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Diversity of Butterfly in District Gurugram, Haryana, India

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Abstract

Butterflies act as crucial pollinators and indicators of environmental health. However, diversity of butterflies is declining due to various anthropogenic pressure. The present study investigates the diversity of butterfly in Chandrashekhar farm district Gurugram Haryana, India from January to June 2025. During the study total 172 butterflies representing 4 different families Lycaenidae, Nymphalidae, Pieridae, Papilionidae were reported. Among these 70 individuals (4 spp.) belonged to family Lycaenidae, 62 individuals (7 spp.) belonged to Nymphalidae, 23 individuals (6 spp.) belonged to family Pieridae and 17 individuals belonged (4 spp.) family Papilionidae. Maximum species diversity was observed in family Lycaenidae, whereas minimum was observed in family Pieridae. The findings highlight the ecological importance of maintaining green patches within urban landscapes, as these areas play a crucial role in supporting diverse butterfly populations.

Keywords: *Butterfly, Pollinator, diversity.*

INTRODUCTION

Butterflies belonged to order "Lepidoptera" means scaled wings. They play a pivotal role in ecosystems by acting as essential architects of nature and contributing significantly to the intricate balance of life. Their role as primary pollinators involves flitting from one flower to another, transferring pollen and ensuring the successful reproduction of various flowering plants. In addition to their crucial pollination services, Butterflies serve as a critical food source for a diverse range of creatures. Their diverse caterpillar forms provide a nutritional feast for birds, reptiles, and other insects. [3]. They also serve as an indicator of the environment. Butterflies respond to ecological disturbances such as change in temperature, rainfall, sun radiation and availability of the food sources. both adult butterflies and caterpillars are reliant on plants for leaf, nectar, and pollen as a source of food, therefore, their distribution is largely dependent on the presence of the host plants [8]

Various authors documented the diversity of butterflies reported Approximately, 18,768 species of butterflies globally and 1318 species in India and its subcontinent, out of which 89 species belonged to family Papilionidae, 277 species belong to Hesperiidae, 92 species belong to Pieridae, 19 species belong to Riodinidae, 380 species belong to Lycaenidae, and 461 species belong to Nymphalidae [12]. India being one of the 12 mega biodiversity countries of the world, harbours 1,800 species of butterflies including both endemic as well as globally threatened species [5]. However, Haryana being an agricultural state only scanty information is available and most of it is from protected areas like 35 species of butterflies under 24 genera and five families were recorded from Kalesar Wildlife Sanctuary [9]. The diversity of butterfly from urban and rural areas of Haryana still remains unexplored.

Despite of rich diversity and important role in the ecosystem. The study of diversity of butterflies in Gurugram is not of concerned. Therefore, the present study was conducted in the Gurugram district that will serve as a baseline data for further research.

Materials and Methods

Study area

The Present study was conducted in Chandrashekhar farm, situated in Village Bhondsi, Gurugram. Chandrashekhar farm is spread in 500-acre areas, and maintained like a forest.

This area was notable for its biodiversity, supporting various lepidoptera species crucial for plant reproduction and maintaining the local food chain. These areas showcased a diverse array of plants that serve as essential habitats for butterfly and moth.

Methodology:

The butterflies were accessed between February to June 2024 in the morning hours between 7 am to 11 AM by random walking on the study site. Photographs of each species were captured using an DSLR camera from various angles to ensure detailed observations and accurate identification. No specimens were collected for anatomical studies. Colour patterns of the wings, sizes and shapes as well as their designs were considered for the identification of the species of butterfly with the help of relevant available literature as well as photographs described by [11] and [6].

Statistical analysis

Recorded butterfly species were analysed by using Simpson diversity index followed by adopted by [11] and [1].

$$D = \frac{n(n-1)}{N}$$

Above formula uses for measuring the single species of butterfly and moth

$$D = 1 - \frac{\sum n(n-1)}{N(N-1)}$$

Results

During the present study total 172 butterflies belonging to 18 genera, 21 species and 4 families namely, Lycaenidae, Nymphalidae, Pieridae and Papilionidae were observed and identified (Table 1). Maximum species richness was observed in family Nymphalidae (7 Spp.) followed by Pieridae (6 spp.). Whereas, minimum species richness was reported in Family Lycaenidae and Papilionidae with (4 Spp.) each. (Fig. 1). In terms of no. of individuals sighted. Family Lycaenidae was reported to be the most abundant one with 70 individuals. Followed by Nymphalidae (62 individuals), Pieridae with 23 individuals and Papilionidae, with only 17 individuals. (Table 1)

In family Nymphalidae maximum no. of individuals was belonged to genus *Danaus* (30 individuals), whereas minimum was reported in the genus represented *Symphaedra* (1 individual). Genus*, Vanessa, Junonia, Ariadne and Euploea* was represented by 12, 11 and 4 individuals respectively.

