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Biodiversity of butterfly species of order (Lepidoptera) and impact of climate change across different rural region of Ghot, near Chamorshi, Dist. Gadchiroli, (M.S), India

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Abstract

The Vidarbha region is home to a diverse range of butterfly species due to its varied habitat types, including forests, grasslands, wetlands, and agricultural areas. These habitats support different butterfly species with unique ecological requirements. The goal of the current study was to compile a list of all the butterfly species found in the Ghot region of district Gadchiroli, which is situated on the North-Eastern side of Maharashtra State. 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 39 species were recorded and identified among these include in three families Nymphalidae with 21 species followed by Papilionidae with 08 species and least appearance of Pierdae with 10 species. The maximum count of species belongs to family Nymphalidae (21) followed by Pieridae (10) and minimum count of species were noted in family Papilionidae (8). In present investigation to assessed physico-chemical parameters of air all the parameters within the permissible limits. Therefore, it is concluded that the study area is rich in butterfly diversity and further research could be conducted to obtain details and documentation on butterfly diversity for the conservation.

Key words : Ghot, Habitat, Butterfly, Environmental Parameters.

The Vidarbha region, located in the eastern part of the Indian state of Maharashtra, is known for its rich butterfly's biodiversity, some general information about butterflies in this area, The Vidarbha region is home to a diverse range of butterfly species due to its varied habitat types, including forests, grasslands, wetlands, and agricultural areas. These habitats

support different butterfly species with unique ecological requirements. Some of the commonly observed butterfly species in the Vidarbha region may include Common Indian species such as the Plain Tiger (*Danaus chrysippus*), Blue Tiger (*Tirumala limniace*), Common Lime Butterfly (*Papilio demoleu*s), and Common Crow (*Euploea c*ore). Regional species adapted to local habitats, such as the Vidarbha Duffer (Discophora lepida vidarbha), which is a subspecies of the Great Eggfly found in the region. To learn more about the specific butterfly species found in the Vidarbha region and their conservation status, I recommend consulting field guides, scientific literature, and local butterfly enthusiasts or organizations dedicated to butterfly conservation in Maharashtra.

Climate change has significant impacts on butterfly diversity affecting their distribution, abundance, phenology, behavior, emergence, mating, migration, and interactions with other species, some of the effects of climate change on butterfly diversity. Rising temperatures and changing precipitation patterns alter the suitable habitats for butterflies, leading to shifts in their geographical distribution and due to warming temperatures, resulting in changes in community composition and species interactions also disrupt the timing of key life cycle events for butterflies. Research workers have used butterfly's species as a model species to determine changes in climate as well as loss of habitat and destruction. There is a great need to protect butterfly species by scientific methods. Some researchers studied butterfly diversity and impact of climate changes viz., Kunte[10], Gunathilagaraj *et al.,*[4], Tiple *et al.,*[13], Wale and Abdella[18] and Kuchanwarr and Kamble[7].

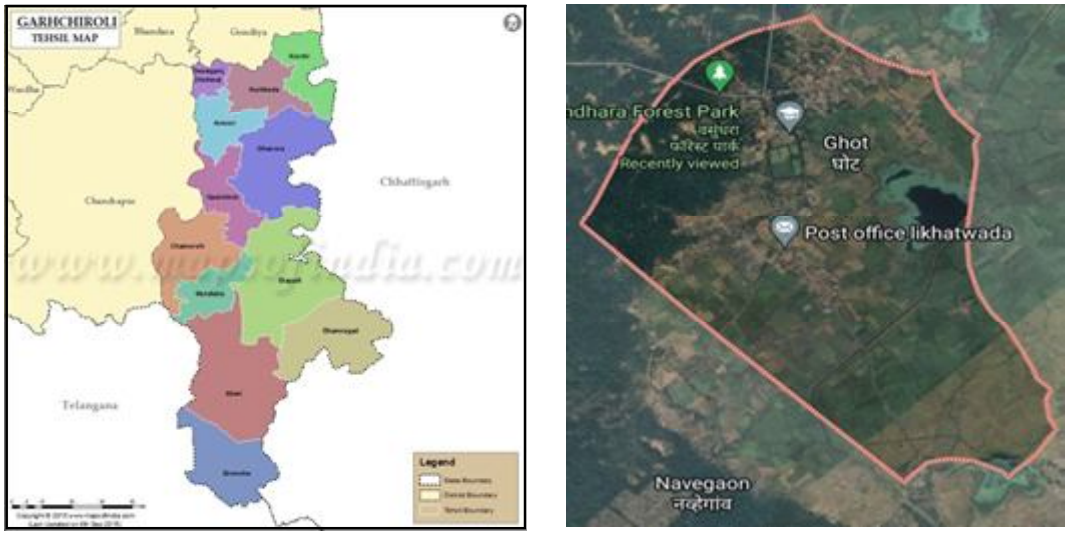

Fig. 1. Location map and Satellite view of Ghot District Gadchiroli, Maharashtra Central India

