominant in investigation sites.

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Fig .1: Location map of Ghot District Gadchiroli, Maharashtra Central India

Table 1.1: Inventory of butterfly species from Ghot area

Scientific Name	Common Name	Abundance
Family-Nymphalidae		
<i>Danus chrysippus</i>	Plain Tiger	VC
<i>Melanitis phedima</i>	Dark evening brown	C
<i>Junonia lemonias</i>	Lemon pancy	VC
<i>Euploea core</i>	Common crow	VC
<i>Parantica alga</i>	Glassy Tiger	C
<i>Parantica sita</i>	Chestnut Tiger	R
<i>Tirumala limniace</i>	Blue Tiger	VC
<i>Danus plexippus</i>	Milkweed butterfly	R
<i>Danus genutia</i>	Striped Tiger	VC
<i>Cirrochroa aoris</i>	Large Yeoman	C
<i>Hypolimnas bolina</i>	Great Eggfly	VC
<i>Kaniska canace</i>	Blue admiral	R
<i>Euthalia aconthea</i>	Common Baron	VC
<i>Junonia atlites</i>	Grey pancy	R
Family-Pieridae		
<i>Delias eucharis</i>	Common jezebel	VC
<i>Cepora nerissa</i>	Common gull	VC
Family-Papilionidae		
<i>Papilio demoleus</i>	Lime butterfly	VC
<i>Battus polydamas</i>	Goldrim swallowtail	C
<i>Papilio nephelus</i>	Yellow Helen	C
<i>Papilio polytes</i>	Common mormon	VC
<i>Papilio polymnestor</i>	Blue mormon	C

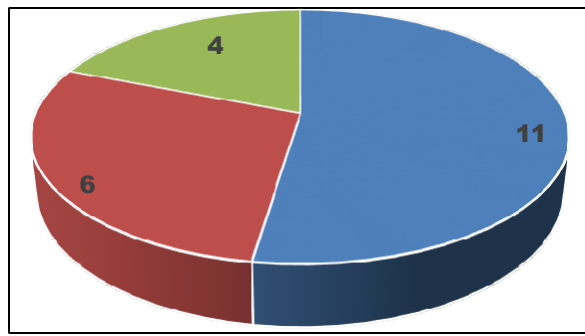
V-Very common, C-Common and R-Rare

Table1. 2: Diversity of Dominant butterflies Family

Family	Species
Nymphalidae: Brush-footed butterflies	14
Papilionidae: Swallowtails	5
Pieridae: White and Yellows	2

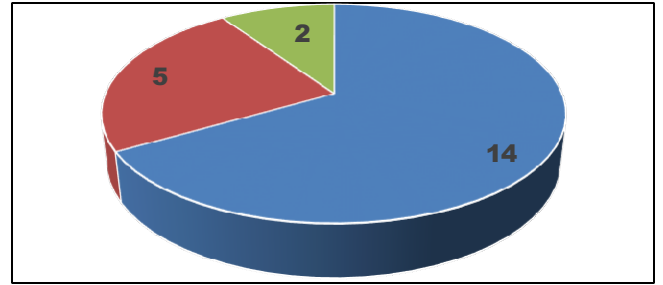
Table1. 3: Abundance of butterfly species diversity

Status	No. of species	% of species
Very Common	11	52%
Common	6	29%
Rare	4	19%



■ Very Common ■ Common ■ Rare

Fig 1: Abundance of butterfly species diversity



■ Nymphalidae: Brush-footed butterflies
 ■ Papilionidae: Swallowtails
 ■ Pieridae: White and Yellows

Fig. 2: Diversity of Dominant butterflies Family