In family Lycaenidae, the maximum no. of butterflies was reported in the genus *Leptotes* (35) and minimum was documented in the genus *Orachrysops* (2). Genus *Zizina* was represented by 25 butterflies *and Zizeeria* with 8 butterflies. The number of butterflies in the reported genus of family Pieridae includes *Pieris* (8), *Eurema* (6), *Catopsillia* (4), *Belenois* (2), *Phoebis* (2), *and Leptophobia* (1) (Table 1 and Fig 2). Each of these known for their unique morphological characteristics and ecological roles.

These butterflies exhibit a fascinating diversity in their choice of host plants, which include genera such as *Brassica, Phaseolus*, *Siamesa, Capparis, Madagascar, and Begger*. In the family Papilionidae 9 individuals were reported under genus *Papilio* and 8 in genus *Graphium* (Table 1 and Fig 2). These butterflies were notable for their intricate wing patterns and diverse ecological role. Each species within Papilionidae is associated with specific host plants essential for their life cycles. These include *Murraya, Polyalthia, Citrus,* and *Benguet*, highlighting their specialized feeding preferences and ecological dependencies.

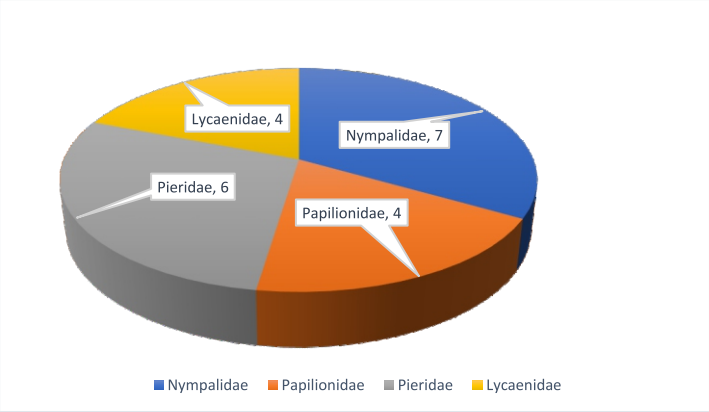

Fig. 1. Species Richness across different family of Butterfly

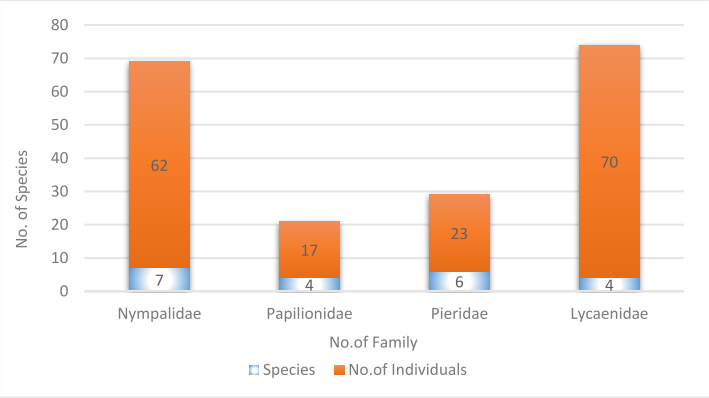

Fig. 2. Showing No. of individuals and Species per family

Table 1: Diversity of Butterflies recorded in Chandrashekhar farm Gurugram, Haryana (India) along with family position, host plant name and Simpson diversity index