Table-1. Inventory of butterfly species from Ghot area

S.N	Scientific Name	Common Name	Abundance
Family-Nymphalidae			
1.	*Danus chrysippus*	Plain Tiger	VC
2.	*Melanitis phedima*	Dark evening brown	C
3.	*Junonia lemonias*	Lemon pancy	VC
4.	*Euploea core*	Common crow	VC
5.	*Tirumala septentrionis*	Dark blue tigar	C
6.	*Euploea klugii more*	Brown king crow	C
7.	*Mycalesis mineus*	Dark branded bushbrown	C
8.	*Mycalesis perseus*	Common bushbrown	C
9.	*Tanaecia lepidea*	Grey count	C
10.	*Parantic a algae*	Glassy Tiger	C
11.	*Parantica sita*	Chestnut Tiger	R
12.	*Ypthima huevneri kirby*	Common four ring	C
13.	*Ypthima baldus*	Common fivering	
14.	*Tirumala limniace*	Blue Tiger	VC
15.	*Danus plexippus*	Milkweed butterfly	R
16.	*Danus genutia*	Striped Tiger	VC
17.	*Cirrochroa aoris*	Large Yeoman	C
18.	*Hypolimnas bolina*	Great Eggfly	VC
19.	*Kaniska canace*	Blue admiral	R
20.	*Euthalia aconthea*	Common Baron	VC
21.	*Junonia atlites*	Grey pancy	R
Family-Pieridae			
22.	*Delias eucharis*	Common jezebel	*VC*
23.	*Eurema laeta*	Spotless grass yellow	*C*
24.	*Eurema brigitta*	Small grass yellow	*C*
25.	*Catopsilia pomona*	Lemon emigrant	*C*
26.	*Ixias marianne*	White orange tip	*C*
27.	*Cepora nerissa*	Common gull	*VC*
28.	*Catopsilia pyranthe*	Mottled emegrant	*C*
29.	*Anaphaeis aurota*	Pioneer	*C*
30.	*Deliashyparete*	Painted jezebel	*C*
31.	*Eurema hecabe*	Common grassyellow	*C*

Family-Papilionidae			
32.	*Papilio demoleus*	Lime butterfly	*VC*
33.	*Battus polydamas*	Goldrim swallowtail	*C*
34.	*Pachliopta aristolochiae*	Common Rose	*C*
35.	*Papilio nephelus*	Yellow Helen	*C*
36.	*Papilio crinofabricus*	Common banded peacock	*C*
37.	*Papilio polytes*	Common mormon	*VC*
38.	*Graphiun nomius*	Spots word tail	*C*
39.	*Papilio polymnestor*	Blue mormon	*C*

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

Table-2. Diversity of Dominant butterflies Family

Family	Species
Nymphalidae: Brush-footed butterflies	21
Papilionidae: Swallowtails	08
Pieridae: White and Yellows	10

Table-3. Abundance of butterfly species diversity

Status	No. of species	% of species
Very Common	11	28.20%
Common	24	61.53%
Rare	4	10.25%

Study Area :

The village Ghot falls in Gadchiroli District situated in Maharashtra State, with a Populations (2020 Cences) 4258. The village Ghot is surrounded by natural forest having varieties of plant diversity. It is located at 19.8127191 North latitude and 79.9819004 East longitude, MSL Ghot village is 200 meters. Village ghot has biodiversity park run by department of forest which covers verities of vegetation like *Ficus religiosa, Oroxylum indicum, Millettia pinnata, Ficus benghalensis, Azadirachta indica, Ocimum tenuiflorum, Mimosa pudica, Terminalia arjuna, Diospyros melanoxylon, Mangifera indica, Moringa oleifera, Polyalthia longifolia, Aegle marmelos etc.*

Field surveys on butterflies were carried out in the study area three times a week for a period of one year. Butterflies were accessed in the study area from 9.00 am to 11.00 am in the morning by random observations during walking through three selected sites based on habitats present in the study area. In the field, photographs of the butterflies were captured with advance DSLR camera (Canon 600d, Canon EF-S 55-250 IS-2 lens). for identification Physico-chemical Parameter like Atmospheric temperature, Humidity, Light, water vapours, Rainfall pattern and SOx , NOx and Methane was assessed by different methods. All above work done with the standard literature under reference of Singh[11], Sunil *et al.,*[12] and Kunte *et al.,*[12], Ghazanfar[3], Dey[2].

In the present investigation, total 39 species were recorded and identified among these include in three families Nymphalidae with 21 species followed by Papilionidae with 08 species and least appearance of Pierdae with 10 species. The maximum count of species belongs to family Nymphalidae (21) followed by Pieridae (10) and minimum count of species were noted in family Papilionidae (8). These 3 families contributed 39 genera. The highest number of genera were reported in the family Nymphalidae (22) with followed by Pieridae (10), and minimum number of genera (08) were reported in family Papilionidae. Percentage wise distribution was 11 (28.20%) were Very common, 24 (61.53%) were common, 4 (10.25 %) were rare.

Bubesh *et al.,*[1] studied on preliminary observation on butterflies of Seshachlam biosphere reserve, Eastern Ghats Andhra Pradesh, was identified butterfly species reported 91 species of butterflies belonging to family: Papilionidae, Pieridae, Nymphalidae, Lycaenidae and Hesperidae as well as 65 genera. Virani[17] recorded 103 species of butterflies belongs to 5 families with a great environment for diversity of butterflies at Pandharkawada forest area of Maharashtra.

In the present investigation, seasonal abundance and diversity of butterflies are maximum during monsoon to early winter and minimum from early Summer onwards because of reduction in moisture and less availability of host plant species. Kunte *et al.,*[9] worked on butterfly diversity in relation to their ecological status at Gosekhurd region of Godavari basin. Most of the species of butterfly were observed and identified during Monsoon months and winter months. Similarly identification made by, Kasambe and Wadatkar[6] reported 86 different species of butterflies were found including family wise diversity was Papilionidae (12), Pierdae(15), lycaenidae(23), Nymphalidae (39)and Hesperidae(11) in and around Nagpur city, Maharashtra.

In the present investigation to assessed physico-chemical parameters of air all the parameters within the permissible limits. Air pollution from Sox and NOx emissions can interact with other stressors, such as habitat loss, climate change, and pesticide exposure, further exacerbating the effects on butterfly diversity and populations. Similarly, fluctuation in Methane (CH_4), humidity, and temperature can all influence butterfly diversity and populations, either directly or indirectly, by affecting their habitats, life cycle, behavior, and physiological processes. Similar report made by, Tiple[14] stated that butterflies species are highly affected by air pollution. The pollutants like Sulfur oxides (SOx) and Nitrogen oxides (NOx) causes acid rain and air pollution. Acid rain is major cause of corrosion of body parts of butterflies.

According to Gupta *et al.,*[5] overall, methane emissions, humidity, and temperature are interconnected factors that contribute to climate change and influence butterfly diversity and populations through their effects on habitat suitability, phenology, behavior, and ecological interactions. Similarly reported, Weiss *et al.,*[19] climate change, and increasing ambient temperature can cause conflict between morphological traits like body and wing size, and ecological traits like dispersal. changing climates cause decreases in body size, a major

consequence is reduced dispersal capacity and fecundity. Recently, Kuchanwar and Kamble[7] high temperature is 30-48°c while the low temperature ranges from 12-25°C and humidity from 10-15% to 60-95%, annual precipitation is 1700 mm, out of which 90% of the precipitation found in 4 months *i.e.* from June to September Tadoba Andhari Tiger Reserve of Chandrapur district.

Study summaries that the Nymphalidae was the most dominant family, followed by Papilionidae and Pieridae with the least number of species from the three families of butterfly. The presence of butterflies in a study aera plays very significant role as a pollinator and biological indicators, their presence or absence can tell us about the health and stability of the ecosystem. In present investigation to assessed physico-chemical parameters of air all the parameters within the permissible limits. So their was no any effect on the abundance and diversity on butterflies species. 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 identified 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. Therefore, it is concluded that the study area is rich in butterfly diversity and further research could be conducted to obtain details and documentation on butterfly diversity for the conservation.

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