S. No.	family	Scientific Name	Common Name	No. of Individuals	Simpson diversity index
1	Nympalidae	*Danaus chrysippus*	Plain tiger	30	0.19
		Vanessa cynthia	Painted lady	12	1.3
		Junonia orithya	Blue pancy	10	1.91
		Ariadne merione	Common castor	4	14.3
		Junonia coenia	Common buckeye	1	0
		Symphaedra nais	Baronet	1	0
		Euploea core	Common crow	4	14.3
2	Papilionidae	*Papilio polytes*	Common Mormon	2	0.01
		Graphium doson	Common Jay	8	3.07
		Papilio demoleus	Lime swallowtail	6	5.73
		Papilio chikae	Luzon peacock Swallow tail	1	0
3	Pieridae	*Pieris rapae*	Cabbage white	8	3.07
		Eurema hecabe	Common grass yellow	6	5.73
		Catopsilia pomona	Common Emigrant	4	14.3
		Belenois aurota	Pioneer White	2	0.01
		Phoebis agraithe	Large orange Sulphur	2	0.01
		Leptophobia aripa	Mountain white	1	0
4	Lycaenidae	*Orachrysops niobe*	Brenton Blue	2	0.01
		Leptotes plinius	Zebra blue	35	0.14
		Zizeeria karsandra	Dark grass blue	8	3.07
		Zizina labradus	Clover blue	25	0.286

Common Name: Lime Swallowtail
Scientific Name: Papilio demoleus

Common Name: Common Grass Yellow
Scientific Name: Eurema hecabe

Common Name: Common Emigrant
Scientific Name: Catopsillia pomona

Common Name: Large Orange Sulphur
Scientific Name: Phoebis agraithe

Common Name: Plain Tiger
Scientific Name: Danaus chrysippus

Common Name: Painted Lady
Scientific Name: Vanessa cardui

Common Name: Blue Pansy
Scientific Name: Junonia orithya

Common Name: Common Castor
Scientific Name: Ariadne merione

Common Name: Common Buckeye
Scientific Name: Junonia coenia

Common Name: Pioneer White
Scientific Name: Belenois aurota

Common Name: Baronet
Scientific Name: Symphaedra nais

Common Name: Common Castor
Scientific Name: Ariadne merione tapestrina

Common Name: Common Mormon
Scientific Name: Papilio polytes

Common Name: Common Jay
Scientific Name: Graphium doson

Common Name: Luzon Peacock Swallowtail
Scientific Name: Papilio chikae

Common Name: Cabbage White
Scientific Name: Pieris rapae

Common Name: Mountain Blue
Scientific Name: Leptophobia aripa

Common Name: Brenton Blue
Scientific Name: Orachrysops niobe

Common Name: Zebra Blue
Scientific Name: Leptotes plinius

Common Name: Dark Grass Blue
Scientific Name: Zizeeria karsandra

Common Name: Clover Blue
Scientific Name: Zizina labradus

Discussion

Butterfly plays important role in ecosystem to maintain a plant reproduction. Butterfly diversity depends upon various climatic parameters such as precipitation, humidity, light intensity, and temperature, and natural enemies. The present study documented 172 individuals of 21 species belonging to 4 families such as Nymphalidae, Pieridae, Lycaenidae, Papillonidae. According to the study [7] Nymphalidae is the most dominant family of butterflies in India. In the present study Nymphalidae was emerge out be the most diverse family with 7 species followed by Pieridae with 6 species Lycaenidae and Papillonidae 4 species each. This could be due to their polygamous behaviour that helps them to survive in different types of habitats, availability of a number of host plants and vegetation, herbs, shrubs, and trees, flower for nectaring & egg laying [10]. The results of the present study were consistent with the study of [4] that reported Nymphalidae is the most diverse family of butterflies. Work of [2] is also supported the results of the present study with Nymphalidae and Lycaenidae families were the highest number of the species of butterfly in the study area. According to the number of butterfly sighted Lycaenidae was observed to be the leading family with 70 indiviudals followed by Nymphalidae with 62 indiviudals, Pieridae (23) and Papillonidae with (17) individuals. The study of [4] was aligns with results of the present study.

CONCLUSION

The current research on the butterfly and moth fauna of Chandrashekhar Farm provides valuable data for future diversity studies and temporal patterns within the Lepidoptera community. Our findings indicate that Chandrashekhar Farm exhibits a lower diversity of butterfly species as compared to moths. We documented 21 butterfly species and 40 moth species. Due to Gurugram's industrial activities, certain tree species are less prevalent in this area, which affects butterfly diversity.

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